Original instructions

Turret truck
NXV



CE

2234

first in intralogistics

5224 804 2501 EN - 12/2023 - 04

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1

Foreword

General

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

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

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

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

Safety instructions

Explanations of the terms used in this manual:

⚠ DANGER

There is the risk of fatality to the operator.

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

⚠ WARNING

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

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

⚠ CAUTION

There is a risk of damage to property.

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

NOTE

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

Declaration reflecting the declaration of conformity

Declaration

Declaration

STILL GmbH
Berzeliusstraße 10
22113 Hamburg Germany

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

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

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

Personnel authorised to compile the technical documents:

See declaration of conformity

STILL GmbH

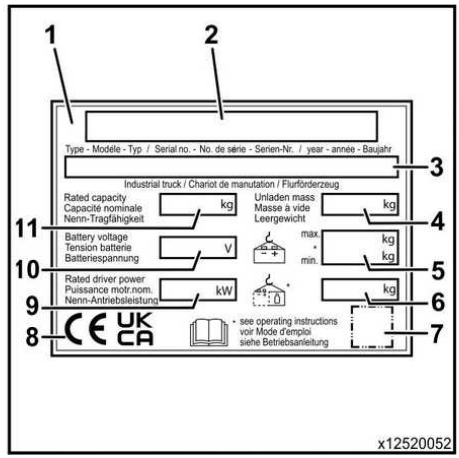
1) For the markets of the European Union, the EU candidate countries, the EFTA States and Switzerland
2) For the United Kingdom market

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

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

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

Nameplate



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

NOTE

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

Rules for the operating company of industrial trucks

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

This guide provides information for handling industrial trucks:

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

Internet address and QR code ▷

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

Operator, Form of address

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

Dimensions of the operator's compartment

The dimensions of the operator's compartment on our industrial trucks are designed in accordance with standard DIN EN ISO 3411 and are accordingly constructed for both female and male operators. This standard also stipulates ranges within which the operator's body weight and dimensions should lie. EN ISO 3411 specifies 114.1 kg for the maximum body weight for a large operator.

⚠ CAUTION

Reduction in the load capacity. Negative effect on stability.

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

Example

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

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

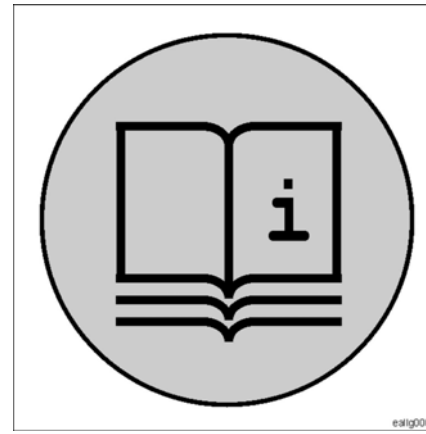
- The ergonomic conditions may be less favourable
- It may not possible for the operator to reach the pedals and foot switches
- The useable height below the overhead guard may be too low
- The adjustment ranges for the steering-wheel and operating panel adjuster may no longer be sufficient
- The adjustment ranges for adjustable drivers' seats may no longer be sufficient
- There could be a negative effect on the load-bearing capacity of the industrial truck

Please be sure to consult your responsible authorised service partner.

Product documentation

This includes:

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



Accessories accompanying the product

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

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

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

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

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

Standard design and options - Special version - Special equipment

These instructions describe the

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

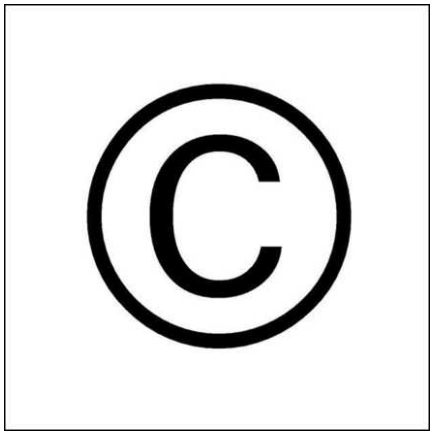
for industrial trucks in the standard design and for the options available at the time of going to print.

Special versions and special equipment

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

Copyright and proprietary rights ▷

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



Storage and transfer

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

2

Safety

Working safely

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

Safe working environment

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

Safe machine

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

Operational safety takes priority over working speed!

Climbing into or out of the truck

⚠ DANGER

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

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

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

⚠ WARNING

Risk of crushing

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

⚠ WARNING

Risk of falling

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

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

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

⚠ WARNING

Risk of injury and damage to property

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

Vibrations

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

Weighted effective value of acceleration to which the body (feet or seat base) is subjected.	< 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 advices for engaging loads ▷

Discuss this with your contractor.

Recognising danger is half the battle!

- Loads may only be transported in appropriate containers or safe packaging.
- The load must not change its gravity center position or even fall down when accelerating/ braking or when travelling in curves (centrifugal force).
- If loads cannot be transported with the necessary safety, then the safety has to be brought about by using appropriate containers or fastenings.
- Before engaging any load, ensure that it does not exceed the loading capacity of the truck (diagram of permissible loads) or the maximum permissible dimensions as specified by the data sheet.
- Loads which are to be transported and placed in storage must be securely packaged to ensure that the centre of gravity of the load does not shift during transport, and that no parts are able to drop out. Remember to pay sufficient attention to the safety of your workmates.



- If very high loads have to be transported which block the view of the travel path, the relevant safety measures must be taken.
- The load suspension device must never be used to raise hanging or suspended loads.

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

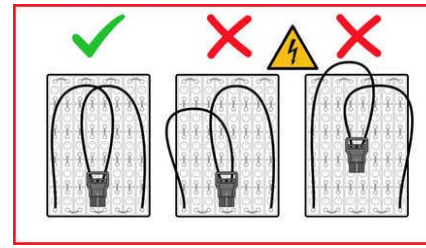
Risk of explosion

– 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.

Intended use

Turret trucks are designed for use in very narrow aisles. They are used for placing complete loading units such as crates or pallets into stock and removing them from stock. The turret trucks can optionally be guided mechanically or inductively in the aisle. Outside the aisle, the trucks can be driven freely.

Observe the information in the "Safety" section.

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

It is prohibited to use the truck for other purposes.

If these trucks are to be used for tasks not listed in these operating instructions or in the guidelines for the proper usage of industrial trucks according to their intended purpose (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 trucks and can result in accidents. It is therefore not permitted to make such changes without our approval.

Attachments and conversions, including welding parts or making openings, can weaken the supporting elements and are therefore only permissible after approval from our 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.

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.

Overhead guard

The overhead guard protects the operator against falling objects. The post on the overhead guard should be used for holding onto when climbing into the truck.

⚠ WARNING

Risk of injury

The overhead guard of the 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. Plastic or metal grid covers are available as an option.

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.

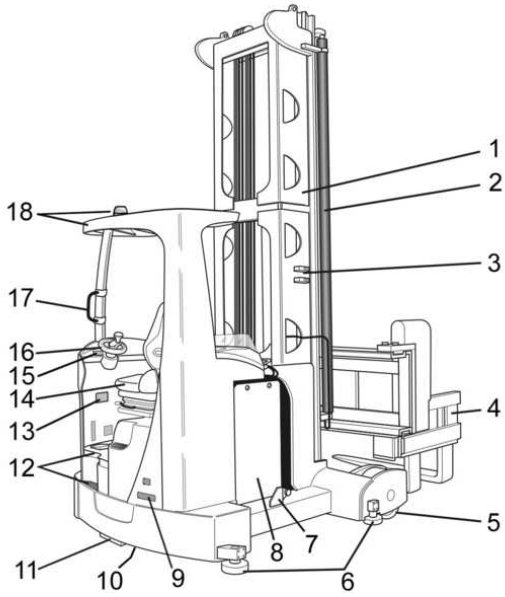
We therefore recommend that you contact your branch or specialist representative.

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

3

Overview

View of the truck



1	Lift mast	10	Drive wheel
2	Lift cylinders	11	Drive-side antenna for inductive guidance (IZF*)
3	Sensor system for aisle detection*	12	Steps
4	Turret head (attachment)	13	Nameplate
5	Load wheel	14	Driver's seat
6	Guide rollers for mechanical guidance (MZF*)	15	Steering wheel
7	Battery lock	16	Load capacity diagram
8	Battery	17	Overhead guard post and handle* for use when entering and exiting
9	Cut-outs for safety laser scanner (MPSE)*	18	Overhead guard with warning light*

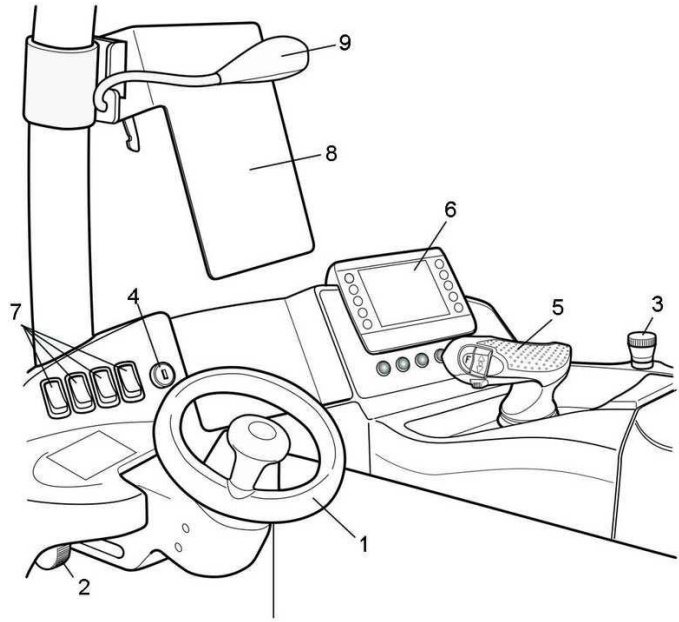
*Option

Functions

NOTE

Operating instructions for the individual functions can be found in the corresponding sections.

Driver's compartment



1	Steering wheel
2	Clamping screw for adjusting the steering wheel
3	Emergency off switch
4	Key switch (or on/off button*)
5	"Joystick" operating lever
6	Display and other operating devices
7	Switches for additional functions (seat and pedal plate adjustment, working spotlights)
8	Writing surface*, adjustable
9	Workplace light*

Driving

Converter controller with reversing gear (AC motor)

The position of the accelerator pedal determines the driving speed. Change of driving direction via joystick.

⚠ CAUTION

Risk of accident

By releasing the accelerator pedal, the driving speed is automatically reduced (braked, no idling). The truck then continues at this selected speed. When the accelerator pedal is fully released, the controller brakes the truck to a standstill. This driving characteristic is the same when driving on slopes.

The parking brake must be used if stopping on uphill and downhill gradients.

NOTE

Observe the information about dual-pedal control.

NOTE

If the truck is stationary for more than three seconds without the foot switch being actuated, the parking brake is applied.

Service brake for the traction motor

Electronically-controlled generator brake.

Parking brake

Electromagnetic spring loaded brake applied to the traction motor.

Steering

Electric steering. The steering angle is shown in the display.

In the event of a power failure or defect, immediate braking via the spring loaded brake on the traction motor.

Lifting system

Different lift mast variants can be installed according to the order. See the order documents for the variant and dimensions.

Ergonomics of the driver's compartment

Various functions are available as standard or as an option to enable the workplace to be ergonomically adjusted to the operator.

Steering wheel adjustment

The distance between the steering wheel and the operator can be adjusted manually.

Seat and pedal plate adjustment

With the combined seat and pedal plate adjustment, the complete driver's seat and the pedal plate are electrically adjusted synchronously with each other. This can significantly improve the accessibility of the operating devices for operators of different heights over a wide range. For a description, see the section entitled **Special equipment.**

Driver's seat

NOTE

See the original operating instructions from the seat manufacturer for the correct operation of the driver's seat.

The driver's seat can be adjusted to the height and body weight of the operator, depending on the type.

- Driver's weight
- Horizontal adjustment*
- Adjustment of the seat backrest tilt
- Lumbar support*
- Height-adjustable head restraint*
- Seat covering in leather*
- Heatable seat*

Overhead guard

The overhead guard protects the operator against falling objects. The post on the overhead guard should be used for holding onto when climbing into the truck.

⚠ WARNING

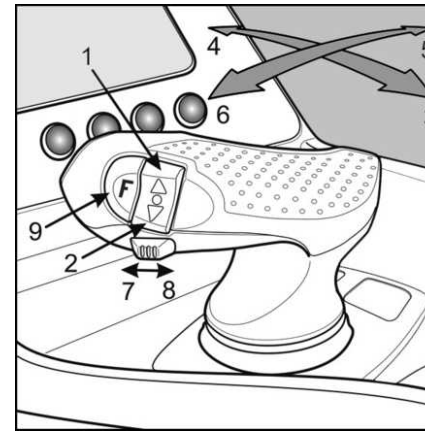
Risk of injury

The overhead guard of the 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. To protect the operator against particularly small falling objects, a transparent protective roof cover* (polycarbonate or metal grid) is available as an option.

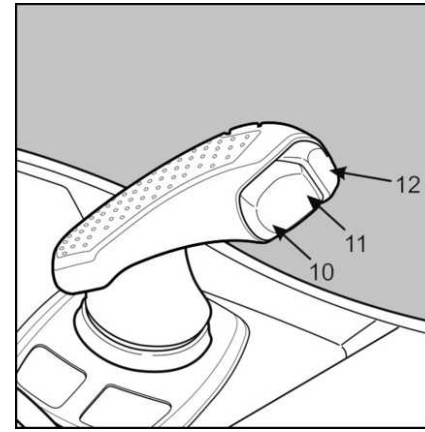
*Option

Joystick functions

The joystick can be used for accurate and continuously variable control of all hydraulic movements. Abrupt operations are to be avoided as they can cause unnecessary impacts and pulsing. Electronic monitoring can prevent operating errors to a large extent.

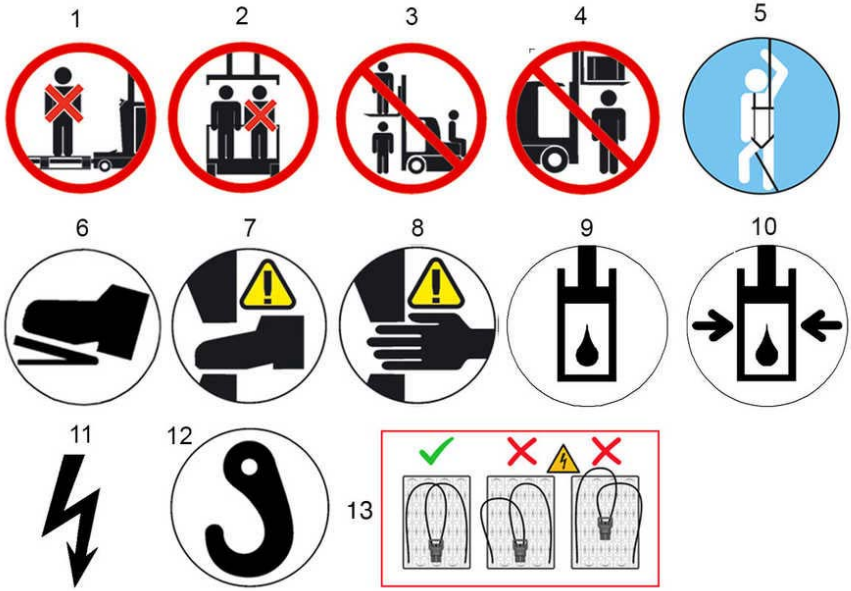


1 Selecting the load side drive direction
2 Selecting the drive side drive direction
3 Lifting the fork with the main lift
4 Lowering the fork with the main lift
5 Shifting the sideshift to the left
6 Shifting the sideshift to the right
7 Swivelling the fork anticlockwise
8 Swivelling the fork clockwise
9+3 Lift the fork with the auxiliary lift
9+4 Lower the fork with the auxiliary lift



10 Synchronised swivelling of the fork and shifting the sideshift to the right
11 Synchronised swivelling of the fork and shifting the sideshift to the left
12 Horn

Standard labelling



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

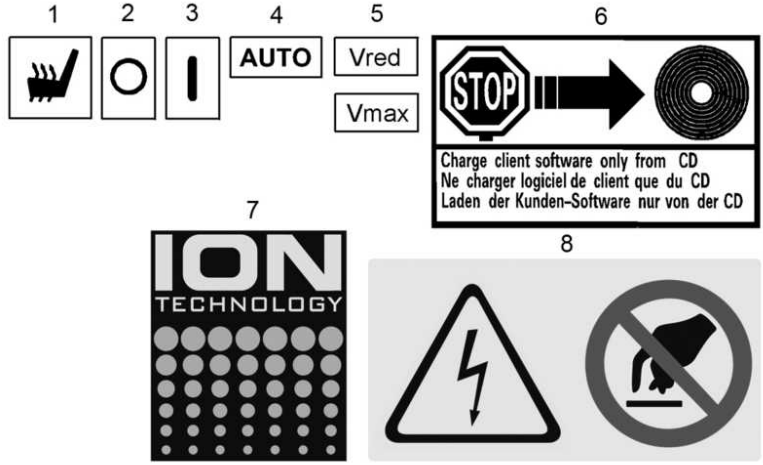
A number of information signs are fitted to every truck depending on the series to draw attention to hazards, technical data or requirements.

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

NOTE

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

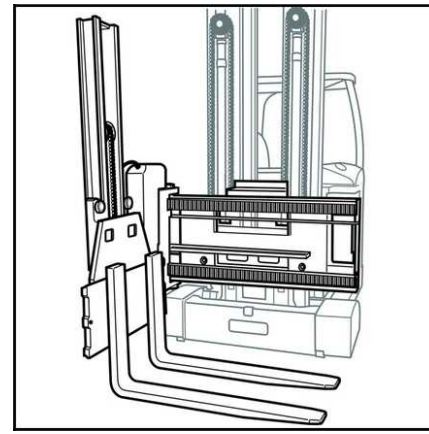
Labelling for options



1 On/off device for the seat heater
2 Switch in "switched off" position
3 Switch in "switched on" position
4 Switch in "automatic mode" position
5 The speed of the truck is limited based on the order.
6 Truck with customised software. Only the customer's special version and not the standard software may be installed in the truck control unit.
7 Truck is equipped with a lithium-ion battery or is prepared for a lithium-ion battery.
8 Danger! High voltage. Identification of charger socket for lithium-ion battery. Do not reach into the charger socket.

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

Turret head attachment



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.

The image shows the "turret head" attachment with an "auxiliary lift*."

The auxiliary lift can be raised or lowered independently of the main lift or together with the main lift. This allows the overall lifting height of the industrial truck to be increased or, in unfavourable conditions, the hall height to be used more economically.

For details on operation, see the section entitled "Joystick functions".

*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

ENVIRONMENT NOTE

Separating hydraulic connections can result in the emergence of hydraulic oil.

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

Hooking on the chassis ▷



NOTE

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

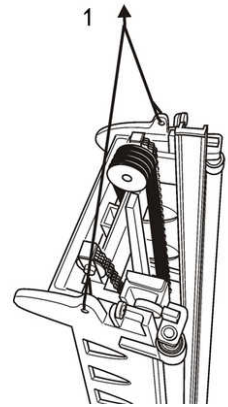
- The lifting points for the chassis are the two posts on the overhead guard and the post between the load wheels.
- The posts above the battery compartment can also be used.
- Always use 4 lifting points that are as far away from each other as possible.
- Make sure that the chassis is as horizontal as possible.
- If the battery is installed, note its weight.
- Before lifting the truck or the chassis, check the battery lock for secure seating.

NOTE

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

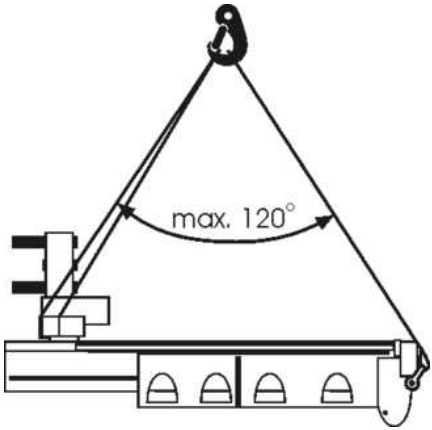
Hooking on the vertical lift mast ▷

For hooking the lift mast onto the crane hook, use the bores intended for this purpose at the top end of the lift mast (1). Suitable harnesses such as shackles or a lifting device are to be used for this.



Hooking on the horizontal lift mast

If the lift mast has to be crane-loaded in a horizontal position, suitable shackles should be used in the indicated bores at the top end of the mast. At the lower end, a textile strap can be wound around the cross web in the beam support of the sideshift. If necessary, the individual lift mast parts can be lashed to each other to prevent them from separating unintentionally and thus shifting the centre of gravity.



Loading

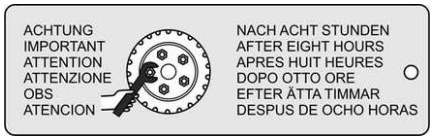
To secure the truck to a loading area for transport, a total of 8 wooden wedges and suitable tension belts are to be used. Position two of the wooden blocks each at the front and rear of the truck, and the others in pairs on the right and left of the truck. The tension belts are to be guided over the battery compartment and around the posts of the lift mast to make sure the truck is firmly on the ground. For trucks with high lift masts, additional tension belts are to be attached on the side to the lift mast posts at the height of the overhead guard, and are to be anchored to the ground.

Wheel screws

⚠ WARNING

Wheel screws may loosen after initial commissioning.

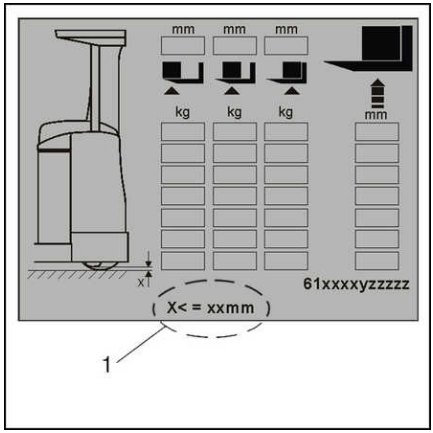
After the first eight operating hours, tighten the wheel screws to 210 Nm.



Support screws

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

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



Weights of the units

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

Delivery in units

⚠ CAUTION

Risk of accident as a result of overloading the hoists.

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

Turret trucks can be delivered disassembled into the following units:

- Lift mast incl. attachment
- Or lift mast separately
- And attachment separately
- Battery
- Chassis

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

Weight of the chassis

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

⚠ CAUTION

Risk of accident as a result of overloading the hoists.

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

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.

If the attachment is installed in the lift mast for transport, add the two weights.

Weight of the lift mast

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

Overall height of the telescopic mast	Weight
2.2 m	<1100 kg
<2.4 m	<1150 kg
<2.9 m	<1300 kg
<3.4 m	<1500 kg
<3.9 m	<1650 kg

Overall height of the telescopic mast	Weight
<4.4 m	<1800 kg
<4.9 m	<2050 kg

Overall height of the triple mast	Weight
2.2 m	<1600 kg
<2.4 m	<1700 kg
<2.9 m	<1900 kg
<3.4 m	<2250 kg
<3.9 m	<2500 kg
<4.4 m	<2750 kg
<4.9 m	<3200 kg
<5.4 m	<3500 kg
<5.9 m	<3800 kg

Weight of the battery

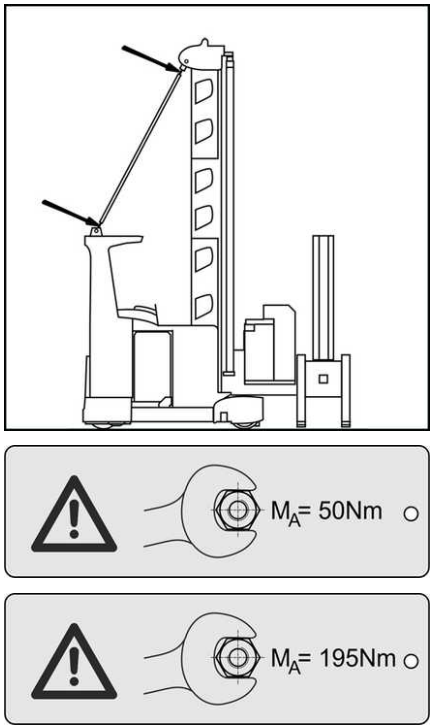
The weight of the battery is specified on the nameplate on the battery.

NOTE

The installed battery must as a minimum weigh the value stipulated on the nameplate on the industrial truck. Compare the information on the nameplate on the battery with the information on the nameplate on the industrial truck.

Mast bracing

Mast bracings may be required depending on the configuration of this industrial 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



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.

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

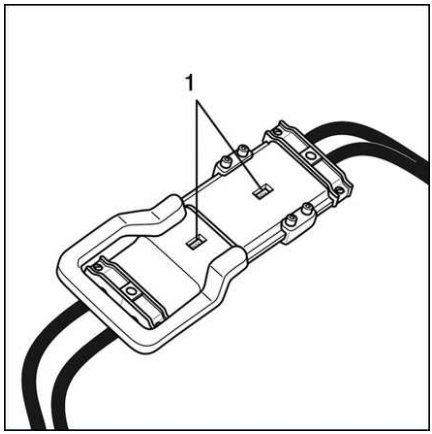
⚠ DANGER

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.

Battery lock

⚠ CAUTION

Risk of crushing if the battery falls out

Releasing the battery lock, as described below, must only be carried out on level ground using suitable devices.

Suitable devices include

– A crane and suitable harnesses
– A mobile or stationary battery change frame
– A suitable forklift truck with sufficient load-bearing capacity.

⚠ CAUTION

Risk of injury from crushing zone and shearing zone

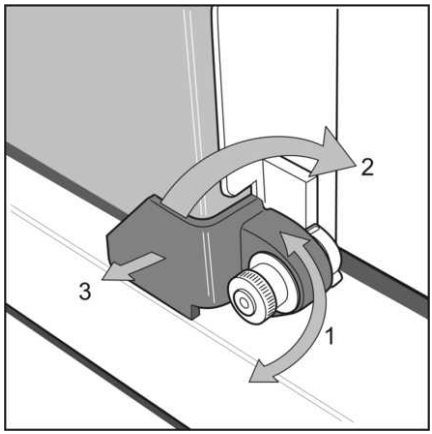
Always actuate the swing bolts with one hand only and make sure that fingers are kept away from the rotation range and clamping area.

The battery is held in position by a swing bolt. By actuating the turning handle, the swing bolt is pressed against the battery so that the battery is securely held in place without any play.

Releasing the swing bolt

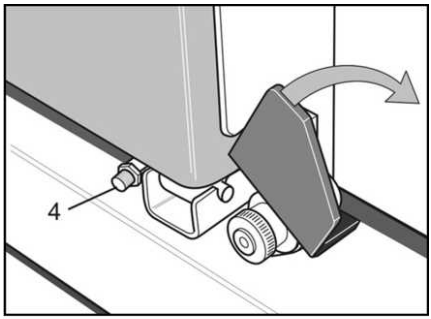
- To release the tension, rotate the turning handle (1) anti-clockwise to the stop.
- Pull the swing bolt out fully in the direction of the arrow (3).
- Fold the swing bolt up in the direction of the arrow (2).

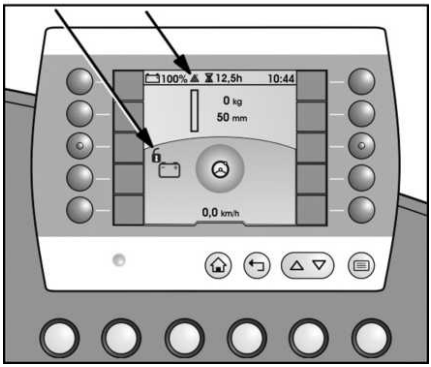
The battery can now be rolled on its roller channel out of the battery compartment so that it can be lifted with a device.



Monitoring the battery lock

A contactless switch (4) detects a battery lock that is not correctly closed. If this is the case, the drive function is switched off. A corresponding message appears in the display.





Lithium-ion battery socket

Industrial trucks with a lithium-ion battery are equipped with an externally accessible socket (1) for the charging cable. To plug in the charging cable, the spring-loaded flap is pushed inward with the plug and the plug is inserted.

This socket is located near the standard battery female connector (2).



NOTE

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

Daily commissioning

Pre-shift checklist

⚠ CAUTION

Risk of accident and damage to property

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

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

Clarify whether a driving licence is required in the country of use.

The industrial truck may be operated only when the covers and flaps are closed and the covers are in place

Function checking the brake assembly

- Trigger braking by releasing the seat switch.
- Trigger braking by actuating the brake pedal.
- Check the reverse brake (switch the drive direction, actuate the alternate pedal in trucks with dual-pedal control*). The braking and subsequent acceleration processes must be gentle and not subject to jerky movements.
- Check the brake function after actuating the emergency off switch.
- Check the **automatic braking*** system function if featured in the truck: automatic brake control, creep speed switch and absolute stop.
- Examine the area around the pedals for foreign objects.

Function checking the steering

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

Checking all operating devices

- Check that the levers, pedals and push buttons are in good working order.
- The levers, the pedals and the push buttons must return independently to the neutral position.
- All operating devices must be checked to ensure that they are in good working order and in an appropriate condition.

Checking the access control

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

Checking the lifting accessory and the connecting elements

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

Check the drive wheel and the load wheels

- Monitor the drive wheel and load wheels for unusual sounds during operation.
- If damage is suspected, examine all wheels for foreign objects.
- If damage is suspected, visually inspect the condition of all wheels.

Other checks

- Check the overhead guard for deformation, damage and cracks at welded seams.
- Visually check the overhead guard cover*.
- Visually check the guard grille*.
- The horn and other warning units must function correctly.

- If lighting devices are fitted, check that they function correctly.
- Check that the battery lock is in good working order and functions correctly.
- If the truck is fitted with options or special equipment, check the condition and functionality of these in the same way.

*Option

Operating devices

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

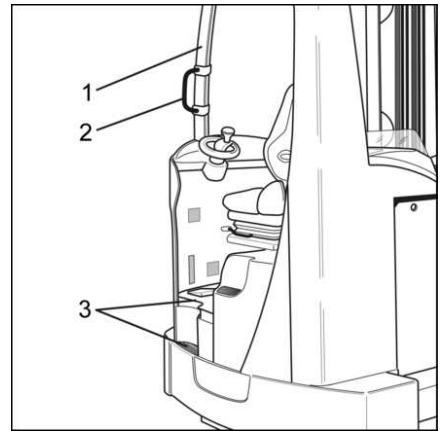
- Use the steps intended for this purpose when climbing into or out of the truck and hold on to fixed parts of the chassis or the optional handholds.
- Apply the parking brake before climbing out.
- Never jump off.
- The steering wheel is not designed as a handhold or climbing aid and is mechanically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

Entering and leaving

For safe entering and leaving the truck use the steps (3).

For easier entering the support of the overheadguard (1) may be grabed with the left hand. Optionally the truck can be equipped with an additional handle (2).

*Option



1 Support of the overhead guard
2 Handle*
3 Step

Driver's seat, seat switch

The position of the driver's seat can be adjusted so that the driver's compartment is suitable for the height of the driver. The horizontal position and the seat backrest inclination of the driver's seat itself are also adjustable. The seat can be moved to suit the driver's weight. The position of the steering column can be adjusted manually. As an option, the truck can be equipped with a combined seat and pedal plate adjustment function. For a description, see the section entitled **Special equipment**.

The driver's seat is equipped with a seat switch. This detects whether the driver is in the correct operating position.

*Option

Adjusting the driver's seat



⚠ CAUTION

Risk of accident

Make adjustments only when the industrial truck is at a standstill.

Refer to the operating instructions for the driver's seat

- (1) Longitudinal adjustment - slide the seat forward or back
- (2) Weight setting - fold out the lever and pull the lever up or push the lever down. Observe the display.
- (3) Adjust the seat backrest
- (4) Adjust the lumbar support*
- (5) Head restraint*
- (6) Horizontal damping*

NOTE

The driver's seat must always be adjusted to suit the weight of the individual driver. Otherwise, there is a risk of damage to the driver's seat. See the original operating instructions from the seat manufacturer for the correct operation of the driver's seat.

Driver's seat, options

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
- Horizontal damping
- Lumbar support
- Air suspension
- Leather upholstery

Switching on the controller

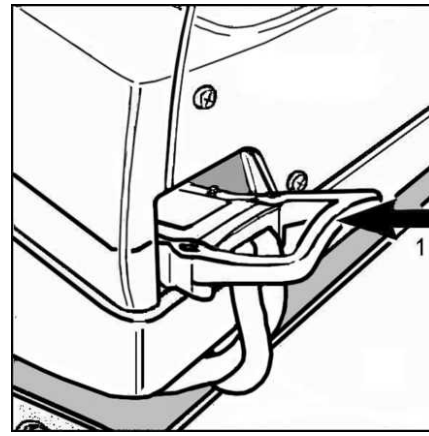
Plug in the battery female connector (1).

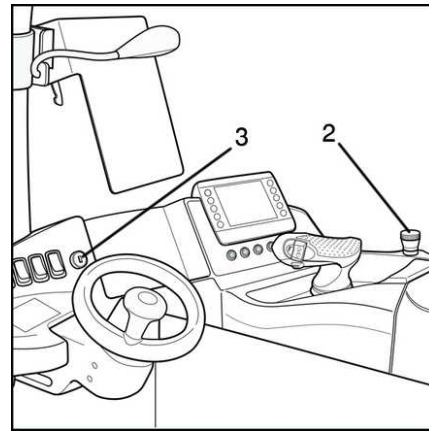
Unlock (turn) the emergency off switch if it is activated (2).

Switch on the key switch (3).

After inserting the battery male connector, an appropriate key must be used to switch on the key switch. To do this, compare the key identifier with the lock identifier.

The truck is ready for operation when the run-up time of a few seconds has passed.





⚠ CAUTION

Risk of accident, protection against unauthorised use

When work is complete, the truck can be secured against unauthorised use by switching off the truck and removing the truck key.

If the industrial truck is equipped with electronic access control, the enable function must be disabled in order to secure the truck against unauthorised use. See also the description of the electronic access control.

Foot switch

The traction current and hydraulic movements are only enabled if the foot switch and/or the seat switch* are actuated. The left foot is therefore protected within the contour of the truck.

Initial driving exercises

⚠ WARNING

Before starting work, complete the **Pre-shift checklist**.

Observe all safety instructions.

Speeds

The driver must adapt the driving speed according to the situation. When cornering in particular, attention must be paid to the overall

height and the centre of gravity, which will be high as a result.

Initial driving exercises

⚠ WARNING

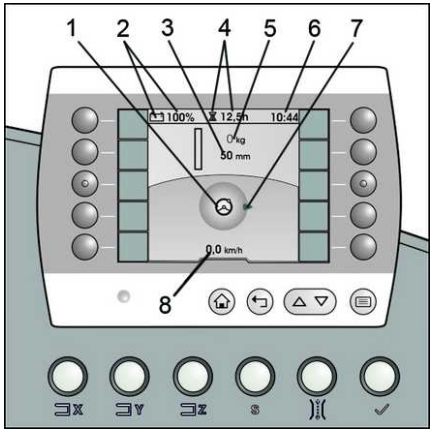
Risk of accident

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.

Display

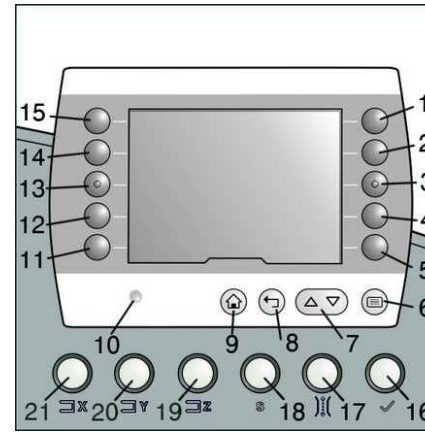
Display, basic

After switching on, the basic information appears on the display.



1	Steering in manual mode
2	Battery charge state. Shut-off of the lifting function at 20% residual charge.
3	Lift height, height of the upper edge of the fork above the ground
4	Operating hours, total service time
5	Load-bearing capacity or load weight on the fork*
6	Current time
7	Currently selected drive direction
8	Current driving speed

Operating devices ▷



1 - 5	Selection keys for **favourites**
6	Selection of a menu display
7	Selection within a menu
8	Go back one step in the menu or cancel a selection
9	Return to main page
10	Light sensor for automatic control of the display lighting
11 - 15	Selection keys for **favourites**
16	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
17	Selection of inductive guidance IZF
18	Reserved for special function
19	Selection key for auxiliary hydraulics in the Z direction
20	Selection key for auxiliary hydraulics in the Y direction
21	Selection key for auxiliary hydraulics in the X direction

Functions

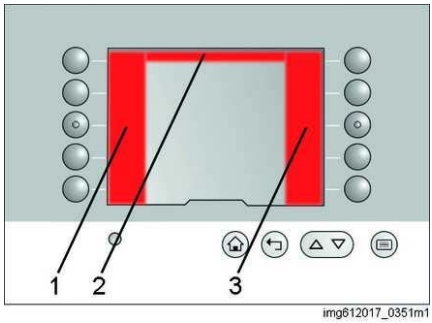
NOTE

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

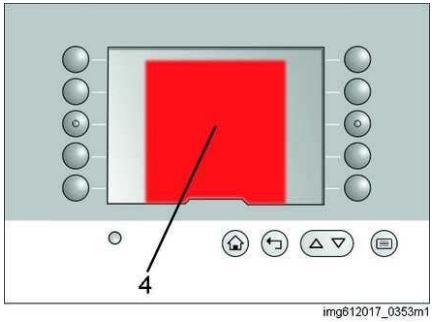
Operating statuses and information relevant for operation are shown on the display. Using the display, it may be possible to switch functions on and off or to switch between defined statuses.

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)

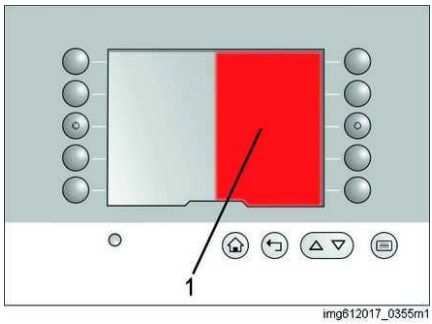


img612017_0351m1



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:

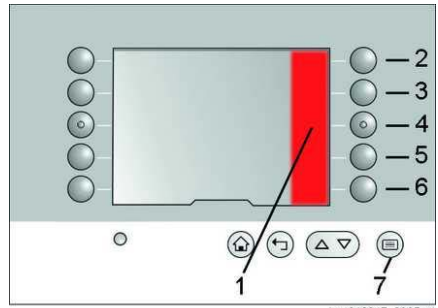
- Messages about operation
- Messages with error numbers
- Target position (drive order) and actual position for navigation

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

Menu structure

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

The menu levels are as follows:



img612017_0365m1

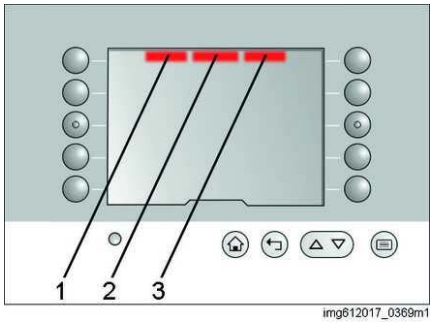
Industrial truck (2)					
	Power-saving feature				
	Navigation				
Lighting (3)					
Height preselection (4)					
	Used lift heights				
Fan (5)					
Settings (6)					
	Truck information				
		Production number			
	Display settings				
		Time			
		Date			
		Language			
		Status bar			
			Left field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

Top status bar

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:



img612017_0369m1

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

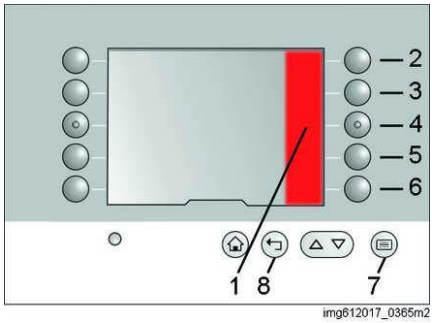
– Push button (7). The menu in area (1) opens.

– 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).

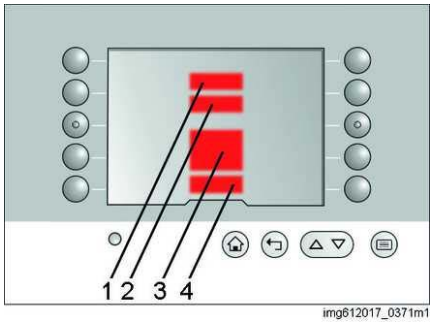


img612017_0365m2

Central information area

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)

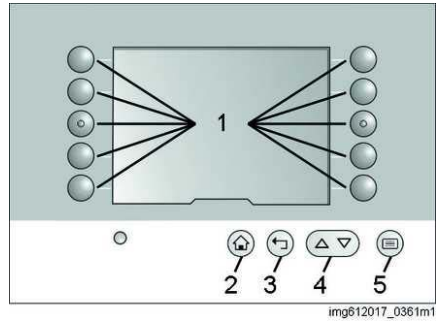


img612017_0371m1

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

This part of the display cannot be parameterised.

Operation

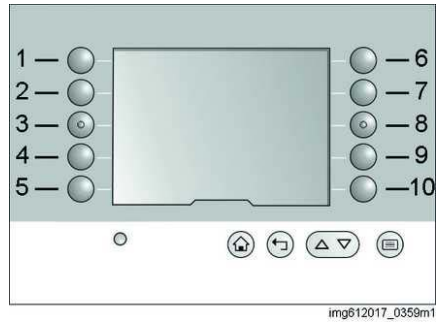


img612017_0361m1

The display is operated using the membrane keys. The functions of the keys (1) are described in the next section.

The function of buttons (2) to (4) is fixed. Button (5) has two functions.

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



img612017_0359m1

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

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

Item number	Function
1	The energy-saving mode of the industrial truck is activated or deactivated.
5	The navigation information is shown or hidden. For this, the key switch for the navigation must be

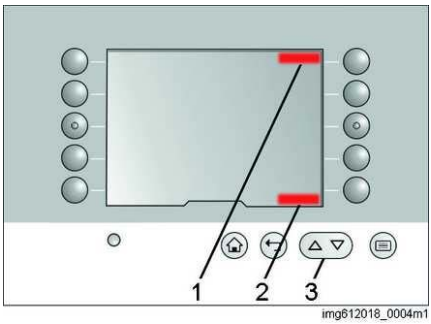
	set to AUTO. Otherwise, the symbol is greyed out and therefore cannot be selected.*
	If the button is pressed and held when a drive order is active, the drive order is deleted.*
6	The right-hand menu bar with the available data regarding height preselection opens. If the symbol is greyed out, the industrial truck is equipped with the navigation option and the key switch for navigation is set to AUTO.*
9	Switch the work light* on/off
10	Switch the fan* on/off
	* Option

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



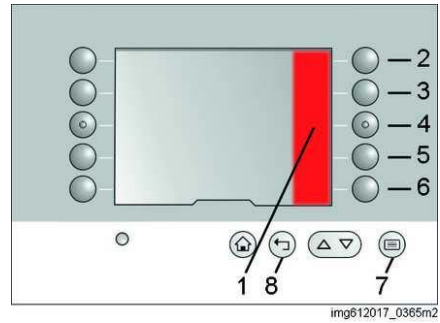
Scrolling through the menu bar ▷

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



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

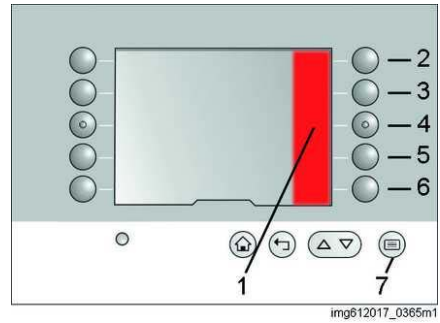
Only five languages are shown here. The other 20 languages can be found by scrolling. See "Scrolling through the menu bar"

– 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**
- **Height preselection**
  Complete, individual areas or individual heights
- **Fan**



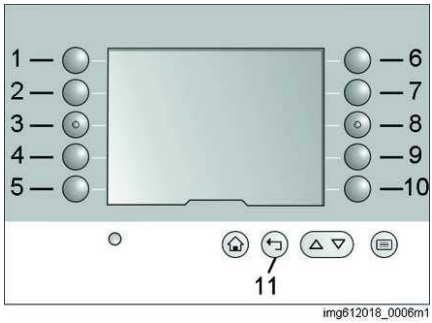
img612017_0365m1

Procedure

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

– Press key sequence (6) and (4).

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



img612018_0006m1

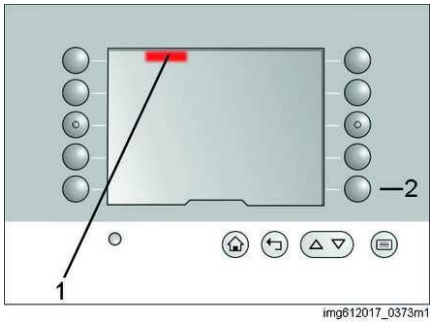
NOTE

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

– Exit the list by pressing button (11).

Message list ▷

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



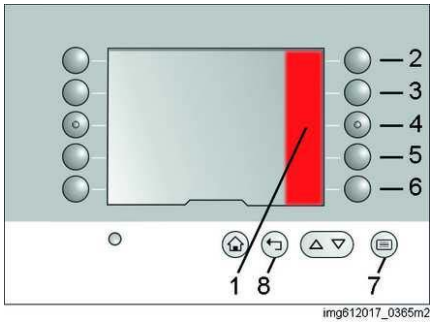
img612017_0373m1

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).



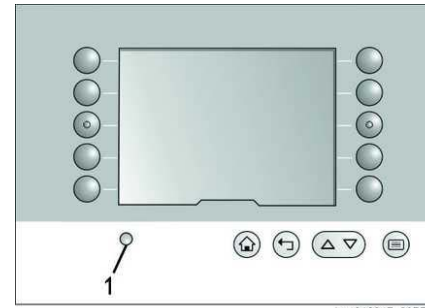
img612017_0365m2

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 for the display

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.

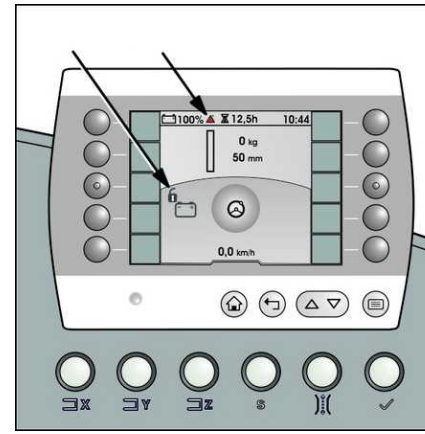
Operating instructions: Pictogram

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

"Battery lock open" pictogram

– Close the battery lock

– If the pictogram does not disappear despite the battery lock being correctly closed, call the authorised service centre.

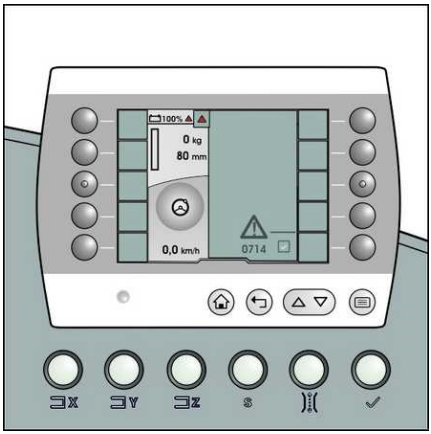


Operating instruction: Error number

In the event of a fault or defect, one or more numbers appear led by a pictogram of a warning triangle. Use the button to the right to scroll through the error list.

"Error number(s)" display

– Call the authorised service centre and report the error numbers displayed.



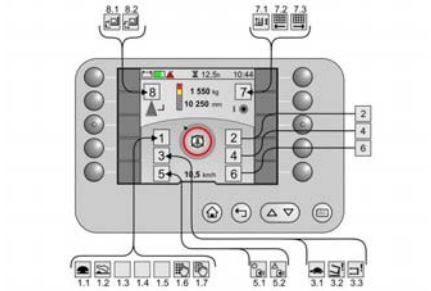
Text message

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

– Follow the operating instructions.

Displays

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



1.1	Emergency off switch pressed	4	Not used
1.2	Foot switch required	5.1	*MPSE in operation
1.3	Reserved for options	5.2	*MPSE has detected a fault
1.4	Reserved for options	6	Not used
1.5	Reserved for options	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		

Driving

Accelerator pedal

Trucks with one accelerator pedal

There are three pedals in the footwell in front of the driver's seat. The foot switch is actuated with pedal (1). Through the actuated seat switch and the actuated foot switch, the controller recognises that there is a driver in the workplace and enables the functions of the truck.

Pedal (3) can be used for continuously variable and accurate control of the driving speed. The drive direction is selected with the drive direction switches in the joystick.

Pedal (2) can be used for continuously variable and accurate braking. If both pedals (2 and 3) are accidentally actuated at the same time, the brake pedal overrides the accelerator pedal.

If none of the pedals are actuated or all pedals are released while the truck is in motion, the truck brakes to a standstill immediately.

The **hydraulic functions** are only enabled if:

- The seat switch has been actuated first
- The foot switch (1) is then actuated
- The required hydraulic function is then selected
- The switches are all functioning correctly

The **driving** function is only enabled if:

- Only the foot switch has been actuated initially and the accelerator pedal (3) has **not** been actuated
- The accelerator pedal (3) is then actuated
- The switches are all functioning correctly
- The parking brake has been released automatically

NOTE

The parking brake is released automatically once the accelerator pedal is actuated slightly.

The brake pedal (2) can be used for continuously variable braking.

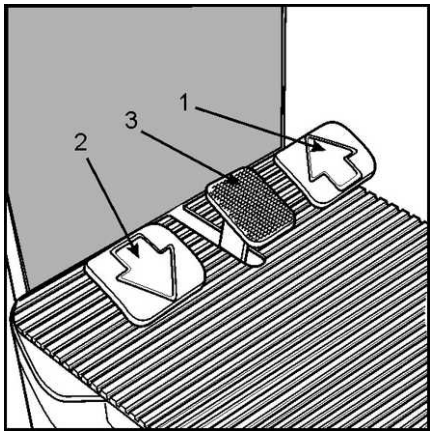


1 Foot switch
2 Brake pedal
3 Accelerator pedal

NOTE

There is no foot switch (1) in trucks with a driver's compartment door or an enclosed cab.

Trucks with two accelerator pedals* (dual-pedal version) ▷



The **hydraulic functions** are only enabled if:

- The seat switch has been actuated
- The switch is functioning correctly

The **driving** function is only enabled if:

- The seat switch has been actuated and **neither** of the accelerator pedals (1) or (2) has been actuated
- One of the accelerator pedals (1) or (2) is then actuated
- The switches are all functioning correctly
- The parking brake has been released

NOTE

The parking brake is released automatically once one of the accelerator pedals is actuated slightly.

The brake pedal (3) can be used for continuously variable braking.

*Option

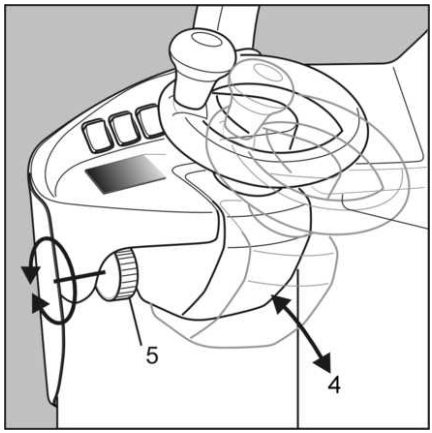
Adjusting the steering column ▷

⚠ CAUTION

Risk of accident

Make adjustments only when the truck is at a standstill.

Unscrew the clamping screw (5), bring the steering column (4) into the required position and tighten the clamping screw. Check that it is tightly screwed in.



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.

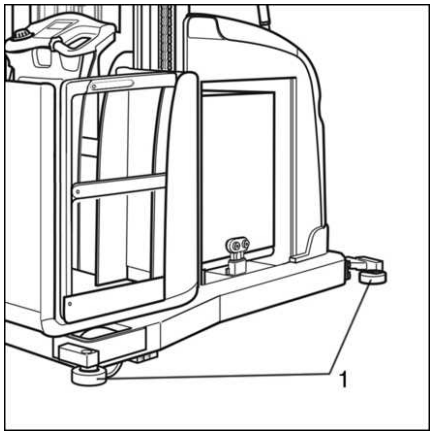
Mechanical guidance MZF

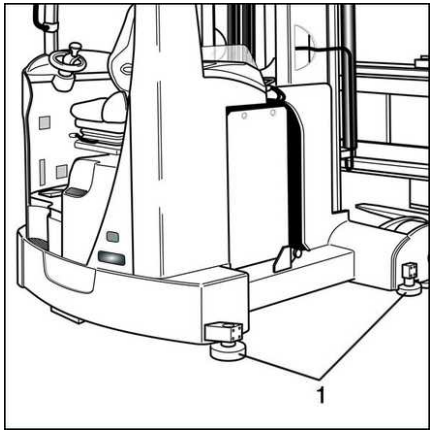
The industrial trucks can be guided **mechanically** when travelling within aisles. To achieve this, a rail system is installed on the floor of the warehouse. There are 2 (or 3*) guide rollers (1) on each side of the industrial truck. This guides the industrial truck along the rail system with little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



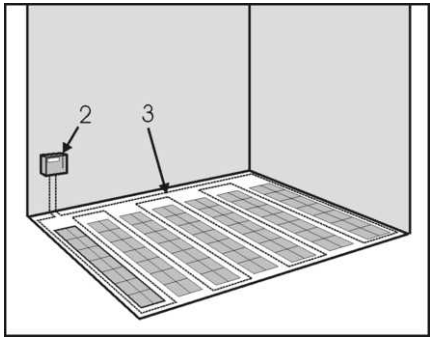


Inductive guidance (IZF*)

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

Mechanical guidance MZF

The mechanical guidance consists of one or two rails on or between which the 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

In order to enter rail guidance, the truck is to be positioned as centrally as possible and aligned with the aisle in front of the entry funnel. The more accurate this positioning, the faster the truck will be led into the guide with as much care as possible. Once the truck has entered the guide, the side rail switches are activated. When the rail switches detect the rail guidance, the new mode of operation is automatically selected:

Exiting the aisle

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

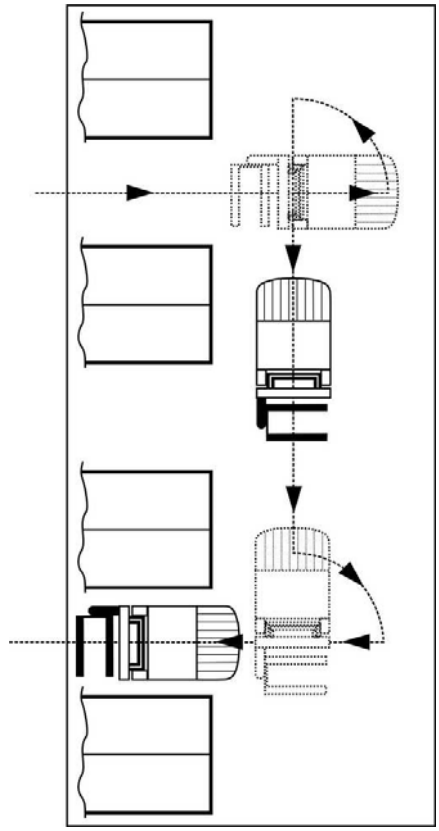
Changing the aisle

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

– Drive the truck completely out of the aisle.

– Drive out of the aisle slowly and beware of any people or other trucks in the transfer aisle.

– Once the truck is outside the rail, the steering is reactivated by the rail switch. The truck can now be turned 90° on the spot and then driven to the target aisle.



Load pick up

Picking up a load

The **safety information for picking up a load** must be observed without fail.

Load capacity diagram

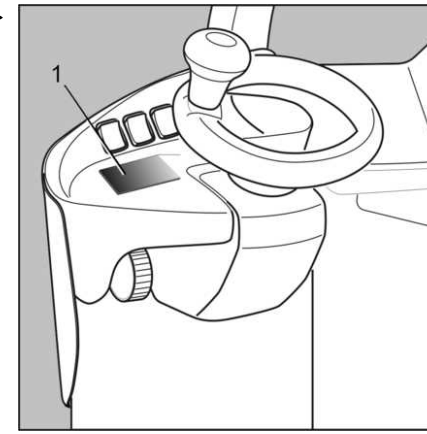
The load capacity specified on the load capacity diagram (1) is dependent on the configuration and can therefore vary from truck to truck.

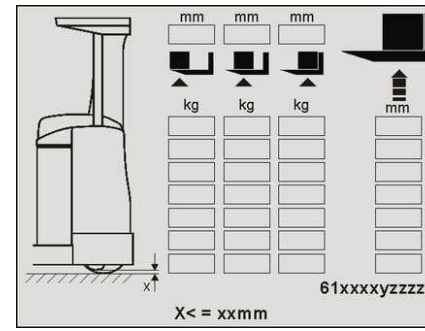
The load capacity diagram and the load capacity restrictions indicated for certain application conditions must be observed without fail so that stability of the truck is not impaired.

⚠ DANGER

Stability at risk

The setting dimension (**X mm**) for setting the support screws, indicated on the load capacity diagram, must be checked every six months and adjusted if necessary.



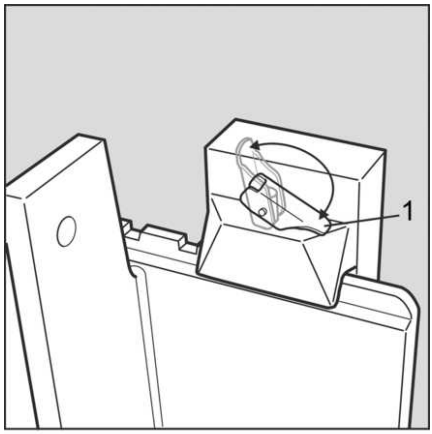


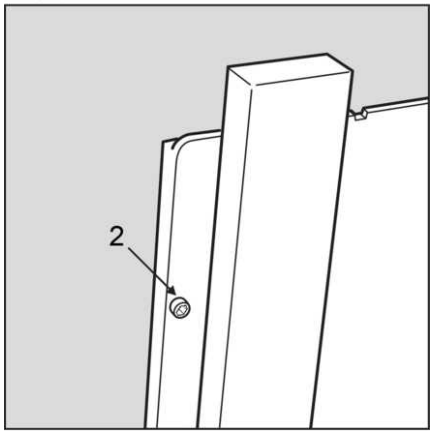
Fork arms, adjustable ▷

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 fails or if part of it fails, the truck can be moved out of the working area by means of the relevant emergency operation mechanism.

NOTE

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

Releasing the brake mechanically

The magnetic brake is located under the cover under the driver's seat.



NOTE

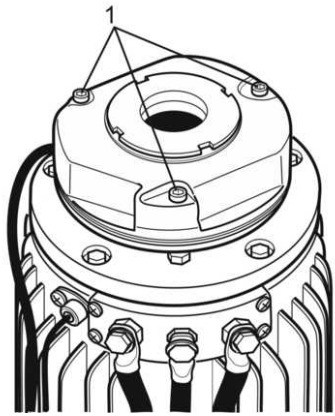
Each truck is supplied with a box of accessories upon delivery from the factory. This includes, among other items, a bag containing two screws and the suitable hexagon socket wrench. These allow you to disable the magnetic brake mechanically.

⚠ WARNING

If the brake has been mechanically disabled as described below, a suitable tow bar must be used for towing or a second vehicle must be coupled to the other end of truck so that the second vehicle can take over the braking procedure.

1st option

Disassemble the brake blocks; remove three mounting screws (1) to do so. Place the brake blocks to one side.



2nd option

Tighten the brake anchor plate; to do so, screw in and tighten two screws (M6X55) into the bores provided in the brake blocks.

⚠ CAUTION

If the brake was released mechanically, it must be checked to ensure that it is assembled correctly and functions correctly when the truck is recommissioned.

Check that the brake lining has a clearance of approx. 0.3 mm.

Retrieving the truck

Towing with functioning steering.

If the steering on the truck still functions and the brake is released, the truck can be towed either with ropes or with the tow bar.

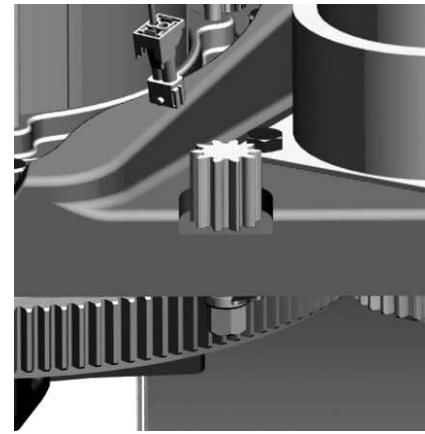
Towing with non-operational steering

If the steering has failed, the truck can be towed using equipment such as steerable heavy-duty rollers. Depending on the truck version, the heavy-duty rollers must be placed underneath the drive wheel or underneath the posts on the side of the truck. As the drive wheel does not come into contact with the ground when using this towing method, the brakes can also no longer operate. Therefore, please observe the safety information in the section entitled "Releasing the brake mechanically".

Emergency steering

An emergency steering pinion shaft is fitted in the chassis for emergency steering. This pinion shaft is secured in position by a locking ring that is fitted from below. This locking ring must be removed in order to insert the pinion shaft into the bore from below in such a way as to make the pinion gear engage into the steering gear. Then refit the locking ring from above. This means that the steering can now be turned manually, by using a socket wrench for example.

▷



NOTE

The emergency steering pinion shaft can be accessed by removing the covers underneath the driver's seat.

⚠ CAUTION

Risk of accident

Only insert the emergency steering pinion shaft when the battery male connector is disconnected.

Attachment points for towing

Attachment points on the mast side: loop around the frame of the sideshift.

Attachment points on the driver's compartment side: loop around the posts of the overhead guard.

Parking, decommissioning

Parking and leaving the industrial truck

NOTE

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

Decommissioning

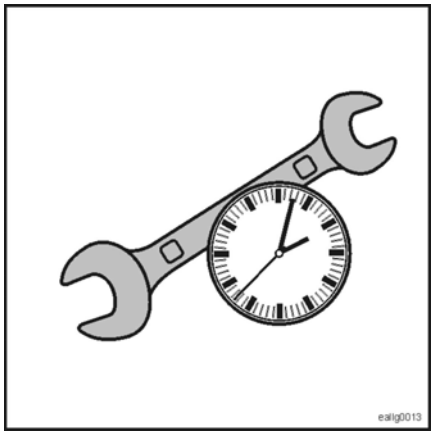
ENVIRONMENT NOTE

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

5

Regular care and maintenance

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.

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		✓	✗
General notes											
Carry out the following test steps according to the truck version (standard design, special equipment, Customer Options).											
In order to ensure occupational health and safety during maintenance work, these steps must only be carried out by qualified personnel.											
Qualified personnel are expected to use only equipment and tools that are suitable for maintenance work.											
Qualified personnel are expected to use only the latest documentation (workshop manuals) provided by the manufacturer.											
Preparatory tasks											
Industrial truck: clean or have it cleaned by the operating company.											
Nameplate: identify the industrial truck.											
Controller: read out the operating hours.											
Gearbox											
Gearbox: check for noise and leakages.											
Gearbox: check the oil level, top it up if necessary.											
Gearbox: first oil change after 1000 operating hours and every 4000 operating hours thereafter.											
Drive unit: check the tightness of the screw connection to the chassis (observe the appropriate torque).											
Traction motor bearings: check for operating noise.											
Chassis, bodywork and fittings											
Bearing points and joints: check and lubricate.											
Doors, flaps and covers: check function.											
Doors, flaps and covers: check the mounting and condition.											
All moving parts: lubricate with a suitable lubricant.											
Overhead guard: visually inspect the weld seams; use a dye penetrant procedure if you suspect there are cracks.											
Overhead guard: visually inspect for damage and deformations.											
Rail switches: check the function and condition.											
Support screws in the chassis: check the setting according to the specifications on the nameplate. Adjust as necessary.											

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		✓	✖
Battery compartment door and battery compartment hood: check and adjust.											
Battery compartment door and battery compartment hood: check and adjust.											
Battery: check the latch and stops.											
Chassis frame											
Drive wheel: check the condition and check for wear and any foreign objects.											
Drive wheel, wheel nuts or wheel screws and cushion tyre: check for secure attachment.											
Load wheels: check the condition and mounting and check for wear and foreign objects.											
Load wheels: check for ease of movement.											
Antistatic belt: check the condition.											
Antistatic chain: check the condition.											
Steering system											
Steering: function check outside the aisle.											
Steering: check the steering angle (>90° on both sides).											
Steering: check straight line travel.											
Steering gears: lubricate with all-purpose grease.											
MZF: function check.											
IZF: check for central positioning and accuracy of the guidance in relation to the guide wire.											
Steering angle measurement: check the level of play and the condition.											
Steering knob, steering wheel: check for ease of movement.											
Live ring bearings: check for ease of movement and wear.											
Live ring bearings: check the play of the gears.											
Steering motor bearings: check for operating noise.											
Brake system											
Service brake: check for correct function. (actuation of brake pedal, removal of foot switch signal, removal of seat switch signal, activation of emergency off switch).											
Reverse brake: check for correct function (change of driving direction via operating lever or dual-pedal control).											
Drive unit: check the condition and thickness of the brake lining.											
Load wheels: check the brake clearance by freewheeling.											
Load wheels: check the condition and thickness of the brake lining.											

At operating hours										Carried out	
1000 h		2000 h		3000 h		4000 h		5000 h			
6000 h		7000 h		8000 h		9000 h		10000 h		✓	✖
Brake 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											
Operating devices: check the function and condition.											
Protective devices: check depending on the equipment.											
Information signs, warning signs, load capacity diagram: check that they are present and legible.											
Optional and additional equipment: check the function and condition according to the order.											
Electrics, electronics											
Check the condition of the battery cables, battery connectors and battery male connectors and check that they are securely attached.											
Battery cables: visually check the insulation.											
Battery: measure the battery voltage under load.											
Battery: measure the tray for short circuits.											
Battery: check the electrolyte level as far as technically possible.											
Plugs and connections: check that they are securely attached.											
Openly routed cables: visually inspect the insulation.											
Contactor contacts: check the condition and check for erosion.											
Fuses: visually check the condition.											
Fuses: check the values.											
Heat sink and fan: check that the air supply is unobstructed and clean if necessary.											
Height measuring system for the main lift: check the function and condition of the measuring system and check that it is securely mounted.											
Height measuring system for the auxiliary lift: check the function and condition of the measuring system and check that it is securely mounted.											
Displacement transducer for the load wheel: check for contamination, check the condition and check that the component is securely mounted.											

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		✓	✖
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.											
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 3%)											
Auxiliary lift load chains: determine wear (maximum permissible wear is 3%)											
Load chains: lubricate with chain spray.											
Chain rollers: check for ease of movement.											
Mast channels: check the surfaces for wear.											
Mast channels: lubricate the surfaces with grease.											
Lift mast rollers: lubricate with all-purpose grease. If necessary, install the lubricating nipples provided.											
Lift mast rollers: check the condition and check the setting.											
Guide elements: check the lateral play.											
Guide elements: lubricate with all-purpose grease.											
Adjustable load fork: check the condition and function of the latches.											
Load fork: visually check for bends, measure if necessary.											
Load fork: if you suspect there are cracks, check using the dye penetrant procedure.											
Load fork, adjustable: lubricate sliding surfaces with all-purpose 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		✓	✗
Work cage*											
Mechanical components: check the condition and check for deformation.											
Electrical components: check shutdown functions.											
Force application points: visually check the weld seams and screw connections. If you suspect there are cracks, check using the dye penetration test procedure.											

2000-hour maintenance schedule

At operating hours										Carried out	
2000 h		4000 h		6000 h		8000 h		10000 h		✓	✗
Gearbox											
Gearbox: 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.											
Final tasks											
Test drive: check all functions and special functions according to the order.											
Attach the service sticker.											

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).

Lubricants

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.

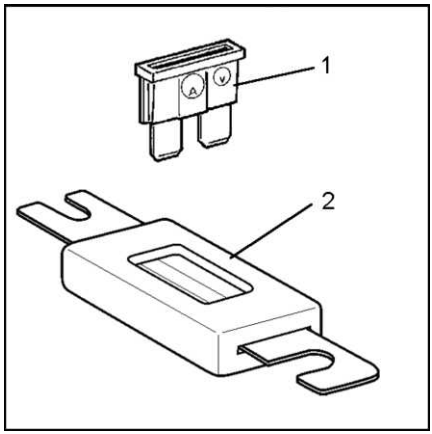
Battery maintenance

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.

Fuses



⚠ CAUTION

Risk of short circuit, risk of electric shock

Before carrying out any work on the electrical system, disconnect the battery female connector to remove the power supply to the system.

Fuses of certain sizes and types must always be exchanged for identical versions.

Control current fuses (1)

- F2: 10 A
- F3: 10 A
- F4: 10 A
- F5: 10 A
- F7: 5 A
- F8: 3 A
- F9: 10 A
- F10: 7.5 A
- F14: 5 A

Main current fuses (2)

- Main current for truck F1: 355 A or 500 A (depending on the model)
- Main current for steering 3F1: 35 A

The fuses are located under the armrest on the right-hand side of the driver's compartment. To access the fuses, remove the covers.

6

Technical data

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).

Technical data

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

Sound level, driver’s ear 68dB(A)

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.

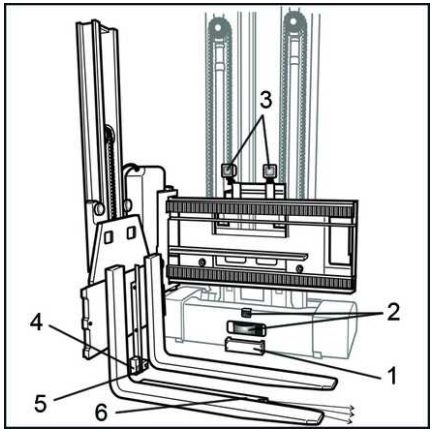
Industrial trucks in customised special versions (CO = customer option) will be supplied with an additional description of these special versions, if necessary.

NOTE

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

Overview of options

The operation and functions of the options are described in separate sections.



Inductive guidance IZF

The load-side antenna for inductive guidance is located behind this protective cover (1). See the section entitled **Inductive guidance IZF**

Personal protection system (MPSE)

The safety laser scanner scans the roadway in the load direction through the lower opening (2). The displays of the safety laser scanner can be seen through the upper opening (2). See the section entitled **Personal protection system (MPSE)**

Working spotlights

Working spotlights (3) are used to illuminate the workplace outside the driver's compartment. These can be the storage spaces in the rack on the right-hand side and on the left-hand side, or the driving area in the load direction or in the drive direction.

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.

Load detection sensor

By detecting (4) whether a load is on the fork or not, logical processes can be automatically monitored and storage activities made more economical.

Laser beam for positioning support

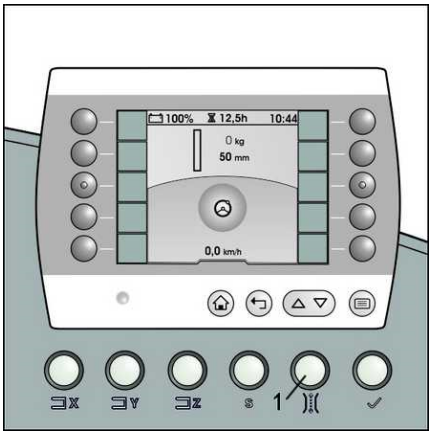
A laser beam (5) projects a luminous dot or two crossed luminous lines (cross line laser) onto the front of the rack or the stored goods. This supports the **manual** positioning of the load fork.

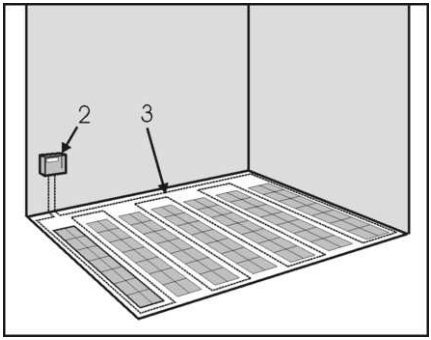
Fork arms camera

The view along the fork arm is transmitted to the operator in the driver's compartment from the fork arms camera (6). This supports the **manual** positioning of the load fork.

See also the section entitled **Camera system**.

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.

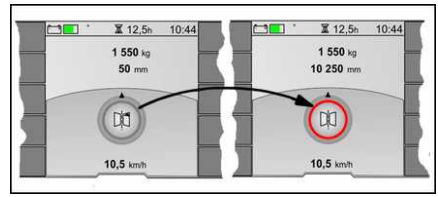
The operating devices for inductive steering control are integrated into the operating panel. The display indicates the current operating status. After the controller is switched on, a self-test runs in the steering control system. Switch (1) on the operating panel is used to switch between manual driving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

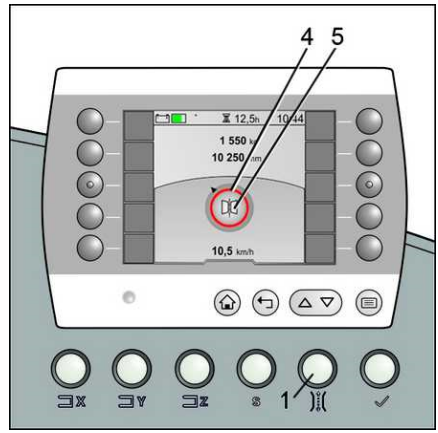
Commissioning

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 pushing 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 sounds.
- 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 (manual steering) 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

All that is required is to select the drive direction and the driving speed. Manual steering is deactivated when in automatic driving mode.

If the main lift needs to be lifted or lowered at the same time as this, the operating lever must be actuated accordingly.

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 "Manual/Automatic" (1) button again.
– The industrial truck is braked automatically.
– An acoustic signal sounds.
– Manual steering is activated automatically. 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 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.

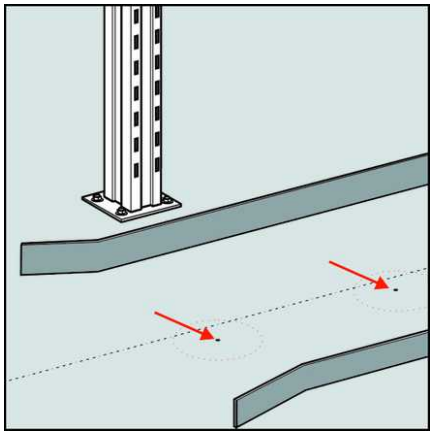
The automatic braking systems are often combined with lift height restrictions.

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

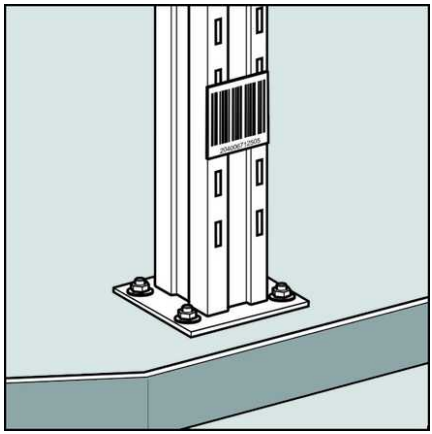


The RFID transponders are embedded in the hall floor. They are located in approx. 8 mm holes slightly outside the centre of the aisle at different intervals. The RFID writing/reading device is mounted on the load wheel axle under the driver's cab or under the battery compartment. The RFID transponders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

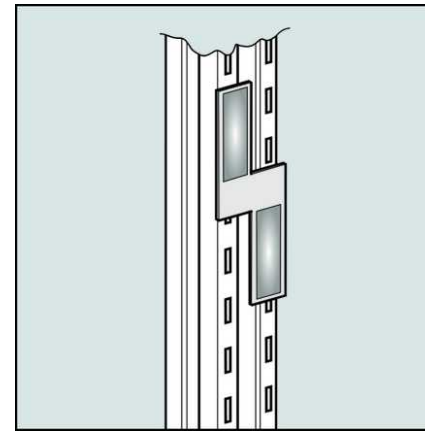


Barcode scanners fitted on the industrial truck read the barcode labels in both drive directions while the truck is in motion. The barcode labels are attached to the uprights approx. 50 cm above the floor. The scanners can be attached to the industrial truck and the labels to the rack on one or both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

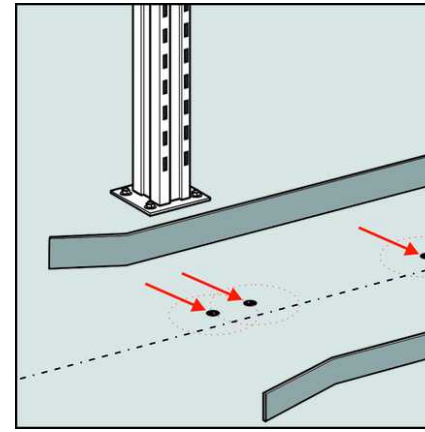
Reflective light switches and reflectors ▷



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.

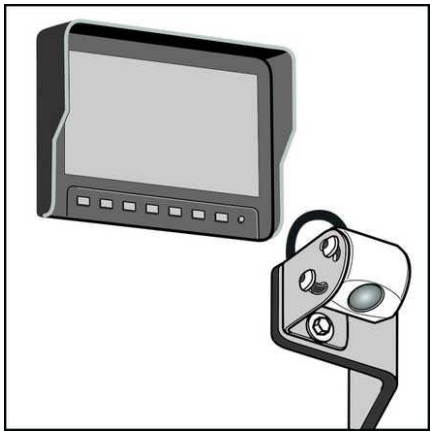
Magnetic system ▷



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.

Camera system



Modern video cameras on the industrial truck and colour monitors in the driver's compartment 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.

Camera for entering the aisle

Two cameras mounted on the lift mast in the load direction with a view of the guide rollers (MZF) and the roadway. One or two monitors in the driver's compartment.

These cameras should be set so that the rail guide rollers (MZF) or the corner contour of the chassis (IZF) are visible in the 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 attachment. Shows the roadway in the load direction. The load must be raised by approximately 50 cm for this purpose.

Fork camera or fork arms camera

In the fork camera version, the camera looking in the reach direction of the turret head shows an oblique image of both fork tips and the

storage position. The system switches to the camera looking in the reach direction automatically.

In the fork arms camera version, the camera looks along the fork blade at the level of the shelving. This makes it very easy to see whether the fork fits into the opening of the pallet when the reach function is used.

Both versions help the operator to pick up or set down the load faster and more precisely.

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.

Acoustic warning signal

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

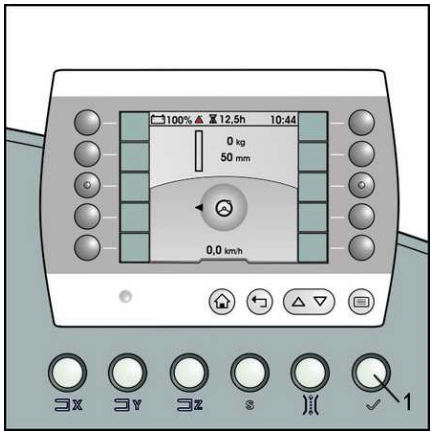
The signal is generated depending on the drive direction.

The signal can be limited to specific areas.

Intermediate lift cut-out

If the truck is used in rooms of different heights, the lift can be limited electrically.

Pressing the enable button (1) removes the limitation and the maximum lift height is possible again.



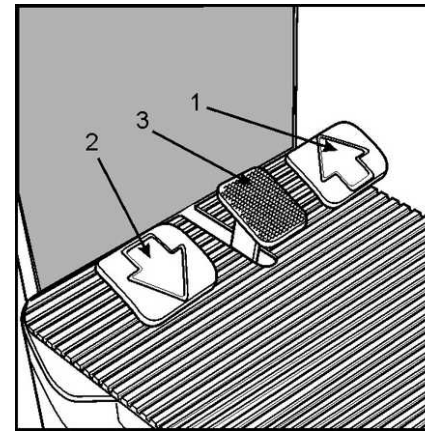
Traction cut-out

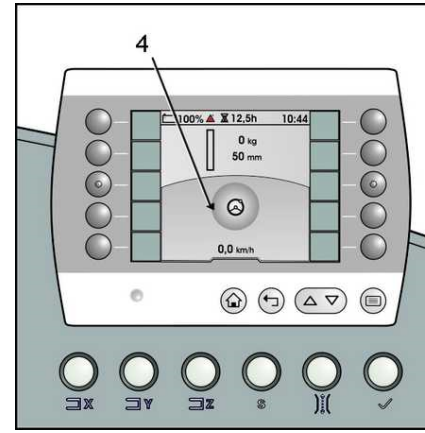
The traction cut-out can be combined with the intermediate lift cut-out. This cut-out can be overridden once the enable button has been pressed.

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.

Dual-pedal version





This turret truck can optionally be fitted with two accelerator pedals, one for each drive direction.

Driving with pedal (1) - driving in the load direction

Driving with pedal (2) - driving in the drive direction

There is no separate foot switch. Traction current and the hydraulic functions are only enabled when there is a load on the seat (seat switch). The drive direction switch is also omitted.

Changing the drive direction on the dual-pedal version

The position of the accelerator pedal determines the driving speed, as it does in other vehicles. By releasing the accelerator pedal, the driving speed is automatically reduced (braked, no idling). The truck then continues at this selected speed. If the pedal is released fully, the truck is braked to a standstill. If this braking effect is not sufficient, the brake pedal (3) must also be depressed.

The drive direction can be switched directly from the forwards drive direction to the backwards drive direction or vice versa by pressing the other accelerator pedal. The process of braking and subsequently accelerating in the opposite direction (reversing) is electronically controlled.

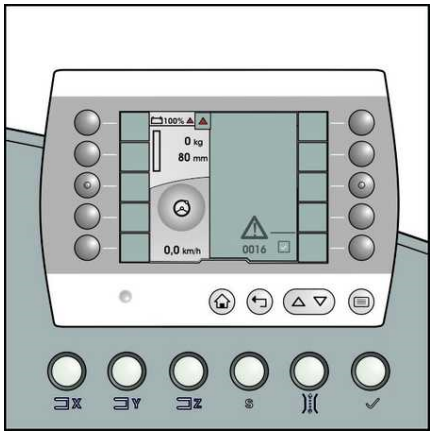
The display (4) shows the actual drive direction.

Seat switch

The driver's seat is equipped with a seat switch* in the dual-pedal version*. This switch detects whether the driver is in the correct operating position.

*Option

Monitoring of the seat switch



The seat switch is monitored electrically. If the truck remains switched on for longer than 8 hours, the switch status of the seat switch must change at least once. In normal operation, this happens automatically during operation. If this is not the case, a corresponding message appears on the display. The seat switch must be released and then reactuated. If the seat switch is defective, an indicator will appear in the display.

If one of the switches stops working during operation, the truck is braked to a standstill or to a speed of 2.5 km/h, according to truck type, and a corresponding message appears in the display.

The seat switch monitors whether or not a driver is at his/her workplace. The seat switch must be actuated together with the foot switch and either the accelerator pedal or the operating devices for the hydraulics in the correct sequence. The seat switch and foot switch must always be actuated first. Only then can driving or one of the hydraulic functions be selected.

The function of the seat switch itself is also monitored. If the switch is not actuated at least once within eight hours, the controller assumes that there is a defect.

If the message is still displayed after the switch has been pressed once, call the customer service centre.

Error message

Display

0016

Possible cause

- The accelerator pedal has been actuated but the seat switch has not been activated.
- Seat switch faulty

Effect

- Braking
- No function
- Error display

Resolution of faults

- Actuate the seat switch before actuating the accelerator pedal.
- Do not release the seat switch while driving.
- Have the function repaired by the authorised service centre.

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.

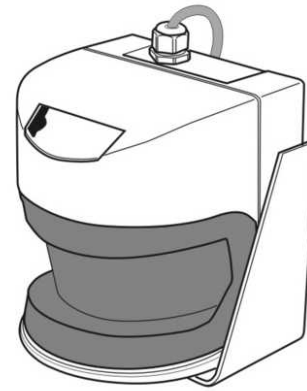
Other manufacturers

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.

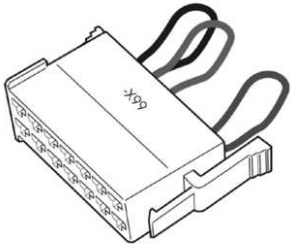
NOTE

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

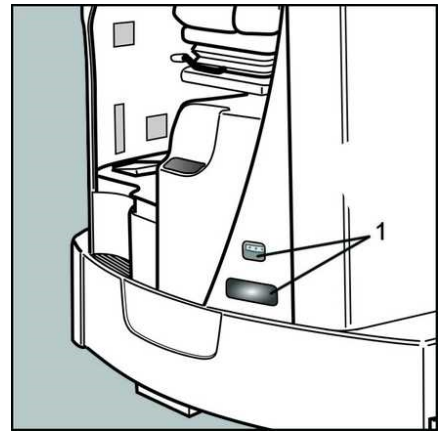
The laser scanners that are used in personal protection systems are highly sensitive opto-electronic sensors. They are well protected in the contour of the industrial truck.

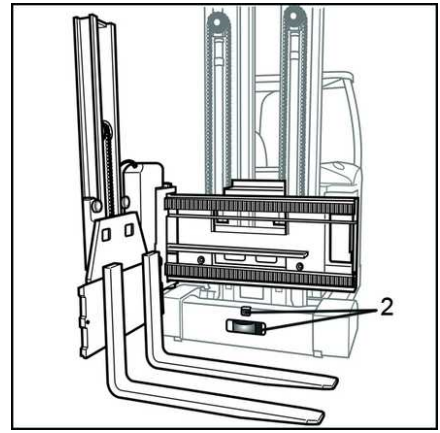
The drive-side scanner (1) is located behind the cover under the driver's seat

The load-side scanner (2) is located behind the load wheel cover.

The load-side scanner (2) is covered by the attachment when in the lowered position. For this reason, the industrial truck drives at a maximum speed of 2.5 km/h when the attachment is lowered. Personal protection is ensured by the low speed and the attention of the operator.

The scanners can monitor the roadway through a wide slot. The diagnostic LEDs are visible through the smaller opening above.





⚠ 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

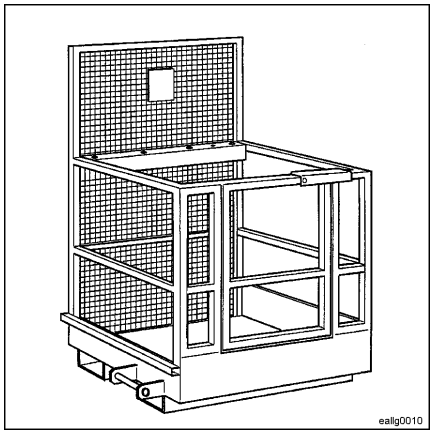
Risk of accident

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.

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.

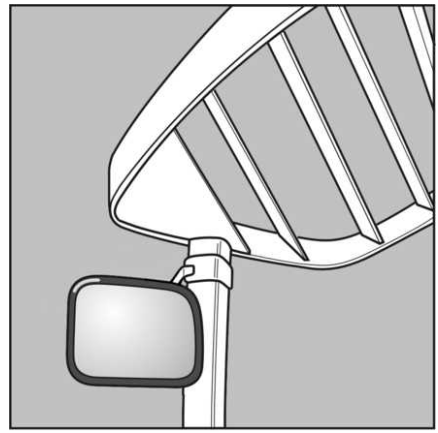
If an industrial truck is equipped with a working platform at the factory, this special version is accompanied by additional operating instructions. Detailed safety information can be found within.

Mirror

Mirrors improve the overview of the working area. The mirrors can be fitted to the post of the overhead guard or to the lift mast.

NOTE

Mirrors are an important contribution to occupational safety. Check the setting and cleanliness daily.



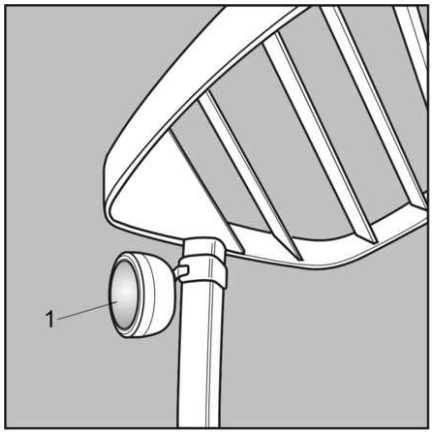
Working spotlights

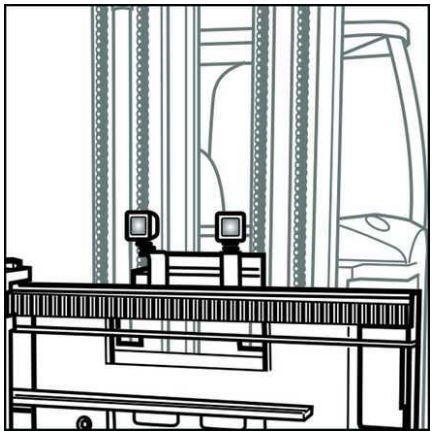
For safety reasons, there is an option to have the truck fitted with one or several working spotlights (1) to improve illumination of the working area. The spotlights can be adjusted for the desired area. To do so, it is possible to release the swivelling mounting and then retighten it again after adjusting.

The switches for these working spotlights are located in the operating panel.

NOTE

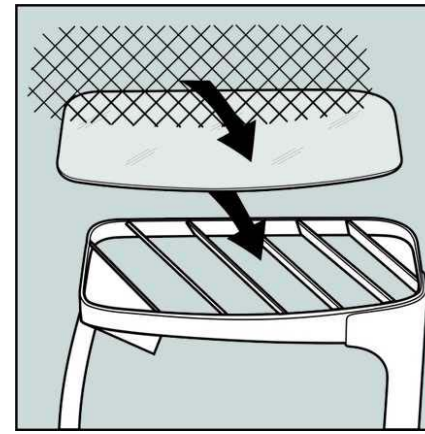
Working spotlights are fitted for safety reasons and therefore should always be in working order.





Overhead guard cover

The distances between the struts in the standard design of the overhead guard meet the requirements of the current standard. However, if smaller objects than provided for in this standard are handled in a storage area, these objects can fall through the struts of the overhead guard and endanger the operator. To avert this danger, a transparent protective roof cover* (multi-layer safety glass, polycarbonate or metal grid) is available as an option.



⚠ CAUTION

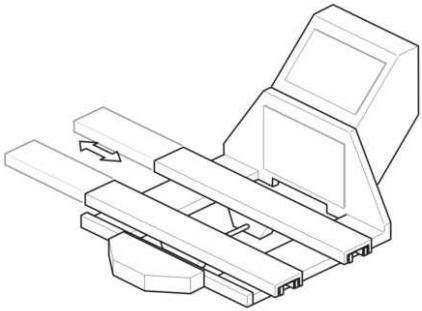
Risk of damage to property. If the glass cover of the overhead guard is contaminated or broken, the view of the higher racking levels is obstructed. Due to poor visibility, collisions between the industrial truck and the racking can occur.

Before setting off, check the glass cover for damage and contamination. If the glass cover is damaged, replace the glass cover immediately. If the glass cover is contaminated, replace the glass cover.

Telescopic table

Description

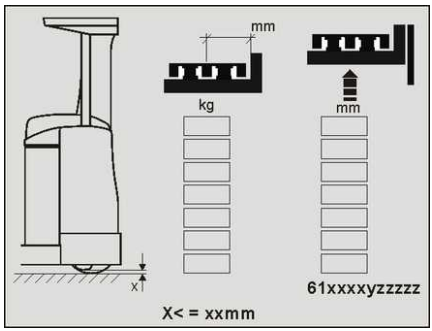
The load capacity specified on the load capacity diagram is dependent on the configuration and can therefore vary from truck to truck. The load capacity diagram and the load capacity restrictions indicated for certain application conditions must be observed without fail so that stability of the truck is not impaired.



⚠ DANGER

Stability at risk

The setting dimension (X mm) for setting the support screws, indicated on the load capacity diagram, must be checked every six months and adjusted if necessary.



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 forks, connected by a mechanical coupling, and possibly a third fork that 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.

Guide rollers that are maintenance-free and very generously-sized as well as side control guides provide a high level of stability for the telescopic table. The top table is picked up by 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.

Operation

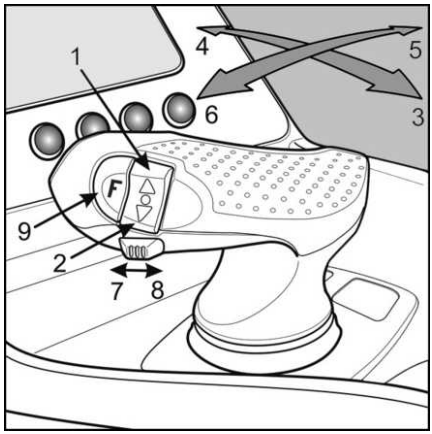
The joystick can be used for accurate and continuously variable control of all hydraulic movements. Jerky operations must be avoided. These cause unnecessary impacts and pulsing.

Electronic monitoring can prevent operating errors to a large extent.

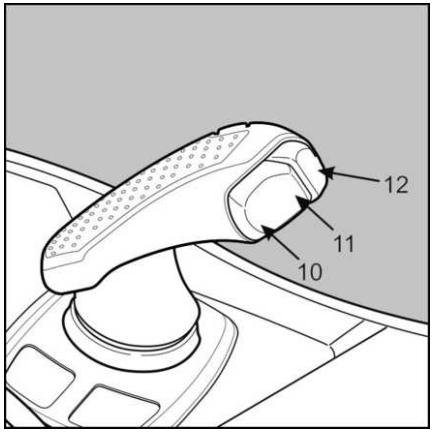
Maintenance of the telescopic table

NOTE

For proper maintenance of the telescopic table, the information in the enclosed manufacturer's documents is to be observed.



1	Select the load side drive direction
2	Selecting the drive side drive direction
3	Lift the forks
4	Lower the forks
5	Shifting the telescopic fork to the left
6	Shifting the telescopic fork to the right
7	No function
8	No function
9+3	Lift the fork with the auxiliary lift
9+4	Lower the fork with the auxiliary lift



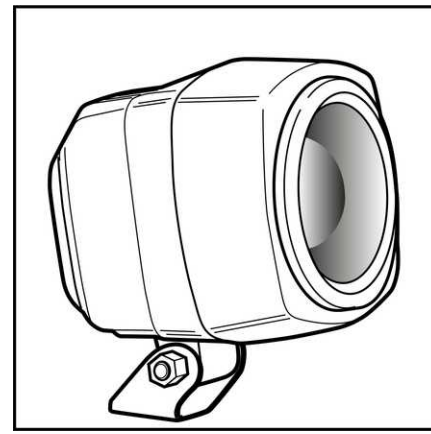
10	No function
11	No function
12	Horn

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

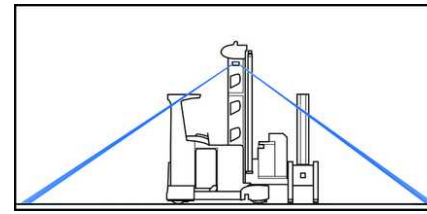
The safety headlight features extremely powerful LEDs. Briefly looking directly into the beam of light does not present a danger to health, but is unpleasant due to the temporary dazzling effect. However, looking into the beam of light for longer periods must be avoided.

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

Special equipment for cold store application ▷



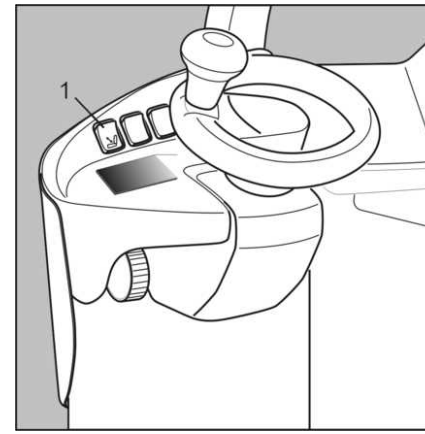
Trucks for cold store application are equipped with many special attachments in order to guarantee full function in low temperatures (-30°C). Separate instructions must be observed for the operation of these trucks, which are not included in these operating instructions. Vehicles suitable for cold store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

Electrical seat adjustment ▷



⚠ CAUTION

Risk of accident, risk of crushing

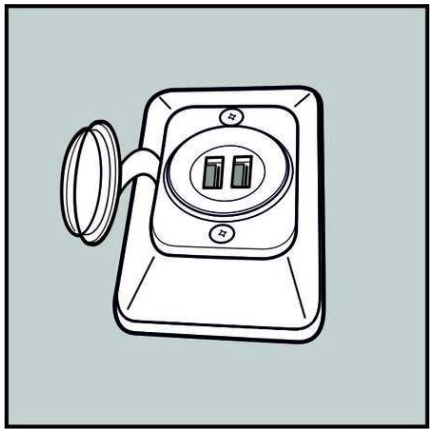
- Make settings only when the truck is at a standstill.
- The pedal plate and seat console move during the adjustment. Therefore, keep your fingers away from the moving parts. Actuate the rocker switch with one hand and place the other hand on the joystick.
- Make sure that there are no objects in the vicinity of the moving parts. They could become trapped and damage the mechanics.

For optimum adaptation of the driver's compartment to suit the size of the operator, you can use this option to electrically adjust both the position of the driver's seat and the pedal plate.

Press the rocker switch (1) in the operating panel up or down accordingly until the position is comfortable. A scale on the front panel of the pedals (2) gives an indication of the setting to help you remember it. The seat itself and the steering column can also be adjusted, as in the standard design.



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.

This charging station is located in the knee area below the steering wheel.

NOTE

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

Lift height preselection

NOTE

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

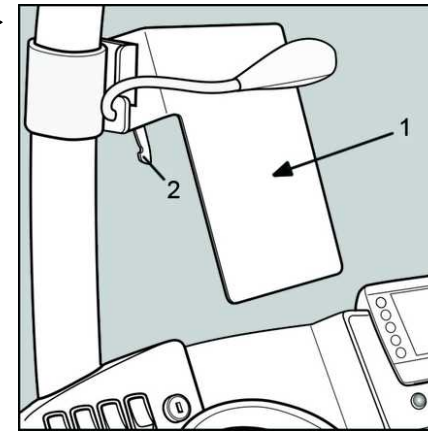
This function partially automates the approach to the lift heights. The operator simply has to enter the required lift height with a number. The operator then actuates the operating devices accordingly and the system automatically brings the load fork to the required height.

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.

Clipboard

You have the option of using a clipboard (1) to secure your work papers. This clipboard is attached to the post of the overhead guard using a standardised clamping system. Adjust the inclination of the clipboard by opening the clamp lever (2).

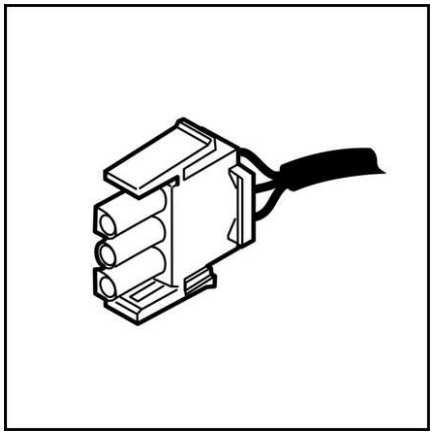
▷



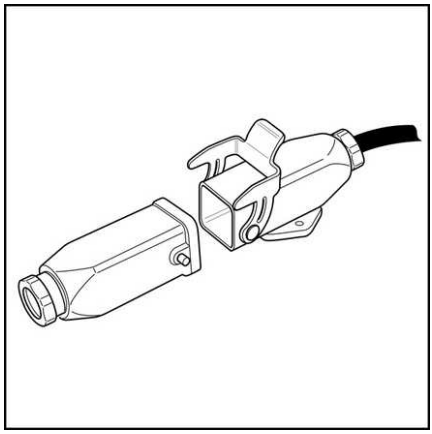
MMS interface

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.

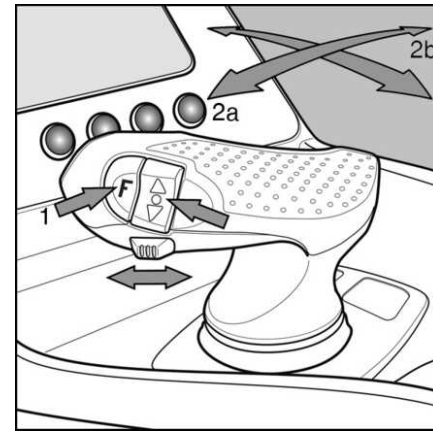


PIN 1 and PIN 2 +24 V
PIN 3 + 0 V
Max. 5 A



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

Fork cycle



"Fork cycle" refers to semi-automatically depositing loading units into stock or removing loading units from stock.

Once the fork has been placed in the correct position to deposit into or remove from stock, the fork cycle can be started.

The cycle begins with the reach movement. At the end of the extension, the fork is either raised or lowered a programmed distance. In the basic version, the operator decides whether the action to be performed is depositing in stock or removing from stock. If the industrial truck is equipped with a "load sensor", the controller selects which action to perform.

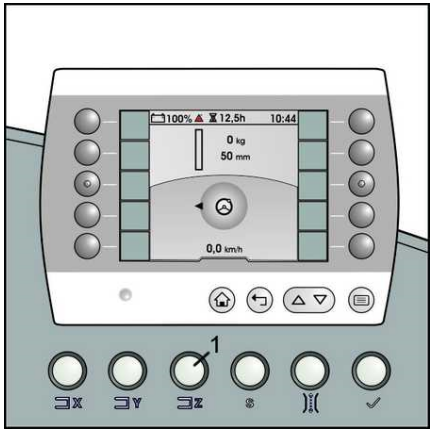
If the industrial truck is equipped with the "lift height preselector" option, the controller also assumes responsibility for approaching the correct height at which the fork cycle can be carried out.

Cancel the fork cycle at any time by releasing the operating devices.

Hydraulic fork arm positioner

Function

The hydraulic fork arm positioner is an additional hydraulic function with which the distance between the fork arms can be synchronised. The fork arm distance can thus be changed for different load dimensions.



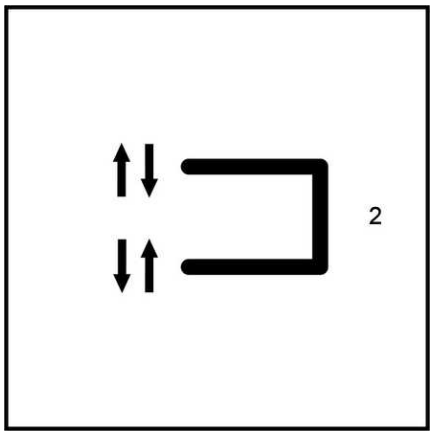
NOTE

The fork arm positioner can only be actuated ***without a load on the fork****. The maximum position and the minimum position of the fork arm positioner can be set by the authorised service centre.*

Programming the intermediate stop

The operator can also use diagnostic software to program an intermediate stop for the fork arm positioner at any point between the maximum position and the minimum position. This intermediate stop is approached softly from both sides.

The fork arm positioner resumes when the function is selected again.



Process

– Press and hold the button (1) and move the fork arm positioner to the desired position by pulling or pressing the operating lever. A symbol (2) appears on the display.

– Continue to hold down the button (1) and move the operating lever to the right for 2 s. An acoustic signal confirms that the position has been saved.

Deleting the intermediate stop

– Press and hold the button (1) and move the operating lever to the left for 2 s. An acoustic signal confirms that the position has been deleted.

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

Attachments

NOTE

Please enquire as to whether there are special regulations in your country for the use of attachments. If this is the case, these regulations must always be observed as well.

An attachment can always be fitted to this industrial truck. In order to guarantee secure operation, the following points must be observed without fail:

- The existing load capacity diagram for the standard design of the truck is no longer valid A new load capacity diagram must be created, taking into consideration the net weight and the distance between the load centre of gravity and the attachment
- If the attachment is being used instead of the standard fork arms, load capacity diagrams must be mounted for both applications
- If the attachment is connected to the truck hydraulics, the required parameters, speeds and pressures must be set
- Only authorised specialist staff are permitted to override the industrial truck controller
- Pressure relief valves must be adjusted, if necessary
- Before disconnecting the hydraulic connections, the lines must be depressurised
- Attachments must have their own nameplate and be described in separate operating instructions
- Attachments may only be used for their intended purpose. Attachments are generally designed to carry specifically shaped loads or lifting accessories. Using them to carry other loads or lifting accessories is therefore not their intended purpose and for this reason is unsafe and possibly also dangerous
- Users of attachments must be instructed in how to use them

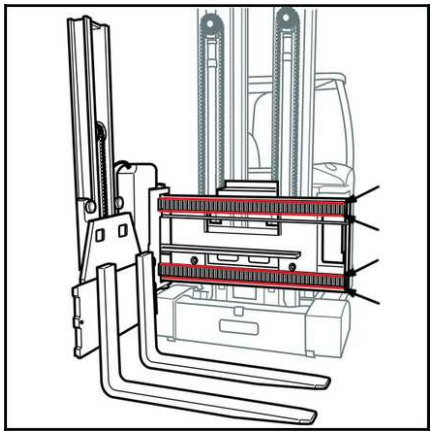
- Attachments must be maintained and checked in accordance with the legal requirements in force at the place of use
- Attachments that do not conform to the above-mentioned conditions may not be used.

Guard plates 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.



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.

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