Original instructions

High-level order picker

EK-X10 2101 24 V
EK-X 2131 24 V
EK-X 2133 48 V
EK-X 2137 24 V
EK-X 2138 48 V
PXV 2142 24 V
PXV 2144 48 V
PXV 2146 24 V
PXV 2147 48 V



CE

2101 2131 2133 2137 2138 2142
2144 2146 2147

first in intralogistics

5213 804 2501 EN - 12/2023 - 05

1 Foreword

General 2
Safety instructions 3
Declaration reflecting the declaration of conformity 4
Nameplate 5
Rules for the operating company of industrial trucks 5
Operator, Form of address 6
Dimensions of the operator's compartment 7
Product documentation 7
Accessories accompanying the product 8
Standard design and options - Special version - Special equipment 8
Copyright and proprietary rights 8
Storage and transfer 9

2 Safety

Working safely 12
Climbing into or out of the truck 13
Vibrations 13
Medical equipment, implants 14
Special safety information about load pick up 15
Safe handling of consumables 16
Safe handling of the battery cable 17
Risk assessment 18
Residual risks 18
Residual risks with the driver's cab raised 18
Residual risks when using order pickers 19
Intended use 20
Regular testing 21
Area of application 21
Floor structure, cleaning 21
Narrow-aisle trucks 22
Original parts 22

Directives and guidelines 22
Driver's licence 22
Alterations to industrial trucks 23
Personal protective equipment 23
Conversion, retrofitting, rebuilding 23

3 Overview

Components of the industrial truck 26
Standard design of labelling 27
Labelling for special equipment 29
Truck description 30
Safety equipment 30
Operating panel, variants 32
Operating panel - Standard display - LCD display 33
Standard display 34
Displays 35
LCD display 36
Displays, information 37
Operating panel - LCD display with keypad 39
LCD display with keypad 40
LCD display with keypad 41
LCD display - Programming - Menu structure 41
Operating instructions 49
View into the control compartment 50

4 Operation

General commissioning 54
Initial commissioning 54
Transporting and loading 54
Weights of the units 56
Support screws 58
Safe handling of the traction battery 58
Traction battery 59

Charging socketLithium-ion battery . . . 62
Battery replacement . . . 63

Daily commissioning . . . 66
Checklist before starting work . . . 66

Driver's compartment . . . 68
Climbing into or out of the truck . . . 68
Barriers . . . 69

Operating devices . . . 70
Brake system . . . 70
Steering system . . . 71
Switching on the controller . . . 73

Driving . . . 75
Types of guidance . . . 75
Driving without automatic guidance . . . 78
Driving with guidance . . . 81

Load pick up . . . 84
Picking up and setting down loads . . . 84
Load capacity diagram . . . 85
Support screws . . . 86
Picking up a load . . . 86
Packages out of reach . . . 86
Lifting accessories . . . 87
Load pick up without guidance . . . 88
Load pick up with guidance . . . 89

Emergency operation . . . 91
Emergency operation . . . 91
Emergency lowering valve . . . 95
Emergency abseil system . . . 98

Parking, decommissioning . . . 102
Parking and leaving the industrial truck . . . 102
Decommissioning . . . 102

5 Regular care and maintenance

Securing the load carrier . . . 104

Removing the hood . . . 104

General information about fuses . . . 105

Fuses . . . 105

Regular care and maintenance . . . 107

Special versions, special equipment 109
Maintenance schedule, 1000 hours 110
2000-hour maintenance schedule 115
Lubricants 115
Battery maintenance 118

6 Technical data

Technical data 120
Eco-design requirements for electric motors and variable speed drives 120

7 Options

Additional documentation 122
Options, enabling - Options, retrofitting 122
Inductive guidance IZF 123
Inductive guidance IZF - LCD display with keypad 126
Inductive guidance IZFOperating panel variants 127
Intermediate lift cut-out 127
Traction cut-out 127
Aisle entry assistant 128
Electronic access control 128
Automatic braking systems 130
Personal protection system STILL PSA 134
Personal protection system (MPSE) 135
Safety laser scanner 136
Personal protection system, preparation 136
Other battery male connectors 137
Battery on a roller channel 138
Tilt barrier 143
Leaning cushion 144
Radio installation 144
Overhead guard switch 145
Driver's compartment options 146

Mounting system for auxiliary components 147
Protective roof cover 148
Mirror and lighting module 148
Operating panel, load side 149
Video system for monitoring the travel path 150
MMS interface 151
USB charging station 152
Acoustic warning signal 152
Acoustic alarm 152
Rescue Alarm 152
Special equipment for cold store application 154
Lifting accessories 155
Modified load pick up 156
Two-person cab 157
Pedestrian mode 161
Fall protection device 162
Working platforms 163
Antistatic version 164
Safety Light safety headlight 164

1

Foreword

General

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

The aim of these instructions is to inform you of how to safely handle your industrial truck and keep it operational. It is therefore essential that the operating company, operating personnel and maintenance personnel familiarise themselves with, understand and adhere to the contents of these instructions prior to commissioning.

The operational readiness, performance and service life of the truck are dependent on:

- The truck being used in accordance with its intended use
- A daily inspection by the operator and
- Regular, appropriate maintenance work

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.

Declaration reflecting the declaration of conformity

Declaration

Declaration

STILL GmbH
Berzeliusstraße 10
22113 Hamburg Germany

We declare that the specified machine conforms to the most recent valid version of the directives specified below:

Industrial truck type:	**corresponding to these operating instructions**
Model:	**corresponding to these operating instructions**

– Machinery Directive 2006/42/EC [1)]
– Supply of Machinery Safety Regulations 2008, 2008 No. 1597[2)]

Personnel authorised to compile the technical documents:

See declaration of conformity

STILL GmbH

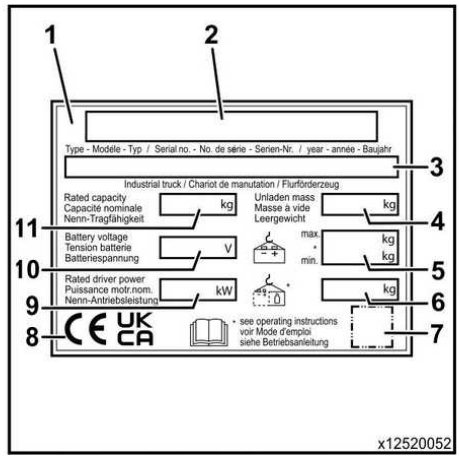
1) For the markets of the European Union, the EU candidate countries, the EFTA States and Switzerland
2) For the United Kingdom market

The declaration of conformity document is supplied with the industrial truck. The declaration shown explains the conformity with the provisions of the EC Machinery Directive and the Supply of Machinery Safety Regulation 2008, 2008 No. 1597.

An unauthorised structural change or addition to the industrial truck can compromise safety, thus invalidating the declaration of conformity.

The declaration of conformity must be carefully stored and made available to the responsible authorities if necessary. It must also be handed over to the new owner if the industrial truck is sold on.

Nameplate



1 Nameplate
2 Manufacturer
3 Model/serial number/year of manufacture
4 Tare weight
5 Max. battery weight/min. battery weight
6 Ballast weight
7 Placeholder for "data matrix code"
8 Conformity marking: CE mark for the markets of the EU, the EU candidate countries, the EFTA States and Switzerland; UKCA mark for the United Kingdom market; EAC mark for the Eurasian Economic Union market
9 Rated drive power
10 Battery voltage
11 Rated capacity

NOTE

- *It is possible for there to be multiple conformity markings on the nameplate.*
- *The EAC mark may also be located in the immediate vicinity of the nameplate.*

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 ▷

The information can be accessed at any time by pasting the address **https://m.still.de/vdma** in a web browser or by scanning the QR code.

Operator, 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.

Dimensions of the operator's compartment

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. EN ISO 3411 specifies 114.1 kg for the maximum body weight for a large operator.

⚠ CAUTION

Reduction in the load capacity. Negative effect on stability.

If the actual body weight of the operator exceeds 114.1 kg, the maximum load weight must be reduced by the difference compared with the information on the load capacity diagram.

Example

The actual body weight of the operator is 160 kg. In this case, the maximum load weight must be reduced by approx. 46 kg compared with the information on the load capacity diagram.

If these industrial trucks are operated by persons who do not meet the criteria specified in EN ISO 3411, the following effects must be expected:

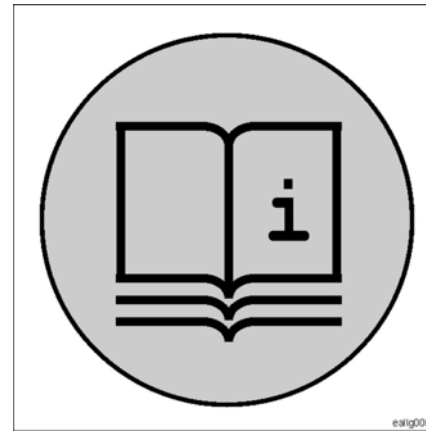
- The ergonomic conditions may be less favourable
- It may not possible for the operator to reach the pedals and foot switches
- The useable height below the overhead guard may be too low
- The adjustment ranges for the steering-wheel and operating panel adjuster may no longer be sufficient
- The adjustment ranges for adjustable drivers' seats 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.

Product documentation

This includes:

- Spare parts list
- Operating instructions and maintenance instructions
- 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



Accessories accompanying the product

Each truck is supplied with a box of accessories upon delivery from the factory.

The contents differ depending on the truck type and the order.

This includes, among other items, an adhesive label that shows how to disable the magnetic brake on the traction motor using mechanical means. This adhesive label can be affixed in a suitable position in the control compartment near the magnetic brake.

This box also contains the documentation to accompany the product, and the screws and wrench that are required to disable the magnetic brake.

Depending on the type, additional lubricating nipples may be included for maintenance.

Standard design and options - Special version - Special equipment

These instructions describe the

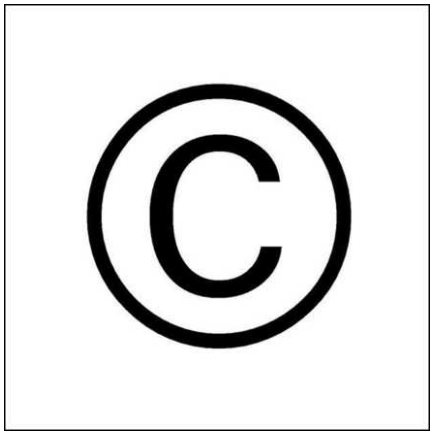
- intended use
- the intended area of use and its limits
- regular maintenance
- and prescribed maintenance

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

Special versions and special equipment

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

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.

Storage and transfer

- These operating and maintenance instructions must be stored so that the operator has access to them at all times.
- Documentation can be reordered. Specify the material number, version and order number.
- When the product is sold on, all documentation must be handed over too.

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 in this regard, 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.
- Fundamentally, it is the duty of the driver to adapt the 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.
- When leaving the industrial truck, the operator must secure the industrial truck against unauthorised use. This is done by removing and taking the switch key or by clearing the access information, e.g. in the case of electronic access control.
- Observe the instructions in the section "Climbing into or out of the 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.
- The operator is responsible for the selection, provision and instruction on occupational health and safety measures and personal protective equipment. Responsibility for use of the equipment lies with the operator.

Safe machine

- Essentially, all safety information located on the industrial truck must be observed.
- Replace any missing or illegible safety information.
- Replace any missing or illegible parts of the signage.
- Drive batteries with different technologies are used in industrial trucks. Observe the safety information provided by the respective manufacturer.
- Only use chargers approved for the respective battery type.
- In addition, observe the safety information outlined in this brochure.

Operational safety takes priority over working speed!

Climbing into or out of the truck

⚠ DANGER

Risk of accident. In principle, the following applies to all industrial trucks: If the operator jumps off the industrial truck even though the industrial truck has not yet come to a standstill, there is a risk that the operator will be crushed or run over.

Never climb onto or jump onto the moving industrial truck. Never climb off or jump off the moving industrial truck.

Additional hazards for industrial trucks with a raisable driver's compartment (man-up)

⚠ WARNING

Risk of crushing

If the barrier is touched at any point other than the points indicated while it is being opened or closed, there is a risk that hands may be crushed.

⚠ WARNING

Risk of falling

- When climbing in and out, it is important to note the difference in height between the driver's platform and the ground.
- Before opening the barrier, check that the driver's cab is completely lowered.
- Turn to face the driver's cab when climbing into and out of the cab.
- Only hold onto fixed parts of the cab.

The movable barriers are not suitable for use as a handhold and may snap shut when subjected to a load. This can lead to crushing or blunt-force trauma.

Additional hazards for industrial trucks without a raisable driver's compartment (man-down)

⚠ WARNING

Risk of injury and damage to property

- Use the steps intended for this purpose when climbing into or out of the truck and hold on to fixed parts of the chassis or the optional handholds.
- Apply the parking brake before climbing out.
- Never jump off.
- The steering wheel is not designed as a handhold or climbing aid and is mechanically overloaded when subjected to lateral forces. This can cause the steering function to fail.

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.	< 1.2 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.

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.

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 consumables ▷



The following consumables are used in this truck:

- Gearbox oil
- Hydraulic oil
- Battery acid

Comprehensive safety regulations apply when handling these materials. The most important points are:

For gearbox oil and hydraulic oil

⚠ DANGER

Danger to life or risk of injury caused by the escape of pressurised hydraulic fluid

If pressurised hydraulic fluid escapes, e.g. from a damaged line or as a result of leakages from a component, it can easily penetrate the skin. This can cause poisoning of the surrounding tissue which can lead to the loss of the affected body part or even cause death. Even if such injuries are not especially painful or considered to be serious, please consult a doctor at once. The cause of injury must be described in detail and treatment must be started immediately.

ENVIRONMENT NOTE

- Oils are water pollutants, so please therefore always collect and transport oils in suitable containers.
- Do not spill oils. Collect any spilled oil with suitable materials.
- Dispose of any waste containing oil in accordance with regulations.
- Dispose of oils in accordance with regulations.

Personal protection

- Avoid contact with the skin and take particular care to prevent escaping pressurised oil (hose breakage, leakages) from coming into contact with your skin.
- Do not inhale oil mist.
- If contact with oils cannot be avoided, wear personal protective equipment such as protective gloves, industrial goggles, etc.

For battery acid

⚠ DANGER

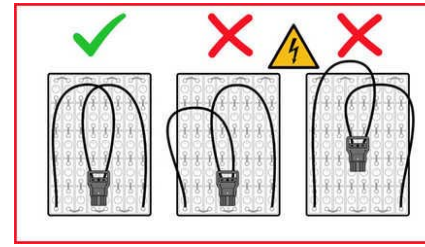
Risk of explosion

– An explosive gas mixture can form when charging batteries. This can remain in the atmosphere for a lengthy period of time even after the charging process has finished. Therefore, ventilate the charging areas thoroughly.

– Smoking, fire and open flames are forbidden in an area of 2 m around the charged batteries.

- Battery acid is poisonous so do not inhale the vapours.
- Battery acid is corrosive so take care to avoid skin contact at all costs.
- 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 this, 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.

Safe handling of the battery cable ▷



⚠ WARNING

Risk of short circuit or fire due to crimped or pinched battery cables.

The battery cables need to be a certain length for user-friendly handling. During operation, the battery cables must be placed on the battery completely within the contour of the battery tray in such a way that no slippage will be caused by the movements of the industrial truck.

Cables that are not placed on the battery completely within the contour of the battery tray can be caught, crushed or even torn off by moving parts of the industrial truck. This can cause short circuits that can destroy the control system or even set the industrial truck on fire.

Risk assessment

Within the scope of validity of the CE guidelines, the operating company must create **operating procedures** 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 industrial 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 observe all safety information without fail.

Residual risks with the driver's cab raised

⚠ DANGER

Risk of fatal injury from falling

Even in the case of **industrial trucks** that are delivered **without barriers** (maximum possible lift height of the driver's platform <1200 mm), there is a risk of fatal injury from falling when the driver's compartment is raised.

Remedy:

– Ensure that you have secure footing.
– Hold on with both hands.
– Drive carefully.

Industrial trucks with a higher lift (driver's platform >1.2 m) are delivered **with barriers**. While the lift is below 1.2 m, there is the same potential danger as for industrial trucks without barriers.

If one of the barriers is opened when the driver's compartment is raised above 1.2 m, there is a risk of fatal injury from falling.

– If the lift is raised higher than 1.2 m, the barriers must be closed.
– Do not open any barriers when the driver's cab is raised.
– Do not leave the driver's compartment when the driver's compartment is in the raised position.

The rail height of the barriers and the safety enclosure is intended to prevent the driver falling out of the driver's cab. If the effective rail height is lowered by climbing on cab parts (e.g. barrier, safety enclosure around the driver's compartment, driver's seat, operating panel etc.) or by using climbing aids (e.g. ladder, step, stool etc.), there is a risk of fatal injury from falling.

– Do not use climbing aids.
– It is forbidden to step over or climb over the safety enclosure or the barrier.
– It is forbidden to climb onto structures outside the industrial truck from the driver's compartment, e.g. into the racking or onto other industrial trucks.

Residual risks when using order pickers

⚠ DANGER

Risk of accident

- During driving, the operator must make sure that all body parts are located within the truck contour at all times, particularly in trucks without barriers and a cab rail.
- Order picking, i.e. reaching outside the truck contour, is only permitted when the truck is stationary.
- When driving past static building and racking parts, make sure that you maintain a sufficient distance and adjust your driving speed.
- In the event of oncoming traffic, always keep a sufficient distance between yourself and the approaching truck and adjust your driving speed.
- The operator must always be securely positioned and have a secure footing on the platform, especially when cornering.

Description of the situations

Depending on their design or the way in which the commissioner trucks described here are used, there may be a risk of severe injury to the operator from static building or racking parts.

The risk exists in trucks:

- Without barriers and a cab rail
- Without rail guidance
- With feed-in rollers on one or both sides
- With a one-sided guide

In versions specified, the above-mentioned risks may occur because second hand operation is not required for the truck type and the modes of operation. In addition, trucks without barriers or a cab rail may be driven with the driver's compartment in the raised position (floor of driver's cab <1.2 m). In trucks with barriers and a cab rail, the barriers may be left open when driving with the driver's compartment in the raised position (floor of driver's cab <1.2 m). If the driver's compartment needs to be raised higher than 1.2 m, the barriers must be closed.

Intended use

These industrial trucks are intended for use in order picking applications, i.e. for collecting parts that are stored in racking systems, for example. This industrial truck is therefore designated as a vertical order picker. The forks must be equipped with suitable load-carrying equipment in order to set down the parts picked for the order. This process is described in the section entitled **Picking up and setting down loads**.

The industrial truck is not suitable for stacking and unstacking unit loads in storage systems.

⚠ DANGER

Risk of serious injury or death

When driving underneath solid structures (e.g. rack bridge pieces, transfer stations or crossbars), there is a risk that the operator may be crushed between the racking and the operating panel and be fatally injured. This risk must be countered by taking measures on site, such as using approach rails for the load wheel arms.

It is the responsibility of the operating company to identify and eliminate any danger areas and/or to prohibit any reasonably foreseeable misuse by issuing operating instructions.

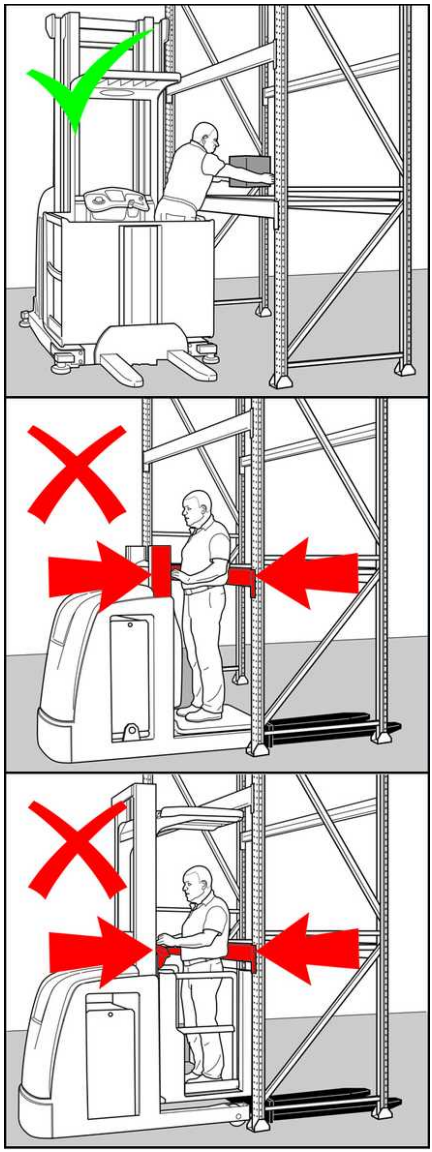
The industrial truck is also suitable for raising, lowering and transporting unit loads.

It is prohibited to use the truck for other purposes.

The auxiliary lift can be moved to a height that is ideal for setting down and collecting items for order picking.

Observe the information in the "Safety" section.

The maximum load to be lifted is specified on the nameplate and load capacity diagram, and must not be exceeded.



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.

Area of application

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 load, therefore utilised capacity up to 50%. Half nominal load per shift or full nominal load for half a 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 of the area of application

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

- in areas at risk of fire
- in potentially explosive atmospheres
- in areas where corrosion is a risk
- in areas with high levels 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.

Floor structure, cleaning

The floor surface must be designed in such a way that the braking requirements according to DIN ISO 6292 are met.

As such, the floor surface must not be:

- slippery,
- wet,
- oiled or
- otherwise contaminated,

as this reduces the braking performance of the industrial truck.

Objects lying around must be removed.

It is the responsibility of the operator to assess the floor structure and any contamination present. Then they must select the most suitable cleaning technique.

Improper cleaning, e.g. using regreasing cleaning materials, can have a negative effect on the floor properties, especially the friction values. In order to ensure occupational safety, we recommend that a specialist company is commissioned to clean the area of application.

Narrow-aisle trucks

Narrow-aisle trucks may only be operated in very narrow aisles as intended with appropriate protective measures in place (e.g. according to EN 2006/42/EC and EN ISO 13849 mobile or stationary protective systems) that prevent collisions between persons and trucks or prevent persons or other trucks being present in the narrow aisle in question at the same time.

In Europe, compliance with EC directives and regulations is the responsibility of the operating company. The operating company must demonstrate that sufficient protection is provided by means of a risk assessment. Based on our experience, we are able to support the operating company in this task.

Original parts

Our original parts and accessories are designed especially for your industrial truck. We specifically draw your attention to the fact that parts and accessories supplied by other companies have not been tested and approved by us. Installation and/or use of such products may therefore have a negative impact on the design features of your truck and thus impair active and/or passive driving safety. The manufacturer accepts no liability for any damage caused by the use of non-original parts and non-original accessories.

Directives and guidelines

In most countries, the national directives and guidelines for proper operation of these trucks according to their intended purpose must be observed. We therefore ask you to contact the relevant authorities or speak to the authorised representatives for more information. As the operating company, you are responsible for ensuring that this requirement is fulfilled.

Driver's licence

In most countries, a driving 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.

Conversion, retrofitting, rebuilding

Conversion, retrofitting

If these industrial trucks are to be used for tasks not listed in these operating instructions or in the guidelines for the intended use of industrial trucks issued by the VDMA (German Engineering Federation) and therefore need to be converted and retrofitted, please note that any structural modification may impair the performance and stability of the industrial trucks and can result in accidents. It is therefore not permitted to make such changes without the manufacturer's approval.

– Note the information in the section entitled "Alterations to industrial trucks".

Attachments, conversions

Attachments and conversions, including welding parts or making openings, can weaken the supporting elements and are therefore only permissible after approval from the manufacturer's construction department. Functional changes caused by modifying the electrical system or software also require approval.

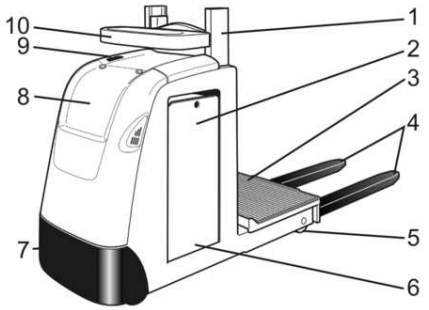
We therefore recommend that you contact your branch or specialist representative.

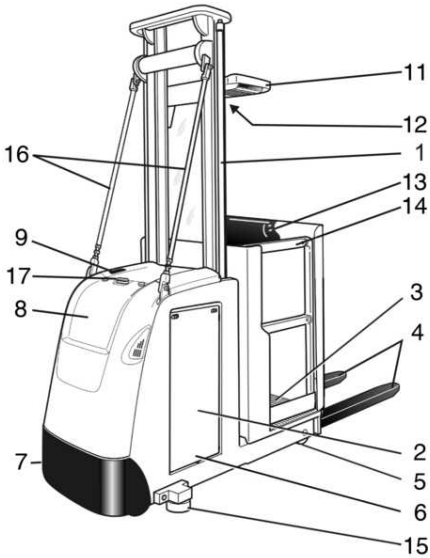
– Note the information in the section entitled "Alterations to industrial trucks".

3

Overview

Components of the industrial truck ▷





(1) Lift mast

(2) Battery compartment

(3) Driver's compartment

(4) Fork arms

(5) Load castors

(6) Battery compartment door*, followed by the battery and the battery lock

(7) Removable collision protection

(8) Removable hood to the control compartment

(9) Removable hood to the battery compartment

(10) Removable shelf*

(11) Overhead guard

(12) Abseil system (depending on the model)

(13) Load-side operating panel*

(14) Barrier

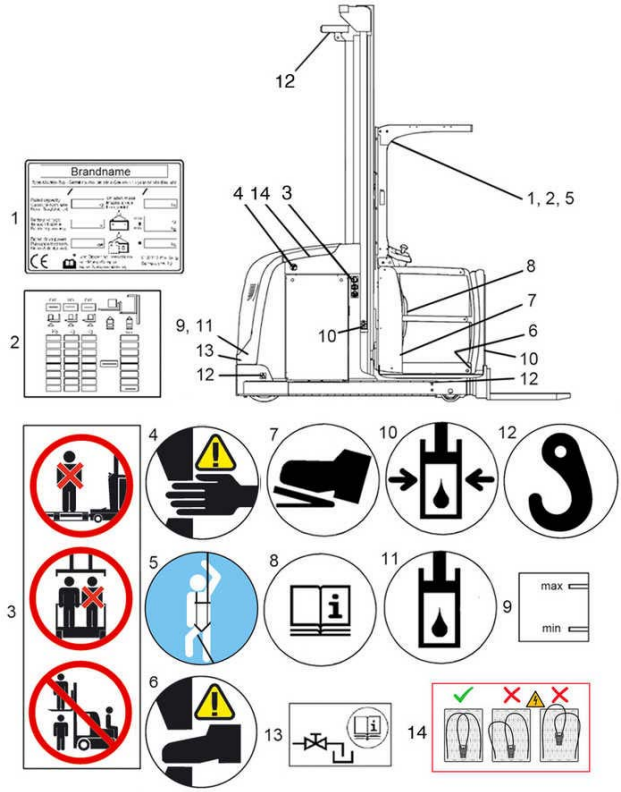
(15) Guide roller*

(16) Mast bracing*

(17) Direction indicator

* Option

Standard design of labelling



1	Nameplate
2	Load capacity diagram
3	a. Do not transport people on the load or on the load support. b. Driver's compartment only approved for use by a single person. 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	Risk of crushing hands
5	Storage space for the abseil system
6	Risk of crushing feet
7	Foot switch
8	Storage space for product documentation
9	Min./max.
10	Container is under hydraulic pressure, hydraulic cylinder
11	Hydraulic oil tank
12	Lifting point for crane loading
13	Emergency lowering valve
14	Before starting work, make sure that the battery cable is securely stored.

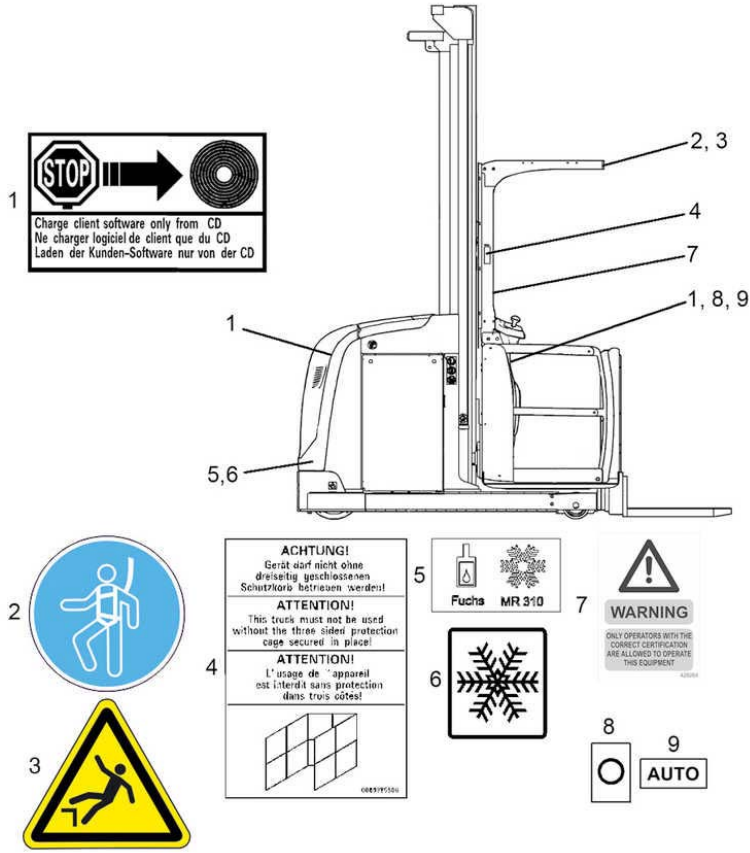
A number of information signs are fitted on every truck depending on the series to draw attention to hazards, technical data or requirements.

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

NOTE

Additional, order-dependent information signs are explained in the section ***Labelling for special equipment****.*

Labelling for special equipment



1	Truck with customised software. Only the customer's special version and not the standard software may be installed in the truck control unit.	5	Lubricants suitable for cold store applications must be used (see lubricants for cold store trucks).
2	Storage space for the fall protection device	6	Industrial truck with cold store equipment
3	Note on risk of falling	7	This industrial truck must only be operated by operators with the appropriate training.
4	The industrial truck must not be operated if a safety barrier closed on three sides is not present	8	Switch in "switched off" position
		9	Switch in "automatic mode" position

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

Truck description

You can find information about how to operate the individual functions in the corresponding chapters.

General information

The driver can put himself and the load suspension device into the most suitable working height by raising the driver's cabin.

The additional lift can be used to serve the highest rack level and to set a favourable deposit height when carrying out order picking work. The lift must always remain in the lowest position possible when travelling.

In the narrow aisle the order pickers are guided either mechanically or inductively (please see chapter Optional equipment).

If the aisles are wide enough, the industrial trucks can be driven freely with the load lowered. All movements (driving, lifting/lowering main lift [cab lift], lifting/lowering auxiliary lift) are infinitely adjustable.

Operating errors can be prevented to a large extent by means of safety circuits. Up to a cab lift height of 1.2 m, the cab barriers may be left open when the truck is being driven. If the truck is driven at a lift height of greater than 1.2 m, the barriers must be closed.

NOTE

*On the version with a simplex mast and auxiliary lift, the changeover point for all of the affected functions is not at 1.2 m, but instead at approximately 0.4 m. If this height is reached, the **Barrier** symbol appears in the display if the truck is equipped with an LCD display.*

* Option

Safety equipment

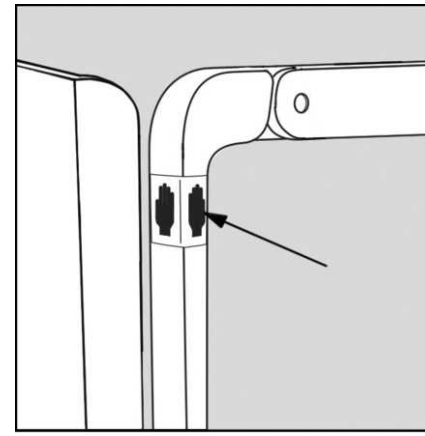
Emergency off switch

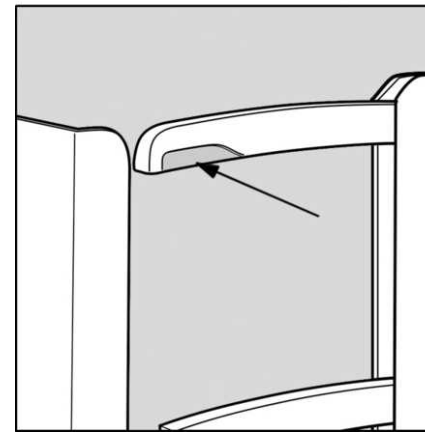
In an emergency, the current entry can be interrupted by pressing the emergency off switch. This causes the industrial truck to be braked to a standstill.

NOTE

Only activate in case of emergency!

Barrier





⚠ WARNING

Danger of crushing

There is a risk of hands being crushed if the barrier is grasped at other points while being opened.

When opening and closing the barrier, only grasp the handles to operate the barrier. Up to a cab floor lift height of 1.2 m, the cab barriers may be left open when the truck is being driven. If the truck is driven at a lift height of greater than 1.2 m, the barriers must be closed.

NOTE

On the version with a simplex mast and auxiliary lift, the changeover point for all of the affected functions is at approximately 0.4 m rather than at 1.2 m.

Horn

The horn is an acoustic warning device that the driver can use at blind spots to signal that the truck is approaching. The horn is part of the safety system and must always be in good working order.

Two-hand controls

Inside the rack aisle, operation using both hands is necessary for, every function.

Outside the rack aisle, operation using both hands is necessary for the lifting / lowering function

Driver's overhead guard

⚠ WARNING

Danger of injuring

The overhead guard of the industrial truck described here is not suitable for providing protection against very small objects. If very small objects need to be transported, the overhead guard must be modified accordingly.

Operating panel, variants

The operating panel is fitted on the mast side as standard for order pickers. As an option, the operating panel can be mounted on the load side or on both sides.

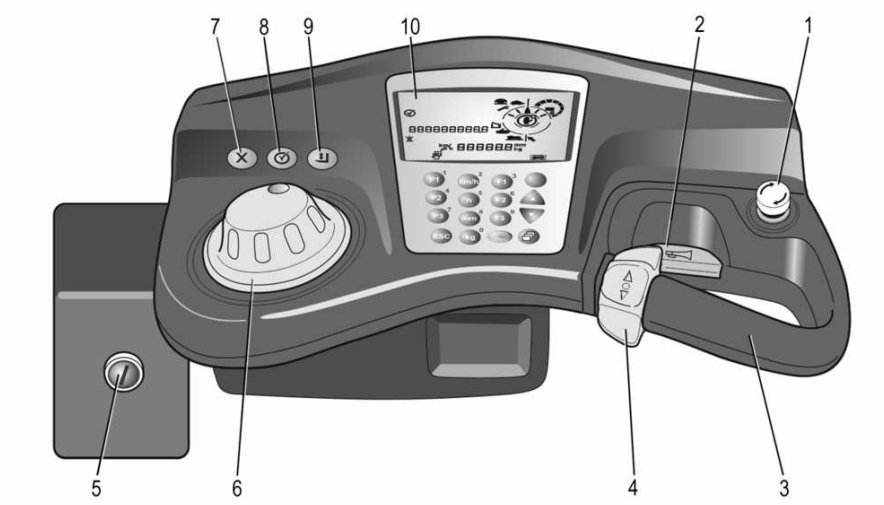
Depending on the series, display variants

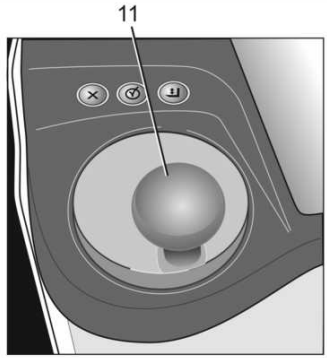
- Standard display
- LCD display
- LCD display with keypad

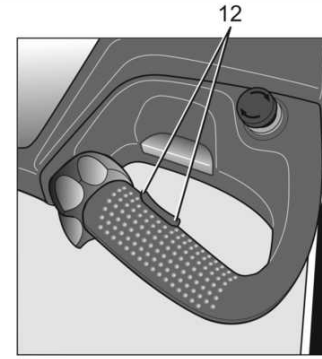
are used.

Operation and indicators are described in separate sections.

Operating panel - Standard display - LCD display





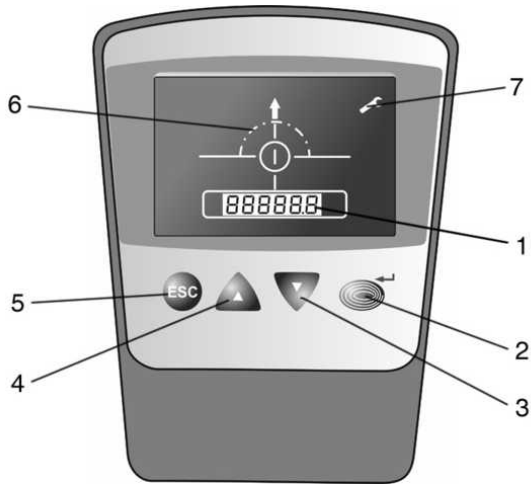


1	Emergency off switch
2	Horn button
3	Handhold and sensor surface for two-hand operation
4	Operating lever for forward/backward driving
5	Key switch
6	Steering knob and sensor surface for two-hand operation.
7	Special function* selection button
8	Enable button, e.g. for releasing the brake in an automatic braking system or as bridging for the intermediate lift cut-out*
9	Auxiliary lift selection button
10	Display of operating status (order-dependent)
11	Steering wheel* and sensor surface for two-hand operation

12 Control rocker for cab lift or auxiliary lift lifting/lowering function

*Option

Standard display



1 Display for operating hours and battery residual charge. When the truck is switched on, the operating hours are displayed for 1 s and then the residual charge of the battery is displayed as a percentage.
2 not assigned
3 not assigned
4 not assigned
5 not assigned
6 Steering angle, actual value
7 Maintenance indication

Displays

Operating hours

The operating hours are displayed for a few seconds directly after switching on the truck. The display then changes to the battery residual charge. The operating hours are counted according to the setting in the truck control unit and are displayed in 1/10 hours (6-minute cycle).

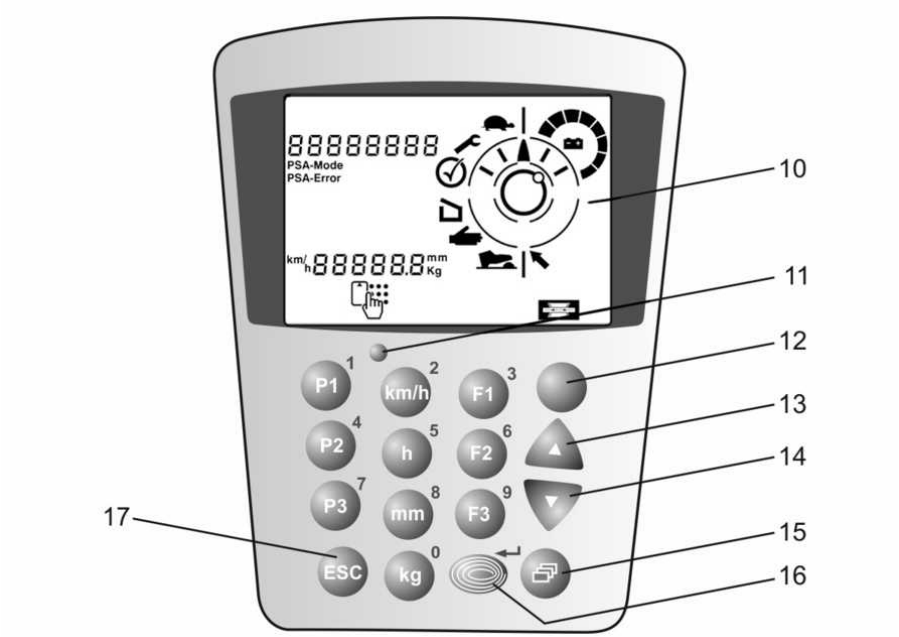


Battery residual charge

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



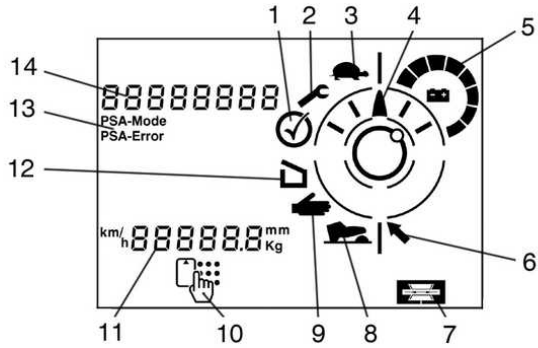
LCD display



0	Input of the number 0 or switch to weight indicator in kg*
1	Input of the number 1 or switch to drive programme 1*
2	Input of the number 2 or switch to speed indicator in km/h
3	Input of the number 3 or switch to function 1*
4	Input of the number 4 or switch to drive programme 2*
5	Input of the number 5 or switch to operating hours display in h
6	Input of the number 6 or switch to function 2*
7	Input of the number 7 or switch to drive programme 3*
8	Input of the number 8 or switch to lift height display in mm
9	Input of the number 9 or switch to function 3*
10	LCD display, see chapter **LCD displays**.
11	Brightness sensor
12	not assigned
13	Arrow button UP
14	Arrow button DOWN
15	Change menu button
16	Confirm input
17	Cancel input

*Option

Indicators



1	Enable button required	9	Two-hand operation required*
2	Maintenance interval expired*	10	Pin code input via keypad required*
3	Creep speed active*	11	Display for operating hours, speed*, lift height*, load weight*, error messages
4	Steering angle display*	12	Barrier open*
5	Battery discharge indicator	13	Operating status of the personal protection system*
6	Inductive forced steering in automatic mode	14	Error messages and information
7	Operating status of inductive forced steering		
8	Foot switch actuation required		

*Option

Displays, information

Info 1

Description:	- Battery voltage too low.
Response:	- Truck malfunctioning possible.
Cause:	- Battery discharged.
	- Battery defective.
Remedy:	- Charge battery.
	- Have battery checked or repaired by a battery service.

Info 14

Description:	- Sequence for the lifting or lowering operating selection incorrect.
Response:	- Lift/lowering stop.
Cause:	- Operating error.

- Left hand operation does not come before selecting lifting or lowering.

- Wiring defective.

Remedy:
- Reset by switching the truck off then on again.
- Release the operating devices and select in correct sequence.

Info 15

Description:
- Operation error for driving.

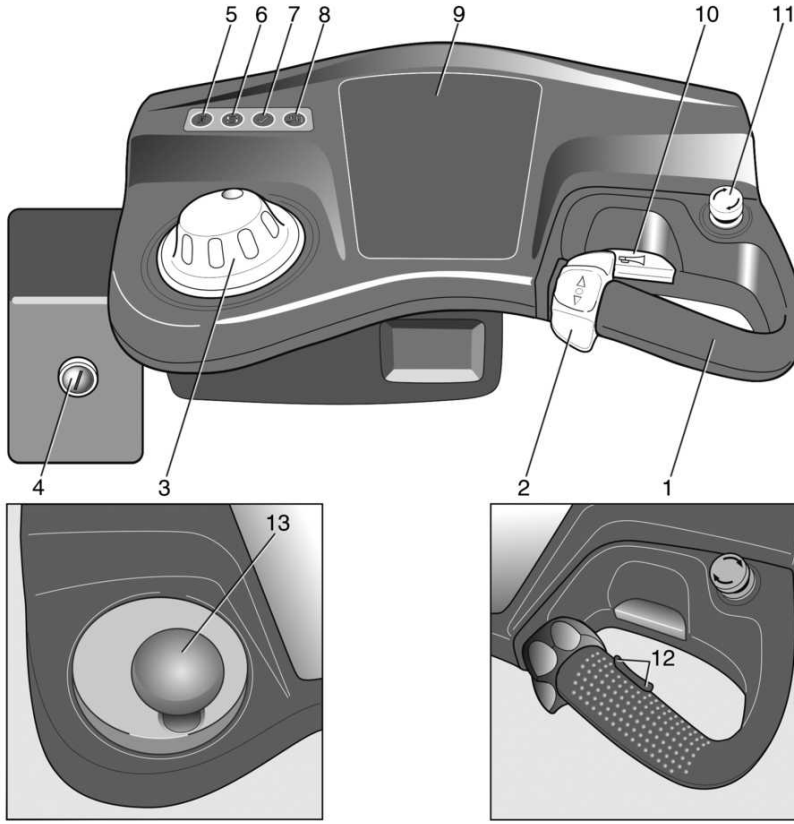
Response:
- No driving function available. Symbol in the display lights up.

Cause:
- Incorrect sequence.
- Foot switch signal missing.
- 2-hand operation signal is missing.

Remedy:
- Carry out the correct sequence.

In the event of all other errors, contact the responsible service centre.

Operating panel - LCD display with keypad

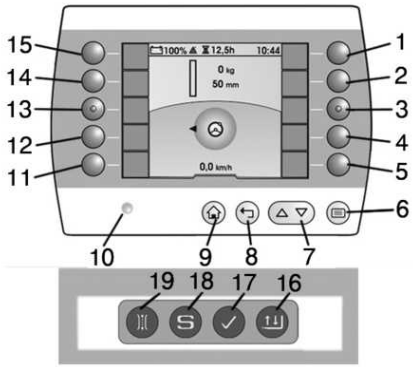


1 Handhold and sensor surface for two-hand operation
2 Operating lever for forward/backward driving
3 Steering knob and sensor surface for two-hand operation
4 Key switches or push buttons for electronic access control*
5 Inductive guidance* selection key.
6 Special function* selection button
7 Enable button, e.g. for releasing the brake in an automatic braking system or as bridging for the intermediate lift cut-out*
8 Auxiliary lift selection button
9 LCD display or cover (depending on order)
10 Horn button
11 Emergency off switch
12 Control rocker for cab lift or auxiliary lift lifting/lowering function
13 Steering wheel* and sensor surface for two-hand operation

*Option

LCD display with keypad

Operation



1 - 5 and 11 - 15 Selection keys for **favourites**
6 Selection of a menu display
7 Selection within a menu
8 Go back one step in the menu or cancel a selection
9 Return to main page
10 Light sensor for automatic control of the display lighting
16 Auxiliary lift selection button
17 Enable button, e.g. for releasing the brake in an automatic braking system or as bridging for the intermediate lift cut-out*
18 Special function* selection button
19 Inductive guidance IZF* selection key

* Optional functions

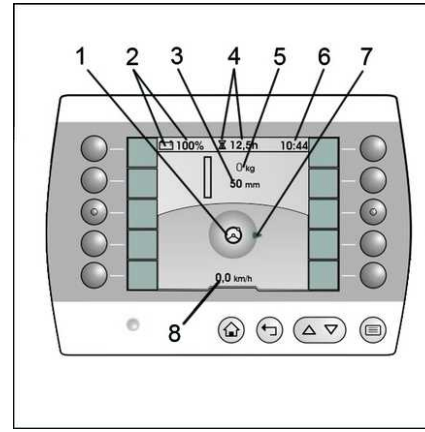
This display and the keypad (pos. 16 - 19) can be integrated into one of the covers (on the lift mast side or on the load side) or mounted separately on a mounting system.

LCD display with keypad

Indicators

*1 only with "weight measurement" option.

*2 only with "IZF" option

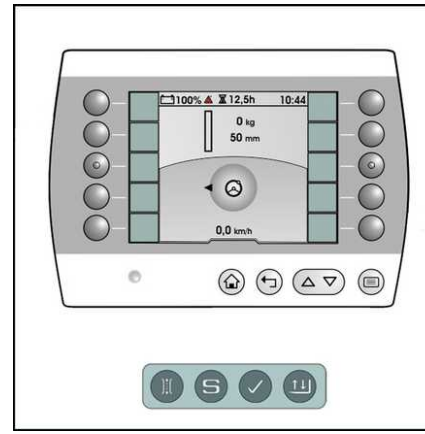


1 Operating status of steering
2 Residual capacity of traction battery
3 Lift height (top edge of load fork)
4 Operating hours
5 Weight of the supported load *1
6 Time
7 Operating status of guidance *2
8 Current driving speed

LCD display - Programming - Menu structure

NOTE

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

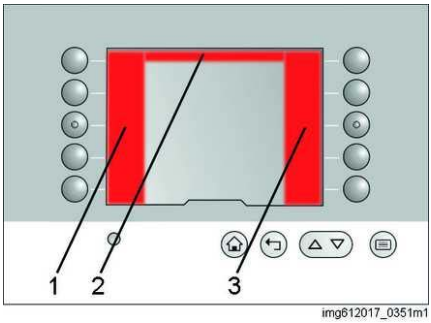


Function

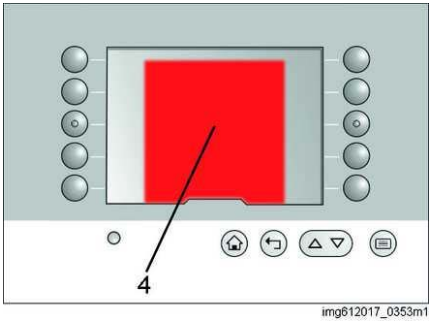
Operating statuses and information relevant to operation are shown on the display. Using the display, it may be possible to switch functions on and off or to switch between defined statuses.

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)

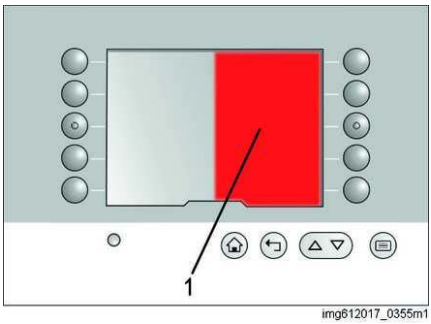


img612017_0351m1



img612017_0353m1

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.



img612017_0355m1

This message window has various content:

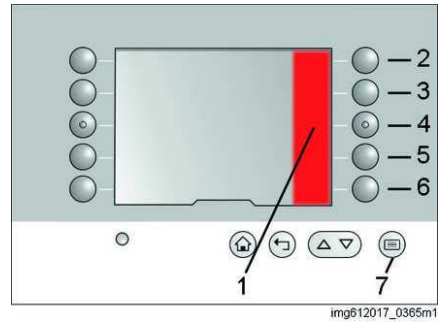
- Messages about operation
- Messages with error numbers
- Target position (drive order) and actual position for navigation

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

The ten membrane keys can be freely configured to display your favourite functions on the main page. 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.

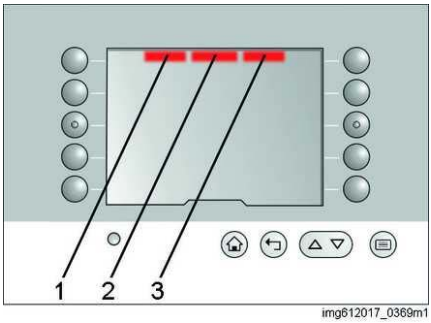
The menu levels are as follows:



img612017_0365m1

Industrial truck (2)			
	Energy-saving function		
	Navigation		
Lighting (3)			
Height preselection (4)			
	Used lift heights		
Fan (5)			
Settings (6)			
	Truck information		
		Production number	
	Display settings		
		Time	
		Date	
		Language	
		Status bar	
			Left field
			Centre field
			Right field
	Configure favourites		
	Truck settings		
		Lift height preselector	
			Approach lift heights
			Enter lift heights
			Clear lift heights
	Service		
		Message list	

Top status bar



img612017_0369m1

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

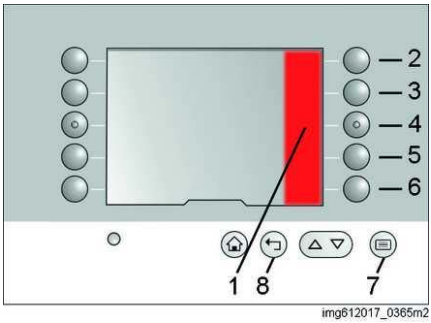
- Left field (1)
- Centre field (2)
- Right field (3)

The status bar can display the following information:

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

The status bar can be configured individually.

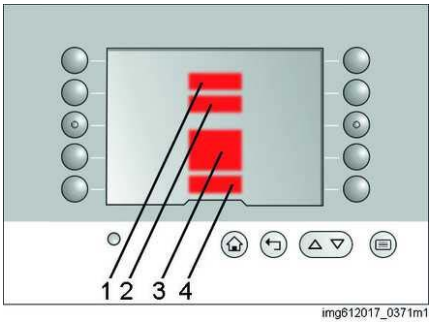
Procedure



img612017_0365m2

– Push button (7). The menu in area (1) opens.
– Press key sequence (3), (6) 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_0371m1

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

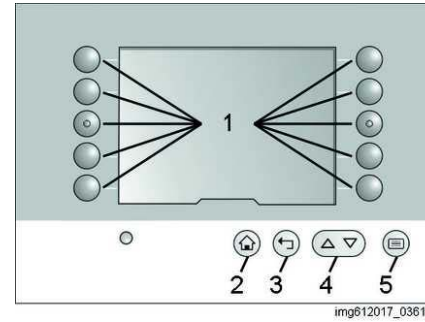
- **Weight** (1):
  The maximum permissible weight for the current lift height. If the optional weight measurement is available, the current weight of the load being lifted.
- **Lift height** (2):
  Current height of the fork arms (upper edge)

- **Type of guidance and steering angle** (3)
- **Driving speed** (4)

This part of the display cannot be parametrised.

Operation

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

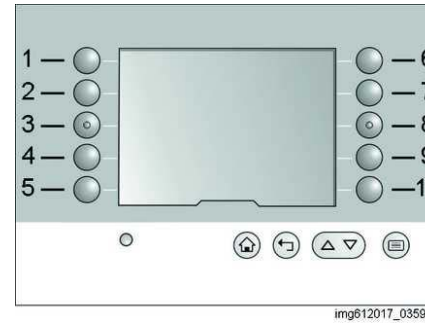


img612017_0361m1

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.



img612017_0359m1

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 navigation must be set to AUTO. Otherwise, the symbol is greyed out and therefore cannot be selected.*

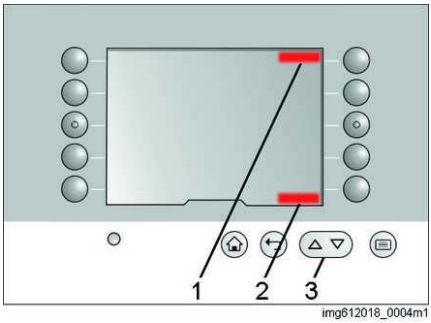
	If the button is pressed and held when a drive order is active, the drive order is deleted.*
6	The right-hand menu bar with the available data regarding height preselection opens. If the symbol is greyed out, the industrial truck is equipped with the navigation option and the key switch for navigation 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 bar (1) next to the button. If the function is deselected, this coloured bar is no longer present.



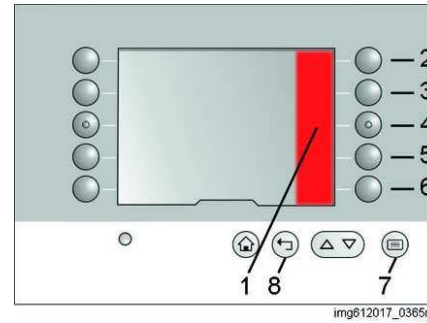
Scrolling through the menu bar

If an arrow appears in area (1) or (2), 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.



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.



img612017_0365m2

Procedure

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

– Press key sequence (3), (6) and (4).

– Use buttons (2) to (6) to select the desired language in the list.

NOTE

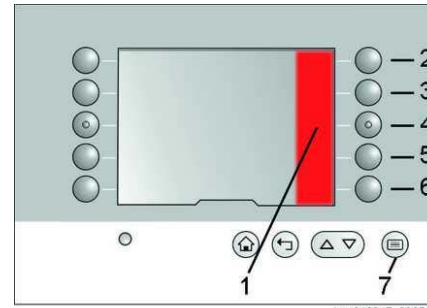
Only five languages are shown here. The other 20 languages can be found by scrolling. See "Scrolling through the menu bar"

– Exit the list by pressing button (8).

Favourites

The ten membrane keys can be freely configured to display your favourite functions on the main page. The following functions are available as favourites:

- **Energy-saving mode**
- **Navigation**
- **Lighting**
- **Height preselection**
  Complete, individual areas or individual heights
- **Fan**



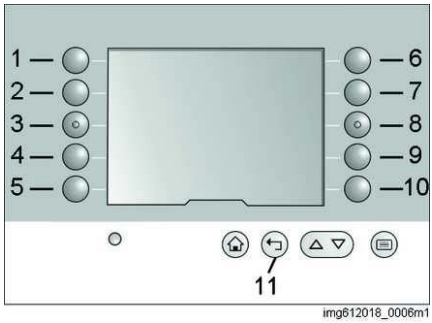
img612017_0365m1

Procedure

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

– Press key sequence (6) and (4).

– Use buttons (1) to (10) to select the position for the favourite function. ▷
– Select the desired function in the list using buttons (6) to (10).



img612018_0006m1

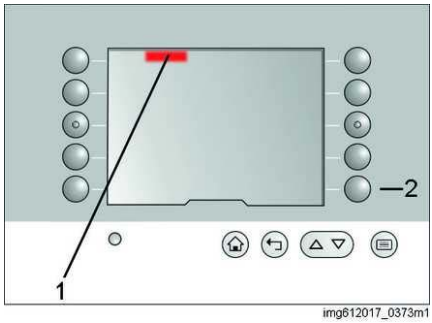
NOTE

On some buttons there is a sub-menu with additional options.

– Exit the list by pressing button (11).

Message list ▷

Currently displayed error numbers can be hidden using button (2). A warning symbol (1) remains in the status bar with the number 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.



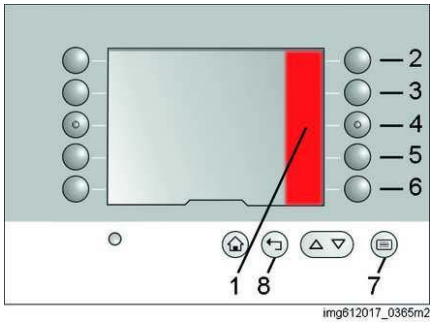
img612017_0373m1

Procedure ▷

– Push button (7). The menu in area (1) opens.
– Press key sequence (6), (6) and (2).

The message list shows all of the current error numbers.

– Exit the list by pressing button (8).



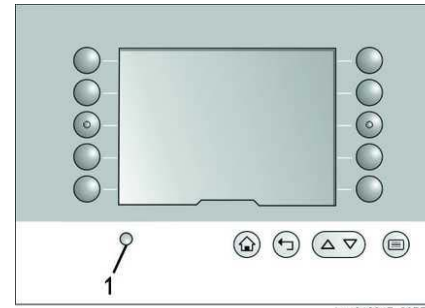
img612017_0365m2

Brightness setting

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

NOTE

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



img612017_0375m1

Operating instructions

The controller assists the operator in operating the industrial truck effectively.

Operating instructions take the form of:

- Illuminated buttons
- Message in plain text
- Pictogram
- Error number

If a particular button needs to be actuated in order to continue working, this button is illuminated.

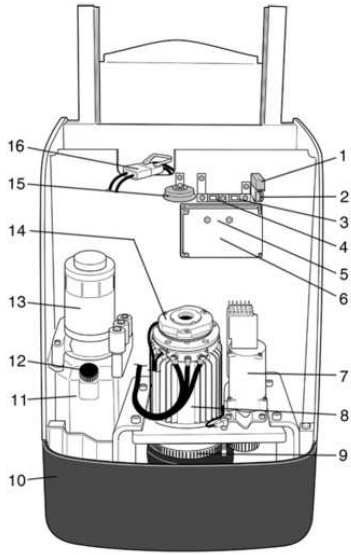
The messages in plain text provide direct information in the configured language.

Pictograms provide self-explanatory, language-neutral information on the necessary operating steps.

In the event of a fault or defect, one or more numbers appear led by a pictogram of a warning triangle. Call the authorised service centre and provide the authorised service centre with these numbers.

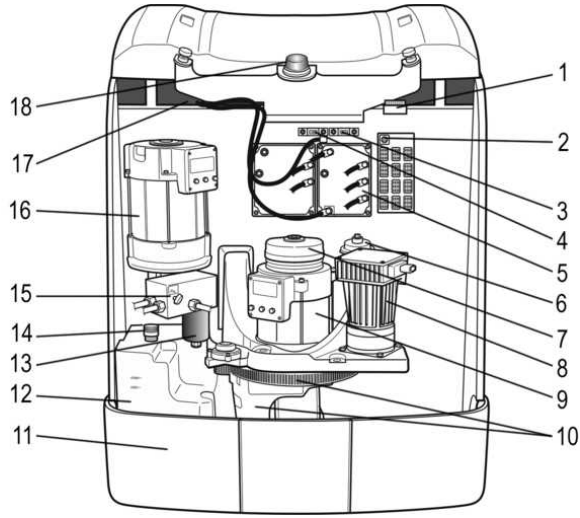
View into the control compartment

Narrow chassis



1	Control current fuses
2	Programming interface
3	Main current fuse for steering
4	Main current fuse for driving and pump
5	Unassigned fuse holder
6	Combined traction and pump controller
7	Steering motor
8	Traction motor
9	Steering gears and gearbox
10	Removable collision protection
11	Hydraulic oil tank
12	Filling opening for hydraulic oil
13	Pump motor
14	Electromagnetic brake
15	Horn
16	Battery connector

Wide chassis



1	Control current fuses	10	Steering gears and gearbox
2	Programming interface	11	Collision protection
3	Main current fuse for steering	12	Hydraulic oil tank
4	Main current fuse for driving and pump	13	Hydraulic oil filter
5	Truck control unit	14	Filling opening for hydraulic oil
6	Horn	15	Emergency lowering valve
7	Electromagnetic brake	16	Pump motor
8	Steering motor	17	Battery connector
9	Traction motor	18	Direction indicator

4

Operation

General commissioning

Initial commissioning

NOTE

*Observe the section entitled **Safe handling of consumables**.*

Prior to initial commissioning, make sure that the entire industrial truck is properly assembled. All electrical and hydraulic connections must be checked. Mechanical connections that were removed for transportation must be reconnected with particular care. Check all screw connections with the appropriate torque. Commissioning can begin once the filling levels for the hydraulic tank and for the gearbox have been checked. The entire initial commissioning process must be correctly performed by authorised service personnel.

NOTE

*During the daily commissioning process, work through the **Checklist before starting work**.*

Transporting and loading

ENVIRONMENT NOTE

Hydraulic oil can escape through disconnected hydraulic connections.

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

Hooking on

NOTE

We always recommend the use of textile straps so as to protect the paintwork of your truck. Shims may be required to protect the harnesses from sharp edges.

The lifting points for the chassis are located on the right and left in the area of the load wheels, as well as in the chassis area next to the drive unit. The lifting points are indicated by the pictogram opposite.



NOTE

The chassis is always mechanically braked — unless the truck is put into operation.

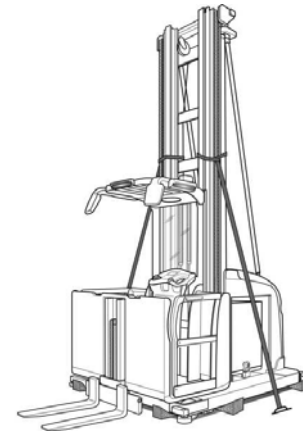
Loading

To secure the truck to a loading area for transport, a total of eight wooden wedges and suitable tension belts must be used. Position two wooden blocks at the front of the truck and two at the rear, and position the remaining blocks in pairs on the right and left of the truck. The tension belts must be guided over the battery compartment and around the posts to make sure that the truck is firmly on the ground. In addition, the battery compartment cover must be removed. In trucks with high lift masts, these must also be secured at the side with belts.



Hooking on the lift mast

To hook on the lift mast, belts can be wound around the uppermost bridge pieces. Harnesses suitable for this purpose must be used (shackle or lifting device). If necessary, the individual lift mast parts can be lashed to each other during this process, to prevent them from separating unintentionally and thus shifting the centre of gravity.



NOTE

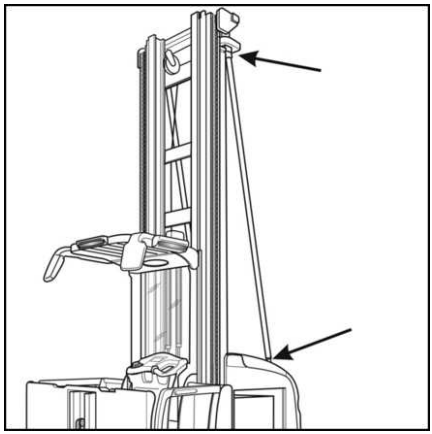
Take care to ensure that neither the cables nor hoses become crushed or torn.

Mast bracing

Mast bracings may be required depending on the configuration of the industrial truck.

Once the mast bracings have been installed, they must be adjusted according to factory specifications and tightened to the specified torques.

The mounting locations are marked with labels. These labels specify the torques of 50 Nm and 195 Nm.



Wheel screws

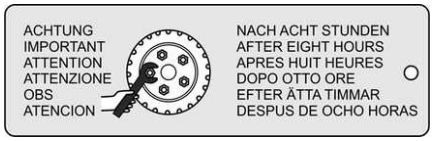
⚠ WARNING

Wheel screws may loosen after initial commissioning.

After the first eight hours of operation, retighten the wheel screws to the torque specified for the installed gearbox size.

150 Nm with 250-mm wheel diameter.

210 Nm with 360-mm wheel diameter.



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. There are also many customised specifications. 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

⚠ CAUTION

Risk of accident as a result of overloading the hoists.

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

Order pickers can be delivered disassembled into the following units:

- Driver's cab including carriage and attachment
- Lift mast
- Battery
- Chassis

When assemblies comprised of multiple complete units are transported, e.g. with the battery installed in the chassis, 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.

Weight of the driver's cab

A standard driver's cab including an auxiliary lift weighs between approx. 600 kg and approx. 750 kg. Take into account the additional weight of further or optional attachments, for example the weight of order-picking platforms.

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 height of the double lift mast	Weight
2250 mm	795 kg
2450 mm	860 kg
2900 mm	1015 kg
3400 mm	1172 kg
3900 mm	1341 kg
4400 mm	1502 kg
4900 mm	1665 kg
5400 mm	1932 kg

Overall height of the triple lift mast	Weight
2250 mm	1133 kg
2450 mm	1236 kg
2900 mm	1451 kg
3400 mm	1841 kg
3900 mm	2118 kg
4500 mm	2347 kg
4800 mm	2500 kg
5400 mm	2730 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 industrial truck. Compare the information on the nameplate on the battery with the information on the nameplate on the industrial truck.

Weight of the chassis

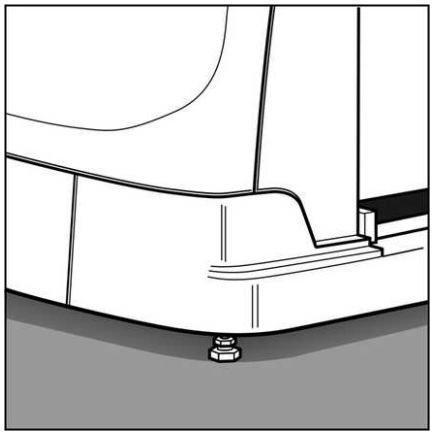
The weight of the chassis depends on its design and the fitted equipment and can range from 600 kg to 1200 kg. See the order.

⚠ CAUTION

Risk of accident as a result of overloading the hoists.

Ballast weights may be installed in the industrial truck. Depending on the configuration, these are required in order to compensate for the reduced weight as a result of light batteries. The weight of these ballast weights must be taken into account when transporting the unit. Operation of the industrial truck without installed ballast weights is not permitted.

Support screws



⚠ CAUTION

Risk of accident as a result of the truck tipping over!

Support screws may only be adjusted by authorised service personnel.

The basic position of the support screws must correspond to the information on the load capacity diagram.

The support screws in the chassis of the truck are used to improve stability.

The support screws may only be adjusted by authorised service personnel.

If problems arise when the truck is operated on uneven surfaces, the stability must be recalculated by the manufacturer. It will then be possible to increase the setting dimensions for the support screws if necessary.

The truck will then be equipped with a new load capacity diagram, on which the new setting dimensions will be indicated.

⚠ WARNING

Risk of accident

The setting dimension for the support screws must be checked every 6 months by authorised service personnel and must be adjusted if necessary.

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.

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.

Traction battery

Dimensions, weight

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.

⚠ DANGER

Risk of accident due to the industrial truck tipping over

A battery that is too light seriously reduces the stability of the truck. As a result, there may be a risk of the truck tipping over.

The battery must comply with the specifications on the nameplate of the industrial truck regarding voltage and weight. Therefore, you need to compare the nameplates on the industrial truck and the battery.

If a lighter battery is used temporarily or continuously, 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.

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.

⚠ CAUTION

Danger of damage to property

Batteries are subject to special charging instructions, maintenance instructions and handling instructions. Incorrect battery chargers can cause total battery failure. Observe the instructions from the respective manufacturer.

Lithium-ion battery

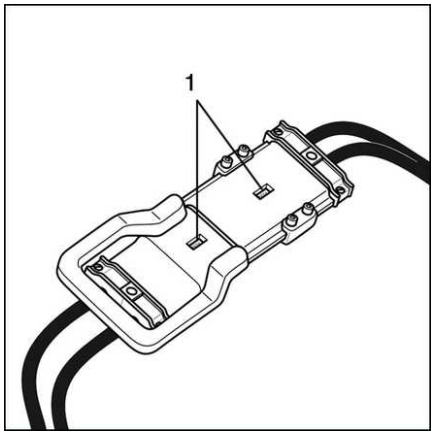
⚠ DANGER

Risk to life

- Only use lithium-ion batteries in industrial trucks that have a design and a controller intended for use with such batteries.
- Lithium-ion batteries are lighter than lead-acid batteries with the same capacity. Use an appropriately attached ballast weight to compensate for the reduced weight.
- Check with the authorised service partner before using a lithium-ion battery.

Commissioning

If your industrial truck is equipped with a Euro battery male connector, 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 zone and shearing zone

⚠ 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

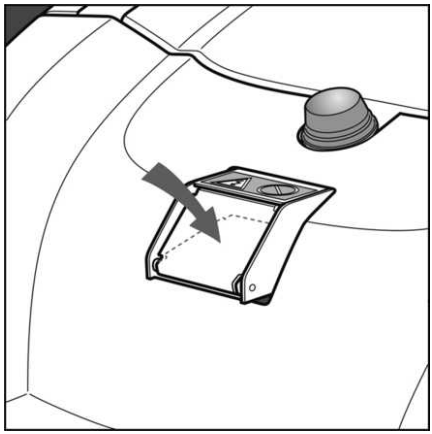
⚠ CAUTION

Danger of damage to property

Observe the information and guidelines from the battery manufacturer.

Charging socket Lithium-ion battery

▷



Industrial trucks with a lithium-ion battery are equipped with an externally accessible socket for the charging cable. To plug in the charging cable, the spring-loaded flap is pushed inward with the plug and the plug is inserted.

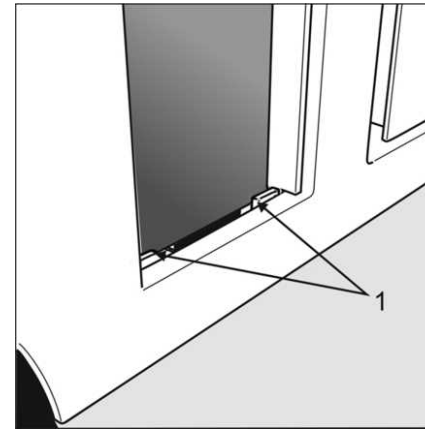
NOTE

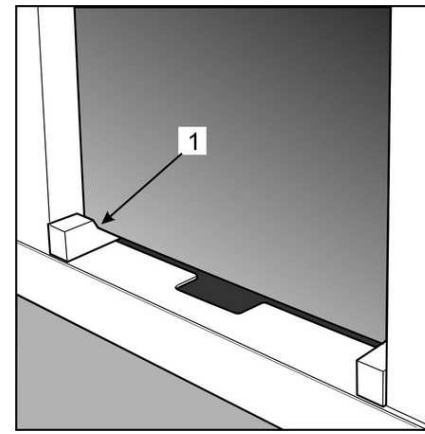
When the charging plug is inserted, the plug flap is pressed open. This activates a switch that deactivates the industrial truck controller.

When the plug is disconnected, this flap must automatically close again. Only operate the industrial truck with the plug flap functioning correctly.

Battery replacement

Battery replacement using a truck ▷





As standard, the battery rests in a recess intended for this purpose in the chassis (1). The battery can be replaced using a truck. In order to do this, lift the battery sideways out of the recess using a truck with sufficient load-bearing capacity and suitable lifting accessories.

On this industrial truck, the battery is replaced to the side. Only suitable aids such as lifting gear and battery change frames may be used for this purpose.

In the standard design, the battery rests in a recess (1). The battery should be replaced using a forklift truck.

The forklift 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

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

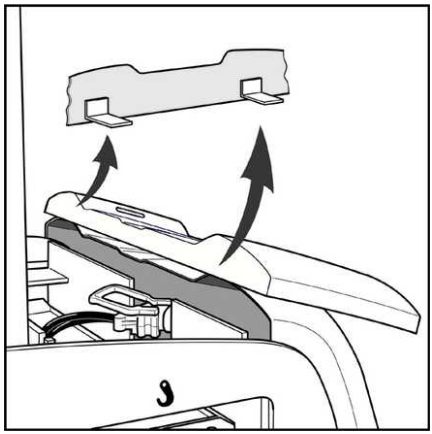
NOTE

*As an option, the battery in these industrial trucks can be replaced using the battery change frame. With this design, the battery rests on a roller channel. See the chapter entitled **Options**.*

Removing the battery compartment cover ▷

Depending on the design of the industrial truck, the battery compartment cover can either be removed manually or folded via a special hinge. This makes the battery accessible from above, so that you can access the battery male connector or perform battery maintenance.

There are two brackets on the inside of the battery compartment cover. These can be used to hang the cover on the control compartment hood.

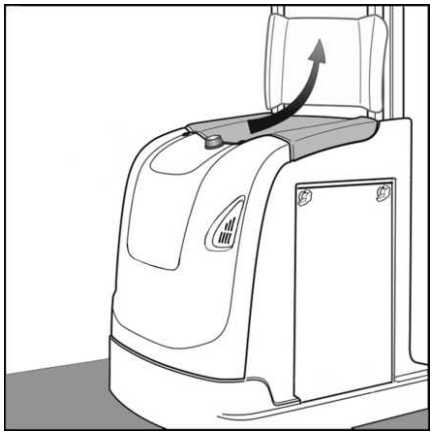


Folding the battery compartment cover ▷

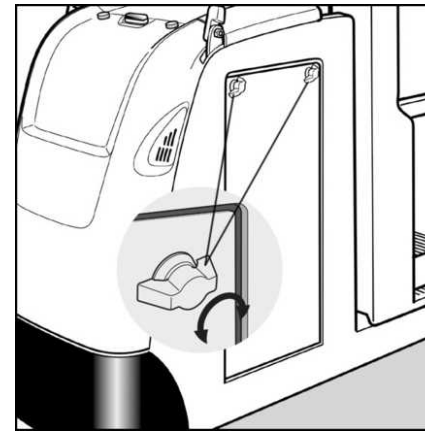
With the folding variant, the flap is guided through the hinge and positioned vertically to the lift mast.

A special hinge system guides the cover.

For maintenance work, the cover can be removed completely.



Battery compartment door*



The side openings of the battery compartment can be closed with battery compartment doors if required. Two swing bolts hold the doors in their positions.

To remove the battery compartment doors, move the two rotary handles into the open position by rotating them 90°. The battery compartment doors can then be lifted from their bottom fixing points.

⚠ CAUTION

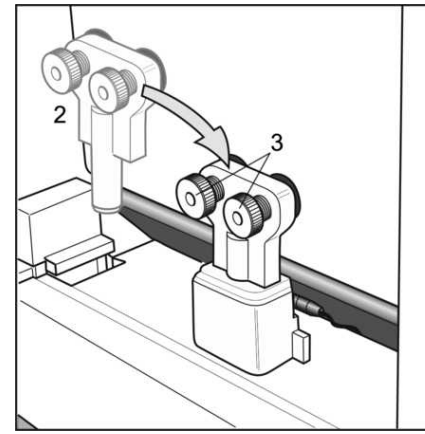
Risk of accident and damage to property

The battery compartment doors may fall out after the swing bolts have been opened. When opening the swing bolts, hold the door with the other hand.

Damaged swing bolts can no longer hold the battery compartment doors securely. If one of the swing bolts is damaged, the industrial truck must not be used. Repair the swing bolt or remove the battery compartment doors.

* Option

Replacing the battery using a battery change frame*



Alternatively, the battery rests on roller channels* and can be installed and removed from the side using a battery change frame*. Pre-assembled plates with clamping screws secure the battery against rolling out to the side.

- Pre-assembled plate removed (2)
- Pre-assembled plate inserted and clamping screws tightened (3). Ensure that the clamping screws are tightened symmetrically on both sides.

⚠ CAUTION

Risk of damage to property

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

* Option

Daily commissioning

Checklist before starting work

⚠ WARNING

If any defects that could influence operational and road safety are determined during the daily pre-shift check, measures must be taken immediately to ensure that appropriate repairs are carried out.

It is prohibited to continue operating the industrial truck until the repairs have been completed.

Before starting work, the driver must make sure that the industrial truck is in a safe operating condition. General checks:

- It must be clarified whether a driver's licence is required in the country of use.
- The industrial truck may be operated only when the covers and flaps are closed and the covers are in place.

Function checking the brake assemblies

- Checking the foot switch
- Examine the area around the foot switch for foreign objects.
- Check the reverse brake. The braking and subsequent acceleration processes must be gentle and not subject to jerky movements.
- Check the brake function after actuating the emergency off switch.
- Check the optional **automatic braking*** system function if featured in the truck: speed reduction, creep speed and absolute stop.

Function checking the steering

- The steering must move freely without jerking.
- The right/left maximum steering angle of approx. 90° must be reached.

Checking all operating devices

- Check that the levers and push buttons are in good working order.
- The operating levers and push buttons must return automatically to the neutral position.
- Check that all operating devices are in good working order and in an appropriate condition.

Checking the access control

- It must be possible to remove the key and it must not be possible to operate the industrial truck when the key is in the O position or when the key is removed.
- If the industrial truck features electronic access control*: It must not be possible to operate the truck if access is blocked.

Checking the lifting accessory and the connecting elements

- The forks must not be cracked.
- The forks must not be bent.
- Forged forks must not show more than 10% wear as a result of abrasion.
- The fork locking device* must be in good working order. The locking pin must move easily and be self-locking.
- The fork carriage must not be bent.
- The condition, wear, tension and lubrication of the load chains must be checked.
- Load chains must not be damaged.

Other checks

- Check the overhead guard for deformation, damage and cracks at welded seams.
- Visually check the overhead guard cover*.
- Visually check the guard grille*.
- Examine the wheels for foreign objects.
- Check the condition of the drive wheels and load wheels and check that they are securely attached.
- Check the barriers and the emergency off switch. If the barriers are open when the cabin lift height is more than 1.2 m or if the emergency off switch is actuated, it must not be possible to operate either the drive function or any hydraulic function.
- Opening the barrier when the cabin lift height is more than 1.2 m or actuating the emergency off switch must immediately trigger braking of the industrial truck.
- If the industrial truck is equipped with a barrier locking device*, it must not be possible to open the barrier above a specified lift height.
- The horn and other warning units must function correctly.

- If lighting devices* are fitted, check that they are working correctly.
- Check that the battery lock is in perfect condition and functions correctly.

*Option

Driver's compartment

Climbing into or out of the truck

⚠ DANGER

Risk of accident. In principle, the following applies to all industrial trucks: If the operator jumps off the industrial truck even though the industrial truck has not yet come to a standstill, there is a risk that the operator will be crushed or run over.

Never climb onto or jump onto the moving industrial truck. Never climb off or jump off the moving industrial truck.

Additional hazards for industrial trucks with a raisable driver's compartment (man-up)

⚠ WARNING

Risk of crushing

If the barrier is touched at any point other than the points indicated while it is being opened or closed, there is a risk that hands may be crushed.

⚠ WARNING

Risk of falling

- When climbing in and out, it is important to note the difference in height between the driver's platform and the ground.
- Before opening the barrier, check that the driver's cab is completely lowered.
- Turn to face the driver's cab when climbing into and out of the cab.
- Only hold onto fixed parts of the cab.

The movable barriers are not suitable for use as a handhold and may snap shut when subjected to a load. This can lead to crushing or blunt-force trauma.

Additional hazards for industrial trucks without a raisable driver's compartment (man-down)

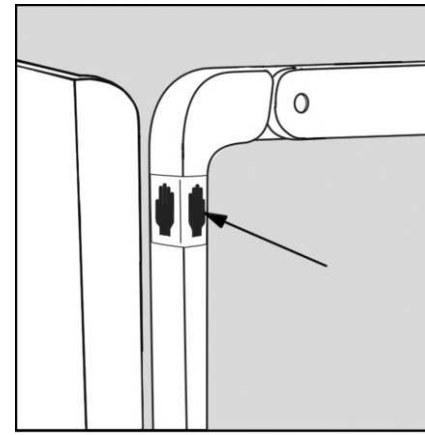
⚠ WARNING

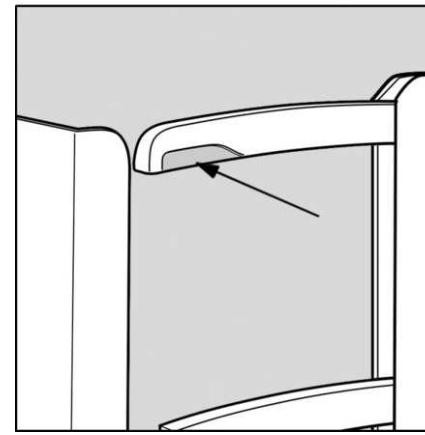
Risk of injury and damage to property

- Use the steps intended for this purpose when climbing into or out of the truck and hold on to fixed parts of the chassis or the optional handholds.
- Apply the parking brake before climbing out.
- Never jump off.
- The steering wheel is not designed as a handhold or climbing aid and is mechanically overloaded when subjected to lateral forces. This can cause the steering function to fail.

Barriers

Depending on the version, the industrial truck either has no barriers or is equipped with one of the two versions of barriers shown.





⚠ WARNING

Risk of crushing

If the barrier is touched at any point other than the points indicated while it is being opened, there is a risk that hands may be crushed.

⚠ WARNING

Risk of falling

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

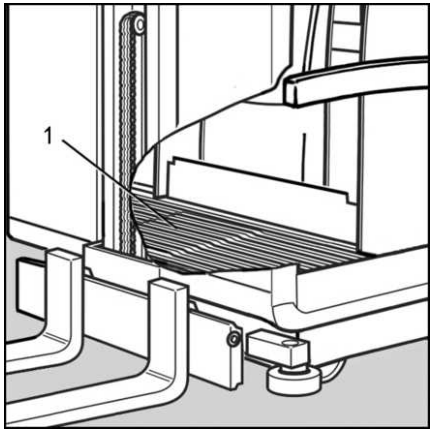
NOTE

The barriers are monitored by electrical means. If the driver's platform is raised higher than 1.2 m, the industrial truck will only work when all barriers are closed.

Operating devices

Brake system

Integrated foot switch



The foot switch (1) is installed in the cab floor. This component must be actuated in order to release the electromagnetic spring loaded brake, and at the same time keeps the driver in the centre of the cab. If the braking process is initiated by releasing the foot switch, the regenerative brake is applied first. When the braking process is complete, the spring loaded brake also engages. The foot switch serves equally as the service brake and the parking brake.

⚠ WARNING

Danger of accidents

The floor of the cab must be kept free of objects. Otherwise, there is a risk that the foot switch will be actuated.

Service brake

In order to brake during normal operation, it is also possible to release the **operating lever**. This initiates an electronic braking process.

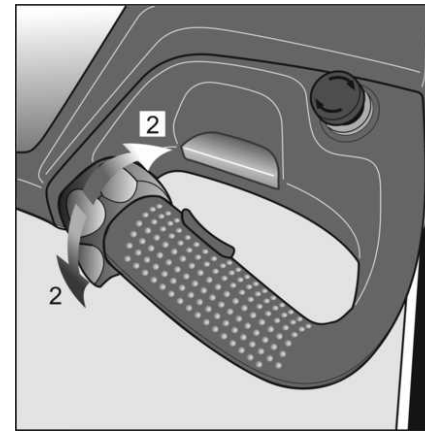
NOTE

As a general rule, the service brake or the reverse brake should be used for normal tasks. The foot switch must be used for emergency braking and as a parking brake.

Reversing brake

Direct switchover from one travel direction to the other (2) activates the reversing brake. This carries out electrically controlled braking followed by acceleration in the opposite direction. This braking mode can be finely metered by the deflection of the driving lever.

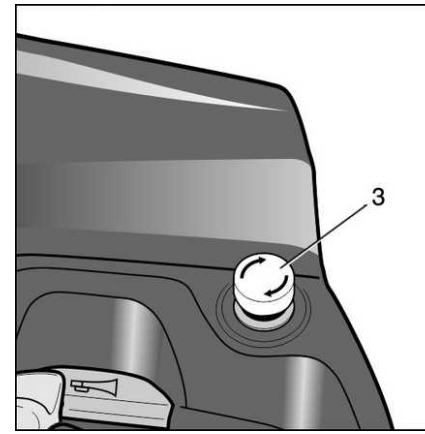
If the lever is released at the moment of direction switchover, the truck comes to a standstill.



Emergency stop brake

Pressing the emergency off switch (3) triggers the emergency braking.

An error message appears in the display.



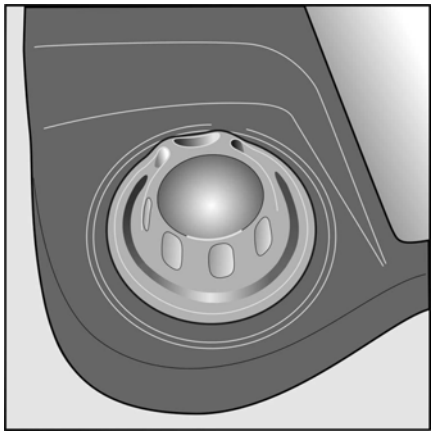
Steering system

The steering system works electrically. The driver rotates the steering knob or steering wheel* to determine the desired steering angle.

*Option

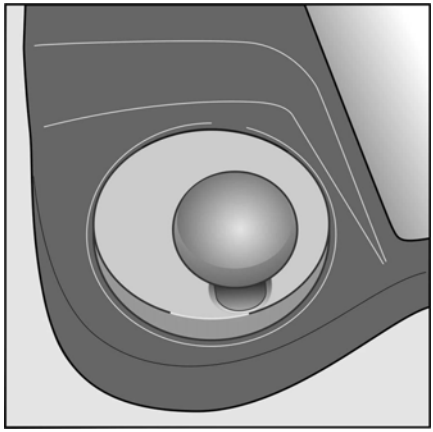
Steering knob

The steering knob has a right and a left stop. The rotation range of the steering knob is approximately 135° to each side. The steering thereby moves a maximum of around 95° to each side.



Steering wheel*

In trucks with a steering wheel, the steering also moves a maximum of around 95° to each side. You can use parameters to set whether two, three or four revolutions of the steering wheel are required. The steering wheel has no end stops. *Option



Switching on the controller ▷

– Remove the battery compartment cover and insert the battery male connector (1)

For industrial trucks with an open platform:

– Step onto the platform.

For industrial trucks with a cab:

– Climb into the cab and close the barriers. Only hold the barriers by the marked areas of the handle (2).

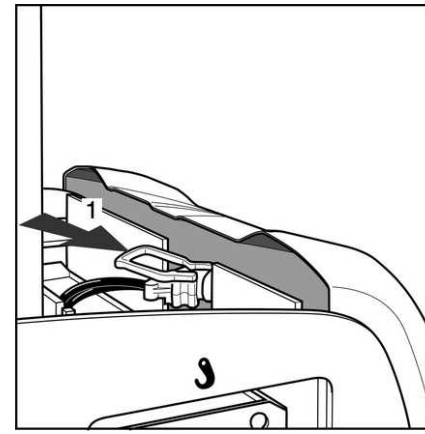
NOTE

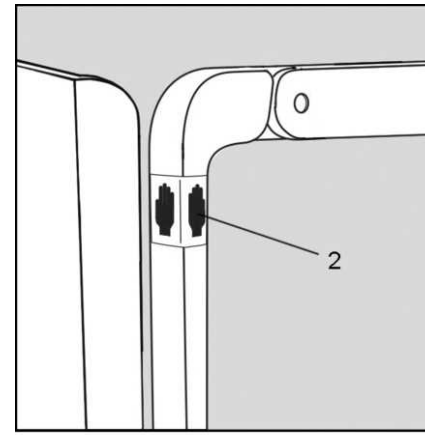
Up to a cab lift height of 1.2 m, the cab barriers may be left open when the truck is being driven. If the truck is driven at a lift height of greater than 1.2 m, the barriers must be closed. On the version with a simplex mast and auxiliary lift, the changeover point for all of the affected functions is not at 1.2 m, but instead at approximately 0.4 m.

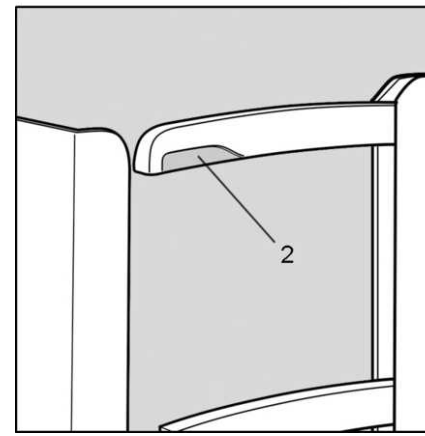
⚠ DANGER

Risk of accident

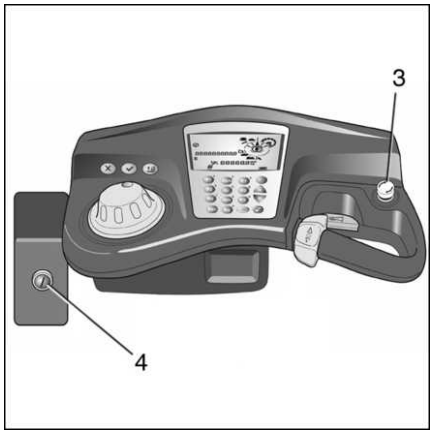
Never climb onto or jump onto the moving industrial truck. Never climb off or jump off the moving industrial truck.







Unlocking the emergency off switch



– Release the emergency off switch (3) by turning it.
– Switch on the key switch (4).

If the industrial truck is in an error-free state, the corresponding displays light up in the display unit.

Driving

Types of guidance

The industrial trucks can be designed for:

- Driving without guidance
- Driving with one-sided guidance (side guide rollers)
- Driving with mechanical guidance
- Driving with inductive guidance*
- And combinations* of these

*Option

Driving without guidance

When driving without guidance, the operator determines the drive direction and the driving speed. The driving speed is adjusted to the situation by the controller and limited accordingly. See the section entitled "Operation".

Driving with one-sided guidance

Industrial trucks with side guide rollers are manually steered to the side in the load direction and towards the guide rail. For this purpose, one or two rollers are installed on each side. When the side guide roller(s) are in contact with the guide rail, the steering must only be set to "straight ahead". The steering system remains active.

Industrial truck guidance with side guide rollers is designed to assist the driver, so that they are able to use the industrial truck in narrow aisles and on both sides of the aisle, for example. Because the industrial truck is only guided on one side, it is possible to switch to the other side of the aisle without leaving the aisle.

The industrial truck is then guided along the guide rail by means of default settings. Move away from the guide rail in the drive direction at a slight steering angle.

If only one side guide roller is fitted on each side, it is only possible to move along the guide rail in the drive direction.

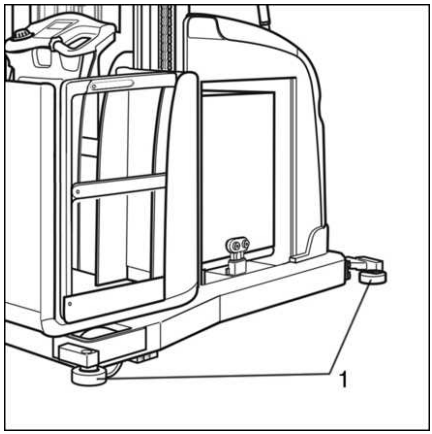
Mechanical guidance MZF

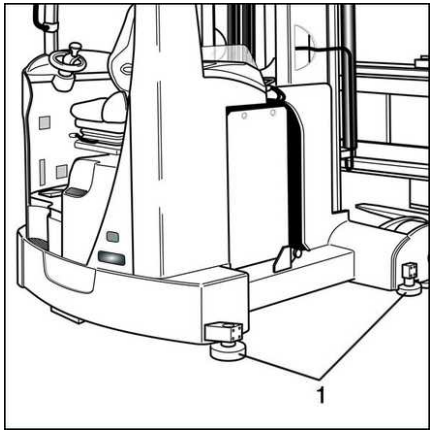
The industrial trucks can be guided **mechanically** when travelling within aisles. To achieve this, a rail system is installed on the floor of the warehouse. There are 2 (or 3*) guide rollers (1) on each side of the industrial truck. This guides the industrial truck along the rail system with little play. The rail system is detected by contactless sensors. The steering system is deactivated when using mechanical guidance.

Two-hand operation is required within the guidance for industrial trucks with a raisable driver's cab.

*Customer option

More detailed information can be found in the relevant sections of these instructions.



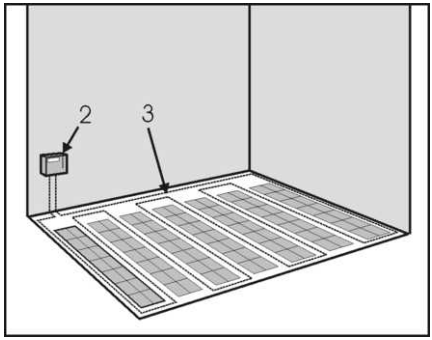


Inductive guidance (IZF*)

The industrial trucks can be guided **inductively** when travelling within aisles. For this purpose, an alternating current is generated in a frequency generator (2). This is fed into the wire (3) embedded in the floor.

The magnetic field generated by this wire is detected by sensors in the industrial truck and used to guide the truck. The steering system continues to operate actively.

Two-hand operation is required within the guidance for industrial trucks with a raisable driver's cab.



More detailed information can be found in the relevant sections of these instructions.

*Option

Driving without automatic guidance

⚠ WARNING

Risk of accident

Observe the **checklist before starting work** and all **safety instructions**.

Initial driving exercises

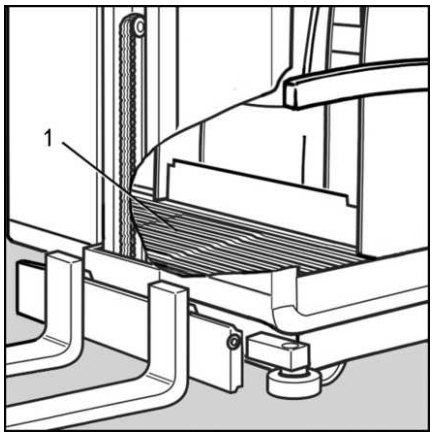
In order to become familiarised with the driving and braking characteristics of this industrial truck, initial driving exercises can be performed in a flat, obstacle-free area of the warehouse. If the following exercises are performed, the operator will soon be familiar with this industrial truck. Only by completing these can full advantage of the high performance potential be taken.

Foot switch

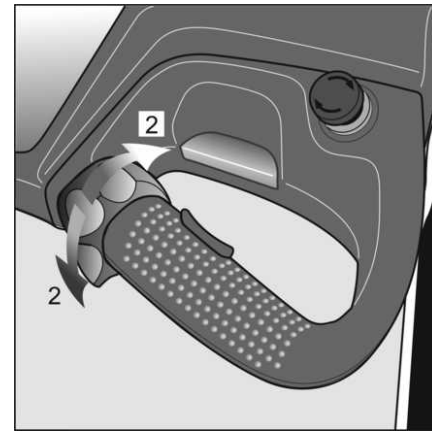
Pressing the foot switch (1) sends the release signal for travel to the traction controller.

When a drive direction is selected, the parking brake is released.

Releasing the foot switch (1) brakes the industrial truck.



Operating lever for driving



The drive direction and speed are selected through decisive movement of the driving operating lever (2). When the drive switch is moved in the opposite direction, you can change directly from one drive direction to another. The electronically controlled braking and the subsequent acceleration are referred to as **reversing**. This initiates electronically controlled braking and then acceleration in the opposite direction. In this case, no brake friction pads are used. This form of braking can be metered precisely through the movement of the driving operating lever. If the operating lever is released at the same time as the drive direction is reversed, the industrial truck remains stationary. As a rule, reversing should be used as the service brake for regular tasks.

Depending on the technical version of the industrial truck, the barriers* of the drivers cab may be left open when the truck is being driven, up to a cab lift height of:

- 0.4 m for industrial trucks with simplex mast and auxiliary lift
- 1.2 m for industrial trucks with speed optimisation* (only available in conjunction with telescopic masts)

*Option

Handle sensor

A sensor is built into the grab handle next to the driving operating lever, which detects the touch of the driver's hand. To enable driving, the foot switch must be actuated **and** the handle sensor touched.

Steering

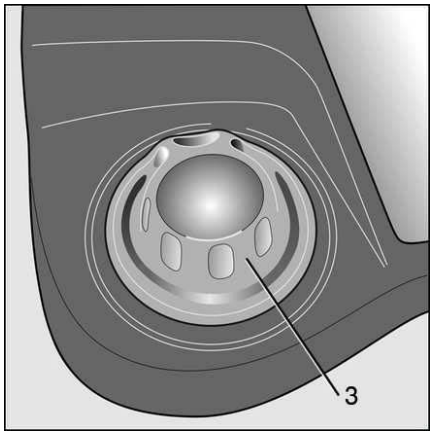
The left hand controls the steering knob (3) and the steering wheel*(4) and thus determines the course of the truck. The maximum angle of rotation of the steered wheel is approximately 95° to each side. This enables the industrial truck to be turned on the spot.

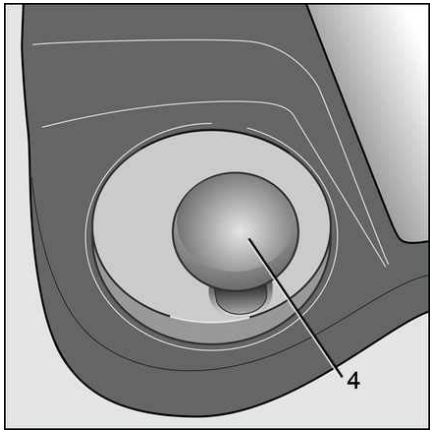
When driving without guidance, diagonal movement is possible. This makes it possible to drive the truck with the load raised or lowered.

NOTE

- *The **steering knob** (3) has an angle of rotation of approx. 135° on each side and stops mechanically. Industrial trucks with this equipment are mainly intended for use in warehouses with automatic guidance for fast switchovers from one aisle to another.*
- *Conversely, the **steering wheel*** (4) has no stops. To achieve the maximum steering angle of approximately 95° on each side, it is necessary to make two, three or four turns from the straight-ahead position to the left or right (programmable). Industrial trucks with this equipment are mainly intended for use in warehouses without automatic guidance due to the sensitive steering.*

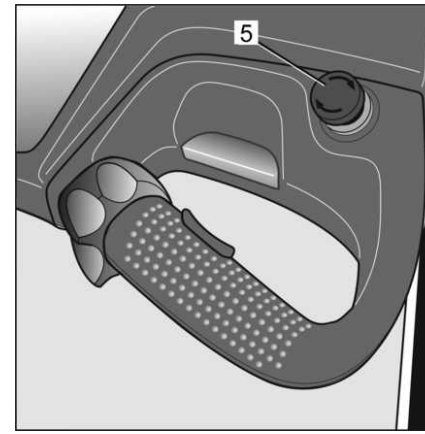
*Option





Emergency off switch

Pressing the emergency off switch (5) activates mechanical braking and brakes the industrial truck to a standstill in the shortest distance possible.



⚠ WARNING

Risk of accident

Never turn the key switch to the "off" position during travel, as this will cause all safety monitoring equipment to be switched off.

NOTE

The braking distance of the industrial truck is influenced by the condition of the floor surface. The driver must take this into account when determining his driving and braking style.

Driving with guidance

All guidances are optional features. A distinction is made between two types of guidance:

- Mechanical guidance
- Inductive guidance

Mechanical guidance

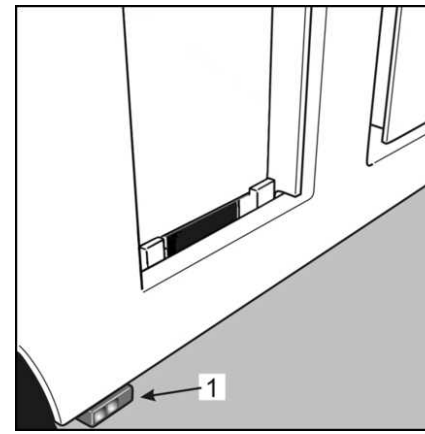
The mechanical guidance consists of one or two rails on or between which the industrial truck is guided with a maximum permissible play of 5 mm.

Entering the aisle

Before entering the rail guidance, position the industrial truck as centrally as possible and flush to 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 (1) are activated.

When the rail switches detect the rail guidance, the new mode of operation is automatically selected:



- The pivoting wheel must be brought into the **straight-ahead** position.
- The truck can now only be driven with two-hand operation. To do so, touch the steering knob or the steering wheel with the left hand. The controller detects the hand applied and releases the other functions.
- If the truck is being driven only, after pressing the foot switch, actuate two-hand operation and move the right-hand operating lever in the desired direction of travel.
- If the truck is being driven **and at the same time** the forks raised or lowered, move the operating lever and control rocker accordingly.
- Example: Pressing the control rocker on the right-hand side and pressing the operating lever upwards causes the main lift to be raised and the truck to drive forward. This method of operation is known as a **diagonal movement**.

Lifting/lowering the cab lift

- Actuate the foot switch.
- Use the control rocker to select the direction of movement and speed (or see "Diagonal movement")

Lifting/lowering the auxiliary lift, operation with the operating panel

- Actuate the foot switch.
- Press the selection key for the auxiliary lift.
- Use the control rocker to select the direction of movement and speed.

NOTE

To avoid influencing and to maintain the damping control and soft transitions, the "auxiliary lift selection button" must always be selected first and then the control rocker moved.

Lifting/lowering the auxiliary lift, operation with load-side buttons*

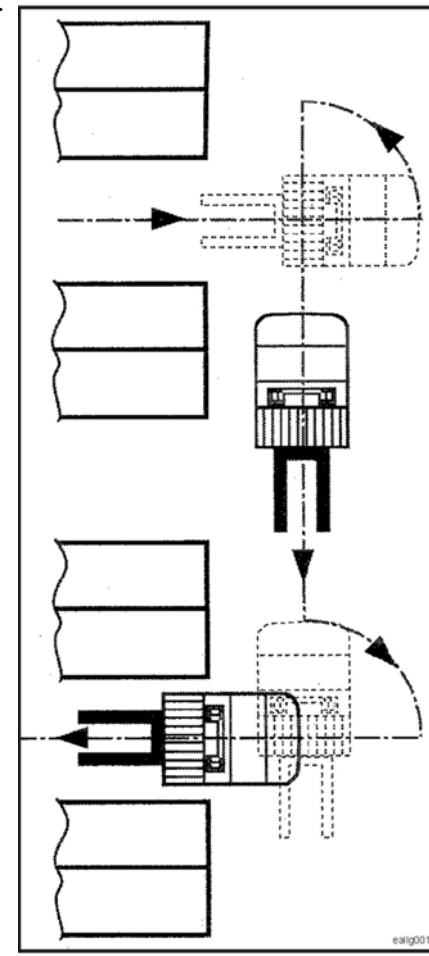
- Actuate the foot switch.
- Press the selection key.
- Press the lift button or
- the lower button.

Changing aisles

If the industrial truck is to be driven out of one aisle and into another, note the following:

- Before exiting an aisle, put the steering into the straight-ahead position.
- The full length of the industrial truck must first be driven out of the aisle.
- Exit the aisle slowly. Pay attention to people or other industrial trucks in the transfer aisles.
- When the industrial truck is outside the rail, the steering is activated again. The industrial truck can now be turned 90° on the spot and driven to the target aisle.
- If the truck is turned back 90° at the correct point, the industrial truck is in front of the new aisle, ready to move in.

The adjacent drawing illustrates how to drive when changing aisles.



Diagonal movement

The combination of driving and lifting functions or driving and lowering the cab lift is referred to as **diagonal movement**.

Diagonal movement is possible in **guided** and **non-guided** modes.

- Actuate the foot switch.
- Through deliberate movement of the operating lever and control rocker, the movements "driving forward/backward and lifting/lowering the cab lift" can be combined as required.
- Both movements are infinitely adjustable.

Load pick up

Picking up and setting down loads

Picking up a load

NOTE

*On this truck, a load is understood to be when loading equipment is picked up on the fork to collect items for order picking, as described in the section entitled **Intended use**. Loads may only be picked up and set down on flat and horizontal surfaces*

Drive the truck towards the loading equipment and insert the fork into the fork pockets provided. Insert the fork into the loading equipment until the load/loading equipment touches the back of the fork.

⚠ CAUTION

During this process, the load may be moved or even knocked over.

Make sure not to jolt the fork.

Setting down loads

– Carefully approach the place at which the load will be set down.

– Position the load as accurately as possible.

– Lower the load carefully until it rests securely on the supporting surface.

– Lower the fork until there is sufficient free space between the load and the fork.

⚠ CAUTION

Risk of damage to property

Do not place the fork on the supporting surface.

– Slowly drive the truck backwards so that the fork is removed from the loading equipment.

– Monitor this process closely. The fork position may be corrected by carefully lifting or lowering the fork.

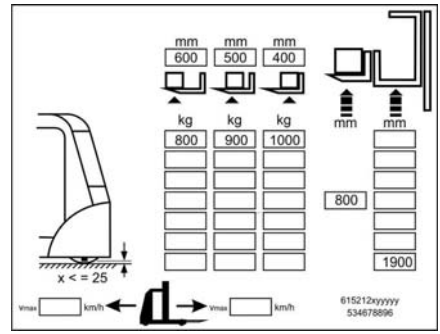
Load capacity diagram

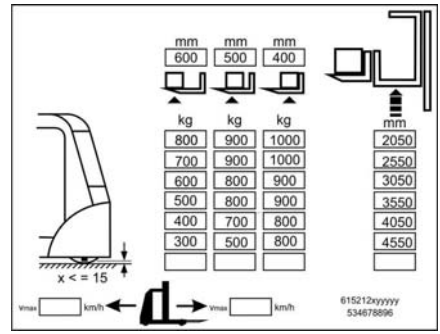
A load capacity diagram is mounted in the driver's cab. The load capacity diagram and the load capacity restrictions indicated for certain application conditions must be observed. If they are not observed, the stability of the industrial truck will be impaired.

This also applies, of course, to the increasing weight due to the picked goods.

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

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





Example: Simplex mast

Example for a truck with a low simplex mast

The lift height of the stand-on platform is max. 1900 mm

Distance between the load centre of gravity and the fork back

400 mm	Max. load 1000 kg
500 mm	Max. load 900 kg
600 mm	Max. load 800 kg

Example: Telescopic mast

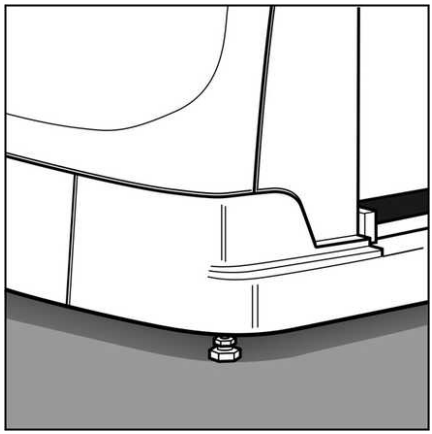
Example for an industrial truck with a high telescopic mast

The lift height of the stand-on platform is max. 4550 mm

Distance between the load centre of gravity and the fork back

400 mm	Max. load 800 kg
500 mm	Max. load 500 kg
600 mm	Max. load 300 kg

Support screws



The support screws for this type of industrial truck can be set to a ground clearance of between 15 mm and 39 mm. The setting dimensions for this special industrial truck can be found in the load capacity diagram.

If uneven ground in the travel range of the industrial truck causes problems due to the ground clearance being too low, the stability must be recalculated by the manufacturer. It will then be possible to increase the setting dimensions for the support screws if necessary.

The industrial truck will then be equipped with a new load capacity diagram on which the new setting dimensions will be indicated.

The support screws may only be adjusted by authorised service personnel.

⚠ WARNING

Risk of accident

The setting dimensions for the support screws must be checked every six months by authorised service personnel and must be adjusted if necessary.

Picking up a load

Before every load pick up, make sure that the load to be picked up does not exceed the truck's load capacity. The loads to be transported and stored must be packed securely so that the centre of gravity of the load cannot change during transport, and parts cannot fall. Also consider the safety of other people.

If very high loads that block the view of the roadway need to be transported, appropriate safety measures must be put in place

Discuss this with your safety officer.

Danger detected - danger averted!

Packages out of reach

As order picking work continues, it is possible that packages further back on the rack can no longer be reached from the driver's compartment without any aids.

⚠ DANGER

Leaning too far can cause the operator to lose their balance and fall out of the driver's cab.

- Leaning too far over the barrier is forbidden.
- Use suitable tools to bring the packages within the reach of the operator.

The operating company must provide the operator with suitable tools to enable the operator to perform order picking of packages without danger.

Lifting accessories

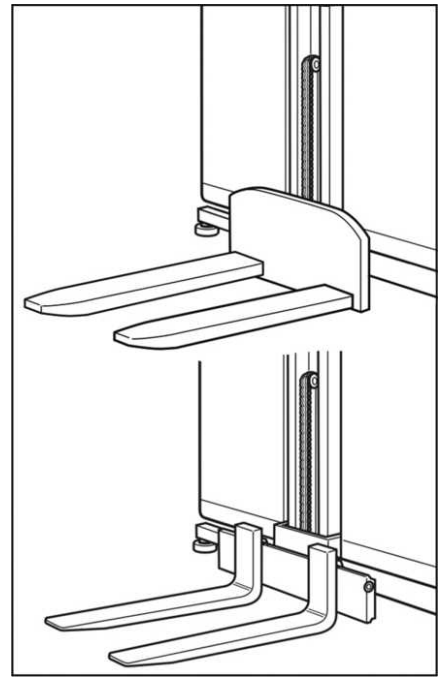
The wide range of applications for these order pickers requires an entire range of variants of driver's cabs and lifting accessories.

Customer-specific solutions are also often developed.

Where applicable, these **special versions** are described in specially prepared documentation.

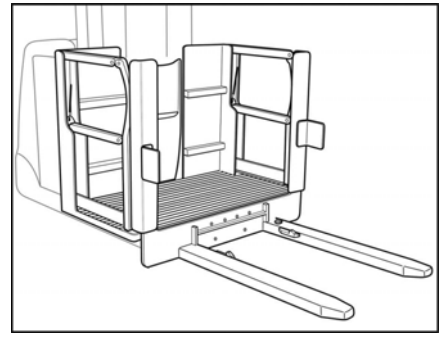
Further examples:

- Driver's cab with load-side auxiliary lift
- Driver's cab without load-side auxiliary lift
- Driver's cab with load-side barrier
- Driver's cab without load-side barrier
- Driver's cab with flanged order-picking platform, with or without additional barriers
- Driver's cab with locating devices for removable order-picking frame or removable order-picking cart
- Driver's cab with folding steps for bridging gaps between the rack and the driver's cab floor
- Tilting and lifting fork carriage



Welded fork

Forged fork



Accessible pallet (example)

Load pick up without guidance ▷

Order pickers are mainly intended for collecting or distributing goods in a container or on a pallet. When transporting loads, the auxiliary lift must always be lowered.

⚠ DANGER

Risk of tipping in the load direction

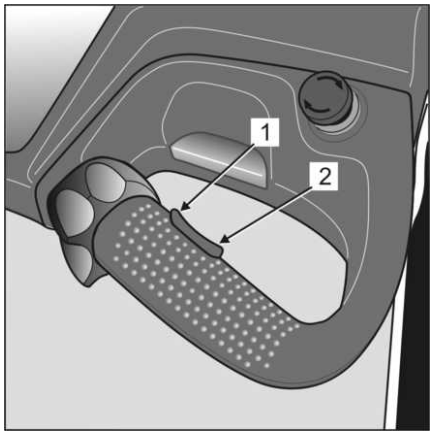
During picking work, goods for transport, and therefore weight, accumulates on the load support. Because picking is a manual process, the truck control unit cannot monitor it and therefore also cannot warn of overloading. The operator must ensure that the load capacity of the order picker is not exceeded during picking work.

⚠ DANGER

Risk of tipping to the side

Under no circumstances must the truck be driven round corners with a load raised further than just clear of the ground. At greater heights, only positioning movements at creep speed are permitted. The steering must be in a straight-ahead position.

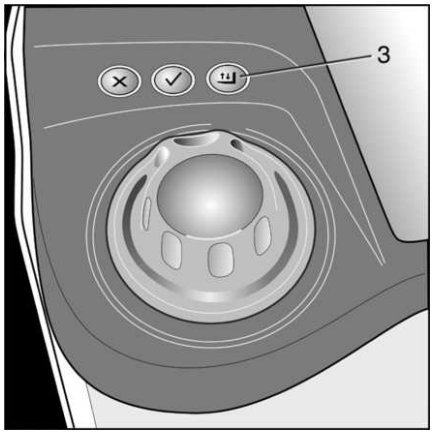
Actuate the right or left control rocker and steplessly raise or lower the driver's compartment.



1 continuously variable lowering
2 continuously variable lifting

Auxiliary lift ▷

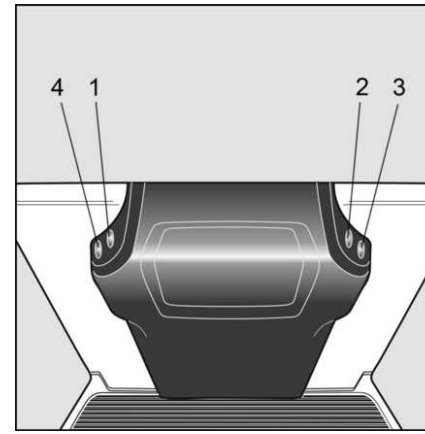
Press the button (3) and then actuate the control rocker using (1) for lowering or (2) for raising.



3 Auxiliary lift selection button

Auxiliary lift, load-side operation

These trucks can optionally be equipped with load-side operation for the auxiliary lift.



1 Auxiliary lift preselection
2 lifting
3 lowering
4 not assigned

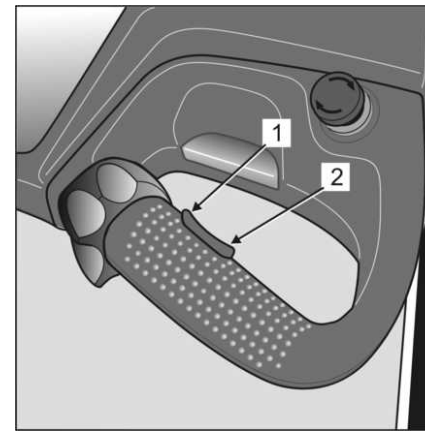
Load pick up with guidance

Order pickers are mainly intended for collecting or distributing goods in a container or on a pallet. When transporting loads, the auxiliary lift* must always be lowered.

⚠ DANGER

Risk of tipping forward

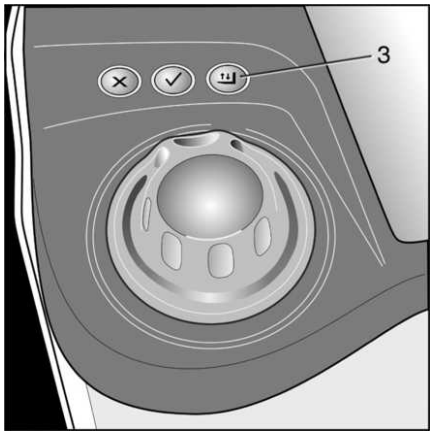
During picking work, goods for transport, and therefore weight, accumulates on the load support. Because picking is a manual process, the truck control unit cannot monitor it and therefore also cannot warn of overloading. The operator must ensure that the load capacity of the order picker is not exceeded during picking work.



1 Infinitely adjustable lowering. Simultaneously touch the steering knob or steering wheel.
2 Infinitely adjustable lifting. Simultaneously touch the steering knob or steering wheel.

Auxiliary lift

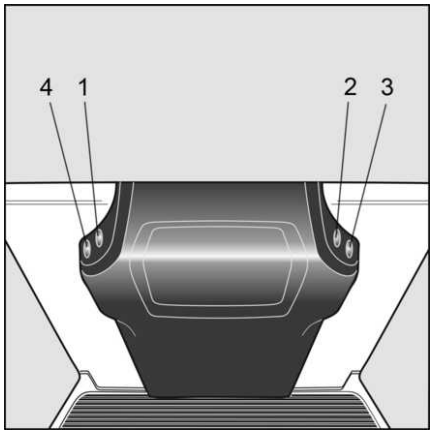
Before actuating the control rocker at (1) or (2), press the button (3).



3 Auxiliary lift selection button

Auxiliary lift, load-side operation

These trucks can optionally be equipped with load-side operation for the auxiliary lift.



1 Auxiliary lift preselection
2 lifting
3 lowering
4 Not assigned

Emergency operation

Emergency operation

If part of or the entire industrial truck control system fails, the industrial truck can be moved out of the working area in emergency operation.

Removing the hood

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

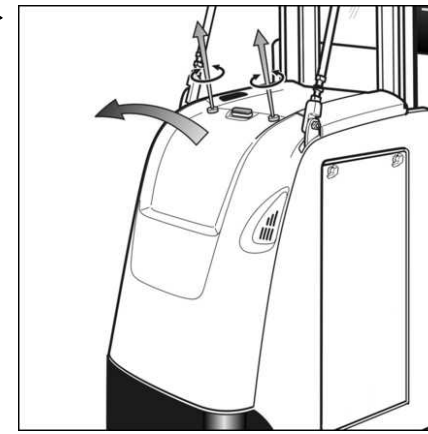
– Remove the two plastic screws. Turning anti-clockwise loosens the screws.

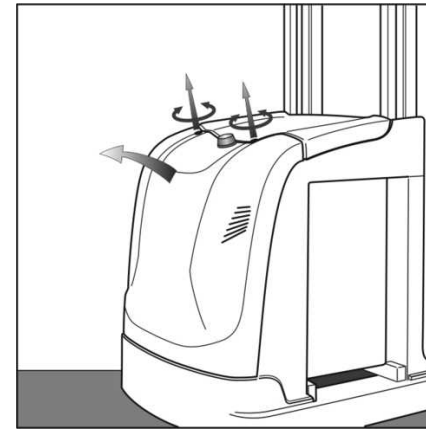
– Lift the hood up and out of the latch. Place it to the side. The hood is very light. It can be removed manually without any aids.

Proceed in the reverse sequence to fit the hood.

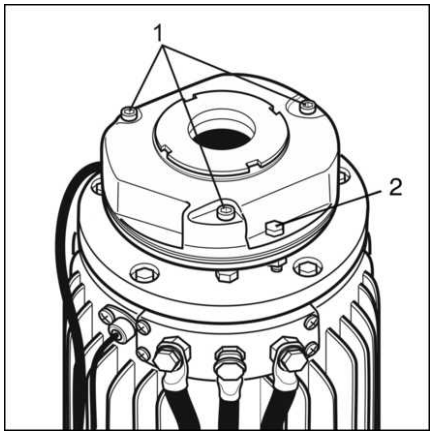
Carefully place the hood in its guide and lock.

Only tighten the plastic screws hand-tight.





Emergency ventilation of the brake ▷



⚠ WARNING

Risk of accident

If the brake has been mechanically disabled as described below, a suitable tow bar must be used for towing or a second vehicle must be coupled to the industrial truck so that it can take over the braking. If the brake was released mechanically, the brake must be checked for correct assembly and function when the industrial truck is recommissioned. The brake lining must also be checked for a clearance of approx. 0.4 mm.

1st option: Disassemble the brake blocks.

– Remove the three mounting screws (1)

– Place the brake blocks to one side.

2nd option: Tighten the brake anchor plate.

– Insert the two socket head screws or hexagon head screws (M4X25) and the corresponding M4 nuts and M4 washers (2) into the bores provided and tighten.

Towing, steering functioning

If the industrial truck's steering is still working and the brake is released, the industrial truck can be towed either with a rope or with the tow bar, as long as suitable lifting points can be found for the tow bar.

The following must be taken into consideration when doing so:

- Only tow at creep speed.
- There must always be a driver in the towed industrial truck.
- 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.

Towing, steering defective

If the steering has failed, the industrial truck can be towed using equipment such as steerable heavy-duty rollers. Depending on the

design, the heavy-duty rollers must be placed underneath the drive wheel or underneath the chassis. As the drive wheel does not come into contact with the ground when using this towing method, the brakes can also no longer operate. Therefore, please observe the safety information in the section entitled "Brake emergency ventilation".

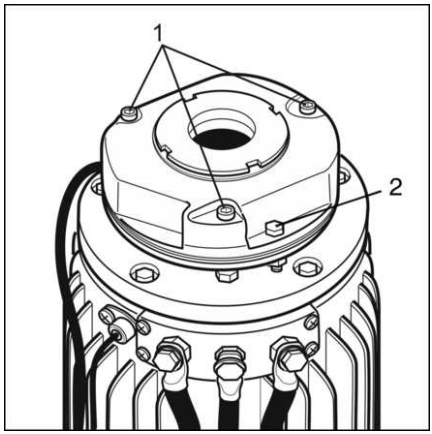
When attaching the truck in order for it to be towed with the **drive unit at the front**, guide a sling or rope that is of the appropriate length and that has a sufficient load capacity through the battery compartment and over the battery.

When attaching the truck in order for it to be towed with the **fork at the front**, loop a sling or rope that is of the appropriate length and that has a sufficient load capacity round the fork carriage.

NOTE

The lifting points and methods may vary for special versions of industrial trucks. If you have any questions, contact the authorised service partner.

Emergency steering ▷



⚠ WARNING

Risk of injury

Before the steering is activated manually as described below, switch off the key switch and disconnect the battery male connector. Secure the jacked-up industrial truck using support blocks or jacks.

⚠ CAUTION

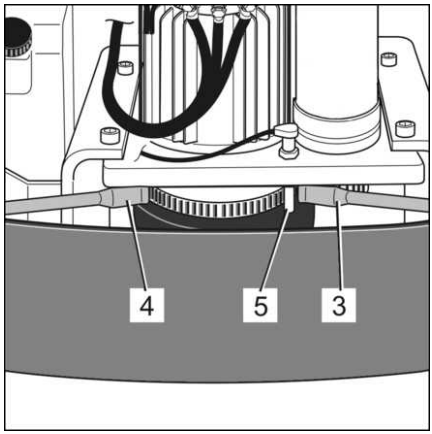
Risk of damage to property

Under no circumstances must the assembly lever be placed on the 0° sensor (5).

NOTE

If the industrial truck is jacked up high enough on the drive side, the steering can be turned with the help of an assembly lever. The cab must also be raised sufficiently so that it is not supported on the ground.

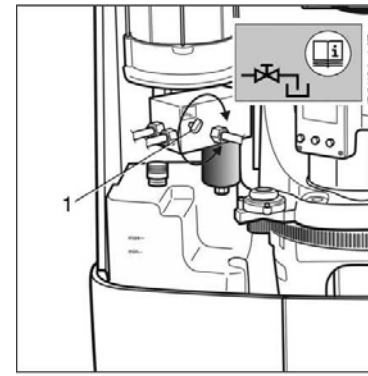
- Jack up the industrial truck. The drive wheel must be free of the ground.
- Obtain a suitable assembly lever. The assembly lever must have a rounded, smooth front edge.
- Cover the assembly lever with grease at the point of engagement.
- Turn the steering sprocket one tooth at a time using the assembly lever. Find suitable abutments for the assembly lever.
- If the steering is stiff, cancel the emergency steering and correct the stiff movement.

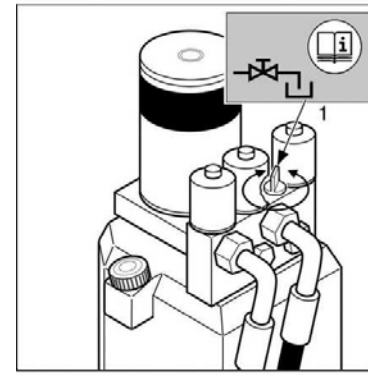


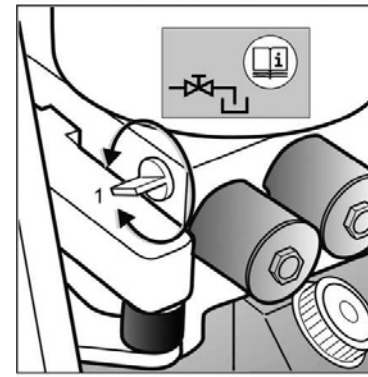
Emergency lowering valve ▷

NOTE

For this industrial truck type, a hand-operated valve is installed in trucks with a possible cab lift height of 3 m and above. This valve can be used to lower the lifted cab by a second person on the ground. To do this, turn the operating device (1) anti-clockwise by only a few turns. The emergency lowering valve is opened continuously. When the lowering procedure is complete, rotate this operating device (hand tight, without tools) clockwise to close the valve again.







Emergency lowering of the driver's cab

Leaving the driver's cab in an emergency situation

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

⚠ WARNING

Risk of injury

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

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

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

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

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

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

The operator must then be retrieved some other way. See **Emergency retrieval**.

Emergency retrieval may only be carried out by authorised specialist personnel.

⚠ DANGER

Emergency retrieval, risk of fatal injury from falling

If lowering the driver's cab with the emergency lowering valve is not possible, the operator can be lifted out of the driver's cab with an emergency retrieval.

Alternatives for emergency retrieval can be a second suitable turret truck, an elevating work platform or a height rescue.

Emergency retrieval may only be carried out by authorised specialist personnel.

Until the emergency retrieval team arrives, observe the operator in the driver's cab, look after them and provide them with everything they need.

Restarting after emergency lowering

⚠ WARNING

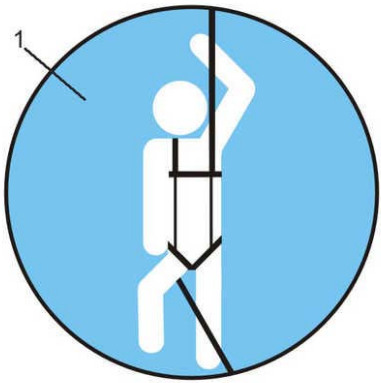
Risk of accident

If the emergency lowering function was required due to a technical defect, the industrial truck may be put back into operation only once the cause of the defect has been rectified by a specialist.

If, as described above, a mechanical jam of the lift mast is suspected, 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 subside. In such cases, the operator must be pulled out of the cab with an emergency retrieval, see **Emergency retrieval**.

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 must 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.
- See the operating instructions for the respective abseil system for the maximum permissible service life (replacement state of wear).
- 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.

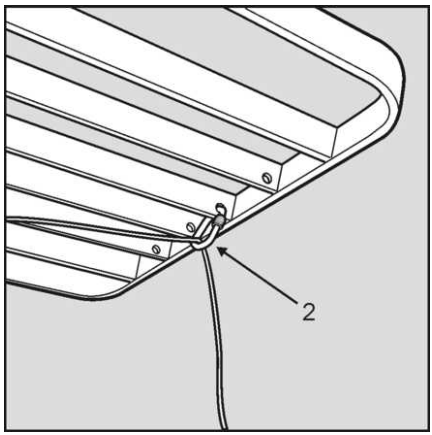
A figure-of-eight knot is tied on the other end to protect it from unthreading. This knot is secured with a cable tie.

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 snap hook in most versions of the overhead guard. This additional carabiner is attached to the safety harness chest eyelet area. To redirect the rope, the snap hook 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. During this time, only minimal use is permitted and the system must be stored in optimum conditions. See the operating instructions for the respective abseil

system for the maximum permissible service life (replacement state of wear).

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

Two-person cab

Industrial trucks that 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 lifting 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 lifting points approved by the manufacturer are used.

Parking, decommissioning

Parking and leaving the industrial truck

NOTE

It is the driver's duty to remove the switch key when he leaves the industrial truck, thus securing the industrial truck against unauthorised use. If the industrial truck is equipped with electronic access control, reset the access control and/or remove the medium for operating the access control. Where possible, the industrial truck should be parked at the start of an aisle or in a loading bay. If parking spaces are provided, park the industrial truck in a parking space. Lower the fork to the ground as far as possible to reduce the risk of tripping.

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

Securing the load carrier

⚠ WARNING

Danger for acidents

Before performing any work on the hydraulic system, depressurize by lowering the load carriage to the floor.

Before permitting any person into the area below the raised cab, a further mechanical safeguard such as a belt of sufficient loadbearing capacity slung around the mast cross-beams must be in position.

Removing the hood ▷

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

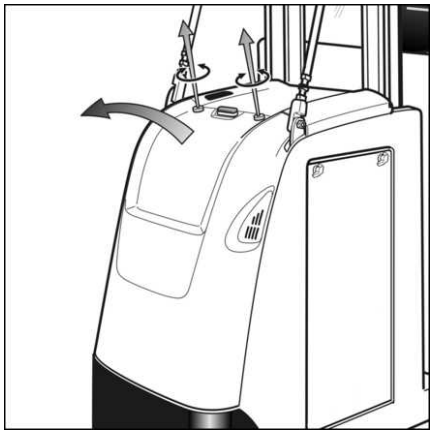
– Remove the two plastic screws. Turning anti-clockwise loosens the screws.

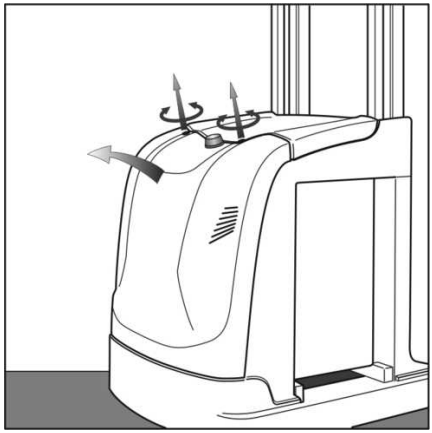
– Lift the hood up and out of the latch. Place it to the side. The hood is very light. It can be removed manually without any aids.

Proceed in the reverse sequence to fit the hood.

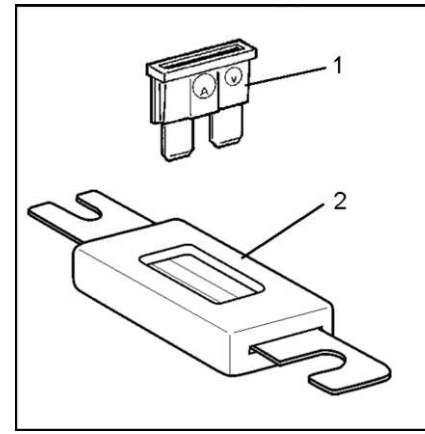
Carefully place the hood in its guide and lock.

Only tighten the plastic screws hand tight.





General information about fuses



If a fuse needs to be replaced:

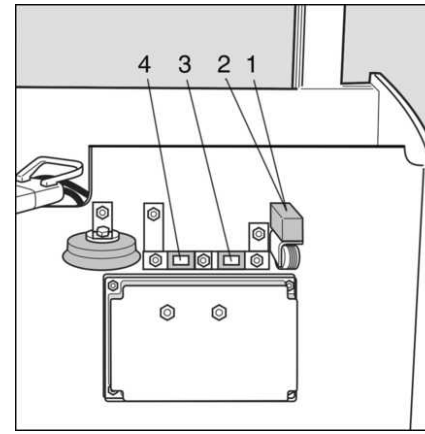
- Disconnect the system by pulling out the battery male connector
- Only use fuses that are identical in size and type
- The correct fuse values can be found in the truck-specific circuitry documents

(1) Control current fuse

(2) Primary current fuse

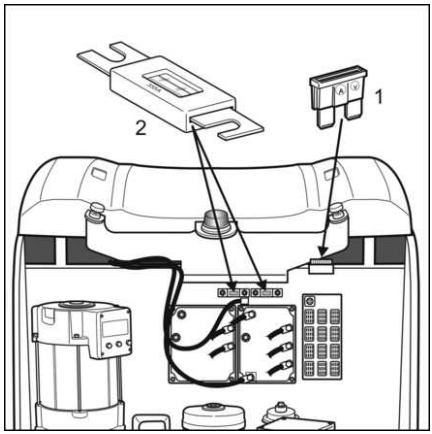
Fuses

Narrow chassis



1	F2	5 A	Control current fuse
2	F3	7.5 A	Control current fuse
3	3F1	35 A	Main current fuse for steering
4	F1	275 A or 355 A	Main current fuse for driving and hydraulics

Wide chassis



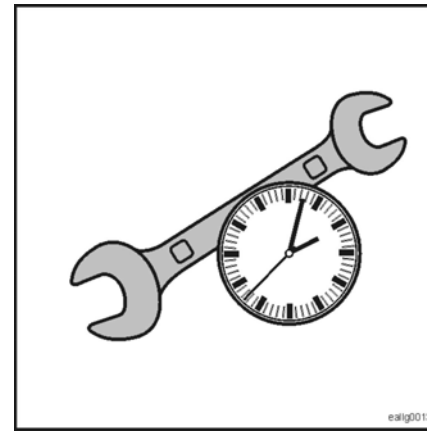
(1) Control current fuses

F2	7.5 A	Battery voltage
F3	7.5 A	Battery voltage
F4	10 A	Battery voltage
F5	10 A	24 V
F6	10 A	24 V
F7	5 A	24 V
F8	5 A	24 V
F9	5 A	24 V
F10	5 A	24 V

(2) Main current fuses

1F1	355 A or 500 A	Main current
3F1	35 A	Steering system

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 observed.
- 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 accident

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.

Special versions, special equipment

The technology used in special versions of industrial trucks or in industrial trucks with special equipment may mean that additional care and maintenance work is required. In some cases, the maintenance intervals will shorten as a result.

NOTE

Observe additional operating instructions as well as documentation from suppliers included in the scope of delivery.

Maintenance schedule, 1000 hours

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		✓	✖
General information											
Carry out the following test steps according to the truck version.											
In order to ensure occupational health and safety during maintenance work, these steps must only be carried out by qualified personnel.											
Qualified personnel are expected to use only equipment and tools that are suitable for maintenance work.											
Qualified personnel are expected to use only the latest documentation (workshop manuals) provided by the manufacturer.											
Preparatory tasks											
Industrial truck: clean 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.											
Drive unit: check the tightness of the screw connection to the chassis (ensure the appropriate torque).											
Traction motor bearings: check for operating noise.											
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 inspect the weld seams; use a dye penetrant procedure if you suspect there are cracks.											
Overhead guard: visually inspect for damage and deformations.											
Rail switches: 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.											

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 compartment door and battery compartment hood: check and adjust.											
Battery: check the lock and stops.											
Chassis frame											
Drive wheel: check the condition and check for wear and any foreign objects.											
Drive wheel, wheel nuts or wheel screws and cushion tyre: 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.											
Antistatic chain: 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.											
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 function.											
Reverse brake: check for correct function.											
Drive unit: check the thickness of the brake lining and check the condition.											
Load wheels: check the brake clearance by freewheeling.											
Load wheels: check the condition and thickness of the brake lining.											
Brake lining: blow out abrasion with oil-free air.											

Maintenance schedule, 1000 hours

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		✓	✖
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											
Operating devices: check the function and condition.											
Protective devices: check depending on the equipment.											
Information signs, warning signs, load capacity diagram: check that they are present and legible.											
Optional and additional equipment: check the function and condition according to the order.											
Electrics, electronics											
Check the condition of the battery cables, battery connectors and battery male connectors and check that they are securely attached.											
Battery cables: visually check the insulation.											
Battery: measure the battery voltage under load.											
Battery: measure the tray for short circuits.											
Battery: check the electrolyte level as far as technically possible.											
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 inspect the insulation.											
Contactor contacts: check the condition and check for erosion.											
Visually check the condition of the fuses.											
Fuses: check the values.											
Heat sink and fan: check for free air supply, clean if necessary.											
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.											

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		✓	✖
Hydraulics											
Check the oil level in the hydraulic system 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 end lift cut-out: check the condition and function.											
Lift cylinder: check the mounting.											
Lift cylinder: visually check bearing points and their weld 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 the lubricating nipples provided.											
Lift mast rollers: check the condition and check the setting.											
Guide elements: check the lateral play.											
Guide elements: lubricate with all-purpose grease.											
Adjustable load fork: check the condition and function of the latches.											
Visually check the load forks 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, 1000 hours

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		✓	✖
Accessible pallet, order-picking platform											
Mechanical components: check for condition and deformation.											
Electrical components: check shutdown functions.											
Force application points: visually check the weld seams and screw connections. If you suspect there are cracks, check using the dye penetration test procedure.											

2000-hour 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 hrs).												
Hydraulics												
Hydraulic system: replace the breather filter of the hydraulic oil tank.												
Hydraulic system: oil change.												
Final tasks												
Test drive: check all functions and special functions according to the order.												
Service adhesive label: attach.												

Lubricants

⚠ CAUTION

Risk of damage to property

- Use only the specified lubricants or their equivalents. If necessary, confirm that the lubricant is an equivalent with the lubricant supplier.
- Industrial trucks for cold-store operation must be lubricated using different lubricants. Observe the additional operating instructions for cold-store trucks.
- For industrial trucks used in the food industry, there may be food-safe lubricants specified for the place of use. Observe additional specifications applicable to the place of use.
- For all lubricants used, follow the instructions supplied by the lubricant manufacturer.

Hydraulic system

Refilling hydraulic oil is a **regular care task** and can be carried out by the operator or the workshop staff at the operating company.

Changing the oil in the hydraulic system is a **maintenance task** and must only be carried out by appropriately trained specialist personnel (authorised service).

The maximum tank size and the filling quantity depend on the configuration of the industrial truck. For tank size and filling quantity

specifications, refer to the service documentation (workshop manual).

- Hydraulic oil HLP46 DIN 51524/T2
- Mat. no. 7327 400 112

⚠ CAUTION

Risk of damage to property

– Observe the min/max markings on the hydraulic tank.

After the hydraulic oil has been topped up or changed, the oil level must be between the min marking and the max marking.

The correct filling level can only be seen when the load support is completely lowered.

Gearbox

Changing and **refilling the oil** in the gearbox is a **maintenance task** and must only be carried out by appropriately trained specialist personnel (authorised service).

Information on the filling quantity can be found in the service documentation (workshop manual).

The filling quantity of the gearbox depends on the configuration of the industrial truck.

The maximum filling level is the bottom edge of the refill hole.

- Castrol alphasyn EP150
- Fuchs Renolin Unisyn XT150
- Mat. no. 7326 000 019 (200 l container)
- Mat. no. 7326 000 029 (5 l container)

Grease lubrication points

Relubricating is a **regular care task** and can be carried out by the operator or the workshop staff at the operating company.

- Multi-purpose grease (e.g. lithium soap grease LITH-EP2)
- Mat. no. 7337 500 200
- Mat. no. 0170 761 (100 g tube)

Load chains

Relubricating the load chains a **regular care task** and can be carried out by the operator or the workshop staff at the operating company.

Cleaning heavily contaminated load chains is a **maintenance task** and must only be carried out by appropriately trained specialist personnel (authorised service).

- High-performance chain spray

Shaft-hub connection

Depending on the type of gearbox used (configuration of the industrial truck), it may be necessary to replace the lubricant in the shaft-hub connection between the gearbox and the traction motor at a specified interval.

Replacing the lubricant in the shaft-hub connection is a **maintenance task** and must only be carried out by appropriately trained specialist personnel (authorised service).

Lubricant

- Klüberplex BEM 34-132
- Mat. no. 7339 300 003

equivalent

- Molycote BR2

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.

Lithium-ion batteries

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

6

Technical data

Technical data

The technical data for this truck depends on the order. You will therefore receive a data-sheet 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 61dB(A)

Eco-design requirements for electric motors and variable speed drives

All motors in this industrial truck are exempt from Regulation (EU) 2019/1781 because these motors do not meet the description given in Article 2 "Scope", Item (1) (a) and because of the provisions in Article 2 (2) (h) "Motors in cordless or battery-operated equipment" and Article 2 (2) (o) "Motors designed specifically for the traction of electric vehicles".

All variable speed drives in this industrial truck are exempt from Regulation (EU) 2019/1781 because these variable speed drives do not meet the description given in Article 2 "Scope", Item (1) (b).

7

Options

Additional documentation

The options that can be ordered according to the price list are described below. Some options are self-explanatory and can be operated intuitively and safely without a description.

Other options, on the other hand, require extensive documentation. If an industrial truck is equipped with such options, the corresponding documentation will also be supplied.

Such extensive options include:

- Navigation (iGo pilot navigation)
- Aisle safety assistant (GSA)
- Aisle entry assistant (GEA)
- On-board charging system
- Cold store version
- etc.

Industrial trucks in customised special versions (CO = customer option) will be supplied with an additional description of these special versions, if necessary.

NOTE

Some options are only available for certain truck types or truck configurations.

Options, enabling - Options, retrofitting

Options completely installed in the factory are also completely commissioned in the factory. If only retrofit preparation options are ordered (e.g. see the section entitled "Modified load pick up"), certain functions may be disabled for safe use.

Enabling

Some options require little or no mechanical modification. A new truck configuration file is not then required.

The following options can be enabled:

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

Retrofitting

Some options require considerable mechanical retrofitting and mostly adaptations in the software.

Certain options can therefore 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.

Inductive guidance IZF ▷

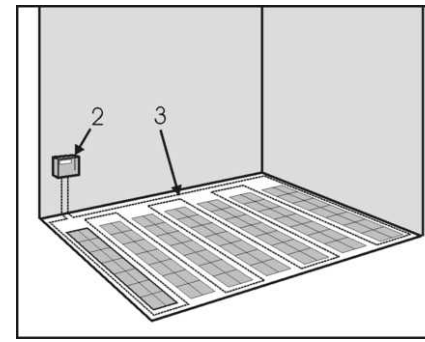
System description

General

If your industrial truck is guided using inductive guidance, the shift button (1) must be pressed before the truck is guided onto the induction track and before leaving the track. This switch in the operating panel is used to switch from manual steering to automatic steering. All other operation processes correspond to the standard industrial truck.

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. A computer drives the industrial truck along the wire groove after the signals are analysed. Extensive safety circuits and a diagnostic program simplify system servicing work. The operating devices for inductive guidance are integrated into the operating panel. The operating status display indicates the active operating status (4) of the system. After switching on the control system, a self-test runs in the guidance system.

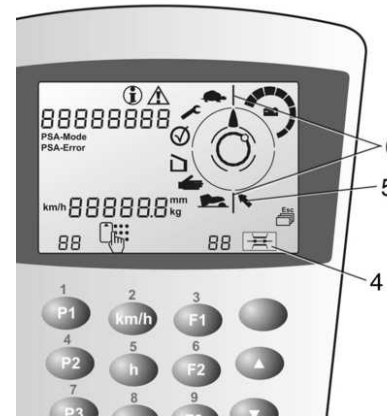




Entering the aisle

Guidance procedure

- Drive the industrial truck towards the wire groove (induction track) and stop in front of it.
- 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 "man/auto" button (1).
- The "wire search" symbol (5) begins to flash.
- 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 sounds.
– The two symbols (6) are lit continuously.
– Continue. The industrial truck is driven automatically along the centre of the wire groove.
– When both antennas detect the induction track, the wire search is finished and the symbol (4) is continuously lit.
– The truck can now be driven at the permissible speed within the racking.

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.

Entering the aisle

– Drive the industrial truck 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.

Automatic driving within the aisle

If the steering knob is turned accidentally out of its straight-ahead position (middle stop) during automatic drive 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, it is immediately braked to a standstill. It is then only possible to continue at creep speed.

Driving speed adaptation

Through automatic speed adaptation, the maximum possible driving speed is adjusted between 2.5 km/h and max. 9 km/h, according to the situation. If an unsafe situation arises,

for example an error, the driving speed is limited or driving is switched off completely.

Leaving the induction track



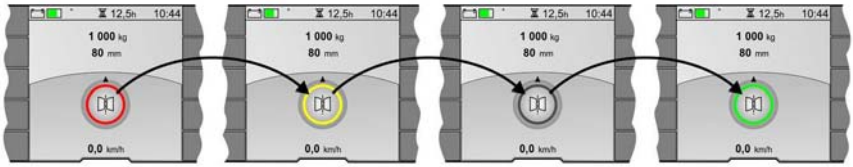
- Drive the entire length of the industrial truck out of the aisle.
- Turn off automatic steering by pushing the "man/auto" button (1) again.
- The industrial truck is braked automatically.
- An acoustic signal sounds.
- Drive the industrial truck away from the wire groove using manual steering. The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

Inductive guidance IZF - LCD display with keypad

Guidance procedure





The system description and the basic description of operation can be found in the general chapter **Inductive guidance IZF**.

NOTE

– Set the steering to the straight-ahead position.

– Select automatic steering by pressing the "man/auto" button (1). The coloured ring around the "guidance status" symbol goes red. The wire search starts. The industrial truck can be moved freely in the direction of the wire groove.

– 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. Manual steering is deactivated. The coloured ring around the "guidance status" symbol changes colour from red to yellow.

– Continue. The truck is driven automatically along the centre of the wire groove. As soon as both antennas are near the induction track (30...15 mm), the coloured ring changes from yellow to grey.

– When the guidance procedure is complete (antenna distance 15...0 mm), the coloured ring changes from grey to green.

– The truck can now be driven at the permissible speed within the racking.

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.

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" button (1) 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.

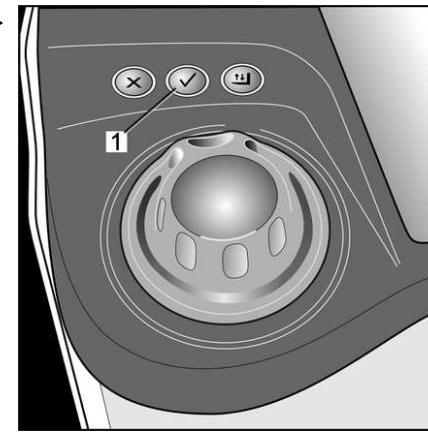
Inductive guidance IZF Operating panel variants

NOTE

This industrial truck can be optionally equipped with various operating panels and displays. As a result, operation and displays vary. Refer to the applicable sections for the appropriate information.

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 necessary if the industrial truck is used in two (or three) buildings of different height, 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.

Traction cut-out

The traction cut-out can be combined with the intermediate lift cut-out. This cut-out can be overridden once the enable button has been pressed.

NOTE

As an option, this function can also be modified so that it is necessary to press and hold the enable button in order to continue driving. The traction cut-out can also be implemented in designated areas of the storage area regardless of the lift height. However, this requires additional sensor systems. See the order for customer-specific details.

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, in the same way as 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 automatic braking (ZAG)** option.

Entering the aisle

The truck is driven along the guide wire outside of the racking, according to the **Entering the aisle** 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 guidance must be deselected by pushing the man/auto button.

Electronic access control

A push button is installed for this option instead of the key switch. The operating panel controller is switched on by pressing this push button. The display then prompts you to enter the 5-digit PIN code. This PIN code is programmed in the controller and is entered via the keypad.

If the PIN code is entered correctly, the controller is switched on and the industrial truck is ready for operation. If the PIN code is not entered correctly, it must be entered again.

Defining the PIN code
Changing the PIN code

The PIN code can be changed so that each industrial truck has an individual access code. To do this, an authorised person, e.g. the authorised service centre, can select the required PIN code from a code list stored in the controller. This coding process is covered in a separate description.

Incorrect PIN code entry

If an incorrect PIN code is entered, the buzzer will sound on the operating panel. If an incorrect code is entered five times in succession, the industrial truck switches off automatically.

Switch off the truck control unit, switch it on again and try again.

Automatic braking systems

Automatic braking systems ensure operational safety. They make it easier for the operator to pay better attention to on-site restrictions and specifications due to the work process. Automatic braking systems therefore also make an important contribution to increasing handling performance.

In principle, the design of the automatic braking systems can be adapted to the customer's requirements. The exact function must therefore be obtained from the order.

A sensor system mounted on the industrial truck forms the basis for reliable detection of the areas (zones) in which the truck must brake or stop. See also the section entitled **Overview of the sensor system**.

⚠ CAUTION

Automatic braking systems are assistance systems for the operator. They do not exempt the operator from a duty of care.

⚠ DANGER

Danger to life and risk of significant damage to equipment due to malfunctions

Changes to the sensor system must only be carried out by authorised service personnel. Every time the racking is modified, assistance from authorised service personnel is required. It is vital to check whether the planned modifications have a negative impact on the functionality of the automatic braking systems. In particular, this includes changing the geometric dimensions, such as adding or removing uprights. During any repair work, it is vital to check whether the sensor system for aisle detection or zone detection is affected. The sensor system may need to be adapted to the modified dimensions. To maintain the functionality of these systems, it is important to observe the information given in the system descriptions.

Aisle detection
Zone detection
Distance measurement

General

Sensors installed in the industrial truck are used for aisle detection, zone detection and

distance measurement. In racking, there may be areas in which the functions of the industrial truck need to be restricted or locked. Such areas include those in which the truck must brake or even stop for occupational safety reasons, e.g.

- In the direction of the open or closed ends of aisles
- Areas in the storage area with lower ceilings (false ceilings, mezzanines)

Zones

A distinction is often made between the following zones with different functions:

- Outside the aisles (transfer aisle)
- Braking zone before leaving an aisle. In the case of aisles that are open on both sides, there may be one of these zones at both ends.
- Braking zone before a wall if the aisles are closed at one end.
- Rapid travel zone. The area within an aisle between the braking zones at the ends of the aisles.

By means of programming, the driving speed can be limited to a different value in each of the zones mentioned.

A waiting period can be programmed after each braking (time stop).

In principle, enabling can be blocked for each function.

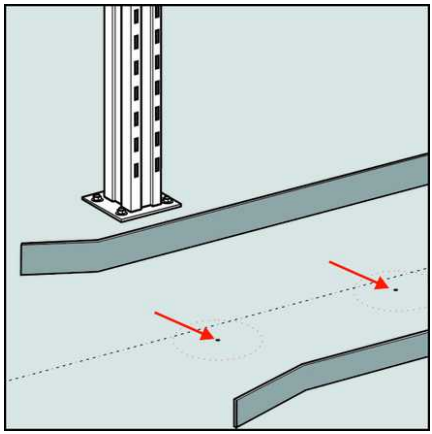
The automatic braking systems are often combined with lift height restrictions.

Zone detection

The zones are identified by a sensor system that is either attached to the rack or embedded in the hall floor. Optical, inductive, magnetic and radio-based systems are used.

In principle, the customer decides which sensor system is best suited for the racking and is therefore used.

RFID technology

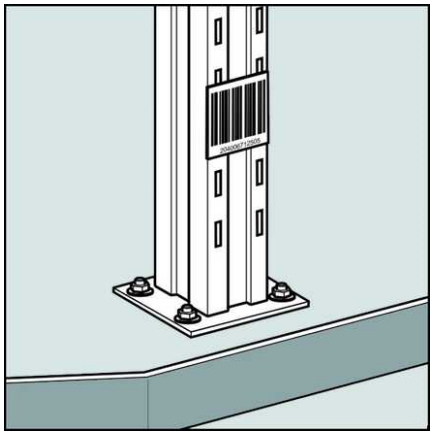


The RFID transponders are embedded in the hall floor. They are located in approx. 8 mm holes slightly outside the centre of the aisle at different intervals. The RFID writing/reading device is mounted on the load wheel axle under the driver's cab or under the battery compartment. The RFID transponders are maintenance-free.

– Keep the aisle clear of objects.

The RFID system is also used for distance measurement in order to position the industrial truck in the aisle.

Barcode

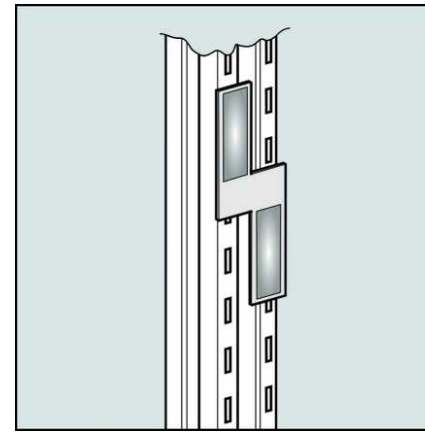


Barcode scanners fitted on the industrial truck read the barcode labels in both drive directions while the truck is in motion. The barcode labels are attached to the uprights approx. 50 cm above the floor. The scanners can be attached to the industrial truck and the labels to the rack on one or both sides.

– Do not cover or adjust the barcode scanners.
– Check the barcode scanners for contamination.
– Check the barcode labels for contamination and legibility.
– Do not cover barcode labels, e.g. with loose packing material.

The barcode system is also used for distance measurement in order to position the industrial truck in the aisle.

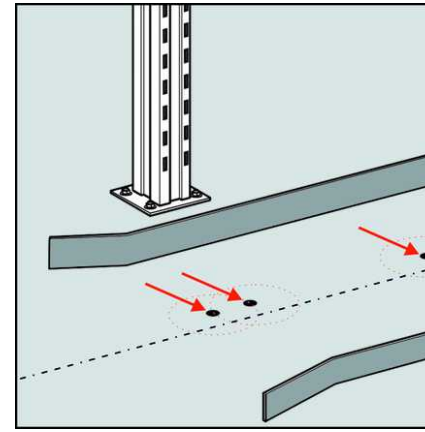
Reflective light switches and reflectors ▷



Reflective light switches attached to the industrial truck detect the reflectors in both drive directions while the industrial truck is in motion. The reflectors are attached to the uprights approx. 170 – 200 cm above the floor. The reflective light switches can be attached to the industrial truck and the reflectors to the rack on one or both sides. The number of reflectors is determined by the functionality in the industrial truck.

– Do not cover or adjust the reflective light switches.
– Check the reflective light switches for contamination.
– Check the reflectors for contamination and damage, such as scratches.
– Do not cover the reflectors, e.g. with loose packing material.

Magnetic system ▷



The switching magnets are embedded in the hall floor. They are located in approx. 35 mm holes slightly outside the centre of the aisle at different intervals. The magnet operated switches are mounted on the load wheel axle under the driver's cab or under the battery compartment. The number of switching magnets is determined by the functionality in the industrial truck. The switching magnets are maintenance-free.

– Keep the aisle clear of objects.

Personal protection system STILL PSA

The personal protection system **STILL PSA** is a proprietary development by the Group.

The purpose of mobile personal protection systems is to protect people who have entered the braking area of the truck without warning. 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).

Description

If an industrial truck has been equipped with **STILL PSA**, separate operating instructions are also supplied. These contain all the necessary information for operation and maintenance. The documentation of the scanner manufacturer, for example, must also be observed.

NOTE

Missing operating instructions can be reordered via the authorised service centre.

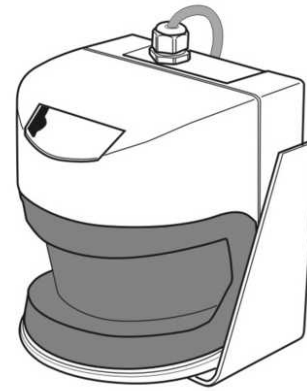
Other manufacturers

Alternatively, our industrial trucks can also be equipped with personal protection systems from other manufacturers.

The industrial truck may also have been factory-prepared for the later installation of a PSA.

For further information about this, please see the following sections.

Personal protection system (MPSE) ▷



The purpose of mobile personal protection systems is to protect people who have entered the braking area of the truck without warning. 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 when a personal protection system is in use, ex works we do not permit people and our very narrow aisle trucks to be in the same aisle at the same time in accordance with intended use. The manufacturer provides a maximum of safety category 2.

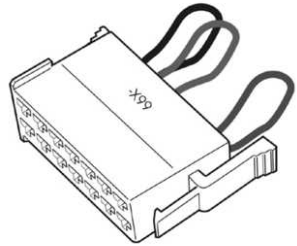
NOTE

The makes of mobile personal protection systems approved by the truck manufacturer are not identical in terms of functions and options. For all information about operation and maintenance of the personal protection systems, see the corresponding manufacturer's documentation.

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 failure of the industrial truck.

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

When a bridging plug is fitted, all safety functions of the MPSE are deactivated and the maximum driving speed of the industrial truck limited to 2.5 km/h. Therefore, the truck may only be operated with a bridging plug during retrieval operations. This bridging plug must be kept locked away by the warehouse manager responsible and its use is permitted only by the instruction of this warehouse manager.

Safety laser scanner

The laser scanners that are used in personal protection systems are highly sensitive optoelectronic sensors. They are well protected in the contour of the industrial truck.

When the load-side scanner is covered by the driver's cab when in the lowered position. For this reason, the industrial truck drives at a maximum speed of 2.5 km/h when the driver's cab is lowered. Personal protection is ensured by the low speed and the attention of the operator.

The drive-side scanner is located behind the control compartment hood. The scanner can monitor the roadway through a wide slot.

⚠ CAUTION

Functional impairment

- Observe the operating instructions provided by the scanner manufacturer.
- Observe cleaning instructions.
- Do not adjust the scanner or cover the openings.

Personal protection system, preparation

Preparation for immediate installation

With this option, industrial trucks are prepared for installation of a personal protection system.

The customer will have already specified the manufacturer of the MPSE. The brand-specific cable harnesses and mechanical support mountings will therefore be installed at the factory. The actual controller and sensor systems must be completed at the customer's site in time for commissioning. Until this point, the driving speed is limited to 2.5 km/h. This limitation is removed once the personal protection system has been installed by the authorised service centre.

⚠ CAUTION

Risk of accident

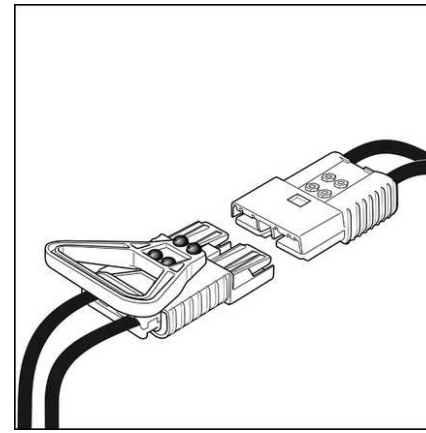
If the personal protection system is not fully installed and commissioned, the "personal protection" and "collision protection" functions are not enabled. In this condition, the intended use of this industrial truck is not possible or permissible.

Preparation for later installation

With this option, only the mechanical components for installation of laser scanners are included in the scope of delivery. The standard interface in the X99 industrial truck for connecting a personal protection system is also available. However, the functionality of the industrial truck corresponds to the standard version.

Other battery male connectors ▷

Battery connectors from other manufacturers are available as an option.



⚠ WARNING

Risk of damage to property, risk of accident, risk of short circuit

If the operator modifies the factory-supplied battery connection, this must be checked for fitness and compliance with the required specifications for the intended location of use by a qualified person before being recommissioned.

Minimum requirements

Approval for the applicable voltage

Minimum required cross-section

Sufficient cable length

Sufficient flexibility of the cable material used

Appropriate method of fixing cable connections and plug housings

If you have any questions about the suitability of battery connectors that are not supplied by the factory, contact the authorised service centre.

Battery on a roller channel

Alternatively, the battery rests on roller channels* and can be installed and removed from the side using a battery change frame*. Pre-assembled plates* with clamping screws secure the battery against rolling out to the side. The presence of the pre-assembled plates is electrically monitored*.

* Option

⚠ CAUTION

Risk of accident and damage to property

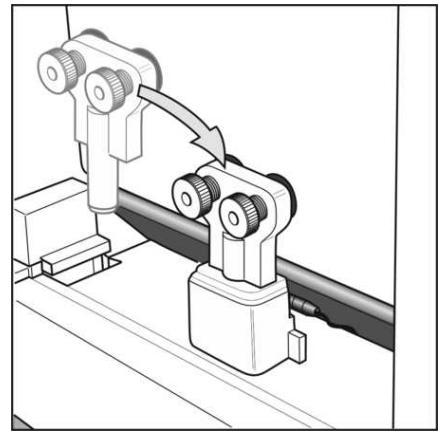
- Before starting work, check that the battery lock is in good working order and that it functions correctly and ensure that the clamping screws are secured in place.
-
- An improperly fixed battery may fall out of the industrial truck during cornering and put people and property at risk.
- If the battery cannot be clamped securely, the responsible service centre must be called. Further operation with a incorrectly or improperly clamped battery is dangerous.

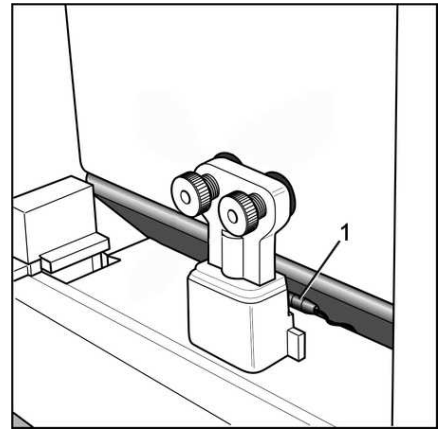
Variants

Depending on the type of chassis, different types of locks are used.

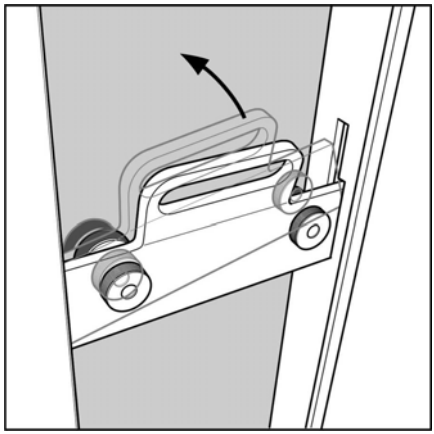
Battery lock for wide chassis

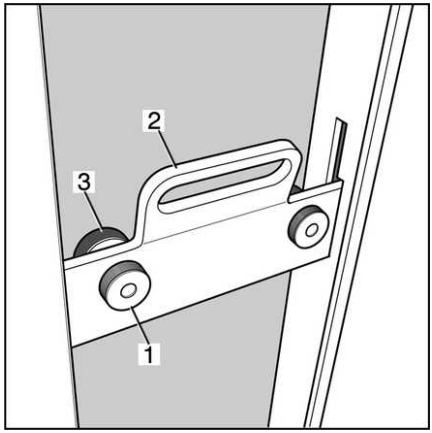
The battery lock is electronically monitored (1). If this monitoring function detects an error, the driving speed of the truck is limited to 1 km/h and an error message appears on the display.





Battery lock for narrow chassis ▷





Installing the battery lock

The locking plate (2) is inserted into the side openings with the clamping screws (1) open. After the clamping screws are tightened, the rubber buffers (3) press against the battery tray.

Removing the battery lock

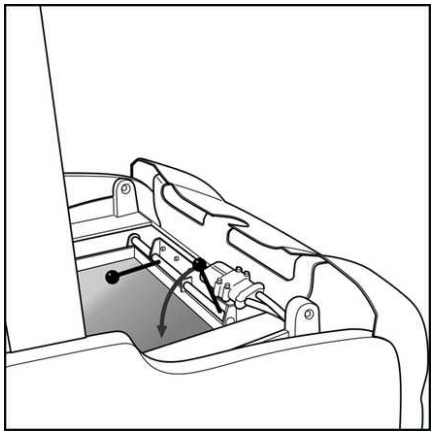
– Loosen both knurled-head screws by turning them anti-clockwise (1).

– Grasp the locking plate (2) by the handle. Press towards the battery slightly. Then remove it upwards in a turning movement.

Internal battery lock

With this type of chassis, the battery is secured with a lock located above the battery. To lock the battery securely, push both levers downwards.

▷



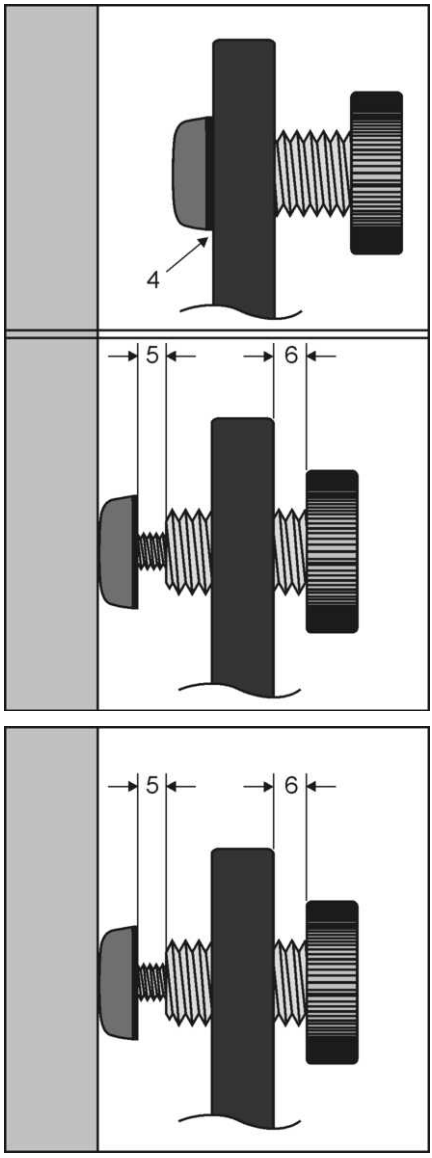
Adjusting the clamping screws

To ensure the operational safety of this industrial truck, the traction battery must be securely fixed in place in the battery compartment by means of clamps. To achieve this, the industrial 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 thread of the rubber buffer (spring element) does not move smoothly, it must be loosened before the setting is defined.

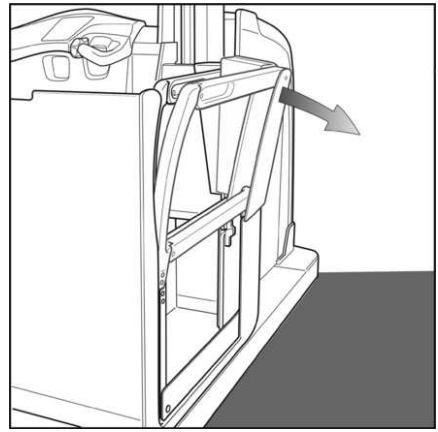
- Insert the battery approximately in the centre of the battery compartment. In doing so, one of the battery locks will remain as a stop in the industrial truck.
- Rotate the knurled-head screw and the rubber buffer all the way back on all the locks (4).
- Insert the second battery lock into the industrial 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 usable threads on both rubber buffers are not long enough to fasten the buffers to the battery, screw the knurled-head screws in to further increase the adjustment range. At the same time, the rubber buffers must rotate with the knurled-head screws.
- Tension can now 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 probable that a battery with incorrect dimensions is being used. The industrial truck must not be used if the battery is not securely locked. The consequences would be a risk of accident and damage.
– When the clamping has been carried out, part of the thread must still be visible at (5) and (6).

Tilt barrier

Description

▷ 

When the driver leans on the tilting order picking barrier, it 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 is no longer leaning on the tilting order picking barrier, the barrier 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 barriers are closed
- The sensors for the second hand are not actuated
- The operating levers for driving/hydraulics are in the neutral position
- The foot switch is not actuated
- The driving speed v is < 0.1 km/h

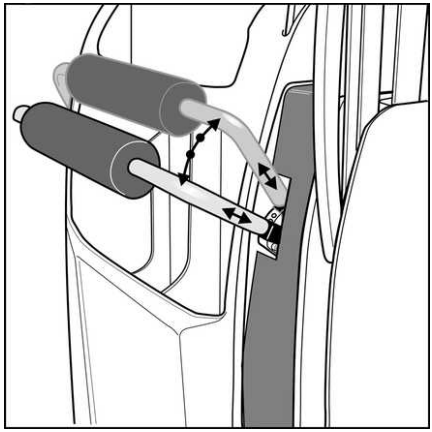
The barrier will be locked if:

- One of the barriers is opened
- The foot switch and the drive operating lever is actuated
- The main lift function is selected

NOTE

If one of the two barriers is opened and then closed again, the tilting order picking 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.

Leaning cushion



When driving in the load direction, the operator is able to lean on this cushion. By doing so, the operator can adopt an ergonomic position.

Adjusting

The cushion can be latched into four positions.

– Using both hands, pull out the leaning cushion on the metal bracket against the spring force.

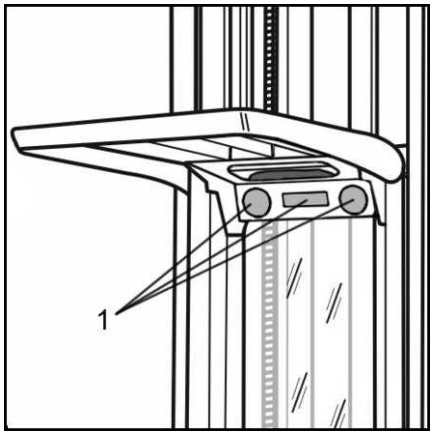
– Latch the leaning cushion back into the required position.

More upholstery

Additional upholstery is available to improve ergonomics during intensive picking work:

- Padding on the load-side edge of the railing,
- Knee pads on the front wall of the driver's cab,
- Padded barriers.

Radio installation



Industrial trucks can be **prepared** in the factory for the installation of a car radio (1).

The preparation consists of:

- Console underneath the overhead guard with two built-in loudspeakers.
- Standard installation slot for the installation of commercially available car radios
- Rod antenna on the overhead guard
- 12 V voltage transformer

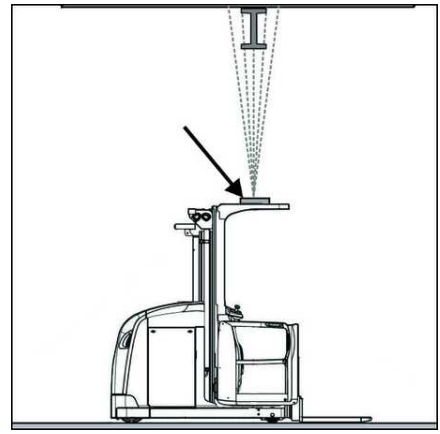
⚠ CAUTION

Risk of accident

The operator's attention may be limited by sound from a radio or playback device, especially if the volume is particularly loud.

The use of sound devices is allowed only if permitted or tolerated by the responsible operating company.

Overhead guard switch ▷



The overhead guard switch fitted on the overhead guard can detect obstacles above the overhead guard using its ultrasonic sensor. If it detects an obstacle, further lifting and thus a collision between the driver's cab and the obstacle is prevented. It is not possible to override this function.

The ultrasonic sensor can be adjusted by the authorised service centre.

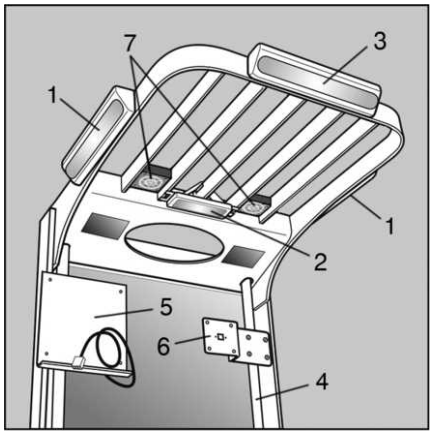
NOTE

Only obstacles that are directly above the overhead guard are detected. Obstacles in the drive direction or to the side are not detected.

NOTE

The overhead guard switch is one of the operator's assistance systems. The operator is responsible for working safely with the industrial truck.

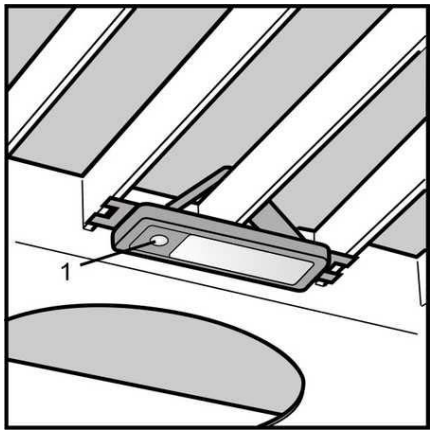
Driver's compartment options



The driver's compartment can be optionally equipped with various additional functions. This enables the functionality to be optimised for the application area in question.

- (1) LED headlights on the side for illuminating the order-picking stations on the rack, switched via switches in the lamp housing.
- (2) Workplace light: LED headlights for illuminating the operating devices in the driver's cab, switched via switches in the lamp housing.
- (3) LED headlights on the load side for illuminating the order-picking stations on the rack, switched via switches in the lamp housing.
- (4) Rod system for fitting upgrade components.
- (5) Assembly baseplate for printer, optionally with power supply.
- (6) Assembly baseplate for terminal or display, optionally with interface plug.
- (7) Fan

Workplace light



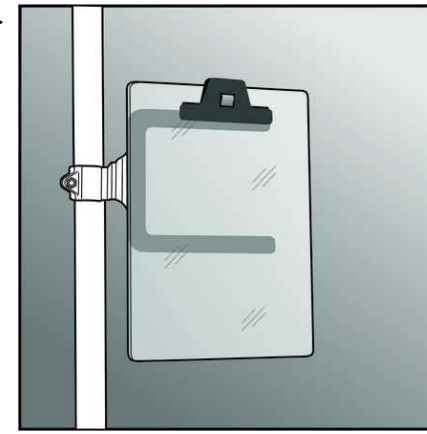
When the truck control unit is switched on, the workplace light can be switched on and off using the push button (1).

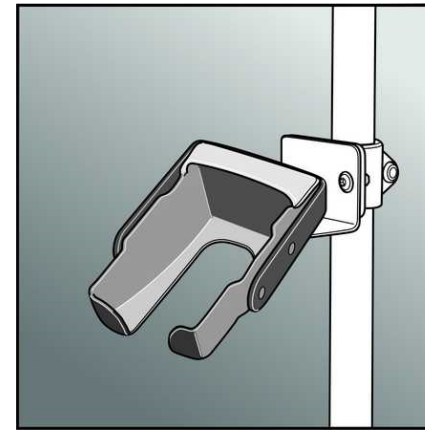
Mounting system for auxiliary components ▷

The driver's cab can be equipped with a system consisting of rods and support mountings in order to mount additional components. These can either be installed at the factory or retrofitted by the customer.

Additional components may include:

- Writing surface with letter clip
- Storage area for barcode scanner gun
- Holding plate for data terminal (not pictured)
- Holding plate for printer (not pictured)
- Support mountings for small load carriers (not pictured)





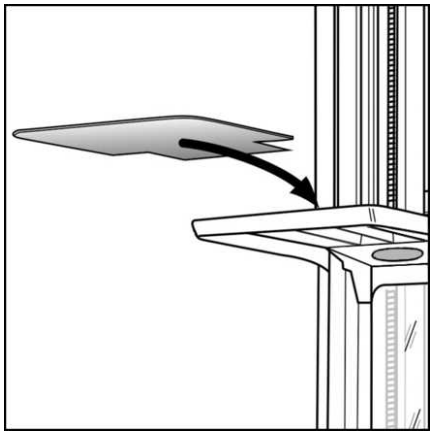
⚠ CAUTION

Risk of accident due to the foot switch getting stuck (service brake).

If your industrial truck is equipped with this mounting system for additional components, only the original components intended for this purpose may be used. Other components cannot be held correctly and may fall to the floor. This can result in the foot pedal being applied continuously and the industrial truck no longer responding to this brake signal.

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

Protective roof cover



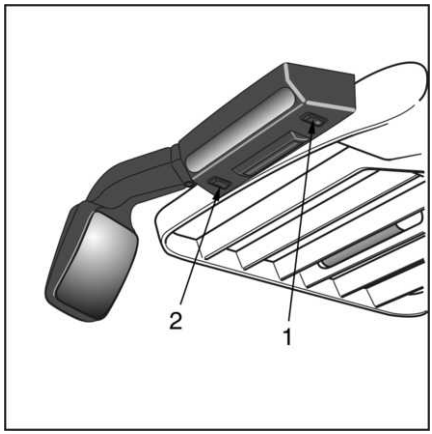
The standard overhead guard meets the current standards in terms of stability and the distance between the roof struts. However, if heavy objects that are small enough to fit through the roof struts of the overhead guard are transported in a storage area, there is a danger that if they fall from a considerable height, they may fall through the overhead guard and injure the operator. To prevent this danger, a cover made of high-strength plastic can be fitted to the overhead guard at the factory.

NOTE

The protective roof cover must always be clean so as not to obstruct the view upwards.

- *Clean regularly.*
- *Use cleaning materials that are suitable for plastics.*
- *Replace defective protective roof covers immediately.*

Mirror and lighting module



If an industrial truck is equipped with this module, additional operating instructions are supplied ex works. These instructions describe in detail how to assemble and configure the module.

This module can be supplied in various versions and combinations:

- As LED workplace lighting for illuminating the racking next to the industrial truck
- With an integrated fan motor for circulating air in the driver's compartment
- With an integrated parabolic mirror as a rear-view mirror

⚠ CAUTION

Risk of accident

The curvature of the mirror surface significantly increases the field of vision. As a result, objects appear further away than they actually are.

Adjusting the mirror

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

⚠ CAUTION

Risk of damage to property

The adjustment range is mechanically limited. Pushing too hard on the mirror glass can cause the glass to crack.

Switching on the fan

Depending on the truck type, press the push button in the operating panel or the switch on the overhead guard.

NOTE

Switch to fan level 2 using switch (1). A blind plugs (2) is fitted on the other side of the fan.

Switching on workplace lighting

Depending on the truck type, press the push button in the operating panel or the switch on the overhead guard.

Operating panel, load side

The operating panel is fitted on the mast side as standard for order pickers. As an option, the operating panel can be mounted on the load side or on both sides.

Depending on the series, display variants

- Standard display
- LCD display
- LCD display with keypad

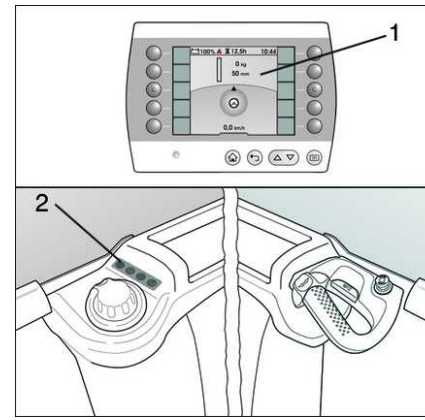
are used.

In the version with a **standard display** or with an **LCD display**, only the operating devices are moved to the load side.

In the version with **LCD display with keypad**, the display and keypad are moved to the load side.

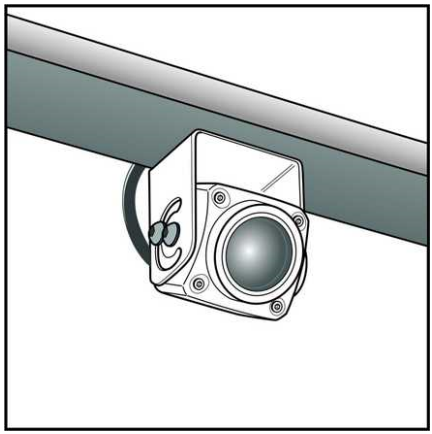
NOTE

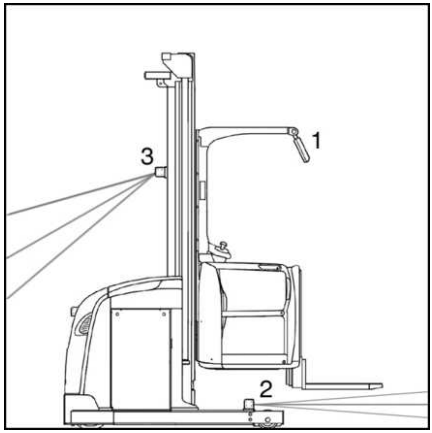
Operation and indicators are described in the respective chapters.



1 **LCD display**
2 **Keypad**

Video system for monitoring the travel path ▷





As an option, these industrial trucks can be equipped with video cameras and monitors. The basic equipment consists of a video camera that is aligned in the drive direction (3) and another video camera that is aligned in the load direction (2). The camera facing the direction of travel is automatically switched to a monitor (1) in the driver's cab in the operator's field of vision, depending on the direction of travel.

This system helps the driver to better monitor the travel path. The system is activated as soon as the industrial truck is switched on.

To achieve an optimum image display, the cameras must be adjusted individually.

The camera in the load direction (2) is covered by the driver's cab when in the lowered position. For this reason, the cab must be raised approx. 300 mm in this drive direction.

⚠ CAUTION

Risk of accident and damage to property

This system provides additional support to the operator with regard to detecting obstacles in the travel path. The truck functions are not electronically controlled (e.g. automatic braking when an obstacle is detected in the travel path)

NOTE

Refer to the manufacturer's operating instructions for information on operating and maintaining the video system.

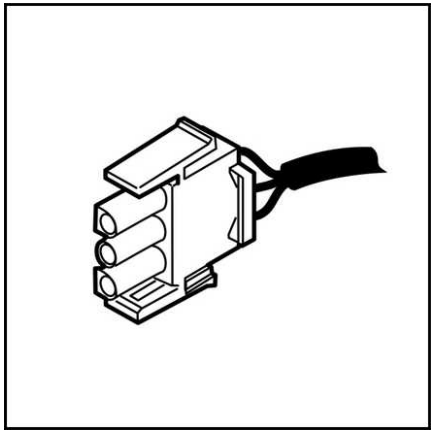
Maintenance

If the image quality of the video displayed on the monitor starts to deteriorate, the lenses of the cameras must be cleaned using a soft cloth (e.g. lens cloths).

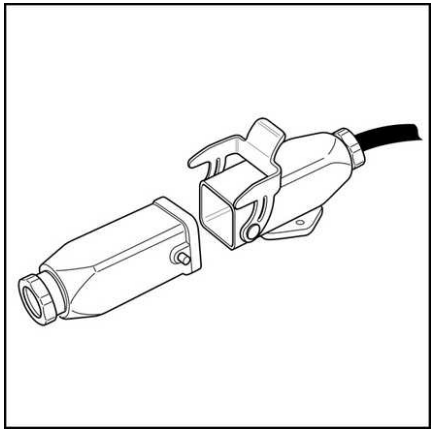
MMS interface

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

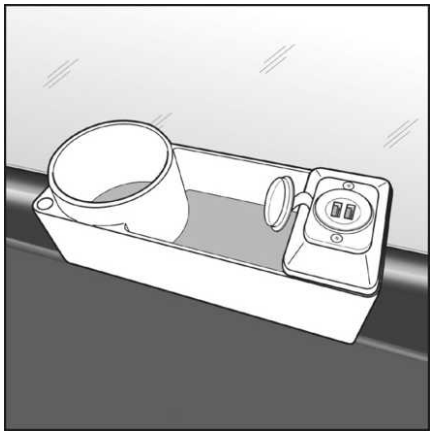
USB charging station

This charging station can be used to charge two consumers with USB charging cables at the same time. Maximum charging power per socket: 2 A.

NOTE

Protect against contamination and damage. When the charging station is not in use, cover the sockets with the hinged cover.

The support mounting also has space for holding drinks, pens and small items.



Acoustic warning signal

Optionally, these trucks can be equipped with an acoustic warning signal transmitter as an additional safety system.

The signal is generated depending on the drive direction.

The signal can be limited to specific areas.

Acoustic alarm

Acoustic alarms can be issued automatically if dangerous situations may arise between humans and machines during a racking work procedure. This ensures that other people are made aware of the industrial truck and can react in good time.

As the work procedures can vary in every storage area, the need for acoustic signals also varies. For this reason, they are configured according to the customer's specifications.

CAUTION

Risk of accident

When employees become used to certain acoustic signals, they will rely on them more and more. That is why acoustic signals are considered part of the safety systems and must always be in working order. See the "Checklist before starting work".

Rescue Alarm

Acoustic and optical emergency signal

Description

Industrial trucks can be equipped with this safety system as an option. This is a monitoring system for the operating devices.

This system monitors whether actuation of the individual operating devices occurs within in a reasonable time frame.

If the adjustable time limits are exceeded, this may indicate

- an operating error,
- defective switching elements or
- health problems on the part of the

operator.

In response, the Rescue Alarm controller triggers an acoustic and optical emergency signal.

NOTE

The time period until the emergency signal is activated can be set by the authorised service centre.

Function

The emergency signal is activated if, after the parametrised time has elapsed,

- at least one barrier is open for longer than a parametrisable time, or
- if the foot switch is actuated for longer than a parametrisable time but no truck movement has been triggered

Effect

- The "barrier" or "foot switch" symbols flash on the display and
- 10 acoustic signals are generated by the operating panel within 15 seconds

Resetting the alarm

The alarm is reset by actuating the foot switch or closing the open barrier.

If the alarm is not reset, the **horn** and the **flashing light** are activated five times.

If this alarm is not reset either, the procedure repeats.

NOTE

The timeout for the open barrier is measured only if the height of the driver's platform is more than 1200 mm.

Pause function

The operator has the option to activate a pause function for the emergency signal. To do this, the lift height of the driver's platform must be less than 1200 mm.

Activating the pause function

- Actuate the ESC button on the display for approx. two seconds
- An acoustic signal sounds ten times; the timeout is no longer evaluated. The Rescue Alarm is paused

Deactivating the pause function

- Actuate the foot switch. The pause function is deactivated

Special equipment for cold store application ▷



Trucks for cold store application are equipped with many special attachments in order to guarantee full function in low temperatures (-30°C). Separate instructions must be observed for the operation of these trucks, which are not included in these operating instructions. Vehicles suitable for cold store application are marked with the symbol (1).

⚠ CAUTION

Risk of accident

Frozen ground has an extremely negative effect on steering and braking characteristics. In extreme cases, steering and braking capabilities may be lost completely. Therefore, aisles must be kept free of ice at all times.

Lifting accessories

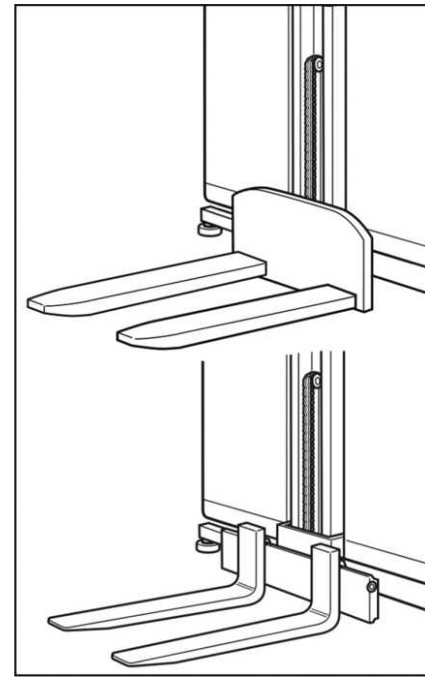
The wide range of applications for these order pickers requires an entire range of variants of driver's cabs and lifting accessories.

Customer-specific solutions are also often developed.

Where applicable, these **special versions** are described in specially prepared documentation.

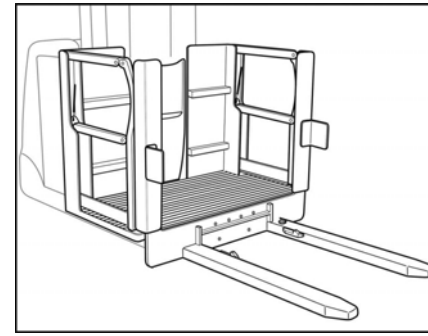
Further examples:

- Driver's cab with load-side auxiliary lift
- Driver's cab without load-side auxiliary lift
- Driver's cab with load-side barrier
- Driver's cab without load-side barrier
- Driver's cab with flanged order-picking platform, with or without additional barriers
- Driver's cab with locating devices for removable order-picking frame or removable order-picking cart
- Driver's cab with folding steps for bridging gaps between the rack and the driver's cab floor
- Tilting and lifting fork carriage



Welded fork

Forged fork



Accessible pallet (example)

Modified load pick up

There are variants of this order picker that have

- an order-picking cage or an order-picking platform instead of the fork, or
- an accessible pallet, or
- an order-picking rack (with or without rollers).

⚠ DANGER

Risk of fatal injury from falling

Observe the information in the "Residual risks with the driver's cab raised" section.

Observe the additional documentation supplied.

Order-picking platform*

Order-picking platforms are usually permanently attached to the driver's cab. On the factory side, there is then a three-sided safety barrier with a foot panel, knee rail and stomach bar at the prescribed height. Use without this three-sided safety barrier is not permitted. At the customer's request, industrial trucks can also be delivered without an order-picking platform. This is then retrofitted by the customer. Until proper commissioning after attachment of this order-picking platform, the lift height of the driver's cab is limited to 1.2 m.

⚠ CAUTION

Risk of accident and damage to property

– Only attach order-picking platforms that were the basis of the design.

– Commissioning by specialist personnel only.

– Order-picking platforms are described in separate documentation. Observe the safety information.

Accessible pallet*

The accessible pallet is a standardised lifting accessory. It is used to hold picked goods.

When the picking process is completed, the aid is handed in and exchanged for an empty one.

On the factory side, there is then a three-sided safety barrier with a foot panel, knee rail and stomach bar at the prescribed height. Use without this three-sided safety barrier is not permitted.

To ensure that the pallet is safe to walk on,

- it is mechanically secured against tipping
- its presence is monitored electrically,
- if the pallet is missing, the lift height is limited to 1.2 m.

Order-picking rack, roll container*

Order-picking racks and roll containers are **not** permanently connected to the order picker, but are mechanically secured and electrically monitored. When the picking process is completed, the aid is handed in and exchanged for an empty one.

To ensure that order picking racks can be transported safely,

- they are mechanically secured
- their presence is monitored electrically,
- if the order-picking rack is missing, the lift height is limited to 1.2 m.

⚠ DANGER

Risk of fatal injury from falling

Order-picking racks and roll containers are not accessible. It is dangerous to enter, climb on or use as a climbing aid and is therefore prohibited.

*Option

Two-person cab

Provided a driver's cab is equipped accordingly, two people may be in it at the same time during normal operation.

NOTE

When the industrial truck is operated by the operator and the passenger in the cab, the ergonomic conditions are impaired. Therefore, this mode of operation should only be used for short periods, e.g. for driver training courses and inventory checks.

The additional equipment usually consists of:

- Key switch to switch from one-person operation to two-person operation
- Handholds
- Additional foot switches
- Protection against accidental contact with the lift cylinders
- Protection against leaning out
- Other safety equipment may be available, depending on the order.

⚠ CAUTION

Risk of accident

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

As long as the industrial truck is moving, the operator and the passenger must ensure that all parts of their bodies are completely within the contour of the driver's cab.

NOTE

If an industrial truck is intended and equipped for normal operation with two people (operator and passenger), two abseil systems must also be kept to hand in the driver's cab.

Operator and passenger

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. EN ISO 3411 specifies 114.1 kg for the maximum body weight for a large operator.

⚠ CAUTION

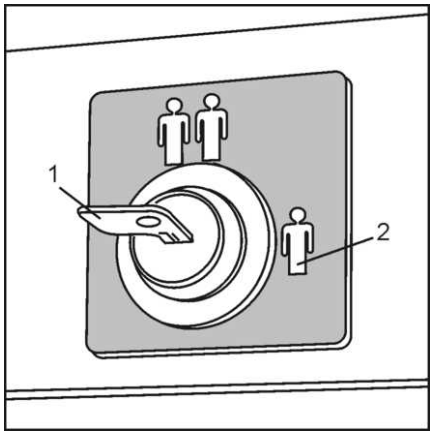
Reduction in the load capacity. Negative effect on stability.

If the actual body weight of the operator and passenger combined exceeds 114.1 kg, the maximum load weight must be reduced by the difference compared with the information on the load capacity diagram.

Example

The actual body weight of the operator is 130 kg. The actual body weight of the passenger is also 130 kg. Together, this makes 260 kg. In this case, the maximum load weight must be reduced by approx. 146 kg compared with the information on the load capacity diagram.

Key switch ▷



⚠ CAUTION

Risk of accident

The industrial truck operator is responsible for ensuring that this key is actually switched to the appropriate position when the truck is operated with two people. The equipment described below is not activated until the switching procedure has been carried out. The industrial truck operator must instruct the passenger regarding the correct operation of the additional equipment and regarding safe conduct when travelling. If the passenger does not comply with these instructions, the passenger must not be transported.

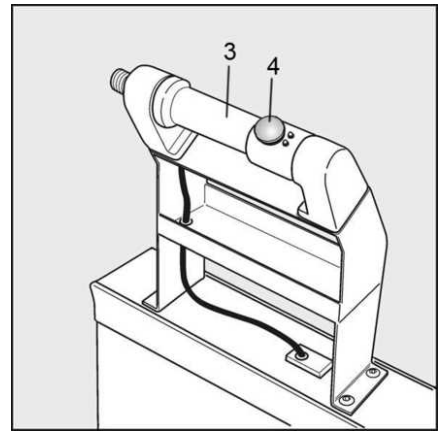
A key switch for switching from one-person operation to two-person operation is installed in the driver's cab.

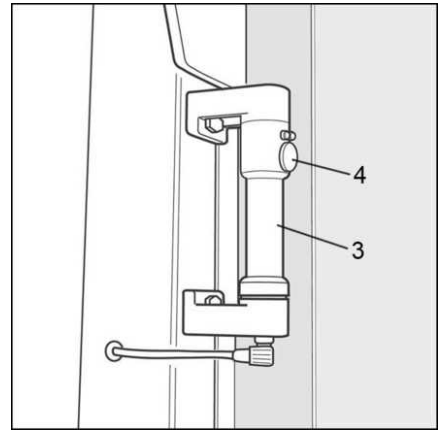
In the illustration, the key switch (1) is set to one-person operation (2).

Handholds

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

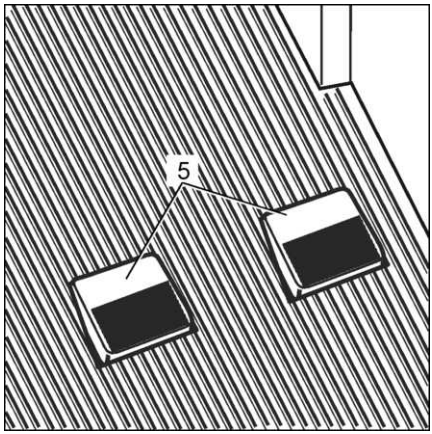
▷





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 industrial truck will stop immediately.



Further equipment

Depending on the lift mast design and cab dimensions, protection against accidental contact with the lift cylinders situated behind the cab can be installed.

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.

Safety

The sensor system of the two-person cab is monitored electronically. This prevents operating errors and means that any damage should be detected. If one of the following errors is detected, a display is shown.

Display

Dependent on the type of industrial truck

Cause

- Incorrect switching sequence. When the key switch was set to ride on mode, one of the enabling switches had already been actuated (manipulation of a switch or switch defect).
- One of the foot switches was actuated for longer than 5 seconds before the second foot switch was actuated.
- One of the enabling switches in the handholds was actuated for longer than 5 seconds before another switch was actuated.

Effect

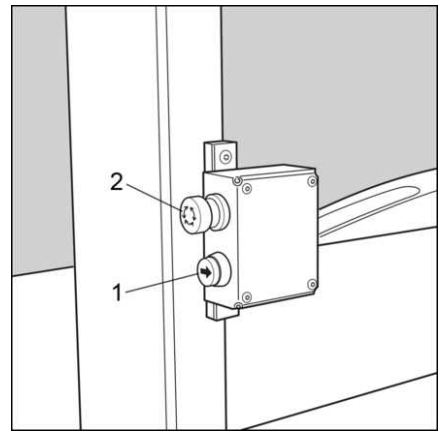
- Lifting and lowering of the main lift is disabled. No enable possible.
- Lifting and lowering of the auxiliary lift is disabled. No enable possible.
- Driving disabled. No enable possible.

Remedy

Release all switches and actuate them in the correct sequence.

If this does not restore the correct function and the error message disappears, call the authorised service centre.

Pedestrian mode



As an option, the industrial truck can be equipped with the additional "pedestrian mode" function. For this purpose, two additional operating devices are fitted on each side of the lift mast.

(1) Travel in the direction of the drive

(2) Emergency off switch

The following requirements must be met for picking operations in pedestrian mode:

– All industrial truck functions are deactivated or not selected.
– The steering is straightened (± 10° to the longitudinal axis of the industrial truck). If the steering is not straight when pedestrian mode is selected, the steering angle display flashes to indicate this.
– The operator has instructed the driver on the operation of this special equipment and any additional safety requirements.

A special switchover to pedestrian mode is not required.

Operation

By pressing the push button (1), the industrial truck is moved at a maximum speed of 2.7 km/h for a maximum of 3 seconds. The push button must remain pressed for this purpose. After the 3 seconds (corresponds to approx. 2 m distance), it is necessary to press the push button again. When the button is released, the industrial truck stops immediately.

NOTE

The auxiliary lift must not be operated in pedestrian mode.

Fall protection device

If the operating procedure requires the operator to open the barrier with the driver's cab raised, for example, in order to better access the stored goods, additional safety measures must be taken. An additional safety measure can be a fall protection device worn by the operator at all times and permanently attached to the overhead guard.

Such application and customer-specific peculiarities require the risk potential to be determined by a specialist.

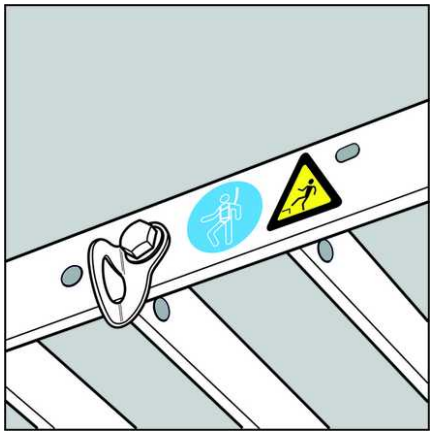
If not already supplied by the factory, suitable personal protective equipment must be provided by the operating company.

See also the section entitled "Risk assessment".

Fall protection device lifting point ▷

If occupational safety requires the use of a fall protection device, the industrial truck can be equipped with a lifting point tested in accordance with DIN EN 795. A fall protection device can then be attached to this.

The fall protection device can be supplied by the factory or procured by the operating company. If provided by the factory, the fall protection device is described in the documentation supplied with the product.



⚠ DANGER

Risk of fatal injury due to incorrect use

If an industrial truck is equipped with a fall protection device:

– The operator must be trained and instructed in how to use the system before using the industrial truck.

– This training must be repeated once a year.

Safety systems such as fall protection devices must:

– be selected and attached by a specialist

– be tested once a year by a specialist

– be regularly maintained by a specialist according to the application in question

– be replaced after the maximum permissible service life has expired

Working platforms

The use of working platforms in conjunction with industrial trucks is regulated by national law.

This legislation must be observed. The use of working platforms is only permitted by virtue of the legislation in the country of use. Before using working platforms, consult your national regulatory authorities.

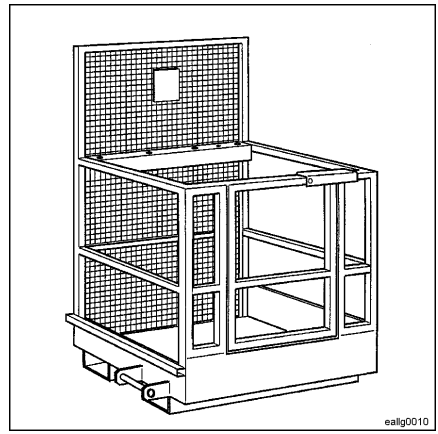
⚠ WARNING

High risk of accident

No one must ever stand on the forks to be raised or transported!

Use only work platforms that have been supplied by the manufacturer or approved work platforms from other manufacturers.

If an industrial truck is equipped with a working platform at the factory, this special version is accompanied by additional operating instructions. Detailed safety information can be found within.



Antistatic version

Various components can be installed to prevent or minimise static charging of the industrial truck. The customer must ensure that the floor covering and/or racking permit the discharge of electrical charge.

These include:

- Electrically conductive guide rollers for mechanical guidance
- Electrically conductive elements for inductive guidance (chains, brushes)
- Electrically conductive load wheels

⚠ CAUTION

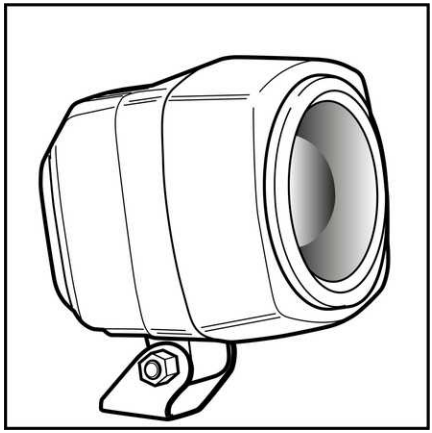
Danger of damage to property, loss of function

When replacing the elements for dissipating static charge, use only elements that are electrically conductive. We recommend using original parts.

Check the condition and functionality of the elements each time maintenance is performed.

Safety Light safety headlight

Function



The safety headlight is a device that can be fitted to industrial trucks in order to give pedestrians sufficient warning of an approaching industrial truck. This function helps to improve safety in storage areas, as it can prevent industrial trucks from colliding with pedestrians.

To prevent such accidents, the safety headlight is fitted to the lift mast at a suitable height so that it projects a powerful beam of light onto the ground a few metres in front of the industrial truck. If pedestrians notice this beam of light, they have enough time to react accordingly. Safety headlights are available in different colours.

⚠ DANGER

The driver of the industrial truck still has full duty of care in relation to pedestrians and other industrial trucks, regardless of whether this safety headlight is fitted to their truck.

The driver cannot assume that pedestrians will notice the beam of light in good time, interpret it correctly and then react correctly.

NOTE

Industrial truck drivers and pedestrians must be provided with instructions to advise them of the safety headlight function and its use for their protection.

Residual dangers

Due to the functionality and design of the system, the safety headlight cannot provide comprehensive protection for other transport users in the racking system.

The safety headlight cannot illuminate in the direction of crossing traffic.

The customer can choose for the safety headlight to be switched on:

- Depending on the drive direction
- Only at the point of moving off
- Only in predefined areas (zones)

It is therefore essential that the functionality specified for the place of use is:

- Included in the operating instructions applicable for the storage area
- Explained to the warehouse staff and
- That the warehouse staff are made aware that they must comply with the operating instructions

Switching on and off

The safety headlight is switched on when the key switch of the industrial truck is switched on.

If the industrial truck is switched off using the key switch, the safety headlight goes out.

NOTE

There is an option available to have the safety headlight switch on or off only in specific areas of the warehouse or during specific work processes. For a description of these special cases, see the order.

Safety

NOTE

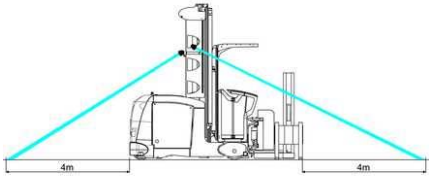
The safety headlight features extremely powerful LEDs. Briefly looking directly into the beam of light does not present a danger to health, but is unpleasant due to the temporary dazzling effect. However, looking into the beam of light for longer periods must be avoided.

Maintenance

Before starting work, the driver must check whether the distance between the beam of light and the truck is correct.

Clean the lens of the safety headlight if it is contaminated. Apart from these measures, the safety headlight is maintenance-free.

Place of attachment and retrofitting ▷



Attach the safety headlight to the highest possible part of the industrial truck using the assembly material supplied. During installation, ensure that the safety headlight is located within the truck contour. Because this safety headlight can be fitted to industrial trucks with a wide range of different designs, no precise specifications can be provided here regarding the ideal place of attachment. Raising the load or the driver's cab can cause the safety headlight to be temporarily covered. Careful selection of the place of attachment can reduce this sometimes unavoidable situation to a minimum. The supplied supports must be used wherever possible.

The tilting support mounting must be used to adjust the safety headlight so that the light beam is projected onto the ground approximately 4 m in front of or behind the industrial truck. When adjusting the safety headlight, the front edge of the industrial truck or load must be considered. Selecting a place of attachment that is high up on the truck maximises the tilt angle of the safety headlight and ensures that pedestrians and oncoming vehicles are dazzled by the light beam as little as possible.

Technical data

Operating voltage	12 – 100 V
Power consumption	5 W
Current draw	0.2 A at 24 V
Service life	>20,000 hours
Protection class	IP68 - IP69K
Operating temperature	-40°C - +85°C

A

Abseil system. 26, 157
Accessories accompanying the product. . . 8
Acoustic alarm. 152
Acoustic emergency signal. 152
Acoustic warning signal. 152
Additional documentation. 122
Aisle detection, barcode. 130
Aisle detection, magnet operated switches. 130
Aisle detection, reflective light switches. . 130
Aisle detection, RFID. 130
Aisle entry assistant. 128
Aisle entry assistant, GEA. 122
Aisle safety assistant, GSA. 122
Aisles, closed on one side. 130
Aisles, open on both sides. 130
Alterations to industrial trucks. 23
Ambient temperature. 21
Antistatic version. 164
Anzeigegerät LCD mit Tastatur. 0
Area of application. 21
Area of application, limitations. 21
Area of application, requirements. 21
Assistance system. 145
Attachment. 7
Attachments. 23
Automatic braking systems. 130
Automatic driving within the aisle. 123
Automatic exposure control. 40
Auxiliary lift. 20, 30, 40, 88, 89, 90
Auxiliary lift, load-side operation. 89

B

Barrier. 26, 30, 69
Barriers, closing. 69
Barriers, opening. 69
Battery. 26
Battery acid. 16, 58
Battery cable, safety. 17
Battery change frame. 58
Battery charger. 60
Battery compartment. 26
Battery compartment cover. 64
Battery compartment cover, folding. 64
Battery compartment cover, removable. . . 64
Battery compartment door. 26
Battery compartment doors. 65
Battery connector. 50
Battery discharge indicator. 34
Battery lock. 26, 63, 138
Battery maintenance. 118
Battery male connectors, minimum requirements. 137
Battery male connectors, variants. 137
Battery management system. 118
Battery on a roller channel. 138
Battery replacement. 58, 63, 138
Battery replacement using a truck. 63
Battery residual charge. 34, 35
Battery type. 58, 60
Battery voltage. 5
Battery weight. 5
Battery, ballast weight. 59
Battery, change frame. 59
Battery, commissioning. 59
Battery, counterweight. 59
Battery, gel. 118
Battery, installing. 59
Battery, lead-acid. 118
Battery, lithium-ion. 118
Battery, maintenance. 59, 118
Battery, replacing. 59
Battery, type. 59
Battery, weight. 56, 59
Body weight. 157
Brake system. 70
Brake, emergency ventilation. 92
Braking characteristics. 12
Braking performance. 21
Braking requirements. 21
Braking zone. 130
Bridging plug X99. 135

C

Cab lift. 30, 88, 89
Care. 107
Care, special equipment. 109
Care, special versions. 109
CD player. 144
CE mark. 5
Changing aisles. 81
Changing the drive direction. 79
Changing the gearbox oil. 116

Changing the hydraulic oil. 115
Checking all operating devices. 66
Checking the access control. 66
Checking the barriers. 66
Checking the connecting elements. 66
Checking the lifting accessory. 66
Checklist before starting work. 54, 66
Clamping screws. 138
Cleaning the load chains. 116
Cleaning, floor. 21
Clearance. 92
Climbing in. 12, 13, 68, 69
Climbing out. 12, 13, 68, 69
Cold store application. 154
Cold store version. 122
Collision protection. 26, 50
Conformity marking. 5
Consumables. 16
Control compartment. 26, 104
Control current fuse. 105
Control current fuses. 50
Conversion. 23
Copyright and proprietary rights. 8
Correct disposal. 102
Country-specific regulations. 2
CO, customer option. 122
Cup holder. 152
Customer option, CO. 122

D

Danger area. 12
Data matrix code. 5
Declaration of conformity. 2, 4
Decommissioning. 102
Depressurize the hydraulic system,. 104
Diagonal movement. 81
Dimensions. 120
DIN ISO 6292. 21
Direction indicator. 26
Directives. 22
Display. 146
Displays, information. 37
Display, LCD. 33
Display, standard. 33
Display, variants. 127
Distance measurement. 130
Documentation, additional. 7, 8, 122
Documentation, order-related. 7, 8
Documentation, product-specific. 7
Documentation, reordering. 9
Drive/pump controller. 50
Drive programme. 36
Driver training. 22
Driver's cab. 30
Driver's cab, emergency lowering. 95
Driver's compartment. 26, 69
Driver's licence. 22
Driver's platform. 69
Driving freely. 75
Driving safety. 22
Driving speed adaptation. 123
Driving speed, maximum. 130
Driving with open barriers. 19
Driving without guidance. 75, 78

E

EAC mark. 5
Electric field strength. 14
Electrolyte. 58
Electromagnetic radiation. 14
Electronic access control. 12, 128
Emergency abseil system. 98
Emergency abseil system for different operators. 98
Emergency lowering of the driver's cab. . . 95
Emergency lowering valve. 95
Emergency lowering, restarting after. 97
Emergency off switch. 30, 33, 39, 78, 81
Emergency operation. 91
Emergency retrieval. 96
Emergency signal, acoustic. 152
Emergency signal, optical. 152
Emergency steering. 94
Emergency stop brake. 70
Emergency ventilation. 92
Emissions. 13
Enable button. 40, 127
Energy-saving mode. 41
EN ISO 3411. 157
Entering the aisle. 123
Error message 813. 157
Error numbers. 49
Exiting the raised driver's compartment in the event of an emergency. 98

Expert. 21

F

Fall protection device. 162
Fall protection device, lifting point. 162
Fan. 41
Fan module. 148
Favourites. 40
FEM 4.004. 21
Filling opening for hydraulic oil. 50
Floor height. 12
Floor load capacity. 21
Floor loads. 21
Floor structure. 12, 21
Floor, cleaning. 21
Floor, contamination. 21
Floor, friction values. 21
Foot switch. 78
Fork arms. 26
Frequency. 14
Front end monitoring. 135
Function checking. 66
Function checking the brake assemblies. . 66
Function checking the steering. 66
Fuses. 105
Fuses, control current. 105
Fuses, main current. 105

G

GEA. 122
Gearbox. 50
Gearbox oil. 16, 115
Gel battery. 59, 118
General safety information. 12
Gradients. 21
Grease lubrication points. 116
Ground clearance. 86
GSA. 122
Guidance. 75, 89
Guide roller. 26
Guide rollers, electrically conductive. . . . 164

H

Hand and arm vibrations. 13
Handhold. 33, 39
Handle sensor. 78, 79
Harnesses. 54
Hooking on the lift mast. 54
Horn. 12, 30, 50
Horn button. 33, 39
Hydraulic oil. 16, 50, 115
Hydraulic oil tank. 50

I

iGo pilot navigation. 122
Implants. 14
Induction track, leaving. 123
Inductive guidance. 81, 123, 126
Inductive guidance (IZF). 76
Initial commissioning. 54
Initial driving exercises. 78
Instruction. 98
Integrated foot switch. 70
Intended use. 7, 8, 20, 23
Interface X99. 135
Intermediate lift cut-out. 127
IZF. 75, 76, 123, 126, 127
IZF, selection. 40

K

Keypad. 36, 39

L

Labelling. 5
Labelling for special equipment. 29
LCD display. 33, 36, 39, 149
LCD display with keyboard panel, indicators. 41
LCD display with keypad. 39, 40, 41, 126, 149
LCD display, functions. 41
LCD display, operation. 41
LCD display, programming. 41
Lead-acid battery. 118
Leakages. 16
Leaving the driver's cab. 95
Leaving the industrial truck. 102
LED headlight. 146
Liability. 22
Lift cut out. 127
Lift height display. 36
Lifting accessory. 30
Lifting clear of the ground. 12
Lift mast. 26
Lighting. 41
Lighting module. 148
Lithium-ion battery. 59, 60, 62, 118

Lithium-ion battery, charging socket. 62
Load-side operation. 89
Load capacity. 12
Load capacity diagram. 20, 85, 86
Load capacity, reduction. 6
Load castors. 26
Loading. 54
Load pick up. 86, 88
Load wheel brake transportation safety device. 54
Load wheels, electrically conductive. . . . 164
Loudspeakers. 144
Lubricant for the shaft-hub connection. . 115
Lubricants. 115
Lubricating the load chains. 116
Lubricating the shaft-hub connection. . . . 117

M

Main current fuse. 105
Main current fuses. 50
Maintenance. 8, 107
Maintenance interval, shortened. 109
Maintenance schedule, 1000 hours. 110
Maintenance schedule, 2000-hr. 115
Maintenance, special equipment. 109
Maintenance, special versions. 109
Manufacturer liability. 22
Mast bracing. 26, 54
Maximum service life. 98
Mechanical guidance. 81
Mechanical guidance (MZF). 76
Medical equipment. 14
Menu structure. 40, 41
Mirror module. 148
MMS interface. 151
Monitor. 150
Mounting system for auxiliary components. 147
MPSE. 135, 136
MPSE laser scanner, care. 136
MPSE laser scanner, cleaning. 136
MPSE laser scanner, maintenance. 136
MPSE, preparation. 136
MZF. 76

N

Nameplate. 5
Narrow-aisle trucks. 22
National regulations. 21, 22, 23
Navigation. 41
Non-ionising radiation. 14

O

Obligations of the operating company. . . . 14
On-board charging system. 122
Operating company. 21
Operating devices. 33, 39
Operating error. 30
Operating hours. 35
Operating instructions. 49
Operating instructions and maintenance instructions. 7
Operating lever for driving. 79
Operating panel. 33, 39
Operating panel on both sides. 32, 149
Operating panel on the load side. . . . 32, 149
Operating panel on the mast side. . . 32, 149
Operating panel, load side. 26
Operating panel, variants. 127
Operating procedures. 18
Operating status display. 33, 34, 36
Operational safety. 12
Operation, load-side. 90
Operation, menu structure. 40
Operator and passenger. 157
Operator's compartment, dimensions. . . 6, 7
Operator, body dimensions. 6
Operator, body weight. 6
Operator, female. 6
Operator, form of address. 6
Operator, male. 6
Optical emergency signal. 152
Options. 8, 122
Options, enabling. 122
Options, retrofitting. 122
Order picking. 20
Original parts. 22
Overhead guard. 26, 30, 145, 148
Overhead guard switch. 145

P

Parking brake. 70
Passenger. 157
Pedestrian mode. 12, 161

Personal protection system. 135, 136
Personal protection system STILL. 134
Personal protection system, preparation. 136
Personal protective equipment. 16, 23
Picking up a load. 84
Pictograms. 49
PIN code. 128
PIN code, change. 128
PIN code, definition. 128
PIN code, incorrect input. 128
Plain text messages. 49
Pre-assembled plates. 138
Printer. 146
Programming interface. 50
Protection against accidental contact. . . 157
Protective roof cover. 148
PzS. 59

R

Radio installation. 144
Rapid travel zone. 130
Rated capacity. 5
Reach, operator. 86
Rebuilding. 23
Recycling. 102
Reduction in load capacity. 157
Refilling the gearbox oil. 116
Refilling the hydraulic oil. 115
Regular maintenance. 8, 107
Regular testing. 21, 107
Regulations. 22
Removing the hood. 91, 104
Replacement interval for lifting chains. . . 107
Replacement state of wear. 98
Replacing the battery using a battery change frame. 65
Rescue alarm. 152
Residual risks. 18
Residual risks due to low clearance. 19
Residual risks, driver's cab raised. 18
Responsibility of the operating company. . 22
Restarting after emergency lowering. 95
Retightening wheel screws. 54
Retrieval. 135
Retrofitting. 23
Reverse brake. 70
Risk assessment. 18
Risk of chemical burns. 58, 59
Risk of explosion. 58, 59
Roadways. 12
Rod system. 146
Roller channel. 138

S

Safety. 30
Safety category 2. 135
Safety headlight. 164
Safety laser scanner. 135, 136
Safety light. 164
Safety light, maintenance. 164
Safety light, retrofitting. 164
Safety light, switching off. 164
Safety light, switching on. 164
Safety officer. 15
Seals. 98
Securing the load carrier. 104
Sensor system. 130
Service brake. 70
Setting down loads. 84
Shelf height. 30
Side guide rollers. 19, 75
Simplex mast. 85
Small items. 152
Software change. 23
Sound level. 120
Spare parts list. 7
Special equipment. 8
Special functions. 40
Specialist. 21
Special safety information about load pick up. 15
Special versions, customised. 8
Special version, customised. 122
Speed indicator. 36
Spring loaded brake. 70
Stability. 6
Standard design. 8
Standard design of labelling. 27
Standard display. 34, 149
Steering. 78, 80
Steering angle. 34, 71
Steering knob. 71, 80
Steering motor. 50
Steering wheel. 71, 80

STILL PSA. 134
Stop system. 147
Support screws. 58, 86
Swinging loads. 15
Switch-off functions. 127
Switching on the controller. 73

T

Technical data. 120
Technicians. 54
Telescopic mast. 85
Terminal. 146
Tilt barrier. 143
Towing. 91, 92
Towing, steering defective. 92
Towing, steering functioning. 92
Traction battery. 58, 59
Traction cut-out. 127
Traction motor. 50
Traffic supervisor. 12
Training. 22
Transfer aisle. 130
Transportation safety device. 54
Transporting. 54
Transporting loads. 30
Truck configuration file. 122
Two-hand operation. 30, 33, 39, 81
Two-person cab. 98, 157
Types of guidance. 75

U

UKCA mark. 5
Ultrasonic sensor. 145
Units. 56
Units, delivery. 56
Units, weights. 56
USB. 152
USB charging station. 152
Use, unauthorised. 12

V

VDMA. 7, 23
VDMA, information booklet. 7
Vibrations. 13
Video camera. 150
Video system. 150
View into the control compartment. 50
Voltage transformer. 144

W

Warranty. 107
Waste containing oil. 16
Wear limit for lifting chains. 107
Weight indicator. 36
Weights. 56
Weights, attachment. 56
Weights, battery. 56
Weights, chassis. 56
Weights, driver's cab. 56
Weights, lift mast. 56
Weights, units. 56
Wet lead battery. 59
Wheel load. 21
Wheel screws. 54
Working platform. 163
Working range. 12
Work light. 41
Workplace light. 146

Z

Zone detection. 130
Zones. 130

STILL GmbH

5213 804 2501 EN - 12/2023 - 05