Original instructions

Order picking truck

MX-X

CE

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first in intralogistics

1 Foreword

2 Safety

6 Technical data

7 Options

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

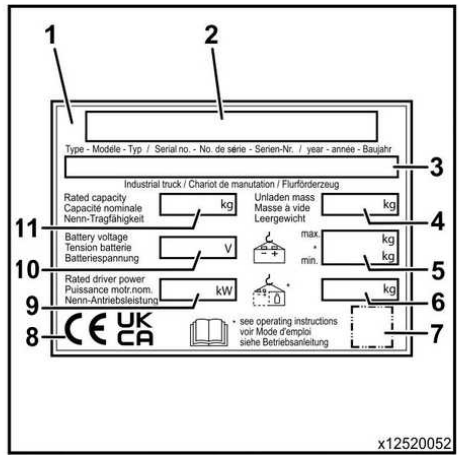
1) For the markets of the European Union, the EU candidate countries, the EFTA States and Switzerland
2) For the United Kingdom market

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:

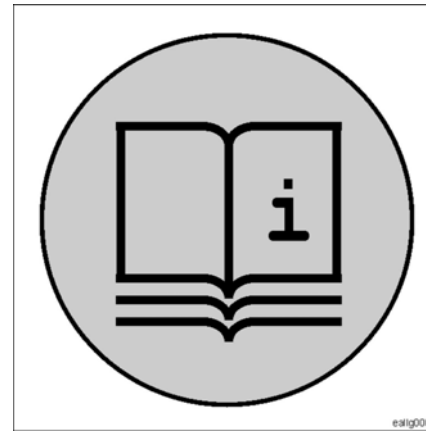
- The ergonomic conditions may be less favourable
- It may not possible for the operator to reach the pedals and foot switches
- The useable height below the overhead guard may be too low
- The adjustment ranges for the steering-wheel and operating panel adjuster may no longer be sufficient
- The adjustment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

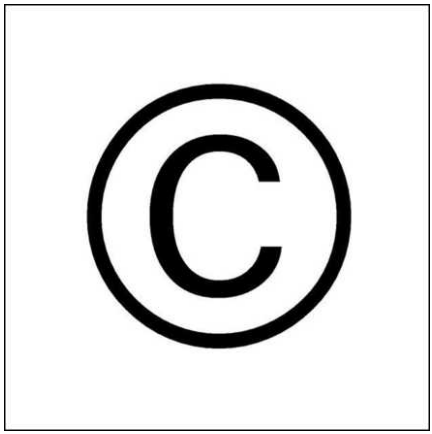
- intended use
- the intended area of use and its limits
- regular maintenance
- and prescribed maintenance

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 ▷



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.	< 0.6 m/s^2
Uncertainty K	0.3 m/s^2

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

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

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

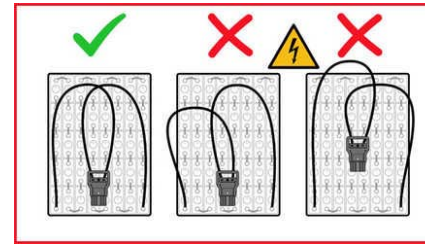
Risk of explosion

– 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.

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.

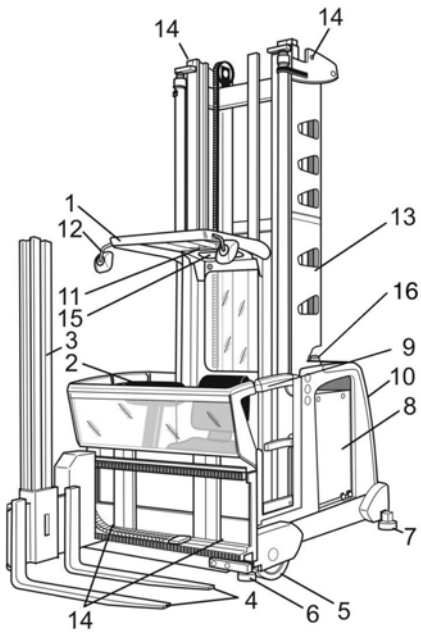
We therefore recommend that you contact your branch or specialist representative.

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

3

Overview

Industrial-truck view



(1) Overhead guard

(2) Operating panel

(3) Auxiliary lift mast

(4) Load forks

(5) Load wheel

(6) Front guide rollers

(7) Rear guide roller and support screws

(8) Battery compartment or battery compartment doors*

(9) Barrier or cab doors*

(10) Control compartment

(11) Portable lamp*

(12) Rear-view mirror*

(13) Lift mast

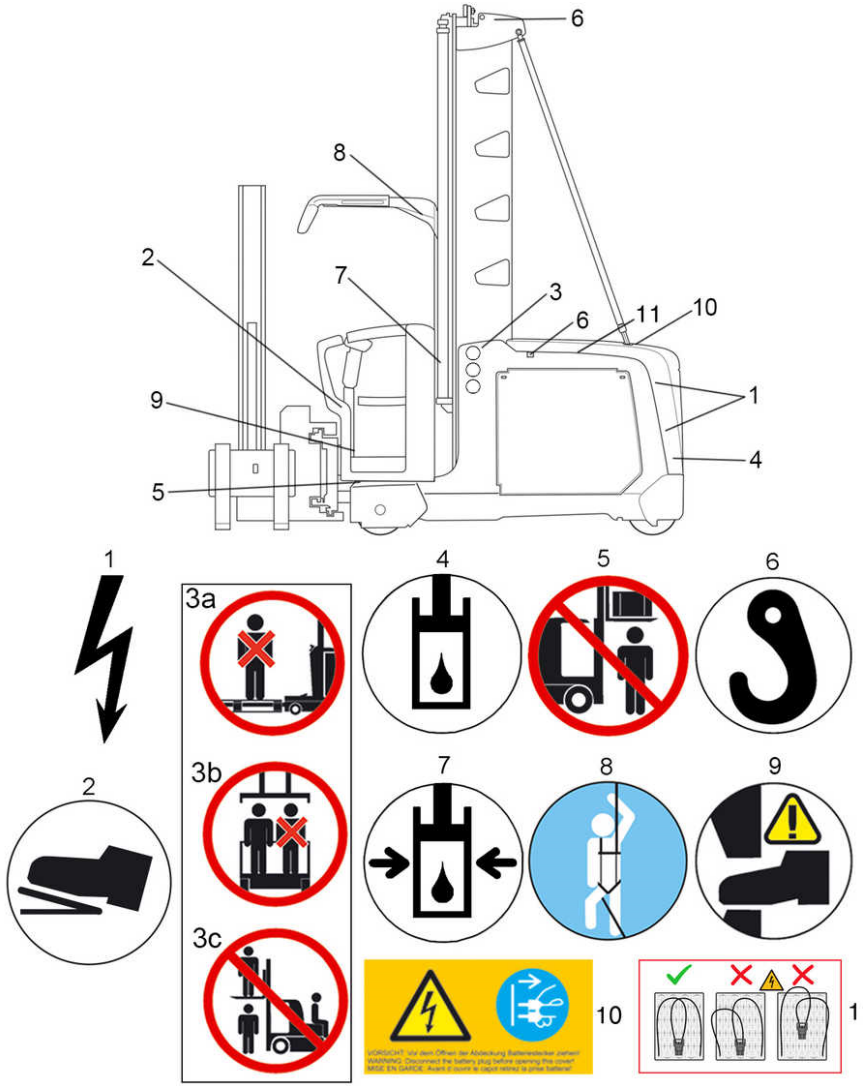
(14) Lifting points for crane-loading

(15) Abseil system

(16) Hazard warning light

* Option

Standard design of labelling



1 Danger! High voltage
2 Foot switch
3 a. Do not transport people on the load or on the load support.
b. 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 Oil tank
5 It is not permitted for people to sit or stand underneath a raised load, or underneath a raised driver's compartment.
6 Lifting point for crane loading
7 The container is under hydraulic pressure, hydraulic cylinder.
8 Storage space for the abseil system
9 Risk of crushing for the feet.
10 Disconnect the battery male connector before removing the control compartment hood. (Only for the 80 V version)
11 Before starting work, make sure that the battery cable is securely stored.

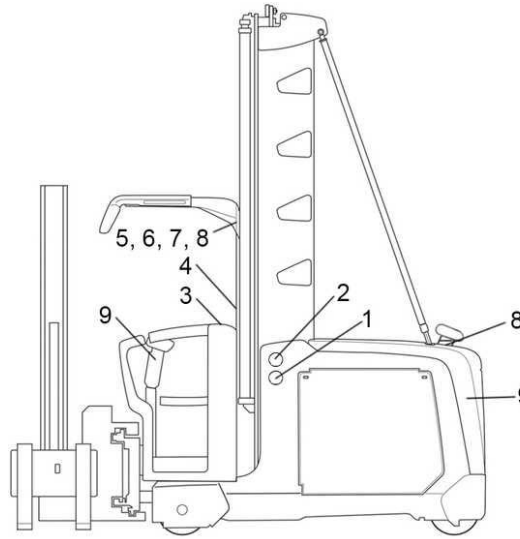
A number of information signs are fitted on every industrial truck depending on the series to draw attention to hazards, technical data or requirements.

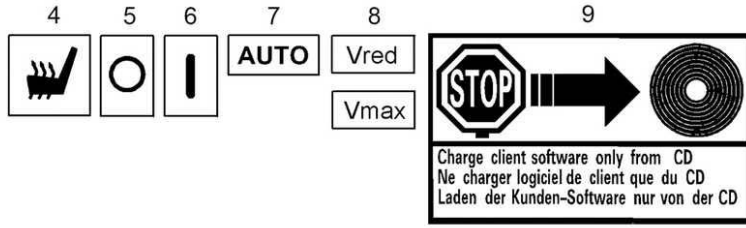
These signs must always be present in full and must always be legible.

NOTE

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

Labelling for special equipment





1 It is not permitted for people to sit or stand on the load or the load support, or to be carried as passengers

2 It is not permitted for people to sit or stand underneath a raised load, or underneath a raised driver's compartment

3 Risk of crushing hands

4 Seat heater on/off switch

5 Switch in "switched off" position
6 Switch in "switched on" position
7 Switch in "automatic mode" position
8 The speed of the truck is limited based on the order.
9 Truck with customised software. Only the customer's special version and not the standard software may be installed in the truck control unit.

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

Intended use

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

Observe the instructions in the paragraph "safety".

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

Use for other purposes is prohibited.

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

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

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

Description of truck

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

General information

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

order picking work. The auxiliary lift must always remain in the lowest position when travelling.

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

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

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

* Option

Safety equipment

Emergency off switch

In an emergency, the current entry can be interrupted by pressing the emergency off switch. This stops all movements and the industrial truck is braked to a standstill.

NOTE

Actuate the emergency off switch only in an emergency.

Barriers

⚠ DANGER

Risk of crushing

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

⚠ WARNING

Risk of falling

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

NOTE

The barriers are monitored by electrical means. If not all barriers are closed correctly, the industrial truck is not ready for operation and all functions are deactivated.

NOTE

As an option, folding glass doors can be installed. The safety functions for these are identical to those of the barriers.

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 operation

Within the aisle, operation with both hands is required for each function.

Outside the aisle, operation with both hands is required for the lifting/lowering function.

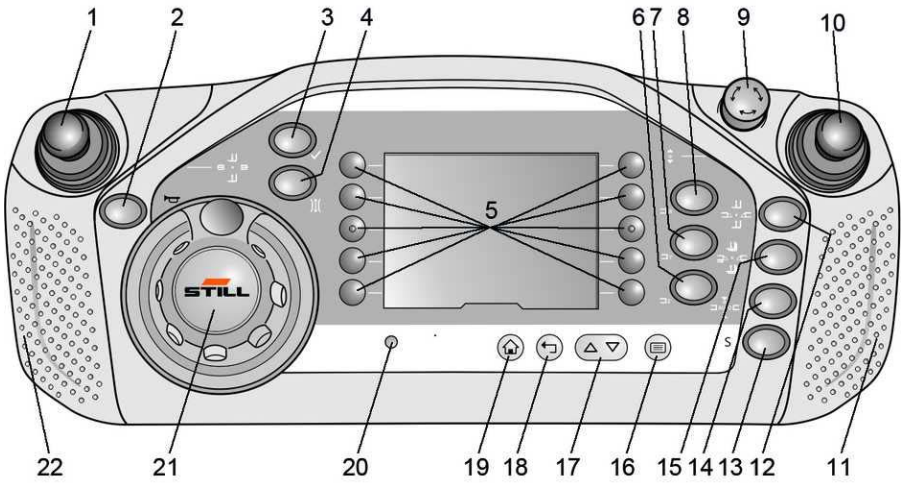
Overhead guard

⚠ WARNING

Risk of injury

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



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

(2) Horn

(3) Enable button (e.g. for releasing the brake in an automatic braking system or as bridging for the intermediate lift cut-out and for acknowledging errors that can be acknowledged)*. Flashes red when it needs to be actuated

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

(5) Selection keys for **favourites**

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

(9) Emergency off switch

(10) Operating lever for driving

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

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

(13) Reserved for special functions

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

(15) Selection key for lifting or lowering the cab lift and auxiliary lift together, in connection with pulling or pushing the operating lever (1), or the selection key for swivelling the fork synchronously 180° to the left or right in connection with moving the operating lever (1) to the right or left

(16) Selection of a menu display

(17) Selection within a menu

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

(19) Return to main page

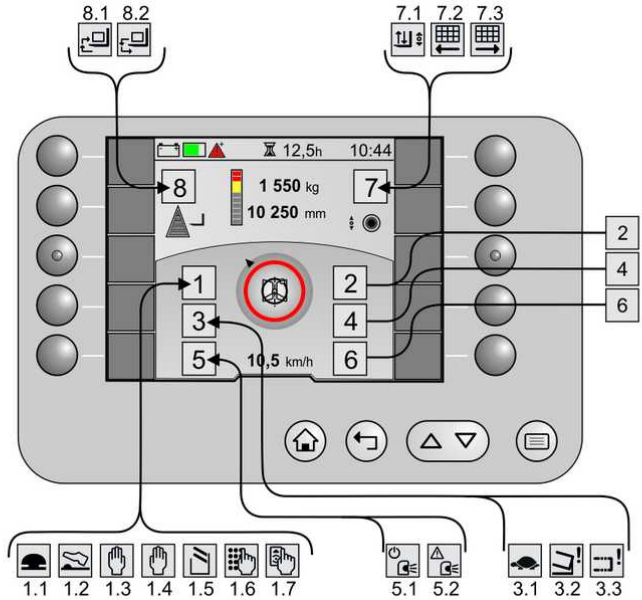
(20) Light sensor for automatic control of the display lighting

(21) Steering knob or steering wheel

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

* Optional functions

Displays



1.1	Emergency off switch pressed	4	Not used
1.2	Foot switch required	5.1	*MPSE in operation
1.3	Two-hand operation on the left required	5.2	*MPSE has detected a fault
1.4	Two-hand operation on the right required	6	Not used
1.5	Barrier open	7.1	*Navigation, combination operation
1.6	PIN entry expected	7.2	*Navigation, destination is located on the left-hand side
1.7	RFID entry expected	7.3	*Navigation, located on the right-hand side
2	Not used	8.1	Remove from stock with a fork cycle
3.1	Creep speed active	8.2	Place into stock with a fork cycle

3.2	Turret head not in the end position		
3.3	Telescopic fork not in the end position		

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

Operating the display ▷

NOTE

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

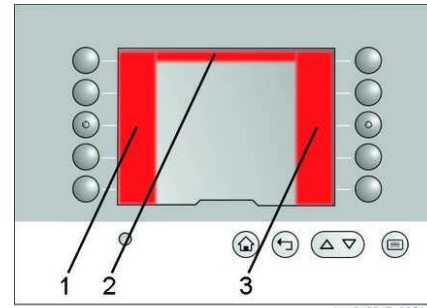
1 **Display in the operating panel**
2 **Display in the case of split operation**

Function

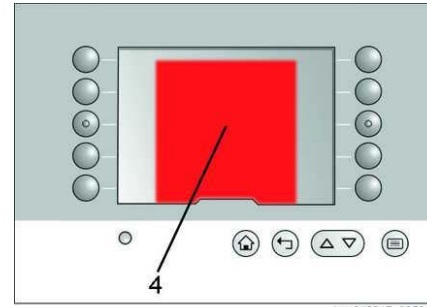
Operating statuses and information relevant for operation are shown on the display. Using the display, it may be possible to switch functions on and off or to switch between defined statuses.

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

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

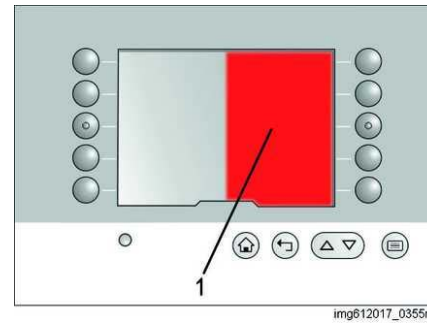


img612017_0351m1



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:

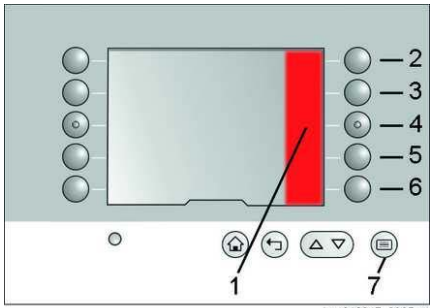
- Messages relevant to operation
- Messages with error numbers
- Target position (drive order) and actual position for navigation

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

Menu structure

The ten membrane switches 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 structure when you select a different language. The symbols also remain the same.

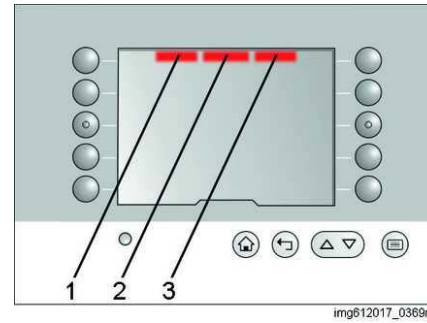
The menu levels are as follows:



img612017_0365m1

Industrial truck (2)			
	Power-saving feature		
	Navigation		
Lighting (3)			
Life height preselection (4)			
	Used lift heights		
Fans (5)			
Settings (6)			
	Truck information		
		Production number	
	Display settings		
		Time	
		Date	
		Language	
		Status bar	
			Left field
			Centre field
			Right field
	Configure favourites		
	Truck settings		
		Lift height preselection	
			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:

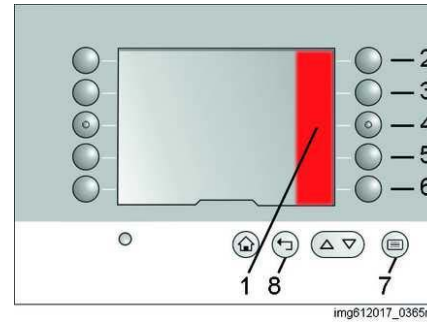
- Left field (1)
- Centre field (2)
- Right field (3)

The status bar can display the following information:

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

The status bar can be configured individually.

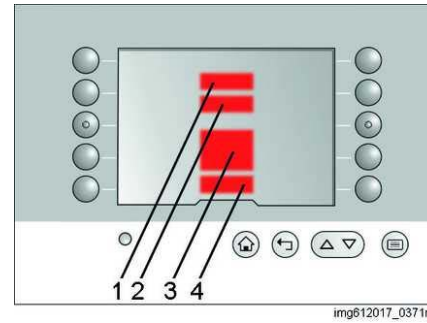
Procedure



img612017_0365m2

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

Central information area



img612017_0371m1

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

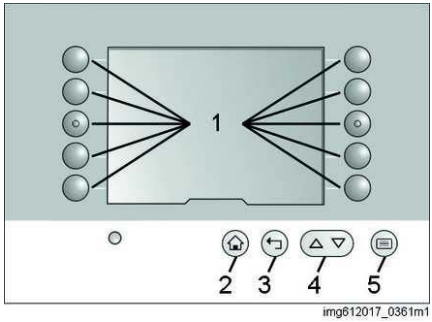
- **Weight** (1):
  The maximum permissible weight for the current lift height. If the optional weight measurement is available, the current weight of the load being lifted.
- **Lift height** (2):
  Current height of the fork arms (upper edge)

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

This part of the display cannot be parameterised.

Operation

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

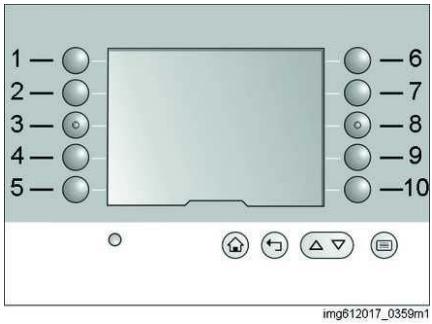


img612017_0361m1

Item number	Function
2	Changes the view back to the main page
3	Changes the view back to the next-highest menu
4	If the 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

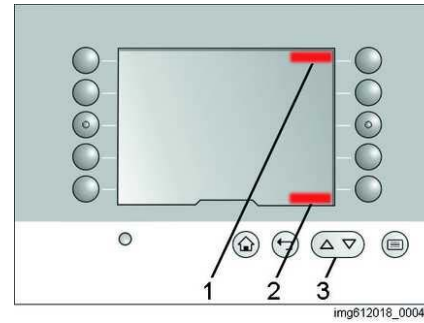
Item number	Function
1	The energy-saving mode of the industrial truck is activated or deactivated.
5	The navigation information is shown or hidden. For this, the key switch for the navigation must be set to AUTO. Otherwise, the symbol is greyed out and therefore cannot be selected.*

	If the button is pressed and held when a drive order is active, the drive order is deleted.*
6	The right-hand menu bar with the available data regarding height preselection opens. If the symbol is greyed out, the industrial truck is equipped with the navigation option and the key switch for navigation is set to AUTO.*
9	Switch the work light* on/off
10	Switch the fan* on/off
	* Option

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

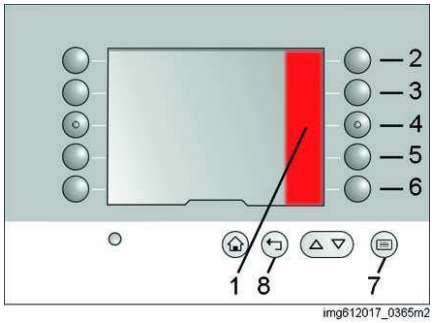
Scrolling through the menu bar

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



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 (6), (3) and (4).

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

NOTE

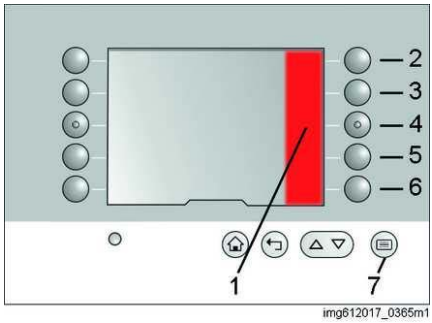
Only five languages are shown here. The other 20 languages can be found by scrolling. See "Scrolling through the menu bar"

– Exit the list by pressing button (8).

Favourites

The ten membrane switches 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**
- **Life height preselection**
  Complete, individual areas or individual heights
- **Fans**



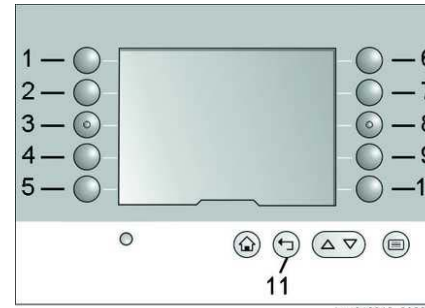
img612017_0365m1

Procedure

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

– Press key sequence (6) and (4).

– Use buttons (1)(10) to select the position for the favourite function. ▷



img612018_0006m1

– Select the desired function in the list using buttons (6) to (10).

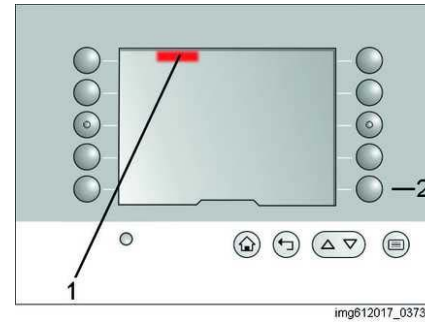
NOTE

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 push button (2). A warning symbol (1) remains in the status bar with the number of the current error. 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

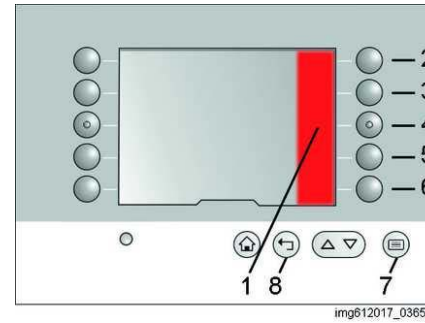
Procedure ▷

– 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).



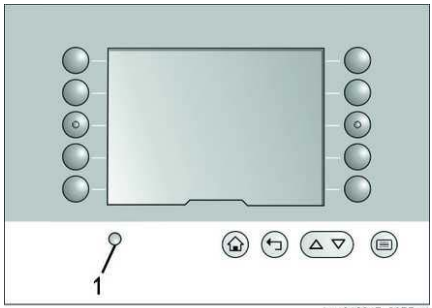
img612017_0365m2

Brightness setting

The brightness is automatically adjusted by a light 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.

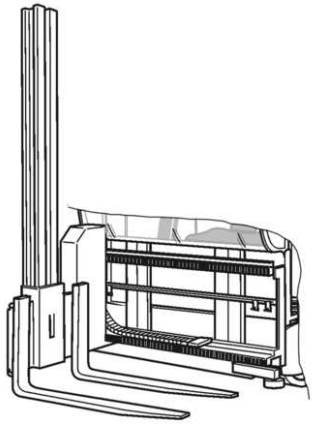
In the event of a fault or defect, one or more numbers appear led by a pictogram of a warning triangle. Call the authorised service centre and provide the authorised service centre with these numbers.

Swivel shift fork

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

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

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



Other attachments

Other attachments* can also be supplied in place of the standard attachment.

These include:

- Telescopic tables
- Telescopic reach fork
- Carpet mandrels
- Accessible pallets
- Order-picking platforms
- Roll container
- Customised structures

⚠ DANGER

Impairment of operational safety, danger to the operator

Other than the attachments supplied by the manufacturer, only attachments tested and supplied by the manufacturer are permitted. Unauthorised modifications are prohibited. See also "Alterations to industrial trucks".

Just as is the case with the industrial truck, attachments must be serviced regularly and inspected once a year by a specialist.

Other attachments differ from the standard design in terms of the method of operation as well as in the type of hazards. Further safety information may be required and must be observed. It is therefore important for the operator to be familiar with and to adhere to the instructions for the particular attachment that is fitted.

Additional operating instructions and maintenance instructions from our suppliers may also apply.

*Option

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**.*

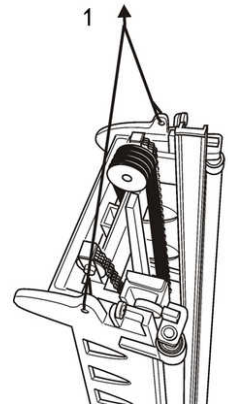
Transporting and loading

General

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

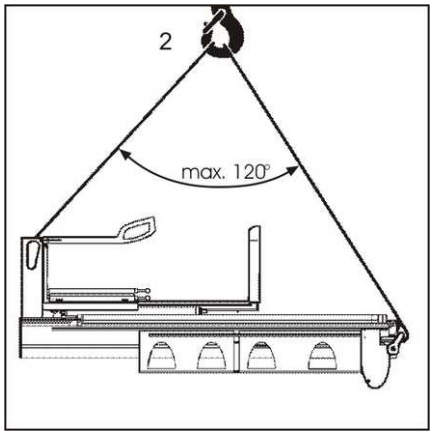
Hooking on the lift mast ▷

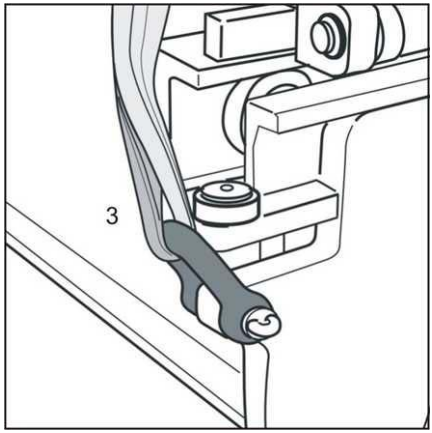
To hook the lift mast onto the crane hook, use the bores intended for this purpose at the top end of the lift mast (1). Harnesses suitable for this purpose must be used (shackle or lifting device). If necessary, the individual parts of the lift mast must be lashed to each other during this process to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



Hooking the lift mast on horizontally

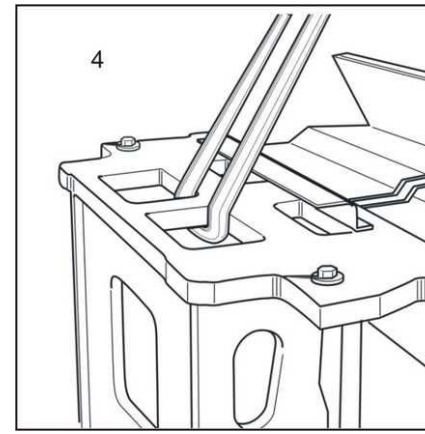
If the lift mast needs to be crane-loaded in a horizontal position (2), suitable shackles must be used in the indicated bores at the top end of the mast (3).





Lift mast, lower lifting point

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

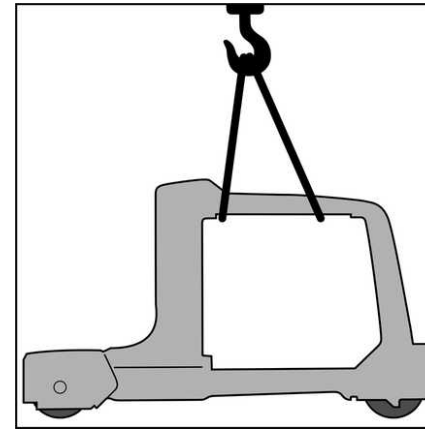


Loading the chassis

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

Hooking on the chassis

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



⚠ WARNING

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

NOTE

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

⚠ WARNING

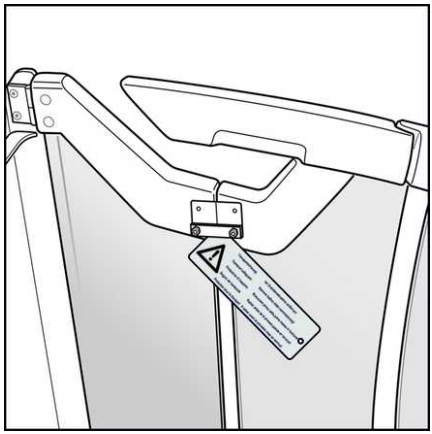
Hydraulic oil can escape through disconnected hydraulic connections.

Transportation safety device on glass doors

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

– Remove and dispose of the transportation safety device.

*Option



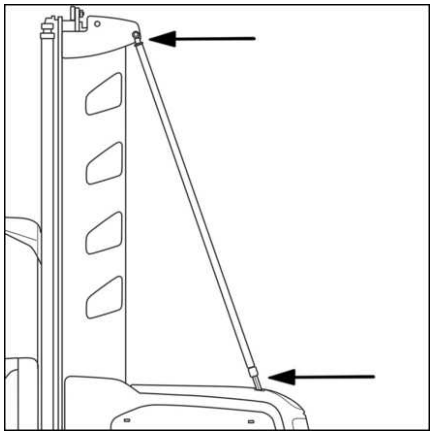
Mast bracing

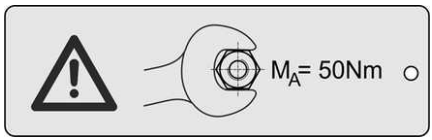
Mast bracing may be required depending on the configuration of the order picking truck.

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

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

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



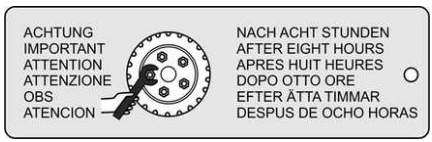


Wheel nuts

⚠ WARNING

Wheel nuts can loosen after initial commissioning.

After the first eight operating hours, tighten the wheel nuts to 210 Nm.



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

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

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

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

Weight of the attachment

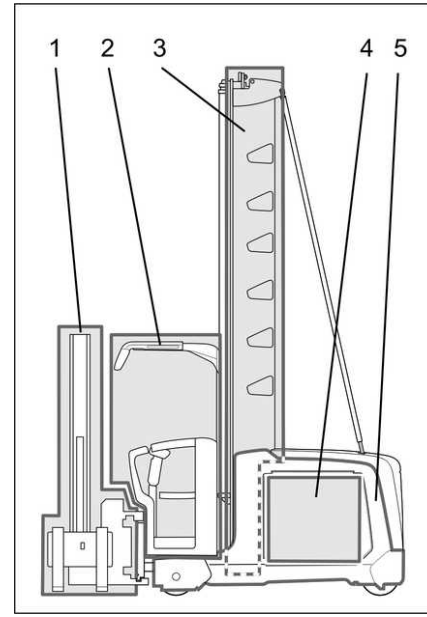
A standard attachment (europallet) with a turret head weighs approximately 800 kg.

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

Weight of the driver's cab

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

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



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

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

Weight of the lift mast

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

Overall mast height	Weight
<3 m	<1600 kg
<4 m	<2,300 kg
<5 m	<2,900 kg
<6 m	<3,500 kg
>6 m	<4,300 kg

Weight of the battery

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

NOTE

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

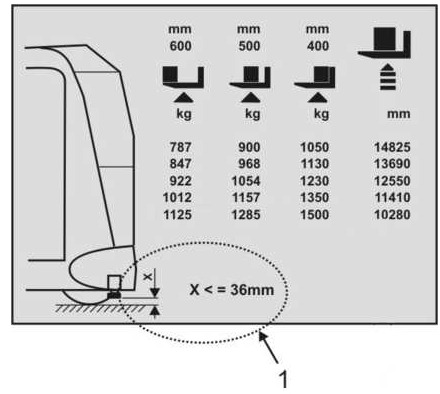
Weight of the chassis

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

Support screws

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

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



Safe handling of the traction battery

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

Batteries with liquid electrolyte

⚠ DANGER

Risk of explosion

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

– The gas mixture formed when charging batteries must not enter the driver's compartment.

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

80-V version

⚠ WARNING

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

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

Handling the battery

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

⚠ WARNING

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

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

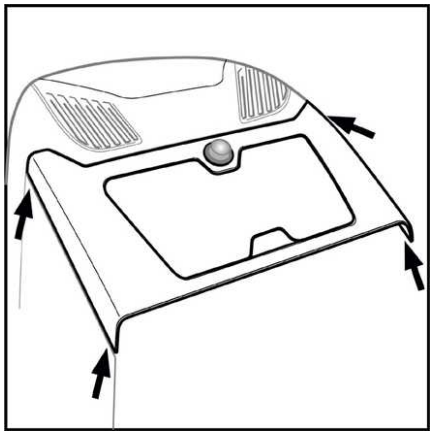
Battery compartment cover, Service flap

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

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

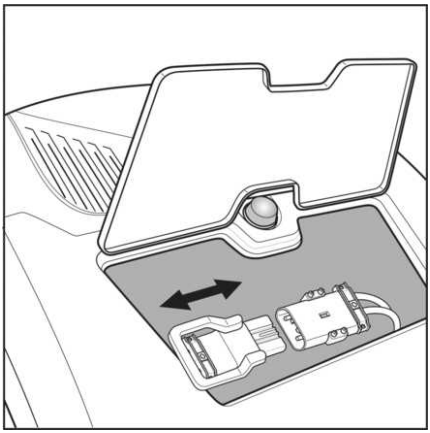
NOTE

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



Service flap

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



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

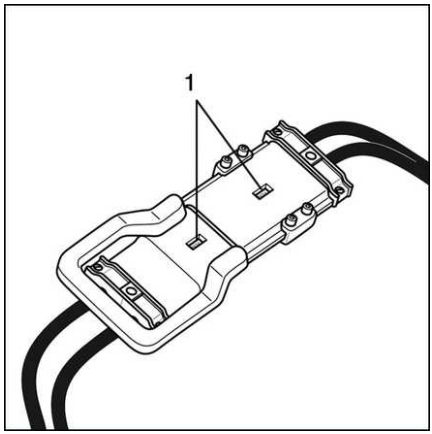
⚠ DANGER

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.

Permitted batteries

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

Battery commissioning

Proper commissioning must be performed if the industrial truck was ordered without a

battery or if it was supplied with a dry pre-charged battery because it had to be transported over a long distance (e.g. from overseas). Observe the information and guidelines from the battery manufacturer. If the battery was obtained separately to the industrial truck, the nominal voltage, the required minimum weight and the attached battery male connector must be checked particularly carefully.

⚠ WARNING

Observe the safety regulations for handling battery acid.

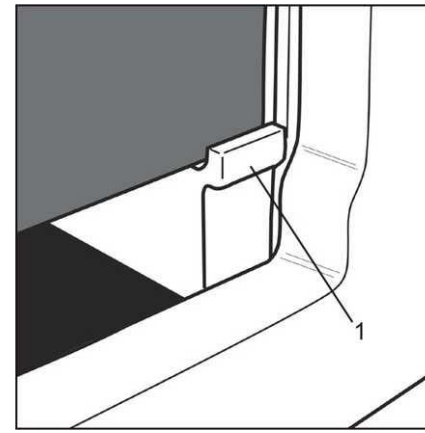
⚠ CAUTION

Risk of short circuits

Take care not to jam or crush the battery cable.

Replacing the battery

Battery replacement using forklift truck ▷



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

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

⚠ WARNING

Risk of accident, risk of crushing

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

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

Battery replacement with change frame

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

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

NOTE

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

⚠ WARNING

Risk of damage to property, risk of crushing

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

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

Function checking

Before the truck is handed over to its destination, thorough function checking must be carried out. Before starting work, the **Checklist before starting work** must be completed.

If any defects that could influence operational and road safety are determined during this daily check, courses of action 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.

If your industrial truck is equipped with any special equipment (order), this must also be checked carefully. For a functional description and any additional maintenance tasks required, see the chapter entitled **Special equipment** or the additional documentation prepared and provided by our suppliers.

Daily commissioning

Checklist before starting work

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

⚠ CAUTION

Risk of accident and component damage

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

Function checking the brake system

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

Function checking the steering system

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

Checking all operating devices

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

Checking the access control

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

Checking the lifting accessory

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

Checking the overhead guard

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

Checking the wheels

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

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

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

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

– Check that there are no chips or cracks in the glazing.

– Check all parts of the glazing for contamination. Clean if necessary.

Other checks

– Check the function of the horn.

– Check the function of all other warning devices*.

– Check the function of the lighting devices.

– Check that all covers and flaps are closed.

– Check that the battery lock is in perfect condition and operates correctly (shut the truck off if the lock is not correctly latched*).

– Check special equipment and special functions according to the order to make sure they are in perfect condition and operate correctly.

* Option

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)

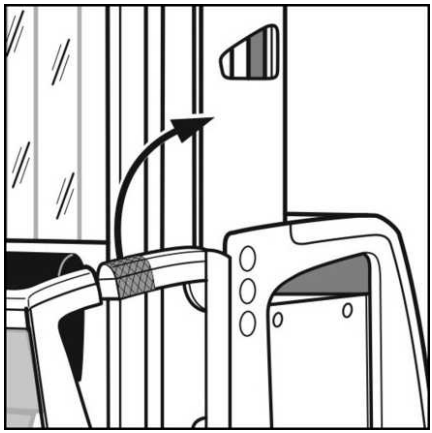
⚠ WARNING

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.

Access to the driver's compartment

Barriers



⚠ DANGER

Risk of crushing

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

⚠ WARNING

Risk of falling

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

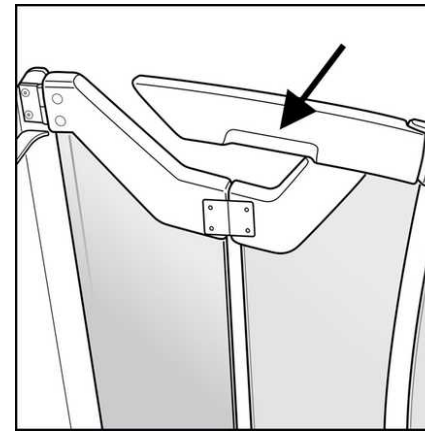
NOTE

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

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

To open and close the barrier, use only the section of the stomach bar that is furthest forward.

Doors



⚠ DANGER

Risk of crushing

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

⚠ WARNING

Risk of falling

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

The glass doors feature a recess on the inside of the handle. Use only this area of the handle to open and close the glass doors.

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

NOTE

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

Operating devices

Initial driving exercises

⚠ WARNING

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

Observe all safety instructions.

⚠ WARNING

Risk of accident

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

Speeds

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

Adjusting the position of the operating panel ▷

⚠ WARNING

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

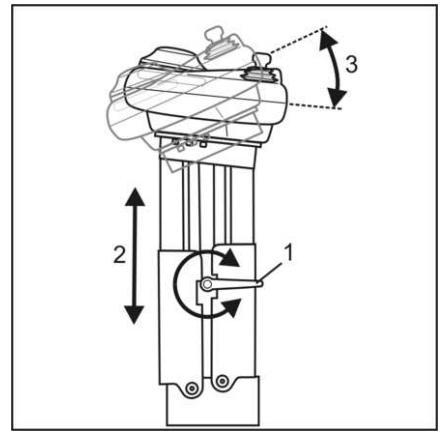
In order to be able to optimally adapt the operating panel to driver requirements, the panel can be adjusted by height, by tilting the console and by tilting the operating panel. The position of the clamp lever can be changed by means of an integrated latching mechanism. To do this, pull out the handle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

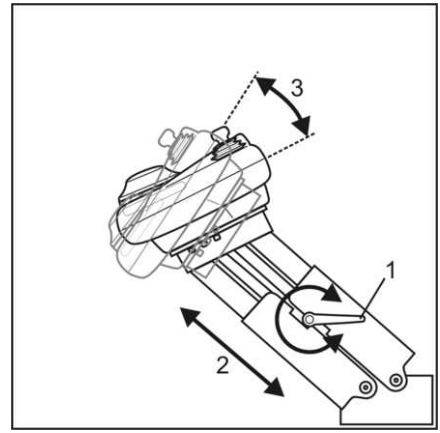
Adjustment

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

– Adjust height (2).

– Adjust tilt (3).





Driver's seat

NOTE

In addition to the standard driver's seat, several other models are available as options. The corresponding original operating instructions from the manufacturer are supplied with each model. Observe these operating instructions.

⚠ WARNING

Risk of accident

Only apply settings in a stationary truck.

Adjusting the driver's seat, standard version

Adjusting the seat height

– Place body weight on driver's seat.

– Pull the lever (1) and raise or lower the driver's seat to the required height using your body weight.

– Release the lever.

Adjusting the horizontal position

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

Tilting the seat surface

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

Folding up the seat base

If the seat base of the driver's seat (4) is in the way when operating the industrial truck in a standing position, it can be folded up and away. The folded-up seat base is upholstered and can be used to lean on.

– Reach under the seat base and fold it upwards.

Driver's seat, option

The driver's seats that are available as different options vary considerably in terms of their

design and operation. Observe the original operating instructions supplied.

Optional versions

- Folding armrests
- Heatable
- 80 mm longitudinal adjustment
- Lumbar support
- Air suspension
- Leather upholstery

Switching on

Switching on the controller

Battery male connector

To plug in the battery male connector, open the service flap behind the lift mast.

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

NOTE

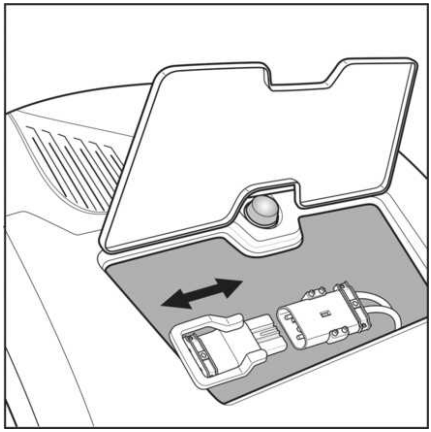
Barriers/cab doors are monitored by monitoring switches to ensure that they are completely and correctly closed.

⚠ WARNING

High risk of injury

Never climb or jump on to a moving truck.

▷



Emergency off switch, key switch

Unlock the emergency off switch by turning it clockwise.

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

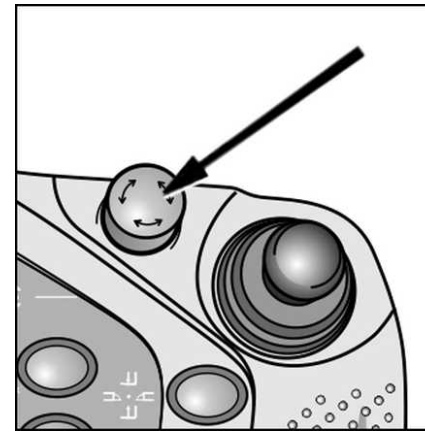
If the truck is in an error-free state, the indicator for normal operation appears on the operation status display (see "Operating status display").

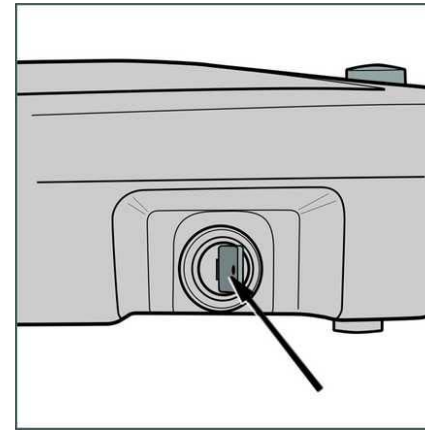
The working spotlights* are switched on.

NOTE

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

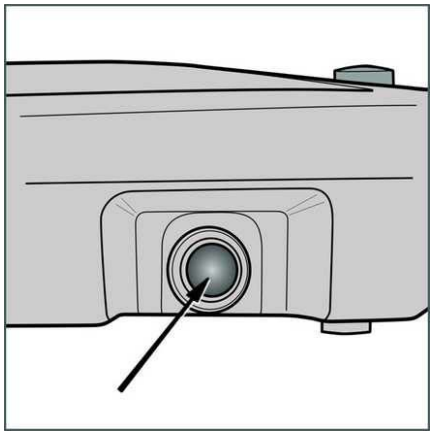
* Option





Electronic access control

There is also the option to have these industrial trucks equipped with electronic access control (PIN code, RFID chip, magnetic card system). See the section entitled "**Special equipment**".



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.

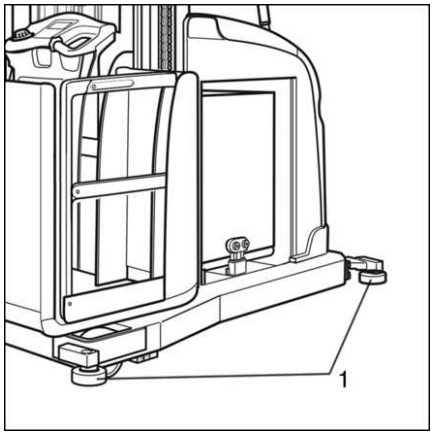
Mechanical guidance MZF

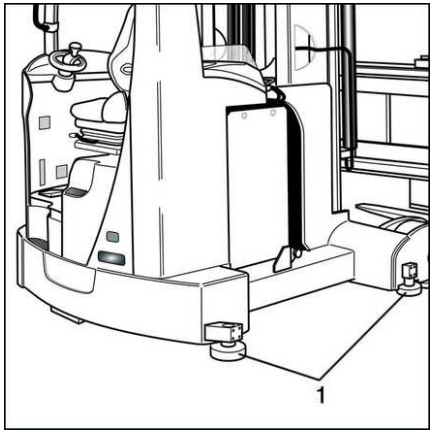
The industrial trucks can be guided **mechanically** when travelling within aisles. To achieve this, a rail system is installed on the floor of the warehouse. There are 2 (or 3*) guide rollers (1) on each side of the industrial truck. This guides the industrial truck along the rail system with little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



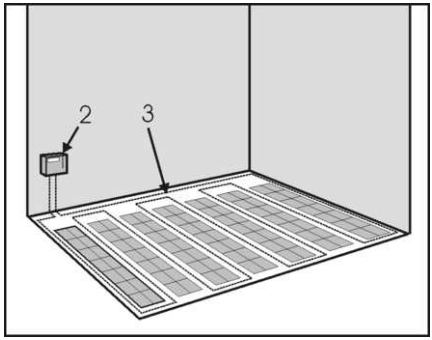


Inductive guidance (IZF*)

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.



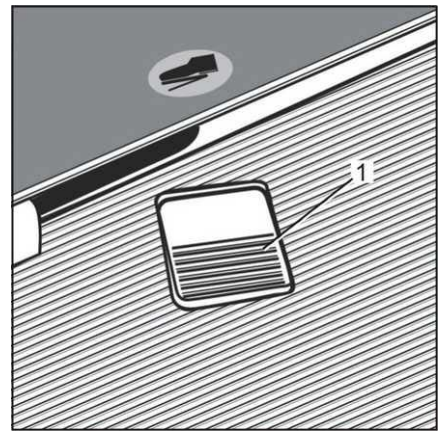
More detailed information can be found in the relevant sections of these instructions.

*Option

Braking, driving and steering

Releasing the brake

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



NOTE

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

Braking

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

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

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

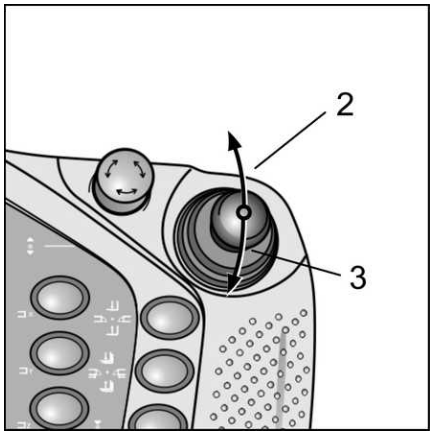
Driving

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

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

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

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



Speed

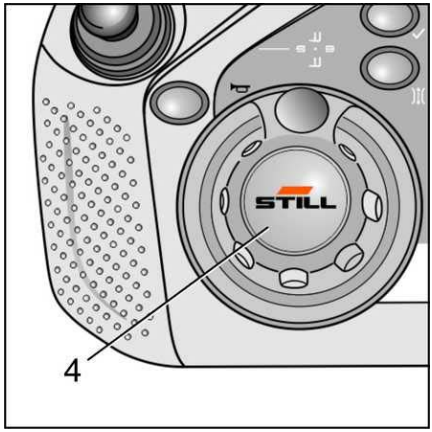
The controller limits the driving speed depending on the driving situation and any options installed. It is always possible to have the speed restricted by the authorised service centre, but not to increase it. The operator can continuously control the speed within the permitted range.

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

Steering

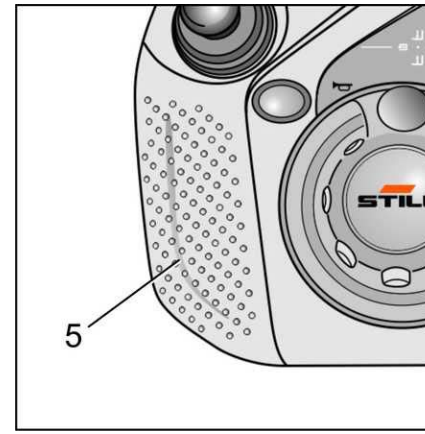
The operator's left hand is used to actuate the steering knob (4) and thus determines the course the truck takes. The steering knob has a mechanical detent in the straight-ahead position. From there, the steering knob can be turned approx. 135° to the right and to the left. The steering turntable rotates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

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



Two-hand driving operation

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



Simultaneous functions

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

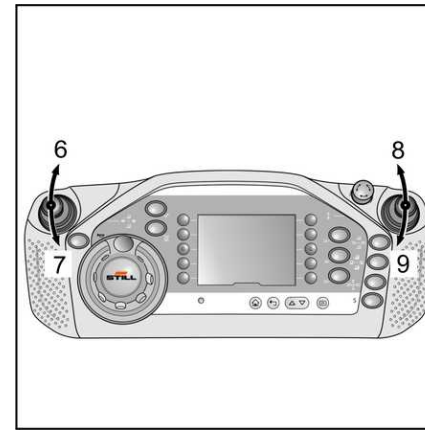
Driving and main lift

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

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

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

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

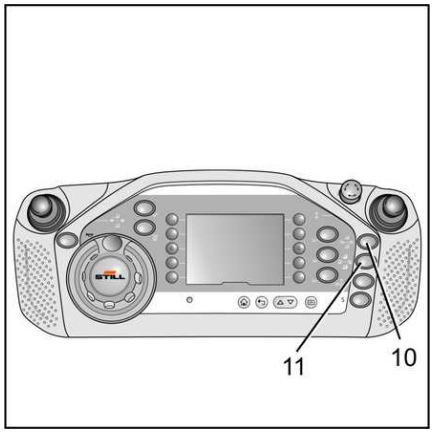


Driving and auxiliary lift

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

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

The degree of activation is always infinitely variable.



Driving, main lift and auxiliary lift

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

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

The degree of activation is always infinitely variable.

Mechanical guidance MZF

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

Entering the aisle

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

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

Exiting the aisle

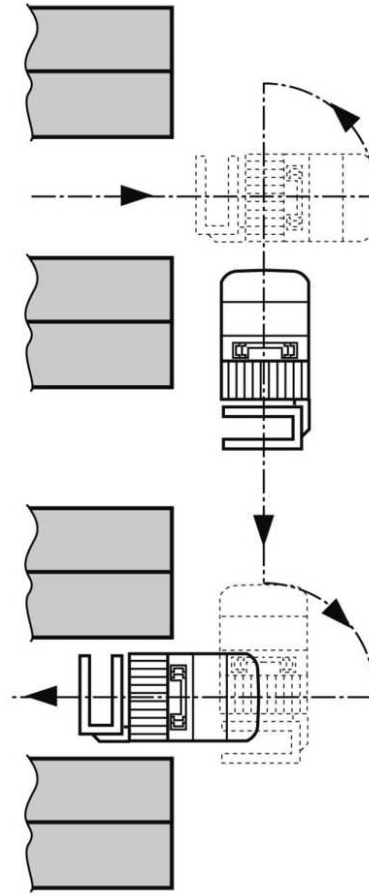
The industrial truck must be driven completely out of the aisle. The sensor system for the

aisle detection recognises the location of truck and re-enables the steering.

Changing the aisle

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

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



Load pick up

Moving the load

Main lift and auxiliary lift

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

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

NOTE

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

Ancillary movements

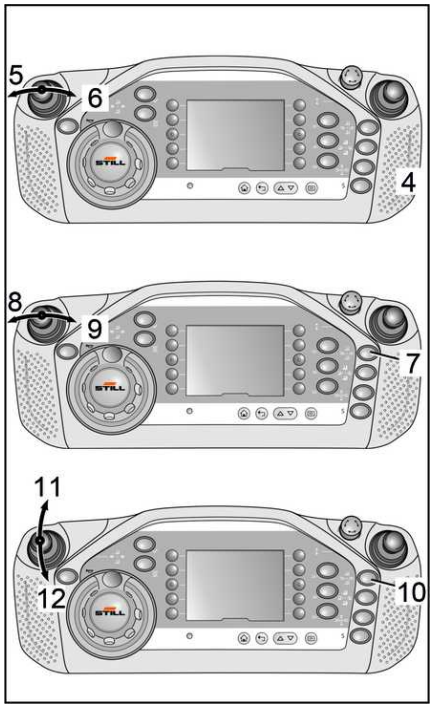
All movements of the load apart from the main lift are categorised as ancillary movements. Standard functions are:

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

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

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

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



Swivelling and sliding the swivel fork 180° synchronously

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

NOTE

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

Swivelling and sliding the swivel fork 90° synchronously

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

Option

See the chapter entitled "Special equipment".

Fork cycle

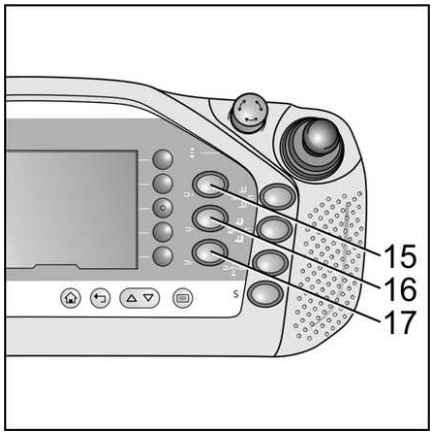
This function enables an increase in handling performance through automation of load pick up and load deposit. The details of the fork cycle function depend on the design of the industrial truck.

Option

See the chapter entitled "Special equipment".

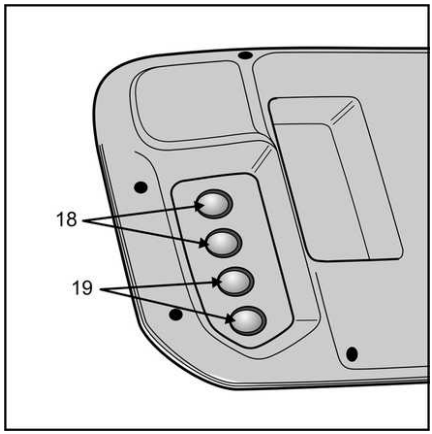
Hydraulic special functions

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



Underside of the operating panel

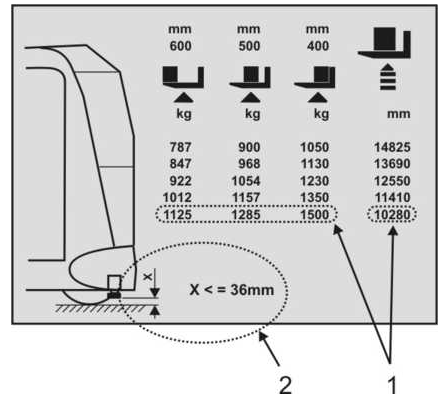
On the top of the operating panel, there are four buttons on the right-hand end that are operated using the thumb on your right hand. There are also four buttons (18) and (19) on the underside of the operating panel. These buttons can operated using your other fingers on the same hand. The functions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



NOTE

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

Load capacity diagram



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

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

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

Distance between the load centre of gravity and the fork back

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

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

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

NOTE

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

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

⚠ WARNING

Risk of accident

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

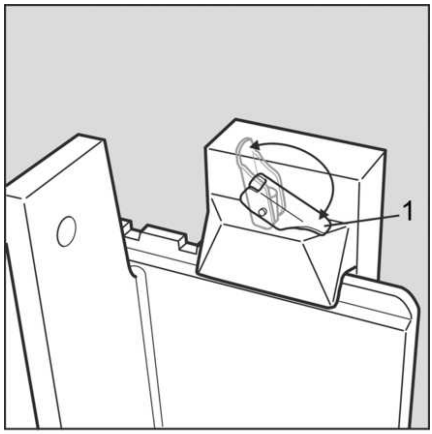
Fork arms, adjustable ▷

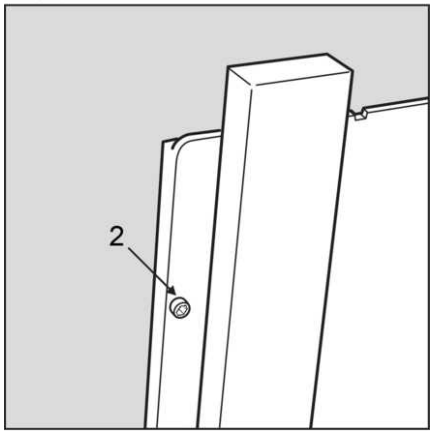
The standard design features forged fork arms that are manually adjustable. This allows different pallets and load supports with suitable dimensions to be picked up.

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

– Lift the locking lever (1).

– Move the fork arms to the desired position and allow the locking lever to engage again.





NOTE

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

⚠ CAUTION

Risk of accident

– Use the industrial truck only if the side fork arm locking device (2) is present and in perfect working order. Fork arms could slide off the fork carriage and fall down.

– Use only fork arms that are designed and approved for this industrial truck. See the order for specifications.

Emergency operation

Emergency operation

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

⚠ WARNING

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

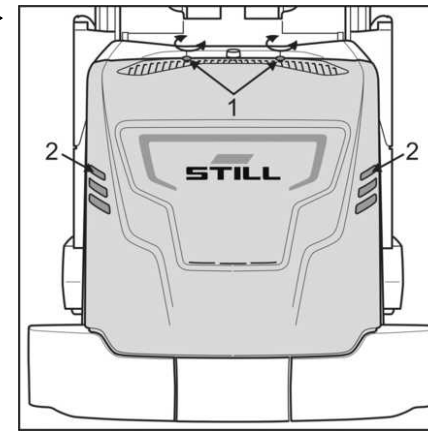
Removing the control compartment hood ▷

⚠ DANGER

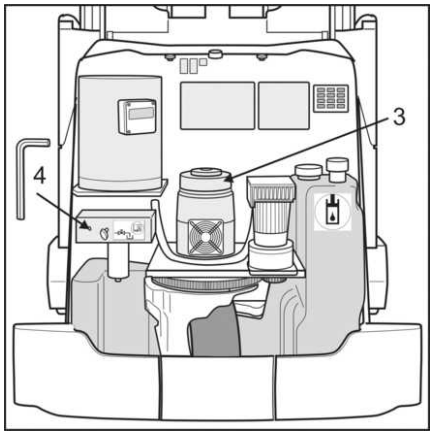
Danger of electric shock (80 V version)

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

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



Releasing the brake mechanically



⚠ WARNING

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

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

Traction motor brake

First option

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

Second option

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

Load wheel brake*

To release the load wheel brake, the hydraulic line must be depressurised. To do this, open the threaded pin (4) on the valve block by turning the threaded pin a maximum of 1.5 turns anti-clockwise. This threaded pin has a width across flats of 4 mm.

NOTE

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

* Option

Towing with operational steering

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

Towing with non-operational steering ▷

⚠ WARNING

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

Make sure that the industrial truck is switched off.

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

– Perform the required steering movement using a socket wrench or box-end wrench.

– Before the industrial truck is recommissioned, the pinion shaft must be fixed back in its original position.

Activating the emergency steering device

48 V version

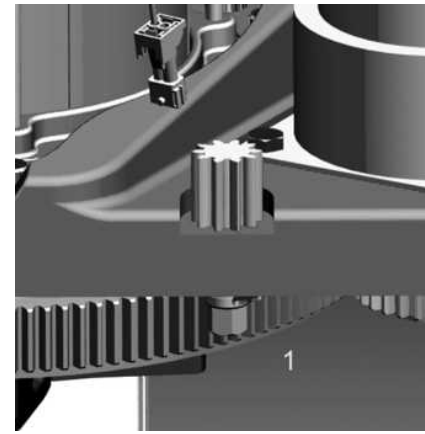
– Using a suitable tool, e.g. a screwdriver, remove the lock washer (1). When doing so, make sure that the lock washer does not jump off.

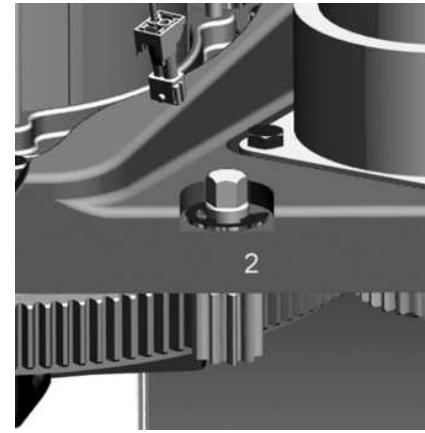
– Insert the pinion shaft into the same bore (2) from below. Insert the lock washer into the shaft groove from above.

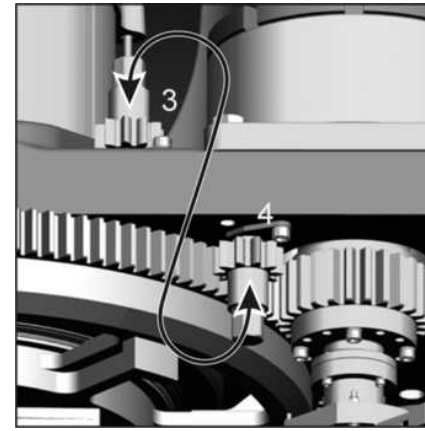
80 V version

– Remove the screw and the holding plate (3).

– Insert the pinion shaft into the bore provided from below and hold the pinion shaft in position with the holding plate and screw (4).



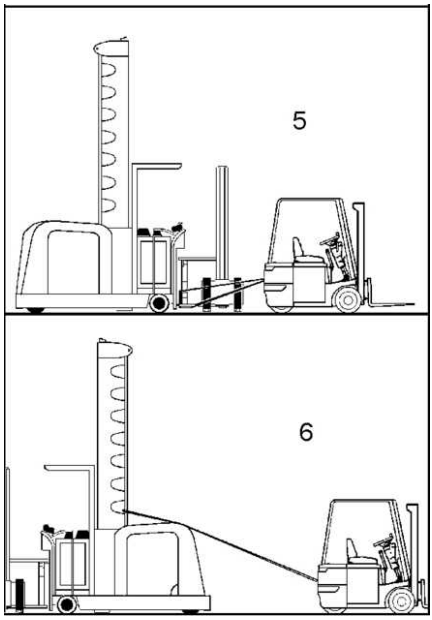




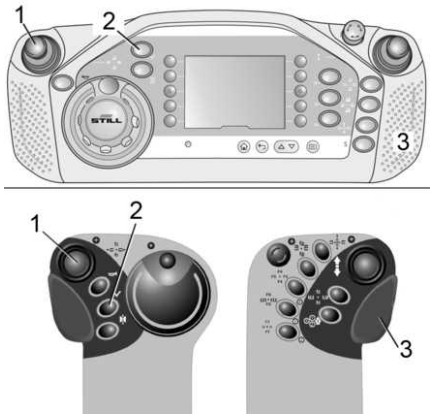
Attachment points

(5) for towing with the drive unit leading,

(6) for towing with the fork leading



Emergency lowering via the operating panel



Under certain circumstances, the truck control unit blocks the further lowering of the cab (defect in the height measuring system, defect in the rev sensor for the pump motor).

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

– Do not actuate the foot switch.

– Push the operating lever for hydraulics (1) forwards while simultaneously touching the right-hand sensor surface (3) (main lift lowering function).

– Wait six seconds. The enable button (2) then flashes in red.

– Leave the main lift lowering function selected while simultaneously pressing the

enable button. The main lift will slowly be lowered.

NOTE

For technical reasons, emergency lowering via the operating panel is not possible in the event of chain breakage, in the event of a slack chain or in the event a fault in the chain monitoring system. The emergency lowering valve in the chassis is available as an alternative. For information on this, observe the section entitled ***Emergency lowering****.*

Emergency lowering

Emergency lowering function for the driver's cab

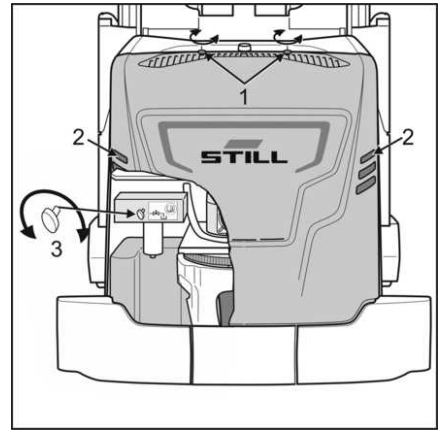
If a technical defect causes the industrial truck to shut down when the driver's cab is raised, or if an operator in the raised cab becomes incapable of operating the industrial truck (e.g. falls unconscious), the driver's cab can be lowered by a second person on the ground using the hand-operated emergency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

Removing the control compartment hood ▷

DANGER

Danger of electric shock (80-V version)

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



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

⚠ DANGER

Risk of physical injury

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

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

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

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

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

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

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

Securing the load support

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

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

⚠ DANGER

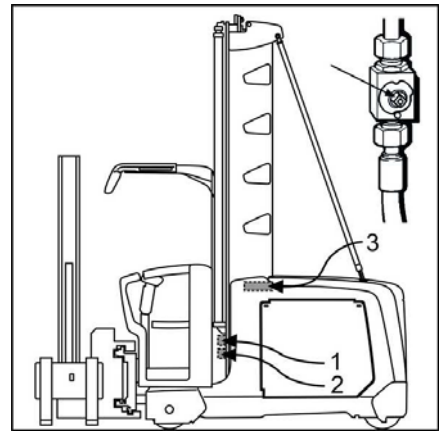
Risk from lowering of the lift mast or driver's cab

– The pressure in the hydraulic system must be released before any work is carried out on it. The load support must also be lowered to the ground.

– Before a person can go underneath the raised driver's cab, an additional mechanical safety device must be installed. For example, fit a suitably strong brace around the bridge pieces on parts of the lift mast or place a suitably strong jack stand underneath the driver's cab.

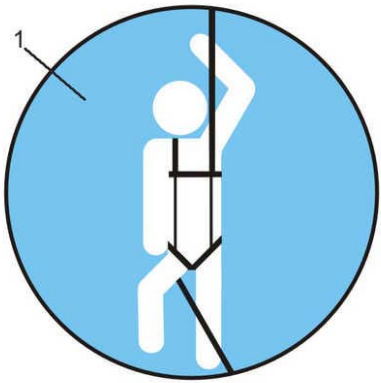
– Lock all existing shut-off valves. There is a valve for each main lift cylinder (1), one for each free lift cylinder* (2) and two additional valves for the hydraulic lines for the attachment (3).

*Option



Emergency 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.

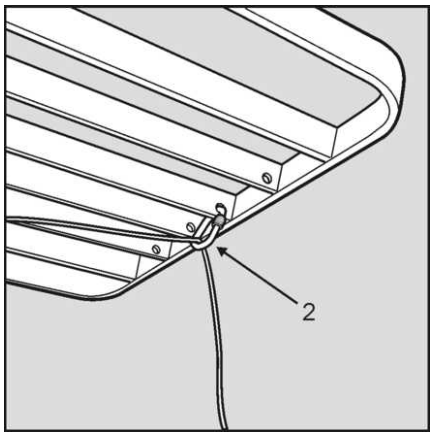
A figure-of-eight knot is tied on the other end to protect it from unthreading. This knot is secured with a cable tie.

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 truck

NOTE

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

Decommissioning

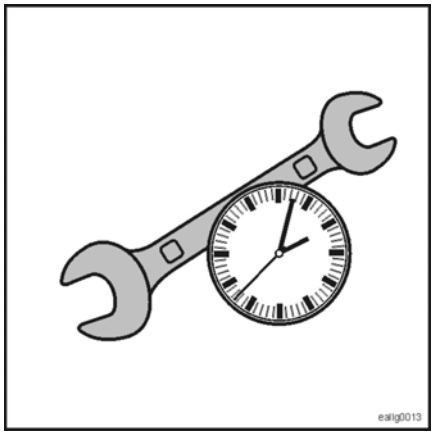
ENVIRONMENT NOTE

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

5

Regular care and maintenance

Regular care and maintenance ▷



NOTE

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

⚠ WARNING

Risk of injury and damage to property

- Appropriate precautions for safe working must be taken for all care and maintenance work.
- As well as the usual occupational safety regulations, the safety information specifically outlined in this brochure must also be 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

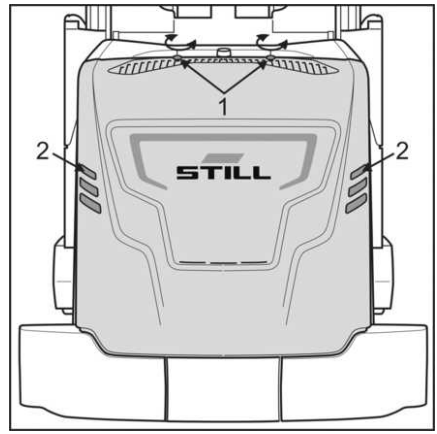
Observe additional operating instructions as well as documentation from suppliers included in the scope of delivery.

Removing the control compartment hood ▷

⚠ DANGER

Risk of electric shock

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



The fuses are installed in the control compartment.

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

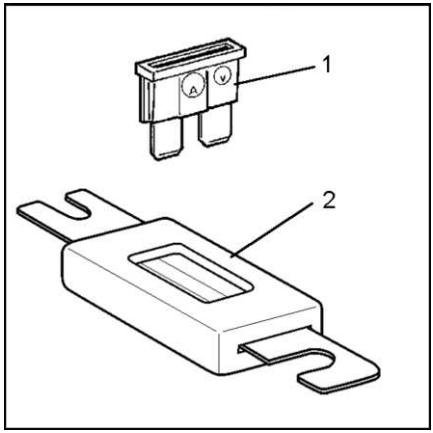
– Open the two screw plugs (1).

– Hold the hood at the ventilation openings (2), lift it off and then place it to one side. The hood is very lightweight and can

therefore be removed by hand without using any tools.

Proceed in the reverse sequence to fit the hood. Place the hood carefully in its guide and latch and tighten the plastic screws until they are hand-tight only.

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

Regular maintenance

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

Maintenance schedule, 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		✓	✖
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: check the bearing of the wheel shaft for axial play.											
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 (observe the appropriate torque).											
Traction motor bearings: check for operating noise.											
Traction motor bearings: replace if necessary.											
Chassis, bodywork and fittings											
Bearing points and joints: check and lubricate.											
Doors, flaps and covers: check function.											
Doors, flaps and covers: check the mounting and condition.											
All moving parts: lubricate with a suitable lubricant.											
Overhead guard: visually 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.											
Battery compartment door and battery compartment hood: check and adjust.											
Battery compartment: check that the battery is securely positioned and check side stops on the battery.											
Chassis frame											
Drive wheel: check the condition and check for wear and any foreign objects.											

At operating hours										Carried out	
1000 h		2000 h		3000 h		4000 h		5000 h			
6000 h		7000 h		8000 h		9000 h		10000 h		✓	✖
Drive 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.											
Active load wheel axle											
Function: check while driving in the aisle.											
Measurement units: check the condition.											
Measurement units: clean, remove any foreign objects.											
Measuring rollers, sensors, magnets: check the condition.											
Measuring rollers, sensors, magnets: clean, remove any foreign objects.											
Spur gears: check the condition of the lubrication and relubricate if necessary.											
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 condition and thickness of the brake lining. Replace if necessary.											

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		✓	✖
Load wheels: check the brake clearance by freewheeling.											
Load wheels: check the condition and thickness of the brake lining. Replace if necessary.											
Brake lining: blow out abrasion with oil-free air.											
Brake retardation values: check after each adjustment (dynometer or retardation measuring device).											
Automatic braking: check the function as per the order.											
Components for automatic braking (inductive switch/photoswitch/magnet-operated switch): check the function, setting and condition.											
Components of the RFID system: check the function, condition and setting.											
Operating devices											
Service brake: check for correct function.											
Operating devices: check the function and condition.											
Protective devices: check depending on the equipment. Repair if necessary.											
Information signs, warning signs, load capacity diagram: check that they are present and legible.											
Information signs, warning signs, load capacity diagram: replace missing or illegible labels.											
Optional and additional equipment: check the function and condition according to the order.											
Electrics, electronics											
Battery cables, battery connectors, battery male connectors: check the condition and check for secure attachment.											
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.											
Functions: check the driving, accelerating, braking and reversing functions.											
Plugs and connections: check that they are securely attached.											
Openly routed cables: visually check the insulation.											
Contactor contacts: check the condition and check for erosion. Replace if necessary.											
Fuses: visually check the condition.											

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		✓	✗
Fuses: check the values.											
Heat sink and fan: clean.											
Height measuring system for the main lift: check the function and condition of the measuring tape and check that the component is securely mounted.											
Height measuring system for the auxiliary lift: check the condition of the magnetic strip and protective tape and check that the components are securely mounted.											
Displacement transducer for the load wheel: check for contamination, check the condition and check that the component is securely mounted.											
Displacement transducer for the load wheel: check the O-rings for contamination, check the condition and check for wear. Replace if necessary.											
Hydraulics											
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 limit stop: 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.											

At operating hours										Carried out	
1000 h		2000 h		3000 h		4000 h		5000 h			
6000 h		7000 h		8000 h		9000 h		10000 h		✓	✖
Lift mast rollers: lubricate with all-purpose grease. If necessary, install lubricating nipples.											
Lift mast rollers: check the condition and check the setting.											
Guide elements: check the lateral play.											
Guide elements: lubricate with all-purpose grease.											
Load fork: check the condition and function of the latches.											
Load fork: visually check for bends, measure if necessary.											
Load fork: if you suspect there are cracks, check using the dye penetrant procedure.											
Adjustable fork: lubricate sliding surfaces with all-purpose grease.											
Swivel drive: check that the eight screws between the swivel drive and the front end are securely fastened.											

2000-hour maintenance schedule

At operating hours										Carried out	
2000 h		4000 h		6000 h		8000 h		10000 h		✓	✖
Gearbox											
Gearbox: visually inspect the shaft/hub connection between the traction motor and gearbox and clean the connection if necessary.											
Gearbox: add new lubricant to the shaft/hub connection between the traction motor and gearbox. Refer to the lubricant overview.											
Gearbox: perform an oil change (every 4000 hrs).											
Hydraulics											
Hydraulic system: oil change.											
Chassis, bodywork and fittings											
M24 screw connection between the welded chassis, the rear of the cast and the collision protection: check for secure attachment with a torque of Ma = 660 Nm.											
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 66dB(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.

Optispeed versions

"Optispeed" denotes the various versions of the speed optimisation system. To make the work processes more economical and reliable, the industrial truck can be equipped in stages with additional components. The result is a considerable expansion of the range of functions.

Version 3.0

Auxiliary equipment

- Advanced software functions

This version represents the basic equipment of the "Optispeed" speed optimisation system.

The "intelligent load capacity diagram" tells the operator what load weight can be lifted to what lift height.

Automatic side shift limitation improves the positioning of the loads on the rack.

Version 3.1

Auxiliary equipment

- Load weight detection
- Advanced software functions

The "intelligent load capacity diagram" shows the operator dynamically how high the load that is currently on the load fork may be lifted.

Automatic side shift limitation improves the positioning of the loads on the rack.

Version 3.3

Auxiliary equipment

- Load weight measurement
- Physical load detection
- Advanced software functions

The "intelligent load capacity diagram" shows the operator dynamically how high the load that is currently on the load fork may be lifted.

If the limit values are exceeded, acoustic and visual warnings are issued.

In addition, the driving and lifting functions can be locked.

Automatic side shift limitation improves the positioning of the loads on the rack.

Version 3.4

Auxiliary equipment

- Load weight measurement
- Physical load detection
- Advanced software functions

The "intelligent load capacity diagram" shows the operator dynamically how high the load that is currently on the load fork may be lifted.

If the limit values are exceeded, acoustic and visual warnings are issued.

In addition, the driving and lifting functions can be locked.

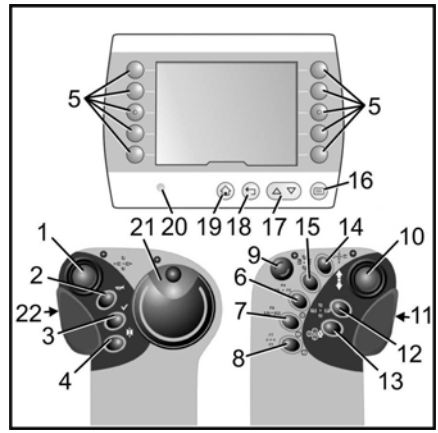
Automatic side shift limitation improves the positioning of the loads on the rack.

The load is stabilised as it is retrieved and stored, with dynamic adaptation to the lift height and the load weight. This enables sensitive loads in particular to be positioned gently and precisely without jerking. These operator assistance functions accelerate work processes in the storage area.

Version 4.0

Version 4.0 includes "iGo pilot navigation" features. This extensive set of functions is described in separate documentation.

Split operating panel



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

(2) Horn

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

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

(5) Selection keys for **favourites**

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

(9) Emergency off switch

(10) Operating lever for driving

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

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

(13) Reserved for special functions

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

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

(16) Selection of a menu display

(17) Selection within a menu

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

(19) Back to the main menu

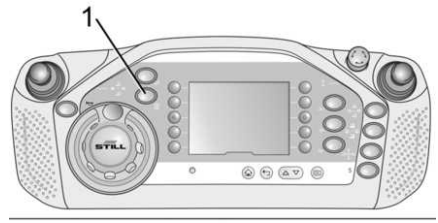
(20) Light sensor for automatically illuminating the display lighting

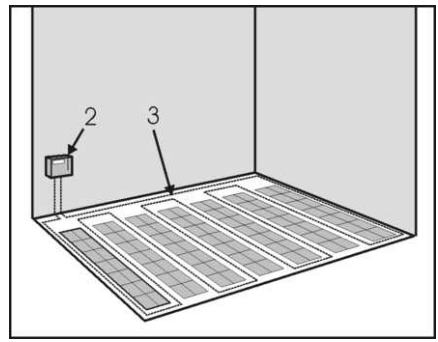
(21) Steering knob or steering wheel

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

*Option

Inductive guidance IZF ▷





System description

General

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

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

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

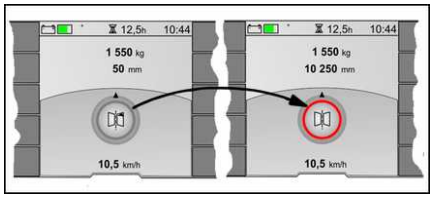
The operating devices for inductive steering control are integrated into the operating panel. The display indicates the current operating status. After the controller is switched on, a self-test runs in the steering control system. Switch (1) on the operating panel is used to switch between manual driving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

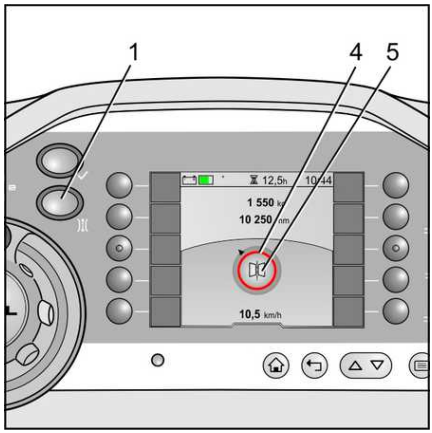
Commissioning

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

Entering the aisle

Guidance procedure





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

NOTE

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

Entering the aisle

– Guide the industrial truck onto the induction track and drive into the aisle in automatic driving mode.

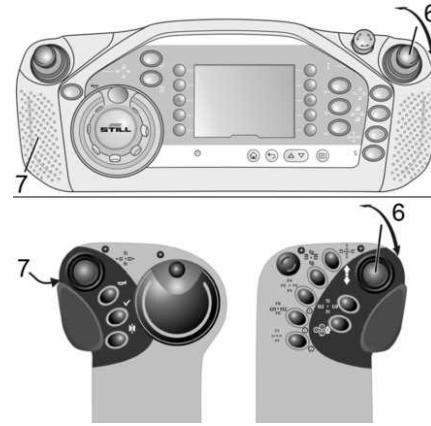
– When the sensor system of the industrial truck has detected the aisle, the maximum permissible speed within the aisle is possible.

⚠ CAUTION

Risk of collision with the racking

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

Automatic driving within the aisle ▷



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

Switching from automatic mode to manual mode within the aisle

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

Driving speed adaptation

The automatic speed adaptation feature adjusts the maximum possible driving speed

according to the current situation. If an unsafe situation arises, for example an error occurs, the driving speed is limited or the driving function is switched off completely.

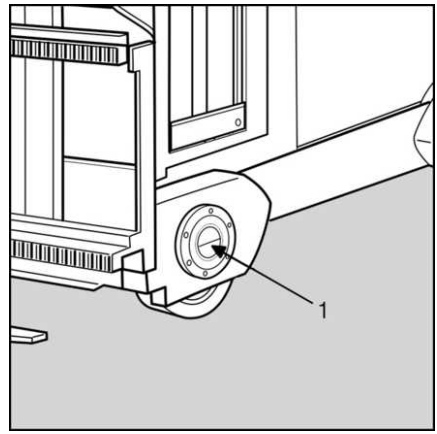
Leaving the induction track ▷

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

Changing the aisle

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

Automatic Floor Compensation AFC ▷



Active load wheel axle

If an industrial truck is equipped with this option, additional sensor systems determine unevenness in the roadway while the truck is in motion. Using these measured values, the controller then actively intervenes in the position of the load wheels and adjusts their axles horizontally via an eccentric. This prevents the lateral tilting response of the lift mast when driving over uneven surfaces. A reduction in the driving speed due to uneven surfaces is not necessary and work safety is increased.

Industrial trucks with an active load wheel axle can be recognised by the special design of the bearing points on the load wheels. When the system is working, the notch in the axle (1) twists while the truck is in motion.

NOTE

- The system is active only if the industrial truck moves under guidance
- Once the industrial truck is switched off, the system goes into a rest position after a short time. Reactions in the load wheel axle can be felt by the operator
- The system is fully automatic. The operator has no influence over the functions
- The parameterising of this function is based on on-site measurements. If the conditions change compared with these measurements, correct functionality can no longer be guaranteed

Error messages

Error message

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.

NOTE

See also the section entitled "Operating instructions".

Possible cause

- Defect in the sensor system
- Defect in the mechanism

Effect

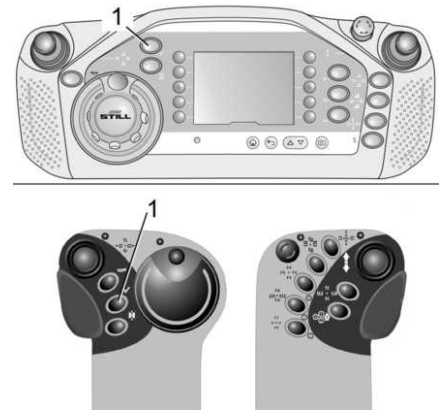
- Lift height of less than 3 m -> speed limitation to 1 km/h
- Lift height of over 3 m -> drive stop, bridging not possible

Remedy

Call the authorised service centre.

Lift cut-out

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



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 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.

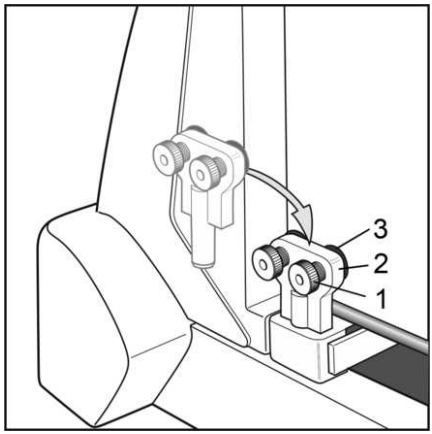
NOTE

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.

Battery on a roller channel ▷



1 Knurled-head screw
2 Battery lock
3 Rubber buffer

Description

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

Monitoring

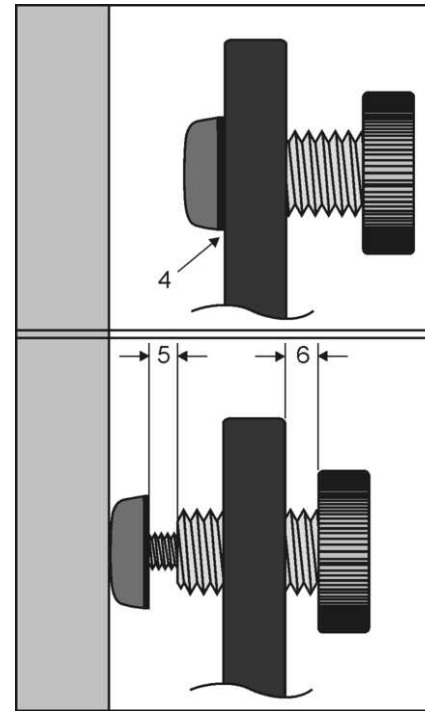
The battery locks are electrically monitored. If one of the locks is not correctly locked in place an error message appears in the display and the truck will stop.

⚠ WARNING

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

* Option

Setting the battery lock



⚠ CAUTION

Risk of crushing and damage to property

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

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

NOTE

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

– Insert the battery approximately in the centre of the battery compartment. In doing so, one of the battery locks will remain as a stop in the truck.

– Rotate the knurled-head screw (1) and the rubber buffer (3) all the way back (4) on both locks (2).

– Insert the second battery lock into the truck.

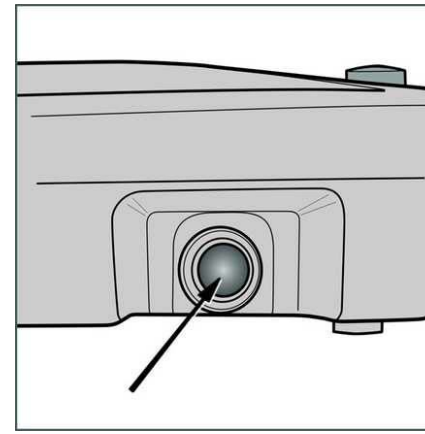
– Unscrew both rubber buffers until they lie against the battery. The visible thread length should be roughly the same on both sides of the battery. Gently move the battery to the side, if necessary The maximum adjustment range for each rubber buffer is approximately 20 mm.

– If the useable threads on both rubber buffers are not long enough to fasten the buffers to the battery, the knurled-head screws must be screwed in to further increase the adjustment range. At the same time, the

rubber buffers must rotate with the knurled-head screws.

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

Electronic access control



As an option, these industrial trucks can also be equipped with electronic access control in place of the key switch.

These systems are available as options:

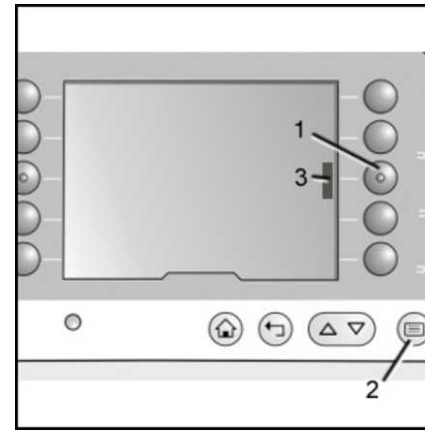
- PIN code input
- RFID chip
- RFID card

Switching on the controller

Push the push button for approximately 2 seconds. The controller is switched on. The display is activated and the working spotlights* are switched on.

Once the industrial truck is switched on, all functions are initially disabled. The functions of the industrial truck are enabled only once the electronic access control has been correctly activated.

PIN code



The functions are enabled by entering a valid five-digit number code using the keypad (see also "factory setting").

– Press the F1 (1) button.

Depending on the language, the following display prompts the user to enter the specified PIN code.

– Enter the five-digit code within 8 seconds.

– Press button (2). This confirms the entry.

When the PIN code is entered correctly, a short acoustic signal will sound.

The display returns to the start screen.

The coloured bar in the display next to the F1 button (3) indicates that the functions of the industrial truck are now enabled.

Incorrect PIN code, input time elapsed

When an incorrect PIN code is entered or if the input time of 8 seconds elapses:

– Press the F1 button (1) again.

– Enter the correct PIN code.

NOTE

- *Each time the industrial truck is switched on using the operator panel button, the PIN code must be entered again.*
- *If the industrial truck cannot be switched on using the PIN code, call the authorised service centre.*

Factory setting

The factory setting for this PIN code is "11111".

PINcode change

Up to five different codes can be used. The customer can select codes between 10000 and 99999 and these can then be programmed into the controller by the authorised service centre.

Switching off

– To switch off the industrial truck, push and hold the operator panel button for approx. 2 seconds.

RFID chip, RFID card

If an industrial truck is equipped with this system, a reading device for RFID chips or for RFID cards will be located in the driver's cab in the vicinity of the operating panel. RFID chips and RFID cards are included in the scope of delivery according to the order. However, the authorised service centre does not program the system to the customer's specifications until it is on site. Assignment to different operators is possible using the various RFID chips or cards.

Factory setting

Standard chips and cards are supplied at the factory.

Activating the system

– Switch on the controller by pressing the operator panel button (see above).

An LED illuminates on the reading device.

– Hold the RFID chip or card in front of the reading device.

The industrial truck is now ready for use.

Configuration levels

Additional configuration levels are available, which are based on the electronic access principle. These systems can be used to evaluate, control and optimise the activities of entire fleets of industrial trucks.

Additional configuration levels can

- Record the driving and idle times
- Determine empty runs
- Count lifting and lowering procedures
- Use a shock sensor to determine collisions

NOTE

Fleet management systems are described in a separate set of operating instructions.

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.

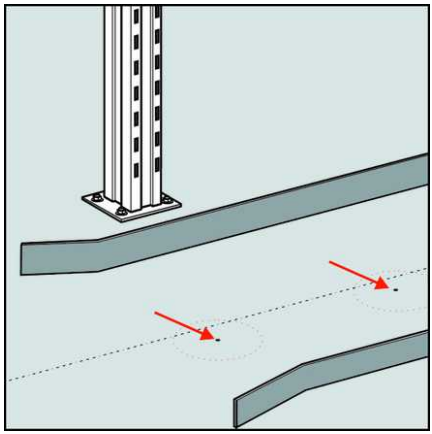
The automatic braking systems are often combined with lift height restrictions.

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

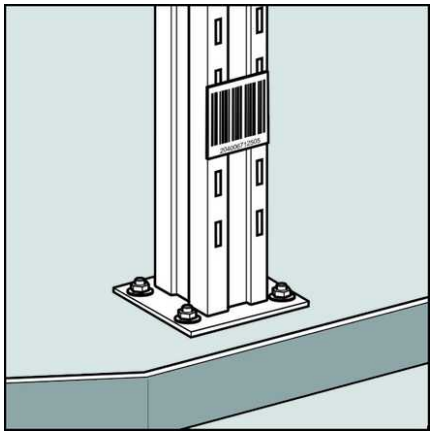


The RFID transponders are embedded in the hall floor. They are located in approx. 8 mm holes slightly outside the centre of the aisle at different intervals. The RFID writing/reading device is mounted on the load wheel axle under the driver's cab or under the battery compartment. The RFID transponders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

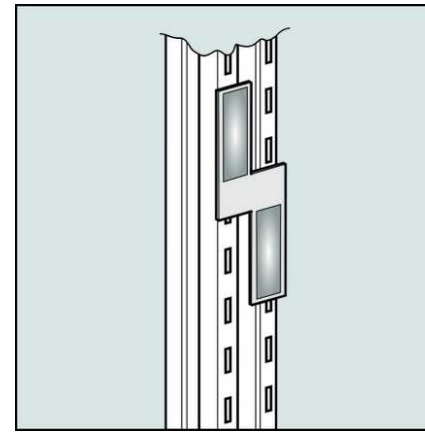


Barcode scanners fitted on the industrial truck read the barcode labels in both drive directions while the truck is in motion. The barcode labels are attached to the uprights approx. 50 cm above the floor. The scanners can be attached to the industrial truck and the labels to the rack on one or both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

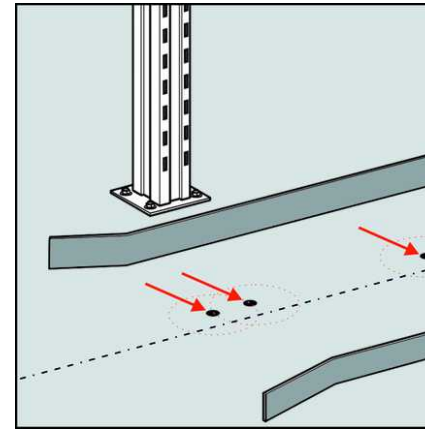
Reflective light switches and reflectors ▷



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.

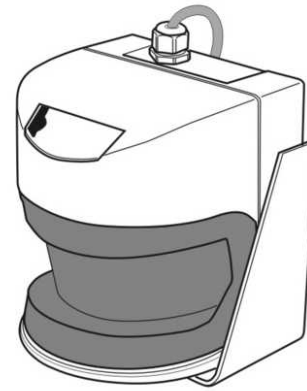
Other manufacturers

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.

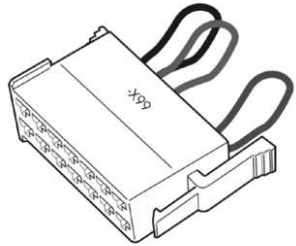
NOTE

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

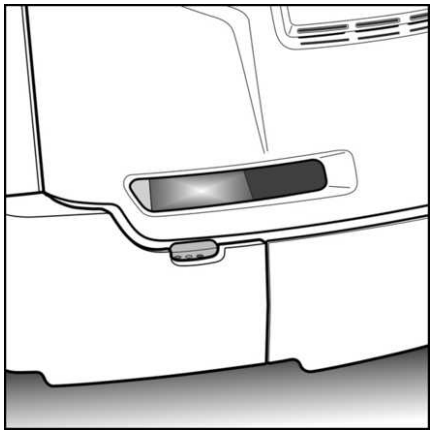
When a bridging plug is fitted, all safety functions of the MPSE are deactivated and the maximum driving speed of the industrial truck limited to 2.5 km/h. Therefore, the truck may only be operated with a bridging plug during retrieval operations. This bridging plug must be kept locked away by the warehouse 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 (picture) is located behind the control compartment hood. The scanner can monitor the roadway through a wide slot. The diagnostic LEDs are visible through the smaller, lower opening.



⚠ 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

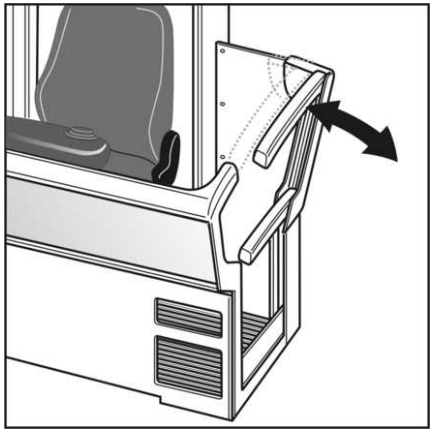
If the personal protection system is not fully installed and commissioned, the "personal protection" and "collision protection" functions are not enabled. In this condition, the intended use of this industrial truck is not possible or permissible.

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.

Tilt barrier

Description



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

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

Function

The barrier can only be opened if:

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

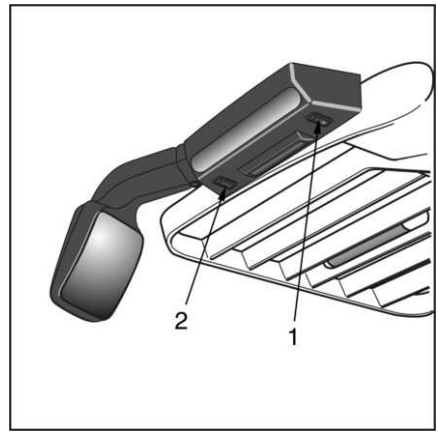
The barrier will be locked if:

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

NOTE

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

Mirror and lighting module ▷



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.

Camera system

Modern video cameras on the industrial truck and colour monitors in the driver's cab provide the operator with a better overview of the working area.

The cameras can only perform the desired function if they are set correctly. To achieve an optimum image display, the cameras must be adjusted individually. The system is activated as soon as the industrial truck is switched on.

⚠ CAUTION

Assistance system

Camera systems are passive systems. They do not interfere with the functionality of the industrial truck. The operator is responsible for working in a safe manner.

Before setting the truck in motion, the operator must check that the camera system is functioning properly and has the correct settings. If the camera system is not functioning correctly, the system must be repaired or adjusted before setting off.

Rear view camera

One camera mounted centrally on the lift mast facing towards the drive unit. One monitor in the driver's cab.

This camera should be set in such a way that the field of vision matches the braking area of the industrial truck. If the operator sees an obstacle on the monitor, there is enough time to react and stop.

Rear view camera for entering aisles

Two cameras mounted on the rear of the driver's cab with a view of the guide rollers (MZF) and the roadway in the direction of the drive unit. Two monitors in the driver's cab. This version can also be used as a replacement for rear-view mirrors in closed cabs (wind deflector, cold store).

These cameras should be set so that one of the rail guide rollers (MZF) or the corner contour of the chassis (IZF) is visible in each

of the two monitors. This system therefore makes it easier to enter the aisle guidance.

Camera system for monitoring the roadway

One camera mounted on the load wheel axle under the driver's cab. Shows the roadway in the load direction. The driver's cab must be raised by approximately 50 cm for this purpose. A second camera installed centrally on the lift mast with a view of the drive unit. One monitor in the driver's cab. Switching takes place depending on the drive direction.

Maintenance and cleaning

Camera systems are low-maintenance.

During regular maintenance or after particular events:

– Check that the support mountings for cameras and monitors are in perfect condition.
– Check the clamps for tightness.
– Check the camera settings.
– Clean the camera lenses using lens cloths.

Lift height preselection

NOTE

The optional "lift height preselection" function is described in detail in separate operating instructions.

This function partially automates the approach to the lift heights. The operator simply has to enter the required lift height with a number. The operator then actuates the operating devices accordingly and the system automatically brings the load fork to the required height.

In a further configuration level, the controller recognises whether or not there is a load on the load fork. Accordingly, the load fork is brought to the correct height for a storage or retrieval process.

Driver's cabs, special versions

Special versions of driver's cab are available for special applications.

There are driver's cabs

- With safety glass all around **below** the rail height
- With a windscreen made of safety glass or plastic, **fitted** on the rail
- With a foil wind deflector with **integrated** foil panels, fitted on the rail above the barriers
- With fixed plastic panels **all around**, fitted on the rail

NOTE

Panels that are installed above the rail in the load direction must either be removed or pushed forward for the abseiling process. See the section entitled "Emergency abseil system". Zips and clamping screws that can be opened by hand are used. Any panels that are removed must be placed inside the cab.

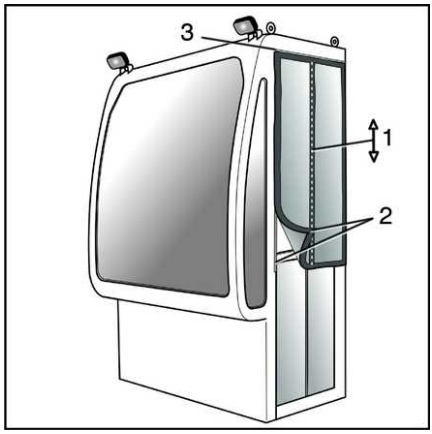
Heating system

Driver's cabs can be equipped with a warm-air heating system as an option.

Wind deflector cab ▷

The driver's cab is equipped with a removable plastic panel on the load side. This panel must be removed if the driver needs to abseil from the cage in an emergency; see the section entitled "Emergency abseiling".

The driver's cab has plastic covers at the sides with inspection windows. This side cover features a zip (1) to enable entry. These covers can also be removed completely.



NOTE

The zip must be closed completely before removing and fitting the side covers.

Removing the side covers

The side covers are held in position on the long sides with Velcro strips (2) and on the top in a keder rail (3). To remove, carefully loosen the Velcro connection and then slide the cover sideways out of the keder rail.

Fitting the side cover

To fit the side covers, follow the removal sequence in reverse order.

Cleaning

Clean plastic panels and plastic foils using only cleaners that are intended specifically for this purpose and special cloths. Dirty and/or scratched panels pose a safety risk.

Emergency abseiling

Removing the windscreen

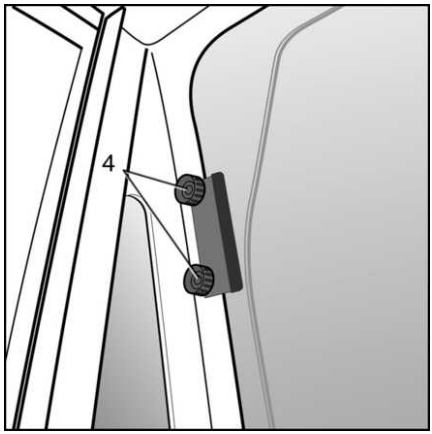
- Remove two knurled nuts (4) on both sides and remove the clamping plates.
- Detach the windscreen from the Velcro strips and bring it inside the cab.
- Stow it at the rear of the cab.
- Remove the abseil system from the storage bag as described in the "Abseiling" section.

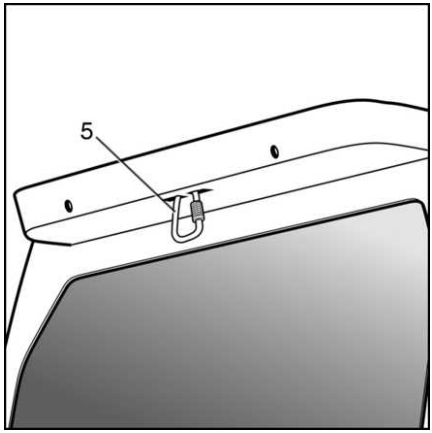
Installing the rope redirection

- An additional snap hook is hooked into the chest eyelet of the safety harness. Remove this snap hook.
- A snap hook is installed at the factory at the front edge of the overhead guard (5).
- Hook the rope of the abseil system into this snap hook. This snap hook thus serves as a redirecting point for the rope.
- Screw on the screw fastening of the snap hook.
- Carry out the abseiling process as described in the "Abseiling" section.
- Only leave the cab once the abseil system is correctly attached.

Inserting the windscreen

- First place the windscreen in the guide at the bottom, align it in the centre and press it into the Velcro strips.
- Fit the clamping plates and hand-tighten the knurled-head screws (4).





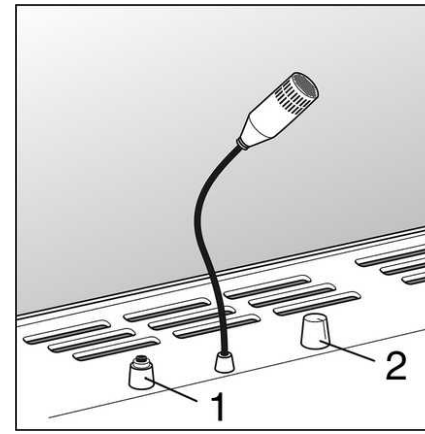
Intercom system

If the ambient conditions in the storage area make it necessary, closed driver's cabs can be equipped with an intercom system.

– Press and hold down the red push button (1) (audio out) on the console while speaking.

– Release the push button in order to hear in the driver's cab what is being said outside.

– Use the turning knob (2) to adjust the volume.



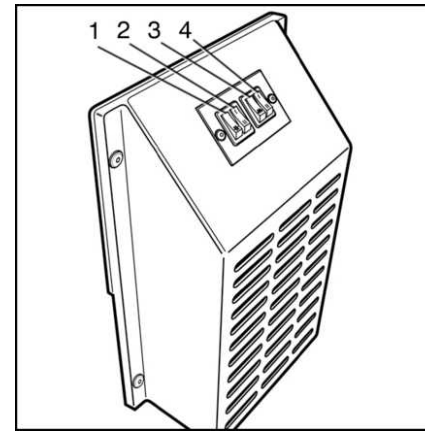
Warm-air heating system

Closed driver's cabs can be equipped with a warm-air heating system to make working in the driver's cab more comfortable. This system also provides a fan for air circulation.

⚠ CAUTION

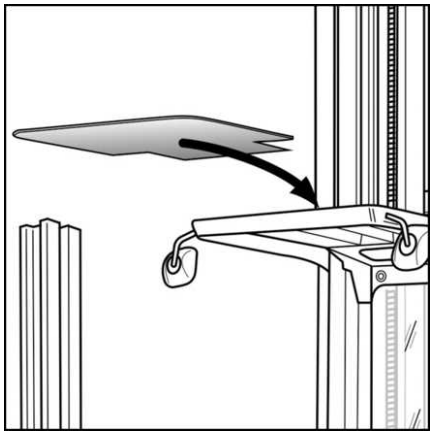
Risk of overheating

Do not cover the inlets or vents for the heating system.



1 Ventilation "On"
2 Ventilation blower level "1" or "2"
3 Heating system "On"
4 Heating level "1" or "2"

Protective roof cover



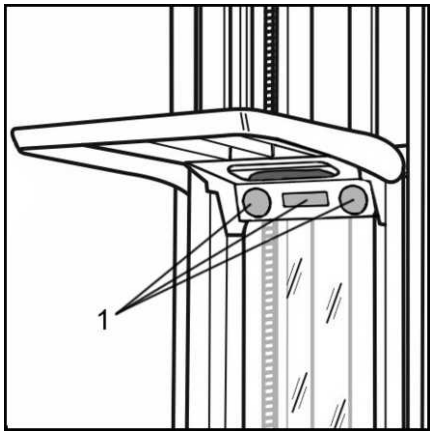
The standard overhead guard meets the current standards in terms of stability and the distance between the roof struts. However, if heavy objects that are small enough to fit through the roof struts of the overhead guard are transported in a storage area, there is a danger that if they fall from a considerable 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.*

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

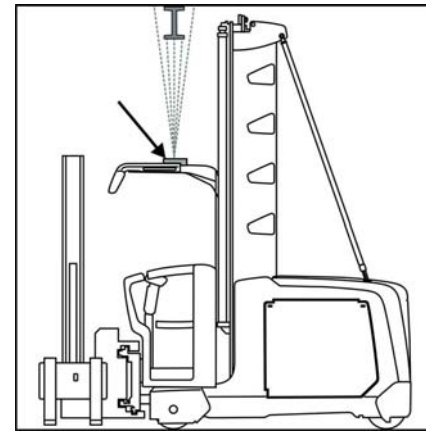
CAUTION

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.

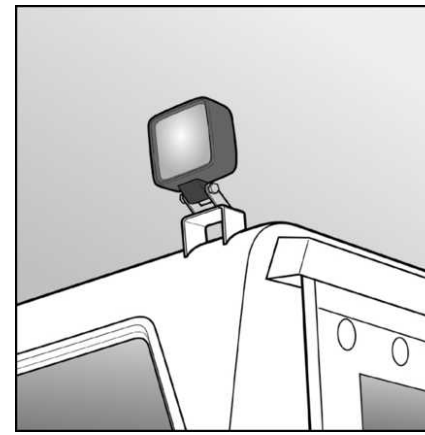
NOTE

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.

Working spotlights



Working spotlights are used to illuminate the workplace outside the driver's cab. This can include the storage spaces in the racking on the right and left as well as the area in front of the driver's cab where picked goods are stored. This makes working with the very narrow aisle truck more effective and increases occupational safety. The setting of the headlights is customised. The headlights are switched from the operating panel.

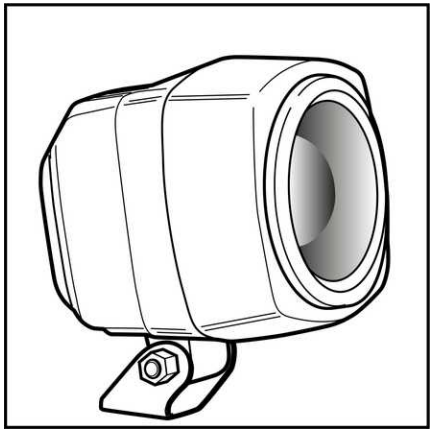
⚠ CAUTION

Impairment of occupational safety

Defective working spotlights must be repaired immediately, as they help to improve occupational safety.

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

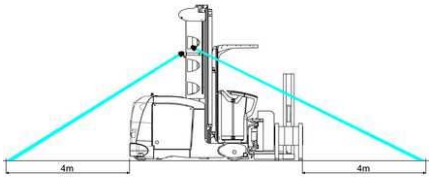
The safety headlight features extremely powerful LEDs. Briefly looking directly into the beam of light does not present a danger to health, but is unpleasant due to the temporary dazzling effect. However, looking into the beam of light for longer periods must be avoided.

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

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".

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.

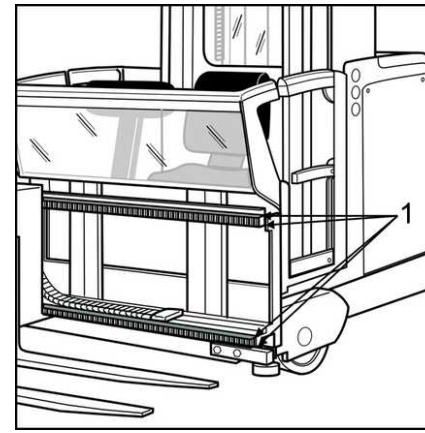
Check the condition and functionality of the elements each time maintenance is performed.

Guard plate on rack rail ▷

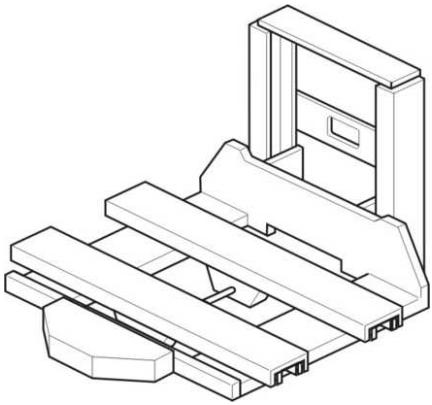
When goods are transported in sacks or bags, they often protrude from the outer edge of the pallet or load carrier.

There is therefore a danger of these sacks or bags being damaged by the sharp edges of the rack rail, e.g. when the sideshift is extended sideways. The goods may be lost or destroyed as a result.

The guard plates on the rack rails minimise this danger by covering the sharp edges of the rack rail at the top and bottom.



Telescopic table ▷



Description

NOTE

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

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

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

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

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

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

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

Maintenance of the telescopic table

NOTE

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

Other attachments

Other attachments* can also be supplied in place of the standard attachment.

These include:

- Telescopic tables
- Telescopic reach fork
- Carpet mandrels
- Accessible pallets
- Order-picking platforms
- Roll container
- Customised structures

⚠ DANGER

Impairment of operational safety, danger to the operator

Other than the attachments supplied by the manufacturer, only attachments tested and supplied by the manufacturer are permitted. Unauthorised modifications are prohibited. See also "Alterations to industrial trucks".

Just as is the case with the industrial truck, attachments must be serviced regularly and inspected once a year by a specialist.

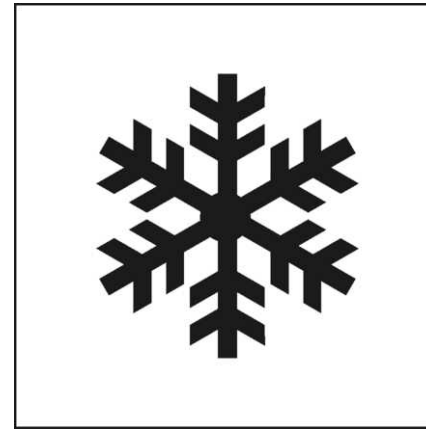
Other attachments differ from the standard design in terms of the method of operation as well as in the type of hazards. Further safety information may be required and must be observed. It is therefore important for the operator to be familiar with and to adhere to the instructions for the particular attachment that is fitted.

Additional operating instructions and maintenance instructions from our suppliers may also apply.

*Option

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).

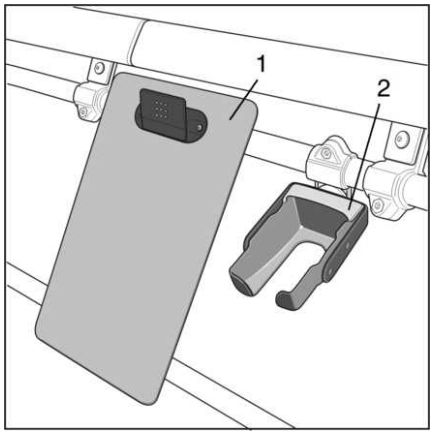


⚠ CAUTION

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.

Mounting system for auxiliary components ▷



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

Additional components may include:

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

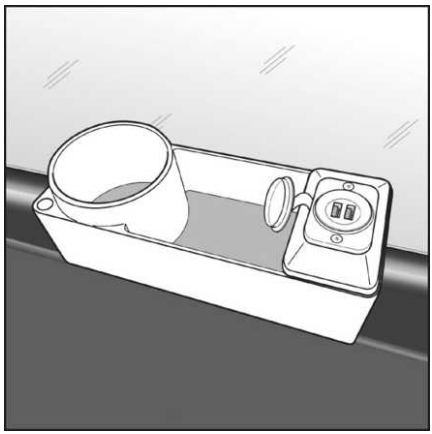
⚠ CAUTION

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

If your industrial truck is fitted with auxiliary equipment for handling small load carriers, only the original containers may be used in it. Other containers 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.

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

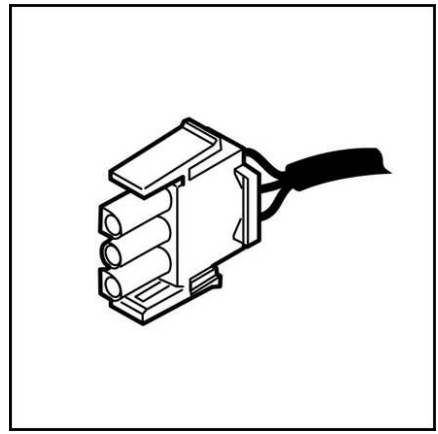
Protect against contamination and damage. When the charging station is not in use, cover the sockets with the hinged cover.

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

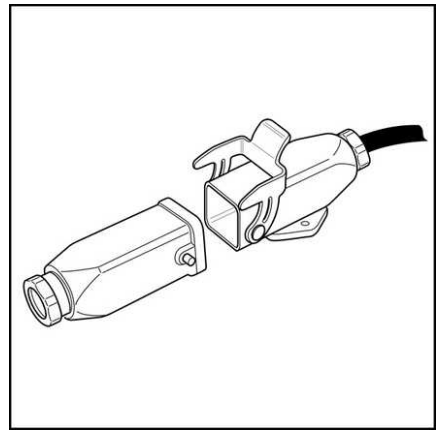
MMS interface

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

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

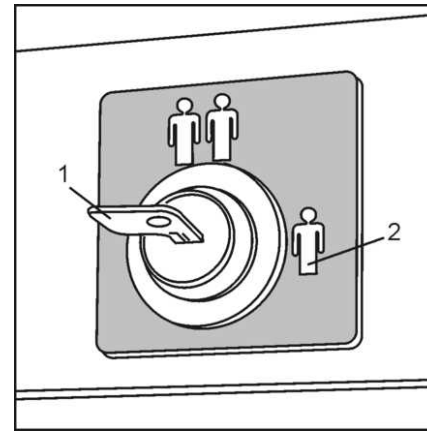
Reduction in the load capacity. Negative effect on stability.

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

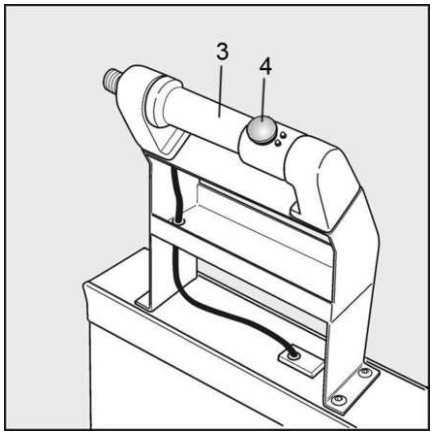
The industrial truck operator is responsible for ensuring that this key is actually switched to the appropriate position when the truck is operated with two people. The equipment described below is not activated until the switching procedure has been carried out. The industrial truck operator must instruct 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.

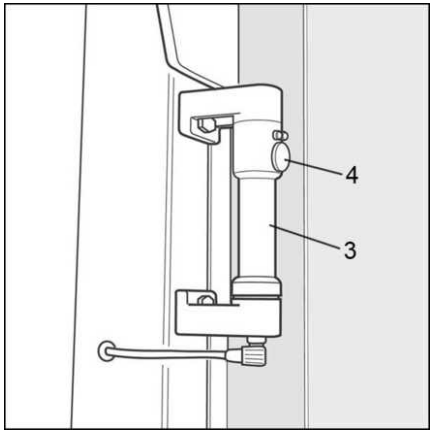
A key switch for switching from one-person operation to two-person operation is installed in the driver's cab.

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

Handholds

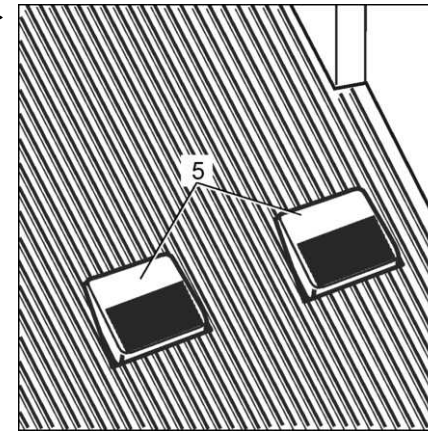
Two handholds (3) are provided so that the passenger is able to hold on with both hands at all times, thus keeping the passenger's body in a safe position. For monitoring purposes, the passenger must always actuate both buttons (4). Only then are the industrial truck functions enabled. If the passenger 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.

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.

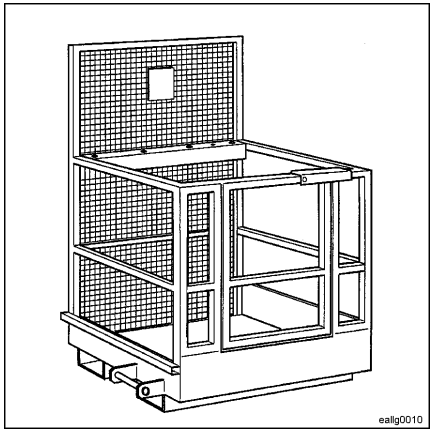
⚠ WARNING

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.



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