

EZS 7280

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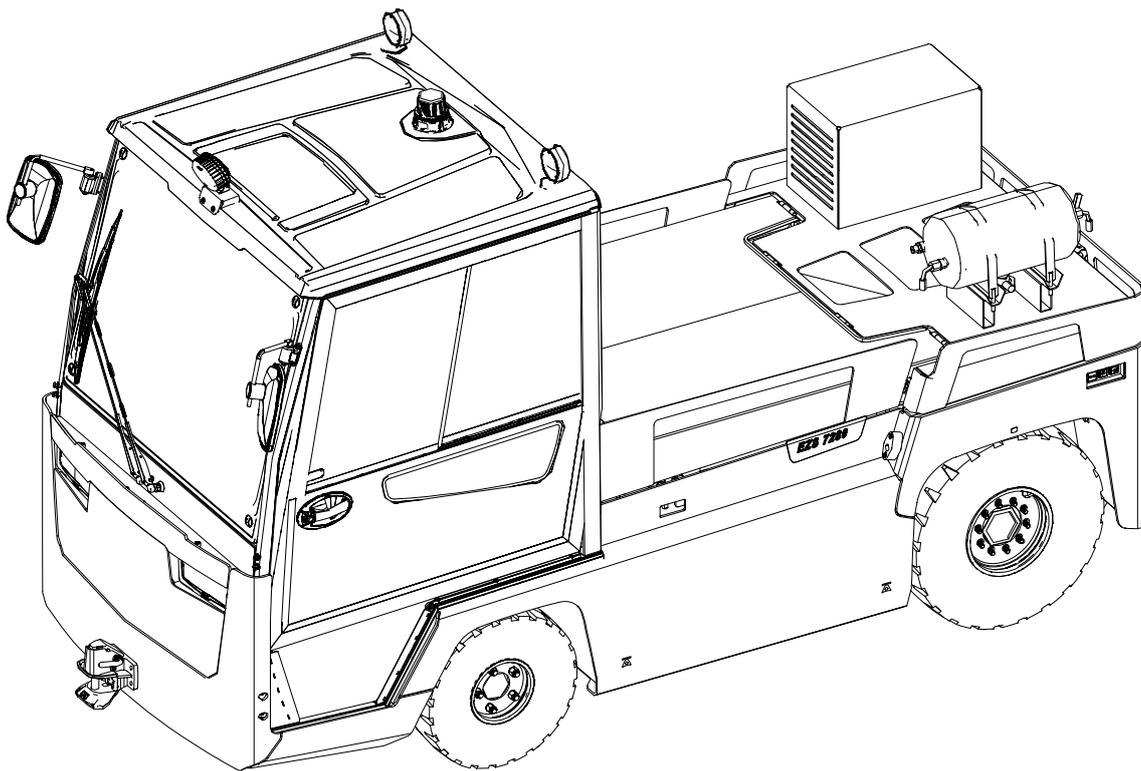
Operating instructions

en-GB

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EZS 570
EZS 7280



Declaration of Conformity



Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

Description Industrial truck
--

Type	Option	Serial no.	Year of manufacture
EZS 570 EZS 7280			

On behalf of

Date

EU DECLARATION OF CONFORMITY

The undersigned hereby declare that the powered truck described in detail complies with the current versions of European Directives 2006/42/EG (Machinery Directive) and 2014/30/EU (Electromagnetic Compatibility - EMC). The manufacturer is authorised to compile the technical file.

Declaration of Conformity (○)

Product: EZS 7280
Serial number/type number

Manufacturer: Jungheinrich Aktiengesellschaft
22039 Hamburg, Germany

UK representative: Jungheinrich UK Ltd
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Authorised to compile documentation:

The manufacturer is authorised to compile the technical documentation and its representative is authorised to make documentation available upon reasoned request for a period of at least 10 years from the date of first placement of the product on the UK market.

The manufacturer bears sole responsibility for issuance of this Declaration of Conformity.

The subject of the Declaration as outlined above satisfies the applicable UK legislation:

Supply of Machinery (Safety) Regulations 2008 No. 1597

and

Electromagnetic Compatibility Regulations 2016 No. 1091

Signed for and on behalf of:

Jungheinrich Aktiengesellschaft

Foreword

Notes on the operating instructions

The present ORIGINAL OPERATING INSTRUCTIONS are designed to provide sufficient instruction for the safe operation of the industrial truck. The information is provided clearly and concisely. The chapters are arranged by letter and the pages are numbered continuously.

The operator manual details different industrial truck models. When operating and servicing the industrial truck, make sure that the particular section applies to your truck model.

Our trucks are subject to ongoing development. We reserve the right to alter the design, equipment and technical features of the system. No guarantee of particular features of the truck should therefore be assumed from the present operating instructions.

Safety notices and text mark-ups

Safety instructions and important explanations are indicated by the following graphics:

⚠ DANGER!

Indicates an extremely hazardous situation. Failure to comply with this instruction will result in severe irreparable injury and even death.

⚠ WARNING!

Indicates an extremely hazardous situation. Failure to comply with this instruction may result in severe irreparable injury and even death.

⚠ CAUTION!

Indicates a hazardous situation. Failure to comply with this instruction may result in slight to medium injury.

NOTICE

Indicates a material hazard. Failure to comply with this instruction may result in material damage.

 Used before notices and explanations.

	Indicates standard equipment
	Indicates optional equipment

Copyright

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A Correct Use and Application

1 General

The truck must be used, operated and serviced in accordance with these operating instructions. All other types of use are beyond its scope of application and may result in damage to persons, material assets and/or the truck.

2 Correct application

NOTICE

The maximum tow load is shown on the data plate and must not be exceeded.

The load must be coupled to a trailer coupling or an attachment approved by the manufacturer.

- Towing loads.
- Do not carry passengers.
- Loads can only be pushed with the trailer coupling.

3 Approved application conditions

WARNING!

Use under extreme conditions

Using the truck under extreme conditions can result in malfunctions and accidents.

- ▶ Special equipment and authorisation are required if the truck is to be constantly used in extreme conditions, especially in dusty or corrosive atmospheres.
 - ▶ The truck cannot be used in areas at risk of explosion.
 - ▶ In adverse weather conditions (thunder, lightning) the industrial truck must not be operated outside or in endangered areas.
-

- Operation in industrial and commercial environments.
- Permissible temperature range -20°C to 40°C.
- Operation only on secure, level surfaces with sufficient capacity.
- Do not exceed the permissible surface and point loading on the travel paths.
- Operation only on travel paths that are clearly visible and approved by the operating company.
- Negotiating of slopes up to a maximum of 25%.
- Do not travel across or at an angle on inclines.
- Only permitted on public roads with optional road traffic approval.

- The truck may only be used as a baggage and equipment tow tractor with the optional equipment “version as baggage and equipment tow tractor”.

-  Do not park and abandon the truck on an incline.

4 Proprietor responsibilities

For the purposes of the present operating instructions the "operating company" is defined as any natural or legal person who either uses the industrial truck himself, or on whose behalf it is used. In special cases (e.g. leasing or renting), the operating company is considered to be the person who is to carry out the specified operational duties in accordance with existing contractual agreements between the proprietor and operator of the industrial truck.

The operating company must ensure that the industrial truck is used only for the purpose for which it is intended and that dangers to life and limb of the user and third parties are excluded. Furthermore, accident prevention regulations, safety regulations and operating, servicing and repair guidelines must be followed. The owner must ensure that all operators have read and understood these operating instructions.

Using the truck as a baggage and equipment tow tractor within the sense of EN 1915-1 to EN 1915-4 and 12312-15 is permissible only if the optional equipment "version as baggage and equipment tow tractor" is part of the truck.

NOTICE

Failure to comply with the operating instructions shall invalidate the warranty. The same applies if improper work is carried out on the truck by the customer or third parties without the permission of the manufacturer.

5 Adding attachments and/or optional equipment

The mounting or installation of additional equipment which affects or enhances the performance of the industrial truck requires the written permission of the manufacturer. Local authority approval may also need to be obtained.

Local authority approval however does not constitute the manufacturer's approval.

B Truck Description

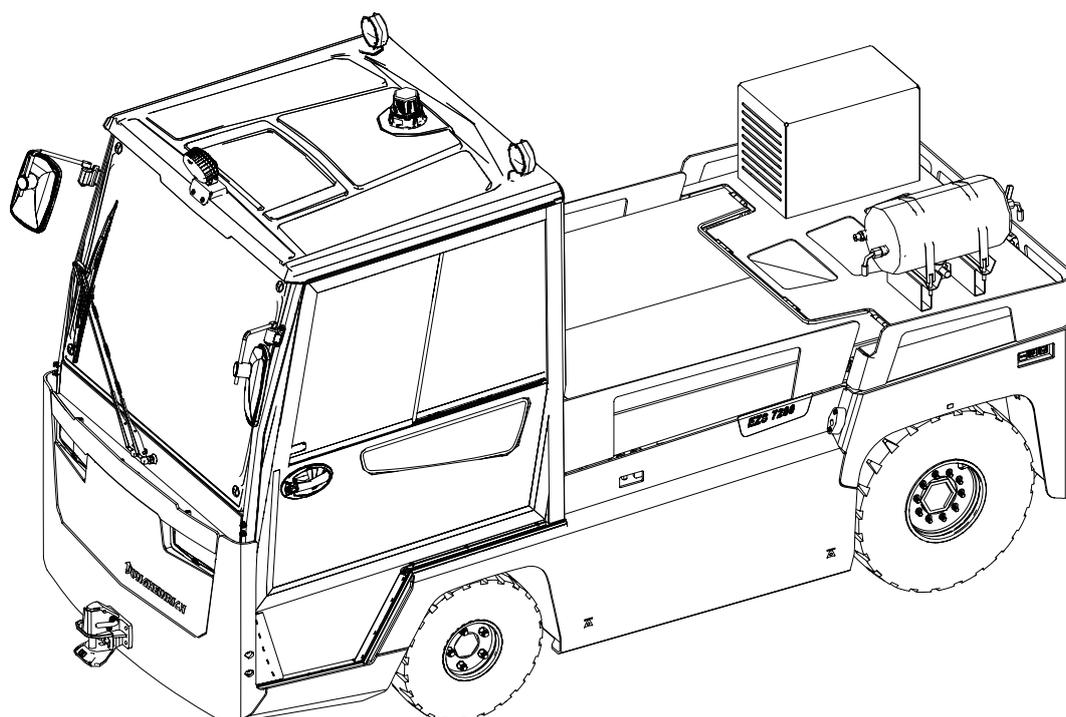
1 Application

The EZS 7280 is a rear drive, industrial electric tow-truck designed to tow tiller-operated trailer loads.

The truck is designed for indoor and outdoor use in 2-shift operation. Generally there is no need to replace the battery, although this may be necessary during periods of intense use, see "Battery - Servicing, Recharging, Replacement" in chapter D.

The truck is only permitted on public roads with optional road traffic approval.

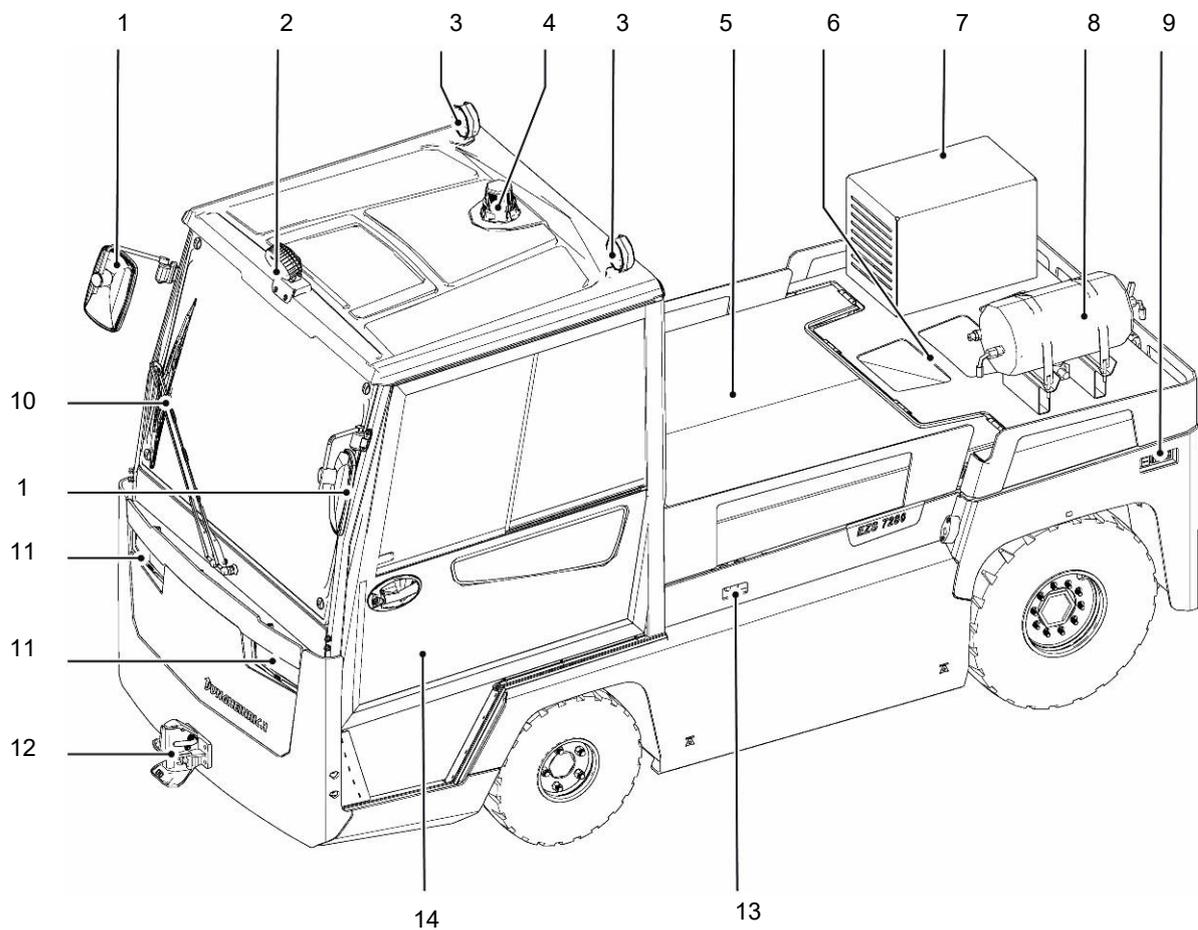
The drawbar pull is indicated on the data plate.



2 Assemblies and Functional Description

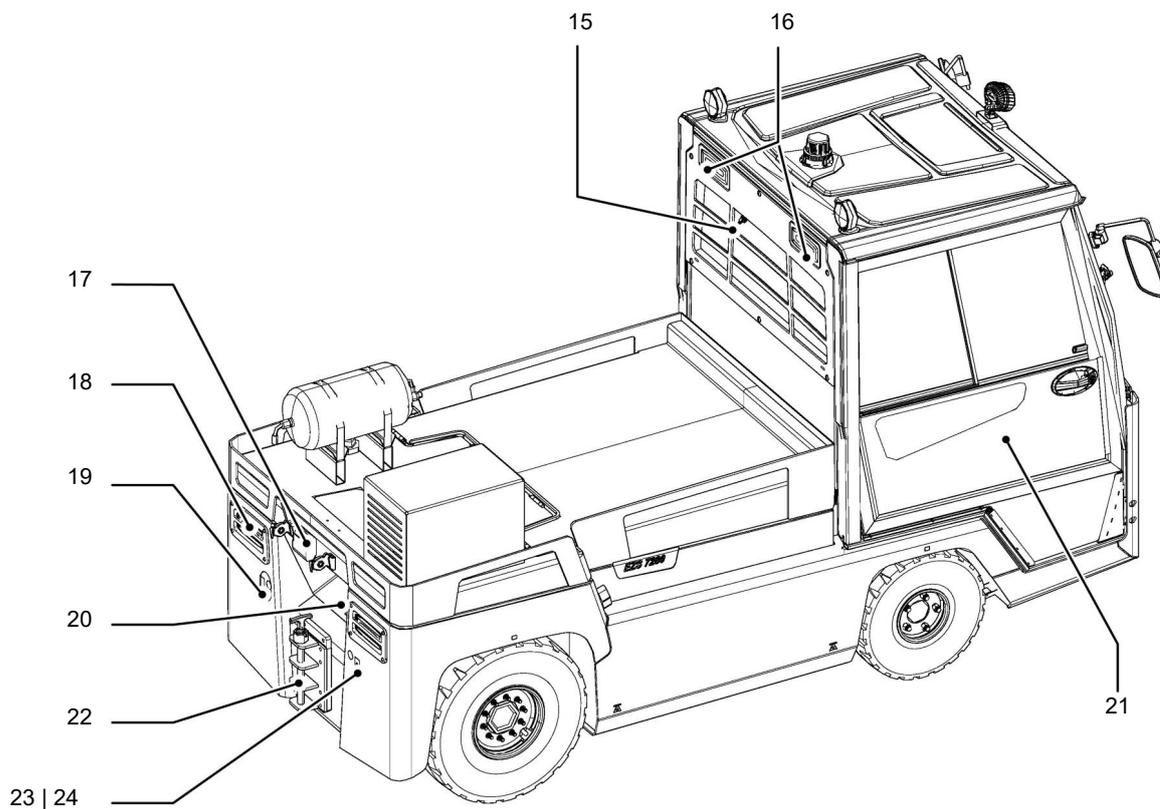
2.1 Assembly Overview

Truck front view



Item	Model	Item	Model
1	● External mirror	8	○ Compressed-air tank
2	○ Floor spot	9	○ Pedestrian mode buttons
3	○ Flashing roof light	10	● Front windscreen wiper
4	○ Warning beacon	11	● Headlight
5	● Battery panel	12	○ Trailer coupling (front)
6	● Drive panel	14	● Left-hand cabin door
7	○ Compressor	13	● Battery panel lock

Truck rear view



Item	Model	Item	Model
15	● Rear windscreen wiper	20	● Drive panel lock
16	○ Reverse lights	22	○ Trailer coupling (rear)
17	○ Duo-Matic quick-release coupling	21	● Right-hand cabin door
18	● Reverse lights	23	○ Hydraulic interface
19	○ Truck socket	24	○ Electrical interface

2.2 Functional Description

Safety mechanisms

An enclosed, smooth truck geometry with rounded edges ensures safe handling of the truck. The wheels are surrounded by a solid skirt.

Activating the emergency disconnect switch rapidly cuts out all electrical functions in hazardous situations.

Emergency stop safety concept

The emergency stop is activated by the traction controller.

Each time the truck is switched on, the system carries out a self-diagnosis.

Drive system

Two fixed three-phase motors power the drive wheels through the bevel spur gearbox. The electronic traction controller ensures stepless speed regulation of the drive motors and hence smooth starting, powerful acceleration, and electronically controlled braking with energy recovery. The driver can choose from 3 travel programs, depending on the load and the environment: from high performance to energy saving.

Curve Control

The Curve Control option assists the operator in handling the truck. When cornering, the maximum travel speed is adapted to the steer angle.

- The default setting can be changed by the manufacturer's customer service department.

Steering

- The driver steers via a steering wheel.
- The steer movements are transmitted by the hydraulic steer axle, based on a hydraulic adjusting cylinder.

Electrical system

The truck is equipped with an electronic traction and steering controller. The truck electrical system has an operating voltage of 80 volts.

Controls and displays

Ergonomic controls ensure fatigue-free operation for sensitive application of the travel and hydraulic operations. The display shows the key operator information such as travel program, service hours, battery capacity and event messages.

2.2.1 Hourmeter

- Prepare the truck for operation, see page 63 or see page 93.

Operating hours are counted while the truck is operational and the seat switch is closed.

2.2.2 Hourmeter in Pedestrian Mode

→ Prepare the truck for operation, see page 63 or see page 93.

Service hours are counted while the truck is operational and one of the following controls is applied:

- "Pedestrian - drive direction" button, see page 76.
- "Pedestrian - load direction" button, see page 76.

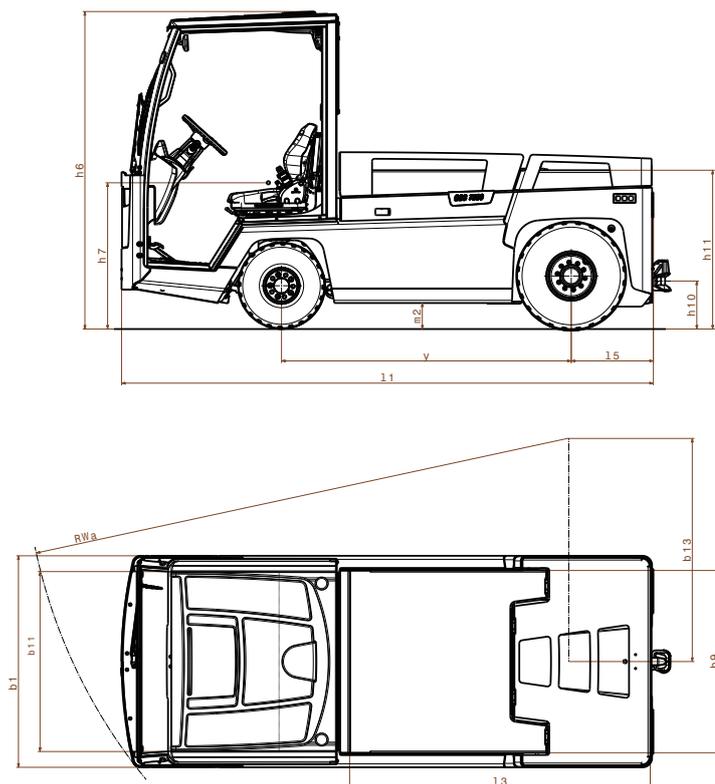
3 Technical Specifications

→ The technical specification is given according to the German guideline "Type sheets for industrial trucks". Technical modifications and additions reserved.

3.1 Performance data

		EZS 7280	EZS 7280 XL
F	Rated drawbar pull	5600 N	
	Travel speed with/without rated load 1	12 / 25 km/h	
	Drive motor, output S2 60 min	20 kW	
	Max. drawbar pull s2 5 min	19000 N	
	Battery voltage, rated capacity K5	80 / 620 V/Ah	80 / 930 V/Ah

3.2 Dimensions



		EZS 7280	EZS 7280 XL
y	Wheelbase	1465 mm	1755 mm
h&	Overhead guard height	1970 mm	
h7	Seat height/standing height	880 mm	
h10	Coupling height	240 - 405 mm	
l1	Overall length	3000 mm	3300 mm
b1	Overall width	1300 mm	
b11	Track	1070 mm	
b9	Load surface width	1090 mm	
m2	Ground clearance, centre wheelbase	150 mm	
Wa	Turning radius ¹	2825 mm	< 3280 mm
2) Total length excluding coupling, as different coupling versions available			

3.3 Weights

	EZS 7280	EZS 7280 XL
Net weight incl. battery	4088 kg	4796 kg
Axle loading without load front / rear + battery	2100 / 1988 kg ¹	2446 / 2350 kg ¹
Battery weight	1558 kg	2178 kg

¹ Applies to trucks with cabin.

- The data given in the table refers to a forklift truck with the standard configuration. The data of the delivered forklift truck can be found on the data plate, see page 27.

3.4 Tyre type

	EZS 7280	EZS 7280 XL
Tyre size, front	6.00 R9	
Tyre size, rear	7.00 R12	
Air pressure for pneumatic tires (○)	8-10 bar	
Wheels, number front/rear (x = driven)	2 / 2x	

3.5 EN norms

Noise emission level

- EZS 7280: 60 dB(A) with heating/ventilation deactivated
- EZS 7280: 70 dB(A) with heating/ventilation activated

in accordance with EN 12053 as harmonised with ISO 4871.

- The noise emission level is calculated in accordance with standard procedures and takes into account the noise level when travelling, lifting and when idle. The noise level is measured at the level of the driver's ear.

Vibration

- EZS 7280: 0,30 m/s² at 10 km/h

Electromagnetic compatibility (EMC)

The manufacturer confirms that the truck adheres to the limits for electromagnetic emissions and resistance as well as the static electricity discharge test in accordance with EN 12895 as well as the standardised instructions contained therein.

- No changes to electric or electronic components or their arrangement may be made without the written agreement of the manufacturer.

⚠ WARNING!

Damage to medical equipment due to non-ionising radiation

Electrical equipment on the truck emitting non-ionising radiation (e.g. wireless data transmission) can affect operators' medical equipment (pacemakers, hearing aids etc.) and result in malfunctions.

- ▶ Consult a doctor or the manufacturer of the medical equipment to clarify whether the medical equipment can be used near the industrial truck.

3.6 Specifications according to RED guideline (Radio Equipment Directive) for radio units

- The table contains any components installed according to the European Directive 2014/53/EU. The table shows the affected frequency range and the emitted transmission power for each component.

Component	Frequency range	Transmission power
Indoor/outdoor detection	24.00 - 24.25 GHz	100 mW
Transponder reader	13.56 MHz	< 100 mW

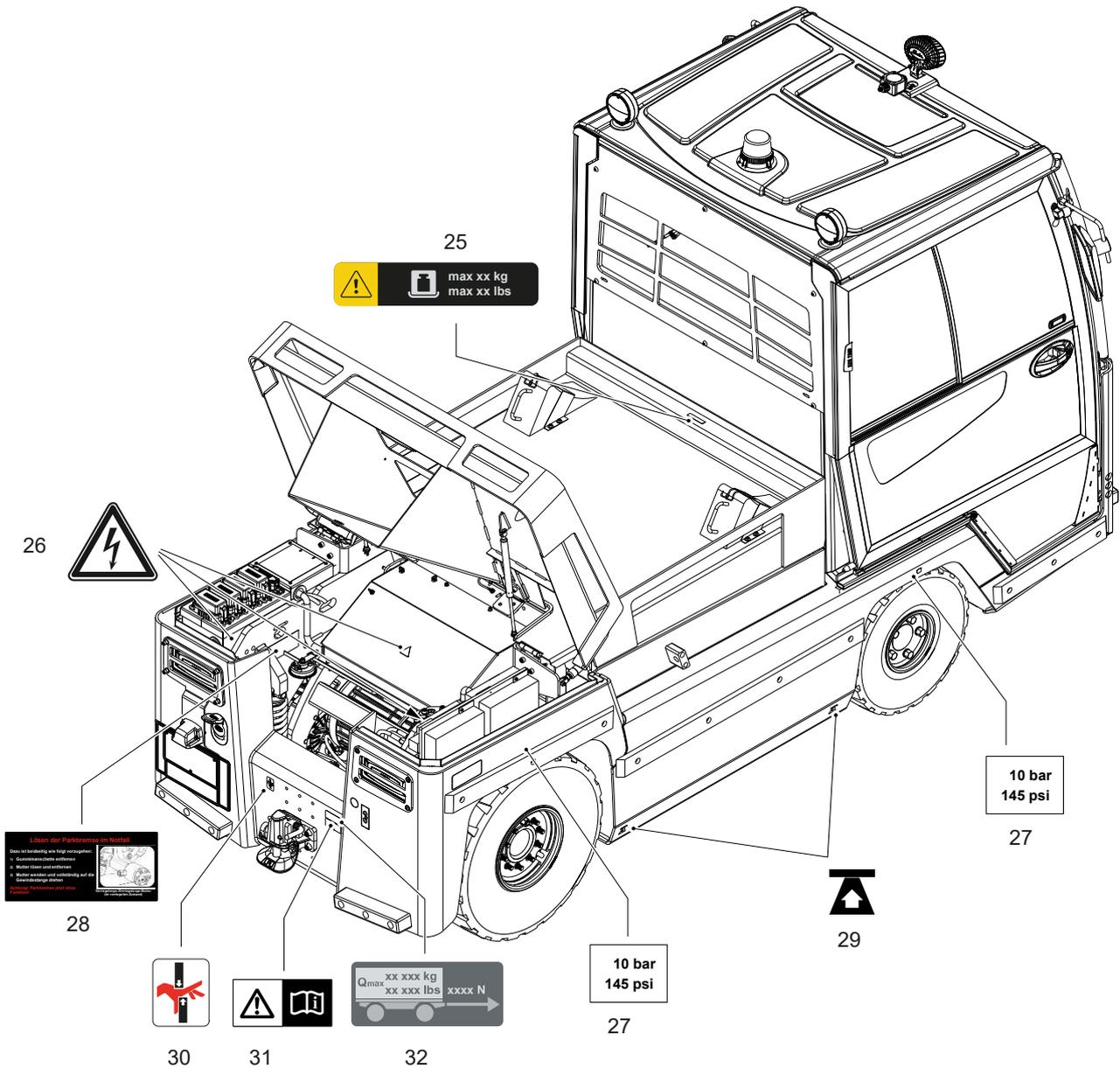
3.7 Conditions of use

Ambient temperature

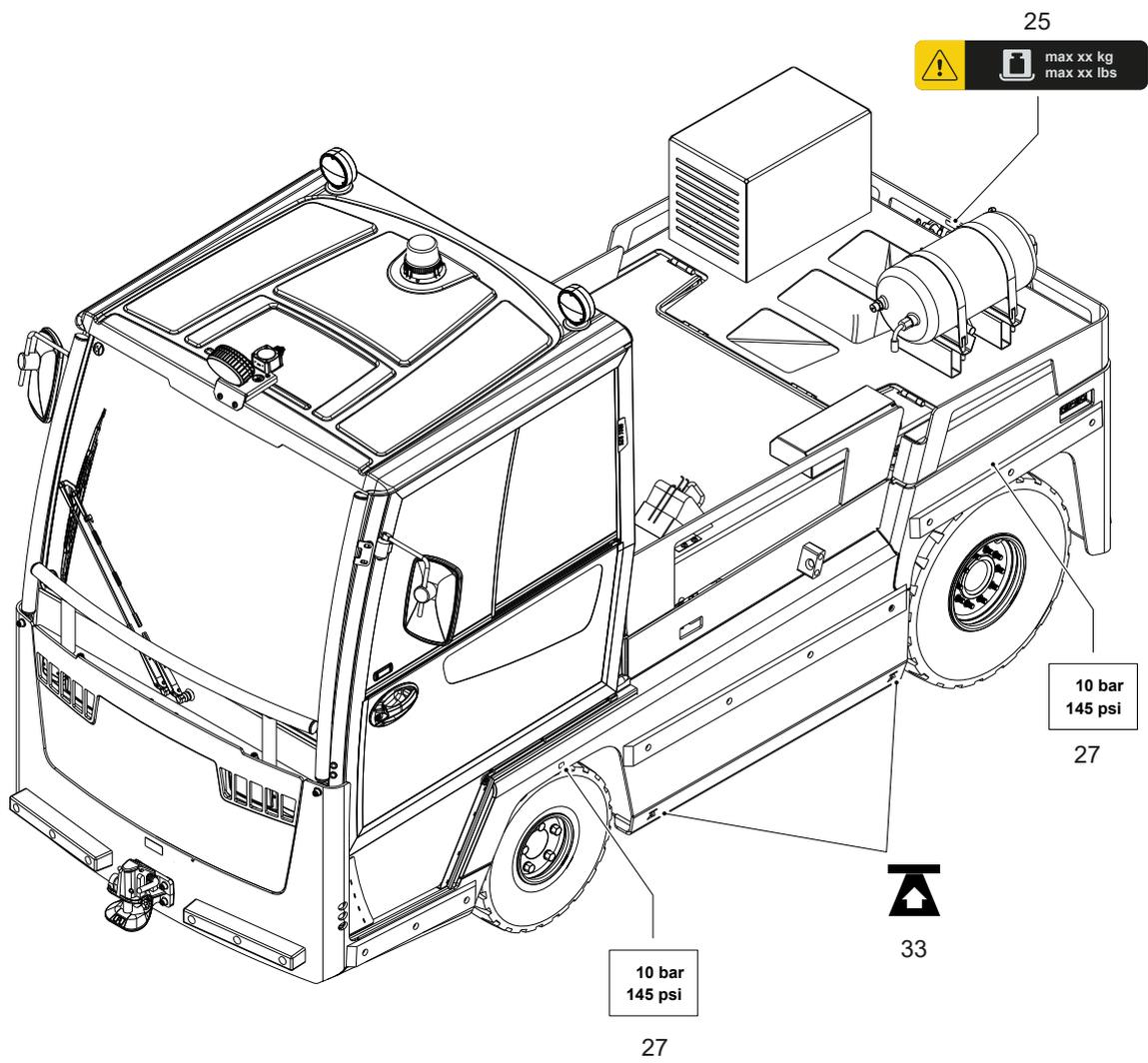
- operating at -20°C to 40°C

- Special equipment and authorisation are required if the truck is to be used continually in conditions of extreme temperature or condensing air humidity fluctuations.

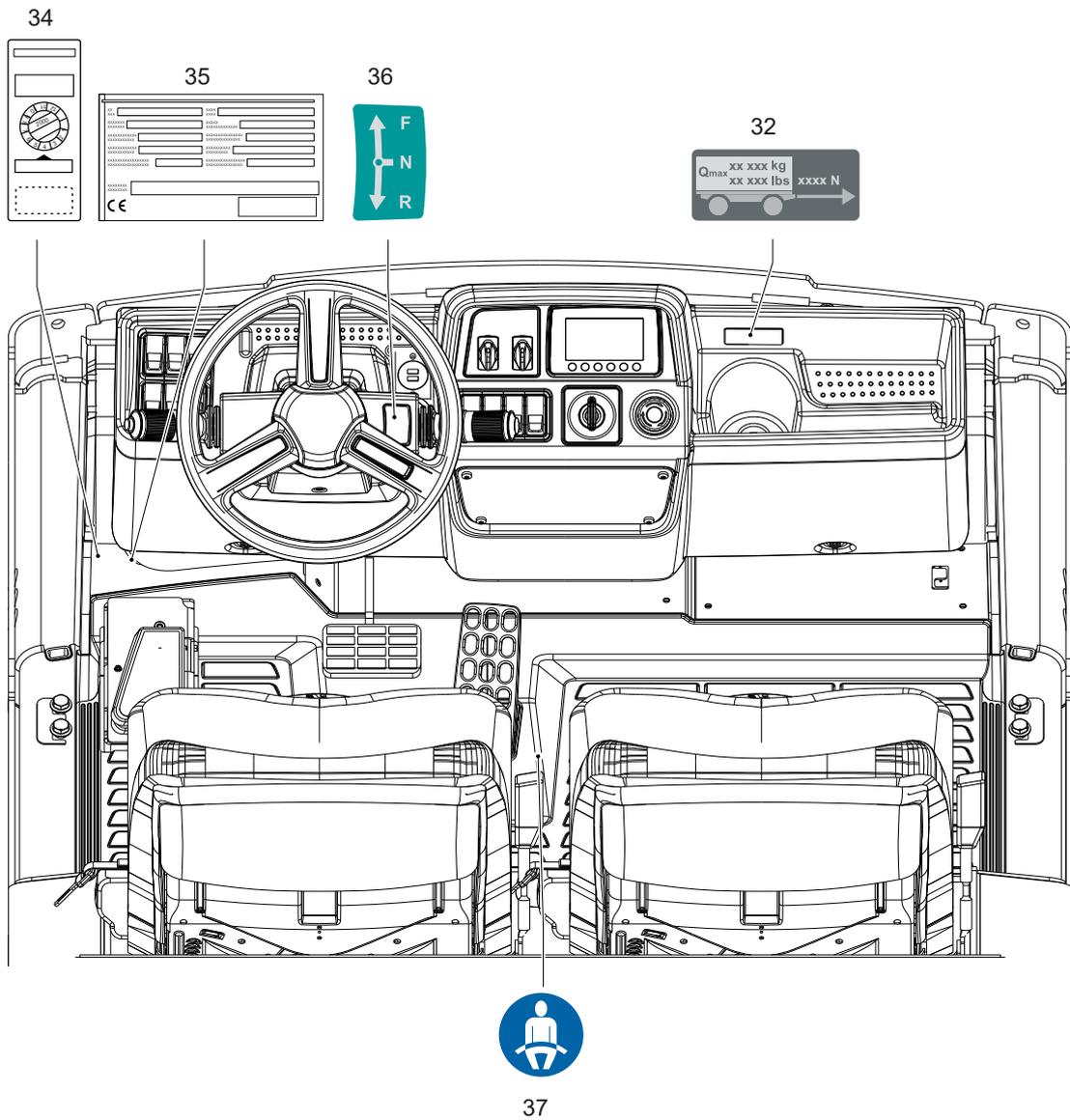
4 Identification Points and Data Plates



Item	Designation
25	Attention: "Maximum load"
26	Warning notice: "Electrical voltage/electrical current"
27	Information sign: "Tyre pressure"
28	Information sign: "Release the parking brake"
29	Jacking points
30	Warning notice: "Trapping hazard"
31	Information sign: "Observe operating instructions"
32	Information sign: "Permissible drawbar pull"

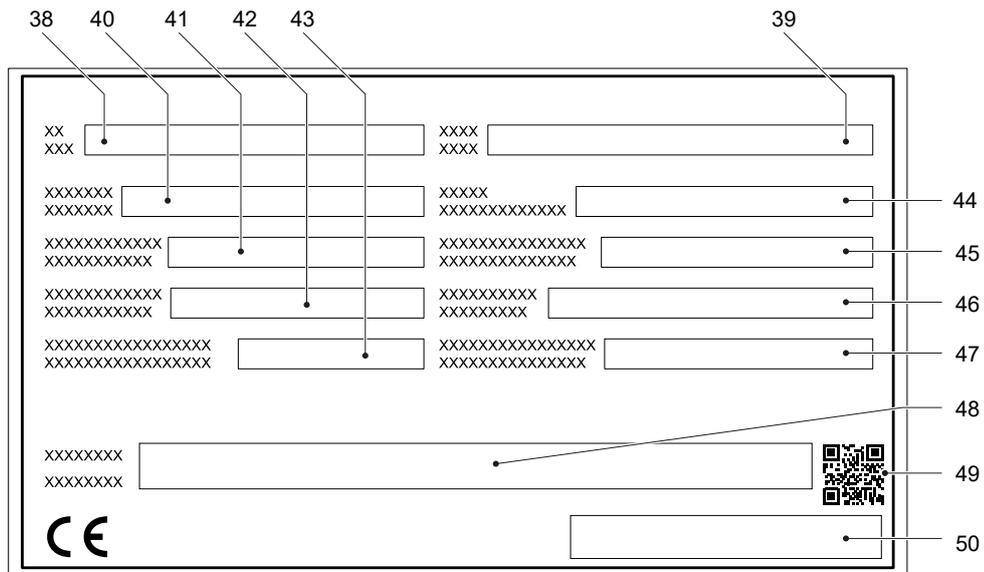


Item	Designation
25	Attention: "Maximum load"
27	Information sign: "Tyre pressure"
33	Attachment point for loading by crane



Item	Designation
32	Information sign: "Permissible drawbar pull"
34	Inspection plaque
35	Data plate see page 27
36	Sign: "Travel direction"
37	Information sign: "Wear seat belt"

4.1 Data plate



Item	Description	Item	Description
38	Type	45	Rated drawbar pull 5 min. (N)
39	Year of manufacture	46	Nominal power
40	Serial number	47	Min./max. battery weight (kg)
41	Rated drawbar pull 60 min. (N)	48	Manufacturer
42	Battery voltage (V)	49	QR code
43	Support force	50	Manufacturer's logo
44	Option		



For queries regarding the truck or when ordering spare parts, always quote the truck serial number (40).

NOTICE

The truck must only be operated with the towing/trailer load specified on the trailer coupling.

If no information is given on the trailer coupling (standard or optional equipment), the maximum permissible towing/trailer load specified for the truck applies see page 20.

If the operating company fits a trailer coupling, the towing/trailer loads on the trailer coupling or the maximum permissible towing/trailer load specified for the truck apply.

QR code

The QR code contains the serial number and product hierarchy of the truck.



C Transport and Commissioning

1 Lifting by crane

DANGER!

Danger of death from falling loads

When loading by crane with battery, there is a danger of death from the load slipping.

- ▶ Always load the load without battery.
 - ▶ Use traverse with adequate capacity.
-

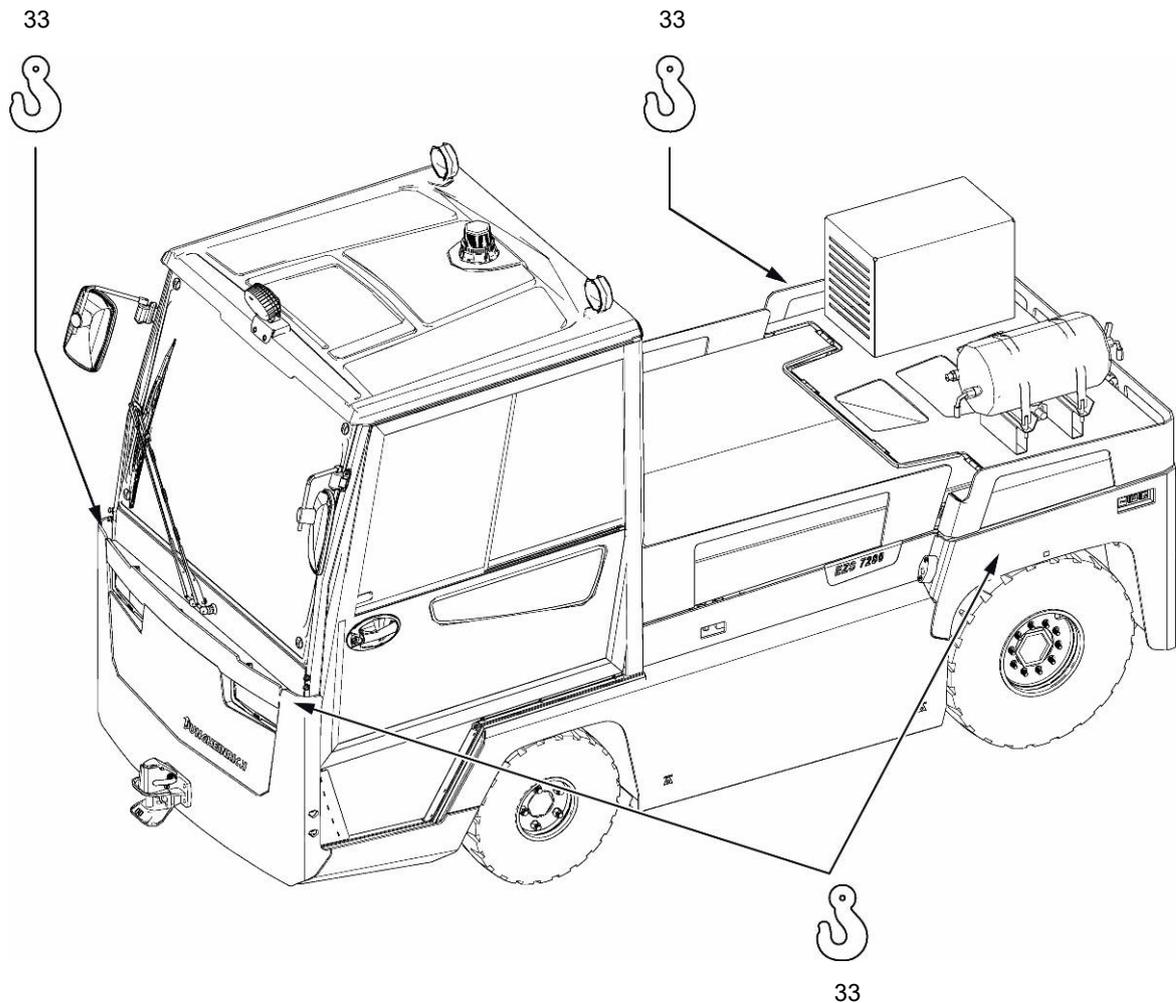
WARNING!

Improper loading by crane can result in accidents

Improper use or use of unsuitable lifting gear can cause the truck to crash when being loaded by crane.

Prevent the truck from hitting other objects during lifting, and avoid uncontrolled movements. If necessary, secure the truck with guide ropes.

- ▶ The truck may be loaded only by people who are trained in using lifting accessories and lifting gear.
 - ▶ Wear personal protective equipment (e.g. safety shoes, safety helmet, hi-vis jacket, protective gloves) when loading by crane.
 - ▶ Do not stand under suspended loads.
 - ▶ Do not walk into or stand in a hazardous area.
 - ▶ Always use lifting gear with sufficient capacity (for truck weight, see truck data plate).
 - ▶ Always attach the crane lifting gear to the prescribed attachment points and prevent them from slipping.
 - ▶ Use the lifting accessories only in the prescribed load direction.
 - ▶ Crane lifting gear must be fastened in such a way that it does not come into contact with any attachments when lifting.
-



Loading the truck by crane

Requirements

- Truck parked securely, see page 65.
- Battery removed, see page 45.

Tools and Material Required

- Traverse with adequate capacity
- Shackle (1,5 t)

Procedure

- Securely attach the crane lifting gear to the attachment points 33.
- Raise and load the truck.
- Lower and park the truck carefully, see page 65.
- Secure the truck with wedges to prevent it from rolling away.

Loading by crane is now completed.

2 Transport

⚠ WARNING!

Accidental movement during transport

Improper fastening of the truck and mast during transport can result in serious accidents.

- ▶ Loading must only be performed by specialist personnel trained for this purpose. The specialist personnel must be instructed in securing loads on road vehicles and handling load securing devices. In each case correct measurements must be taken and appropriate safety measures applied.
- ▶ The truck must be securely fastened when transported on a lorry or a trailer.
- ▶ The lorry or trailer must have fastening rings.
- ▶ Use wedges to prevent the truck from moving.
- ▶ Use only fastening belts with sufficient strength.
- ▶ Use non-slip materials to securing the load aids (pallet, wedges, ...) e. g. non-slip mats.

Securing the truck for transport

Requirements

- Load the truck.
- Truck parked securely, see page 65.

Tools and Material Required

- Lashing straps
- Edge protectors
- Wooden beam or pallet

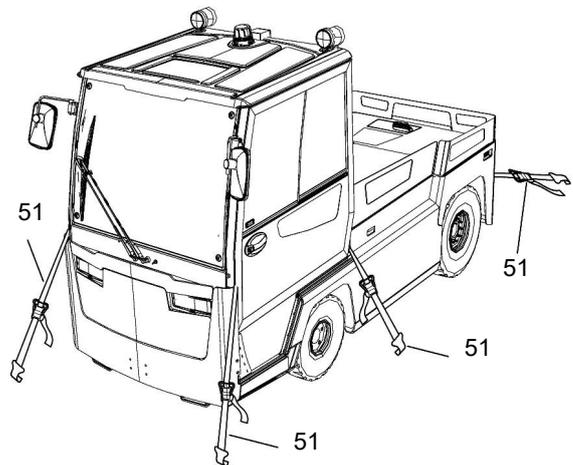
Procedure

- Position the wooden beam or pallet between the front of the transport vehicle and the truck to ensure a positive fit.
- Attach the lashing straps (51) to the industrial truck and the transport vehicle and tension sufficiently.
- Route a lashing strap along behind the bolt for the coupling, attach to the transport vehicle and tension sufficiently.

→ Use edge protectors to protect the truck and the lashing straps.

The truck can now be transported.

→ If no coupling (○) is available, 2x M12 eye bolts must be inserted. This prevents the lashing straps from slipping.



3 Using the Truck for the First Time

WARNING!

The use of unsuitable energy sources can be hazardous

Rectified AC current will damage the assemblies (controllers, sensors, motors etc.) of the electronic system.

Unsuitable cable connections (too long, insufficient wire cross-section) to the battery (tow cables) can overheat, setting the truck and battery on fire.

- ▶ The truck must only be operated with battery current.
 - ▶ Cable connections to the battery (tow leads) must be less than 6 m long and have a minimum cross-section of 95 mm².
-

If the truck is delivered in multiple parts, setup and commissioning must only be performed by trained, authorised personnel.

Procedure

- Check the equipment is complete.
- Install the battery if necessary, see page 45.
- Charge the battery, see page 41.

 The truck settings must match the battery type.

The truck can now be started, see page 59.

D Battery - Servicing, Recharging, Replacement

1 General notes on handling batteries

WARNING!

Unsuitable batteries that have not been approved by Jungheinrich for the truck can be hazardous

The design, weight and dimensions of the battery have a considerable effect on the operational safety of the truck, in particular its stability and capacity. The use of unsuitable batteries that have not been approved for the truck by Jungheinrich, can lead to a deterioration of the braking characteristics of the truck during energy recovery, causing considerable damage to the electric controller and resulting in serious danger to the health and safety of individuals.

- ▶ Only Jungheinrich-approved batteries may be used on the truck.
 - ▶ Battery equipment may only be replaced with the agreement of Jungheinrich.
 - ▶ When replacing/installing the battery make sure the battery is securely located in the battery compartment of the truck.
 - ▶ Do not use batteries that have not been approved by the manufacturer.
-

The truck must be parked securely before all work on the batteries, see page 65.

Maintenance personnel

Batteries may only be charged, serviced or replaced by trained personnel. These operating instructions and the manufacturer's instructions concerning batteries and charging stations must be observed when carrying out the work.

Battery disposal

Batteries may only be disposed of in accordance with national environmental protection regulations or disposal laws. The manufacturer's disposal instructions must be observed.

2 Safety instructions for handling lead-acid batteries

WARNING!

Risk of accidents and injuries when handling acid batteries

Batteries contain dissolved acid, which is toxic and caustic. Above all, avoid any contact with battery acid.

- ▶ Dispose of used battery acid in accordance with regulations.
 - ▶ Wear protective clothing and eye protection when working with acid batteries.
 - ▶ Do not let battery acid come into contact with skin, clothing or eyes. If necessary, rinse with plenty of clean water.
 - ▶ In the event of physical injuries (e.g. skin or eye contact with battery acid), call a doctor immediately.
 - ▶ Neutralise spilled battery acid immediately with plenty of water.
 - ▶ Use only batteries with a closed battery tray.
 - ▶ Follow national guidelines and legislation.
-

⚠ CAUTION!

Short circuits can cause fires

Damaged cables can cause a short circuit, setting the truck and the battery on fire.

- ▶ Before closing the battery cover make sure that the battery cables cannot be damaged.
-

Battery maintenance

The battery cell covers must be kept dry and clean. Terminals and cable shoes must be clean, lightly greased with terminal grease and must be securely tightened. Batteries with non insulated terminals must be covered with a non slip insulating mat.

2.1 Fire Hazard

⚠ CAUTION!

The use of unsuitable fire-protection equipment can result in acid burns

In the event of fire, a reaction with the battery acid can occur if water is used to extinguish the fire. This can lead to acid burns.

- ▶ Use powder extinguishers.
 - ▶ Never extinguish burning batteries with water.
-

Fire protection

Do not smoke and avoid naked flames when handling batteries. Wherever an industrial truck is parked for charging, there must be no inflammable material or consumables capable of creating sparks within a minimum distance of 2,5 m from the truck. The room must be ventilated. Fire protection equipment must be on hand.

3 Safety regulations for handling lithium-ion batteries

The following hazards can arise in the event of improper use:

- Physical damage:
This can occur if a battery falls or is deformed through pressure (e.g. truck forks penetrate the battery housing).
Mechanical damage includes cracks, breakage, splinters or holes in the battery housing. This type of damage may be caused by a short circuit inside the battery, which may cause a battery fire.
- Short circuits:
These may be caused by connecting the two battery terminals (e.g. battery immersed in water)
- Temperature effects:
High temperatures caused for example by sunlight or being stored in warm locations (e.g. near ovens) can cause a battery fire.

3.1 Fire Hazard

WARNING!

Burning lithium-ion battery cells can be hazardous

Physical damage, thermal effects or incorrect storage in the event of a defect can result in fire.

If the inside of lithium-ion battery cells burns, the fire cannot be put out by extinguishing methods.

- ▶ Avoid contact with combustion products.
- ▶ Use protective equipment.
- ▶ Use carbon dioxide extinguishers (CO₂) to cool the fire and reduce the chemical reaction.
- ▶ Use carbon dioxide extinguishers (CO₂) to cool the area around the battery and prevent the fire from spreading.

In order to avoid fire hazards, a safe place for storing batteries until the manufacturer's customer service department arrives on site must satisfy the following criteria:

- Do not store in places often frequented by personnel.
- Do not store in places where valuable objects (e.g. cars) are stored.
- A carbon dioxide extinguisher (CO₂) must be provided on site.
- There should not be any fire or smoke detectors in the vicinity in order to ensure that an automatic fire detection system is activated only in the event of actual danger (e.g. naked flames).
- Small amounts of discharge from a single battery are not critical to the environment. Above-average natural ventilation is required in this case.
- No ventilation intake pipes should be in the vicinity, as discharged content could spread within a building.

Examples of where to store a non-functional battery:

- Roofed outdoor position.
- Ventilated containers.
- Covered box with pressure and smoke discharge option.

3.1.1 Particular hazard from combustion products

⚠ WARNING!

Risk due to contact with combustion products

Combustion is a chemical process by which a flammable material combines with oxygen under heat and light (fire). The resulting combustion products can occur in the form of smoke, through leaking fluids, escaping gases, debris as well decomposition products of certain chemicals. These combustion products are substances that enter the body through the respiratory tract or skin, where they can produce adverse effects such as choking.

- ▶ Avoid contact with combustion products.
 - ▶ Use protective equipment.
-

- Hydrogen fluoride (HF) Hydrofluoric acid = extremely corrosive
- Risk of toxic substances produced by pyrolysis
- Risk of highly flammable gas mixtures.
- Other combustion products: Carbon monoxide & - dioxide.

3.1.2 Special fire fighting protective equipment

- Use self-contained breathing apparatus.
- Wear protective overalls.

3.1.3 Additional fire fighting instructions

- Risk of metal fires.
- Fire residue, contaminated extinguishing agents or materials must be disposed of in accordance with the local official regulations.
They must not be introduced to the water system, drainage system or underground water.

Unsuitable extinguishing agents

- Water
- Foam
- Grease fire extinguishing agents
- Powder extinguishers
- Metal fire extinguisher (PM 12i extinguisher)
- Metal fire extinguisher powder PL-9/78 DIN/EN 3SP-44/95
- Dry sand

Suitable extinguishing agents

- Carbon dioxide extinguisher (CO₂)

3.2 Instructions for cooling an overheated, non physically damaged battery

This type of damage may be caused by a short circuit inside the battery, which may cause battery fire.

Endangered unopened batteries can be cooled using a water jet.

4 Battery types

⚠ CAUTION!

Always use batteries with insulated covers or live components.

Depending on the model, the truck will be supplied with different battery types. The following table shows which combinations are included as standard:

Lead-acid storage batteries

Battery type EZS 7280	Capacity	Weight
80 V battery 1028 mm x 711 mm x 784 mm (L x W x H)	4 PzS 620 Ah	1558 kg
80 V battery 1028 mm x 567 mm x 784 mm (L x W x H)	3 EPzS 460 Ah	1238 kg

Battery type EZS 7280 XL	Capacity	Weight
80 V battery 1028 mm x 999 mm x 784 mm (L x W x H)	6 PzS 930 Ah	2178 kg
80 V battery 1028 mm x 855 mm x 784 mm (L x W x H)	5 EPzS 775 Ah	1863 kg

Lithium-ion batteries

Battery type EZS 7280	Capacity	Weight
80 V battery 1028 mm x 711 mm x 784 mm (L x W x H)	500 Ah	1558 kg

Battery type EZS 7280 XL	Capacity	Weight
86.6 V battery 1028 mm x 999 mm x 784 mm (L x W x H)	500 Ah	2178 kg
86.6 V battery 1028 mm x 855 mm x 784 mm (L x W x H)	500 Ah	1863 kg

The battery weights can be taken from the battery data plate. Batteries with non insulated terminals must be covered with a non slip insulating mat.

- The battery type used must match the truck controller's battery parameters.

5 Exposing the battery

⚠ WARNING!

An unsecured truck can cause accidents

Parking the truck on an incline is dangerous and is strictly prohibited.

- ▶ Always park the truck on a level surface. In special cases the truck may need to be secured with wedges.

⚠ CAUTION!

Trapping hazard

- ▶ Make sure there is nothing between the battery cover and the truck when you fit the battery cover.

- ➔ All covers and connections must be restored to the normal operating condition before the truck can operate again.

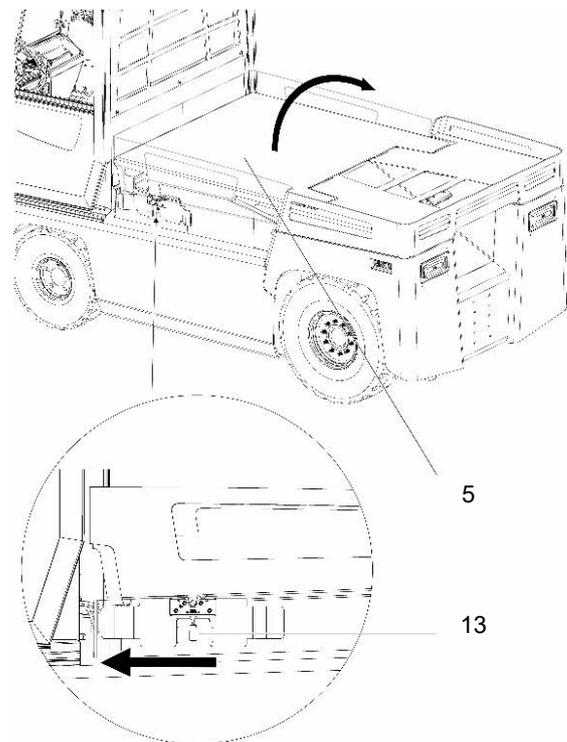
Requirements

- Park the truck on a horizontal surface.
- Park the truck securely, see page 65.

Procedure

- Move the lever (13) in the travel direction.
- Open the battery panel (5).

The battery is exposed.



6 Charging the battery

6.1 Charging the Lead Battery

⚠ WARNING!

The gases produced during charging can cause explosions

The battery produces a mixture of nitrogen and hydrogen (electrolytic gas) during charging. Gassing is a chemical process. This gas mixture is highly explosive and must not be ignited.

- ▶ Switch the charging station and truck off first before connecting/disconnecting the charging cable of the battery charging station to/from the battery connector.
- ▶ The charger must be adapted to the battery in terms of voltage and charge capacity.
- ▶ Before charging, check all cables and plug connections for visible signs of damage.
- ▶ Ventilate the room in which the truck is being charged.
- ▶ The battery cover must be open and the battery cell surfaces must be exposed during charging to ensure adequate ventilation.
- ▶ Do not smoke and avoid naked flames when handling batteries.
- ▶ Wherever an industrial truck is parked for charging there shall be no inflammable material or lubricants capable of creating sparks within 2,5 m around the truck.
- ▶ Fire protection equipment must be on hand.
- ▶ Do not lay any metallic objects on battery.
- ▶ It is essential to follow the safety regulations of the battery and charger station manufacturers.

⚠ CAUTION!

- ▶ The characteristics of the charger and controller must correspond to the battery type.

Charging the battery

Requirements

- Truck parked on a level surface.
- Battery exposed, see page 40.
- Battery disconnected.
- The battery charger is switched off.
- Correct charging program set on charger.

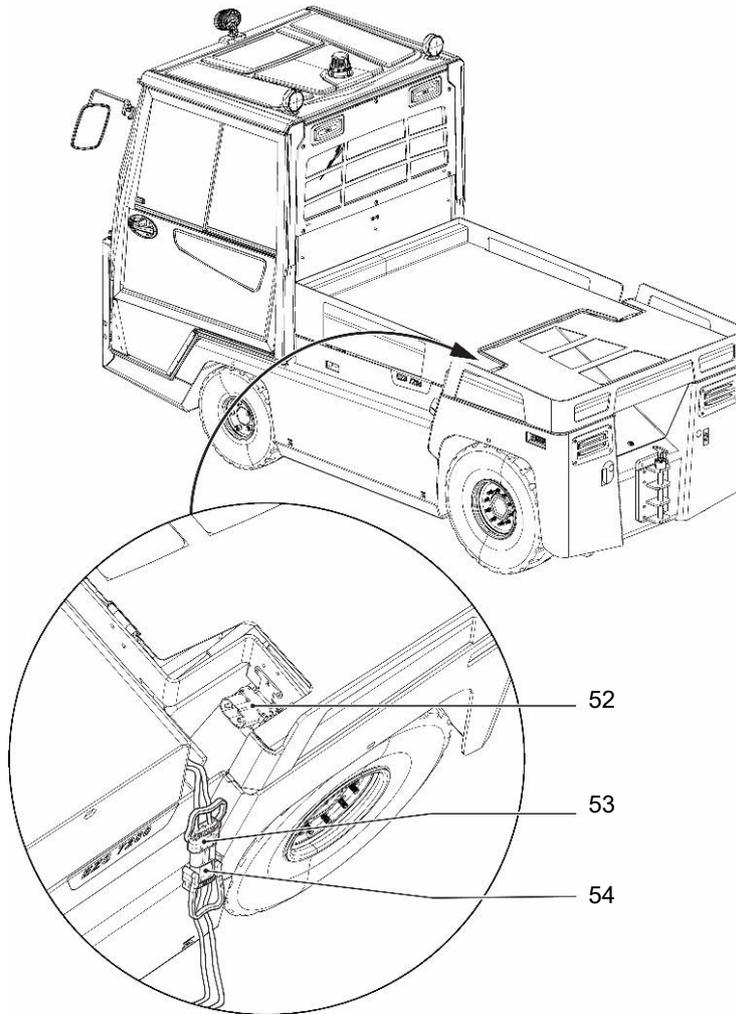
Procedure

- Pull the battery connector (53) out of the bracket (52).
- Remove any insulating mats from the battery.
- Connect the charger cable (54) of the battery charging station to the battery connector (53).
- Switch on the battery charger.

Charging begins automatically. The battery is charged.



If charging has been interrupted, the full battery capacity will not be available.



Complete battery charging and restore the truck to operation

Requirements

- Battery charging is complete.

Procedure

- Switch off the charger.
- Remove the battery connector (53) from the charging cable (54).
- Connect the battery connector (53) to the truck.
- Close the battery cover.

The truck is now ready for operation.

6.2 Charging lithium-ion batteries (○)

NOTICE

Intermediate charging

A lithium-ion battery that is not fully discharged can be recharged at any time either in part or in full. In order to ensure the reliable operation of the lithium-ion battery, the following must be borne in mind:

- ▶ In the event of frequent intermediate charging, charge the lithium-ion battery fully every 4 weeks. If the battery charger has a “balancing” function, ensure that the balancing phase is completed at the end of charging. Further information on “balancing” can be found in the operating instructions for the battery charger.
- ▶ Turn off the battery charger before disconnecting the lithium-ion battery from the battery charger.

NOTICE

Damage to the lithium-ion battery due to discharge

If the lithium-ion battery is not used for a long period of time, it can become damaged through discharge.

- ▶ Disconnect the interface connector from the lithium-ion battery if it is to remain unused for longer than a week.
- ▶ Fully charge the battery before extended downtimes.
- ▶ To ensure a long service life of the lithium-ion battery, it must be fully charged every 4 weeks when not in use.

Lithium-ion batteries are charged independently of equipment by means of the comfort charger socket of the truck or at the battery in accordance with the operating instructions for the lithium-ion battery.

For information on charging the lithium-ion battery with a stationary battery charger, see the operating instructions for the lithium-ion battery.

- The lithium-ion battery can only be charged with a specially equipped stationary battery charger.

The stationary battery charger can only charge suitable lithium-ion batteries with a battery management system, not standard batteries.

- Observe the battery charger operating instructions.

6.2.1 Charging the Lithium-Ion Battery with a Comfort Charger Socket (o) on the Truck

Requirements

- Truck parked securely, see page 65.

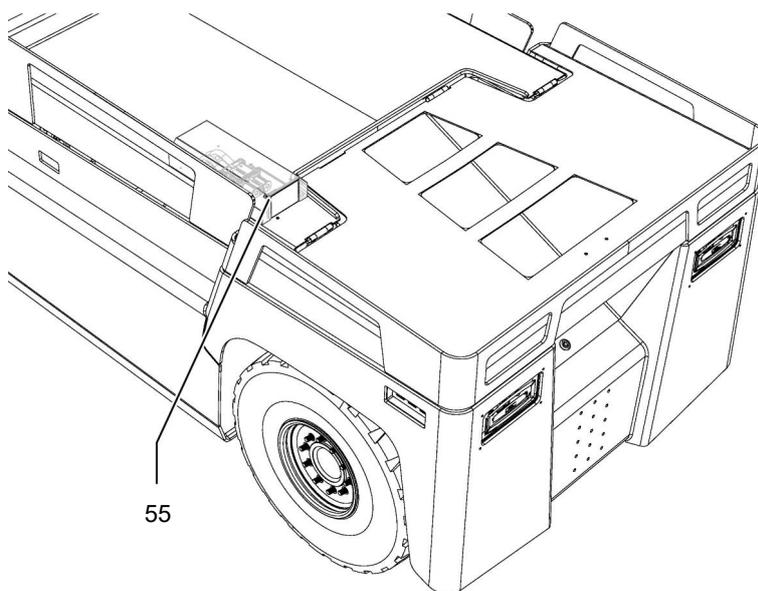
Procedure

- Connect the charger cable of the battery charger station to the charger socket (55).
 - Switch on the battery charging station and charge the battery in accordance with the battery and charging station manufacturer's instructions.
- Disconnect the connector when charging is complete.
- Use only chargers with a max. charge current of 300 A.

Battery is charged.

Travel cut-off during charging via the comfort charging socket (○)

When the access (flap or cover) to the comfort charging socket is open, the travel function of the truck is blocked. This ensures that the truck cannot move during charging. Once the access to the comfort charging socket has been properly closed again, the travel cut-off is revoked and the truck can be moved again.



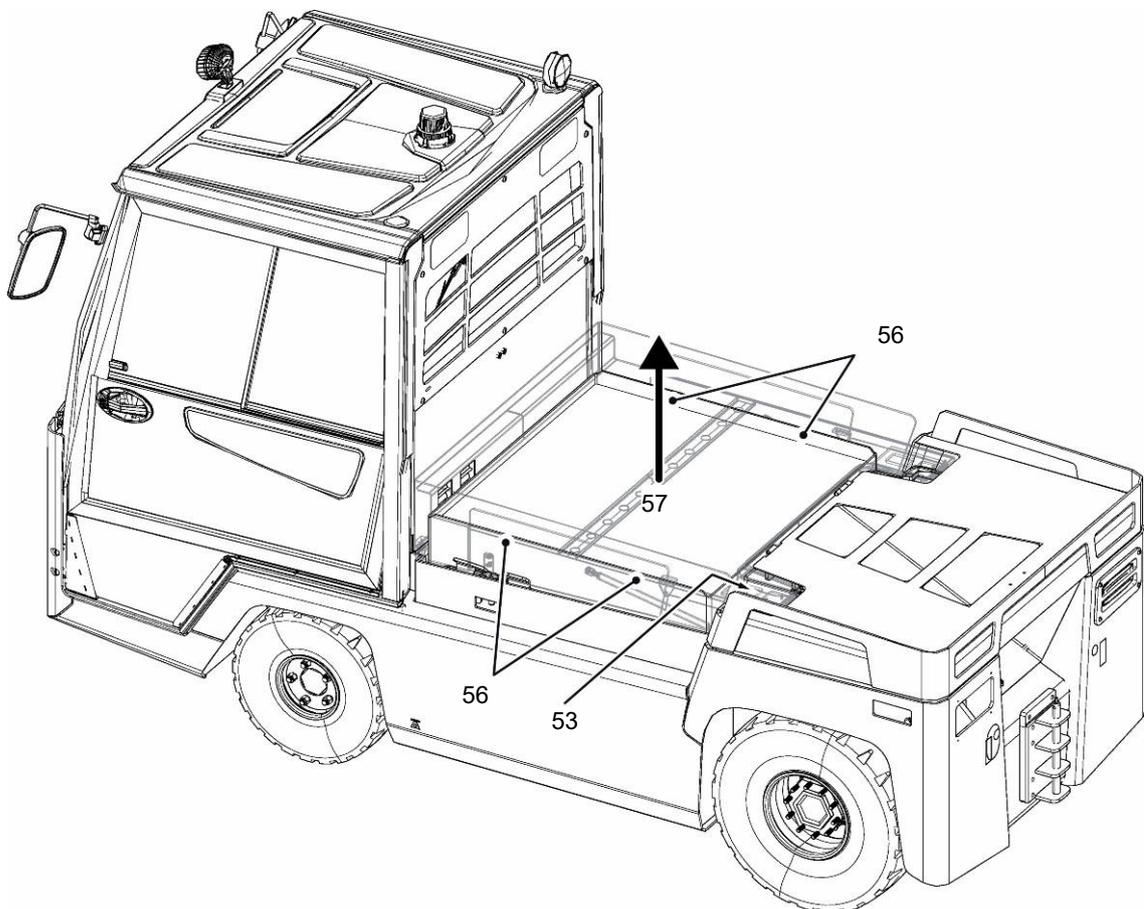
7 Removing or installing the battery

⚠ WARNING!

Accident risk during battery removal and installation

Due to the battery weight and acid there is a risk of trapping or scalding when the battery is removed and installed.

- ▶ Note the "Safety regulations for handling acid batteries" section in this chapter.
- ▶ Wear safety shoes when removing and installing the battery.
- ▶ Use only batteries with insulated cells and terminal connectors.
- ▶ Park the truck on a horizontal surface.
- ▶ Make sure the crane lifting gear has sufficient capacity to replace the battery.
- ▶ Use only approved battery-replacement devices (battery roller stand, replacement trolley etc.).
- ▶ Make sure the battery is located securely in the truck's battery compartment.



Battery removal upwards

Battery removal

Requirements

- Park the truck securely, see page 65.
- Emergency disconnected pressed, see page 70.
- Expose the battery, see page 40.

Procedure

- Disconnect the battery connector from the truck connector.

→ Place the battery cable on the battery tray so that it cannot be severed when the battery is pulled out.

- Attach the crane lifting gear to the eyes (56).

→ The crane lifting gear must exert a vertical pull. The hooks of the crane lifting gear must never fall onto the battery cells.

- Pull the battery (57) upwards out of the battery compartment.

The battery has now been removed.

→ Assembly is in the reverse order. Note the correct mounting position and make sure the battery is connected correctly.

E Operation

1 Safety Regulations for the Operation of Forklift Trucks

Driver authorisation

The truck may only be used by suitably trained personnel, who have demonstrated to the proprietor or his representative that they can drive and handle loads and have been authorised to operate the truck by the proprietor or his representative.

Operator's rights, responsibilities and rules of conduct

The driver must be informed of his duties and responsibilities and be instructed in the operation of the truck and shall be familiar with the operating instructions. Safety shoes must be worn on pedestrian-operated trucks.

Unauthorised use

The operator is responsible for the truck during the time it is in use. The operator must prevent unauthorised persons from driving or operating the truck. A maximum of one person is allowed to sit on the passenger seat.

Damage and defects

The supervisor must be informed immediately of any damage or faults to the truck or attachment. Trucks which are unsafe for operation (e.g. wheel or brake problems) must not be used until they have been rectified.

Repairs

The operator must not carry out any repairs or alterations to the truck without authorisation and the necessary training to do so. The operator must never disable or adjust safety mechanisms or switches.

Hazardous area

WARNING!

Risk of accidents / injury in the hazardous area of the truck

The hazardous area is defined as the area in which people are at risk from the truck movement or from the load itself. This also includes areas which can be reached by falling loads.

- ▶ Instruct unauthorised people to leave the hazardous area.
 - ▶ Give a warning signal with plenty of time for people to leave.
 - ▶ If unauthorised personnel are still within the hazardous area stop the truck immediately.
-

WARNING!

The use of mobile phones can result in lack of attention and ultimately accidents

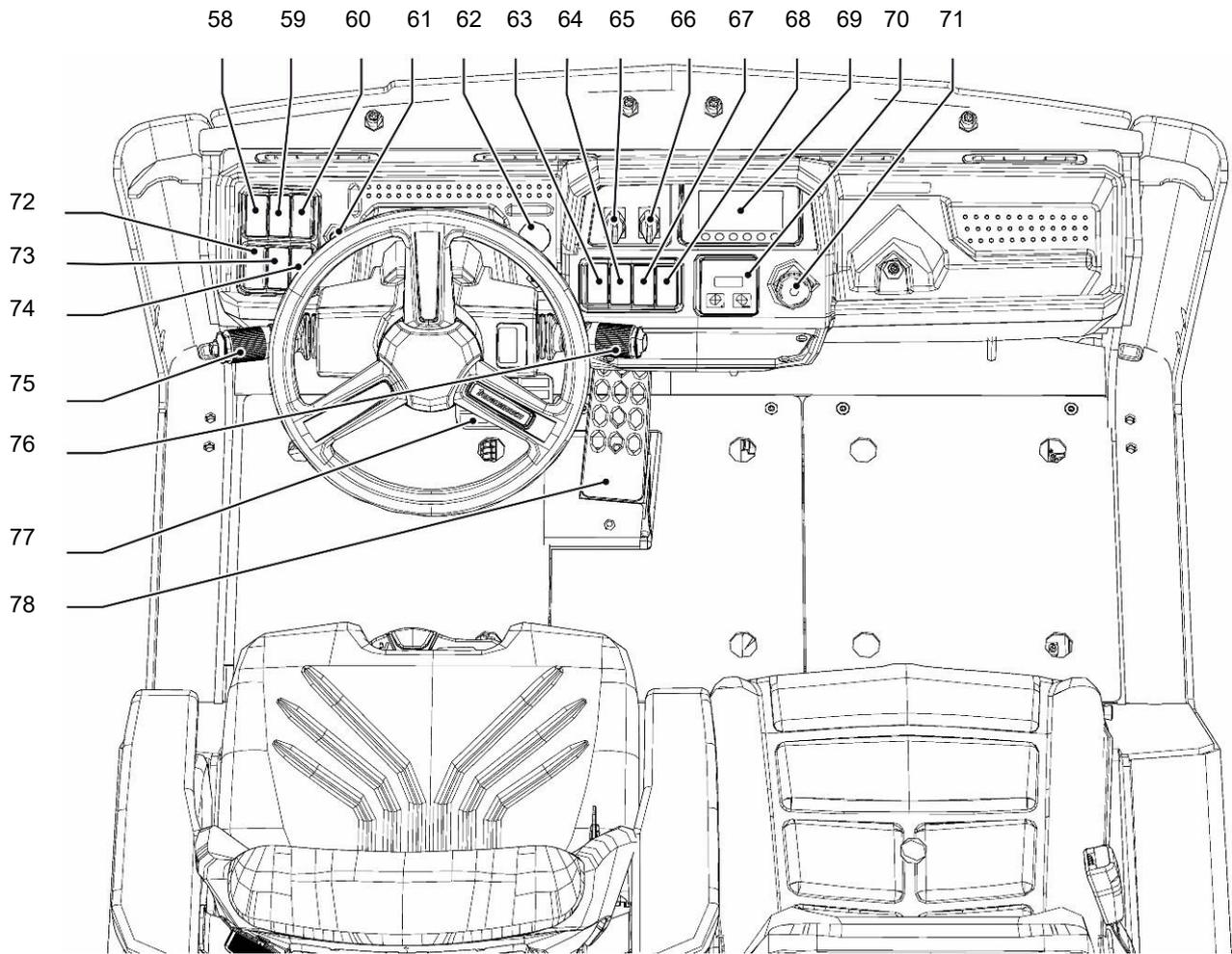
Using a mobile phone while operating the truck can result in accidents.

- ▶ Observe national regulations on the use of mobile phones while operating the truck.
-

Safety devices, warning signs and warning instructions

Safety devices, warning signs (see page 24) and warning instructions in the present operating instructions must be strictly observed.

2 Displays and Controls

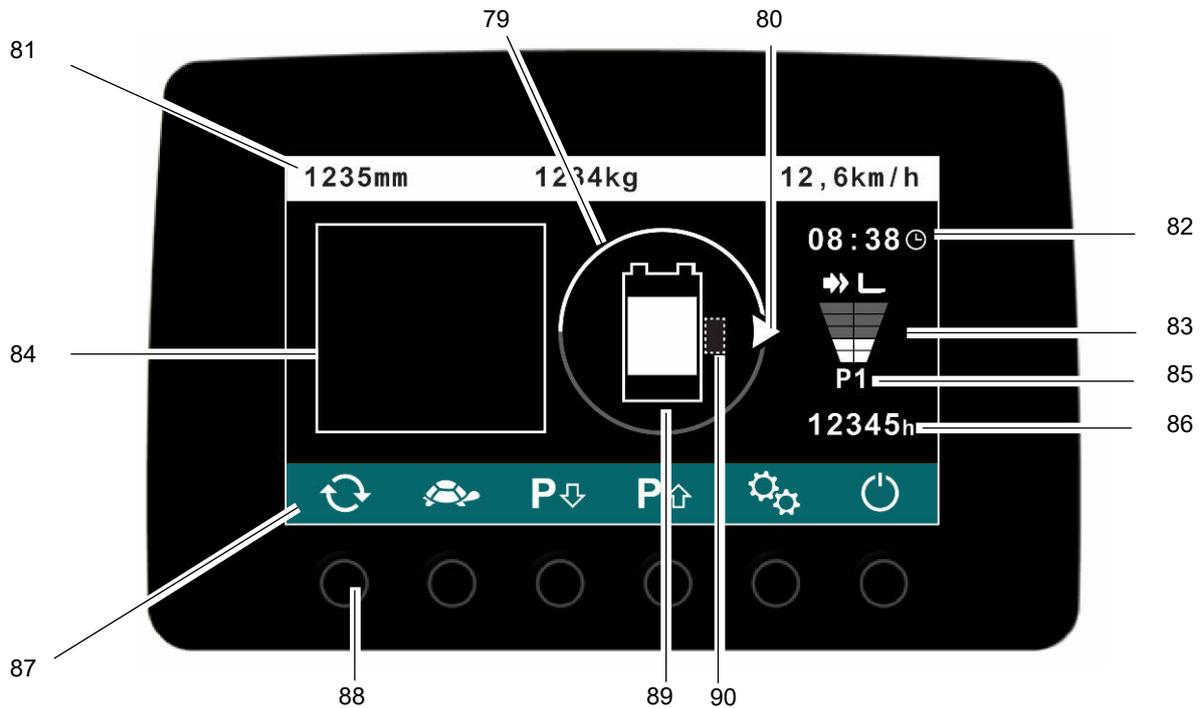


Item	Control/display		Function
58	"Strobe light" switch	<input type="radio"/>	Activates the strobe light.
59	"Fog light" switch	<input checked="" type="radio"/>	Activates the fog lights.
60	"Hazard warning lights" switch	<input type="radio"/>	Activates the hazard warning lights.
61	"Steer wheel adjustment" release knob	<input checked="" type="radio"/>	When the knob is pressed, the tilt angle of the steering wheel can be adjusted.
62	24 V socket	<input checked="" type="radio"/>	Suitable for charging electrical devices such as smartphones, etc.
63	"Release electrical coupling - 2" switch	<input type="radio"/>	Pressing the "Release electrical coupling - 1" (74) and "Release electrical coupling - 2" (63) switches at the same time opens the electrical coupling.
64	"Rear windscreen wiper" switch	<input type="radio"/>	Activates the rear windscreen wiper.
65	"Fan" rotary switch	<input type="radio"/>	Activates the ventilation.
66	"Heater" rotary switch	<input type="radio"/>	Activates the heater.
67	"Rear windscreen heater" switch	<input type="radio"/>	Activates the rear windscreen heater.
68	"Crawl speed" switch	<input checked="" type="radio"/>	Activates "crawl speed" travel mode – The truck travels at reduced speed.
71	"EMERGENCY DISCONNECT" switch	<input checked="" type="radio"/>	Disconnects the battery supply – All electric functions are cut out and the industrial truck decelerates.
70	Key switch and key	<input checked="" type="radio"/>	– Activates the truck by applying the control voltage. – Removing the key prevents the truck from being switched on by unauthorized personnel.
	CanCode	<input type="radio"/>	Replaces the key switch – Entering the correct code activates the truck. – Travel program selection. – Code setting
	ISM	<input type="radio"/>	Replaces the key switch – Releases the truck via a card/transponder. – Displays readiness for operation. – Operational data logging – Data exchange with card/transponder
69	Control and display unit	<input checked="" type="radio"/>	Displays steering modes, warning indicators, incorrect operation notes and service displays.
		<input type="radio"/>	Switches on the truck using Easy Access with PIN code.

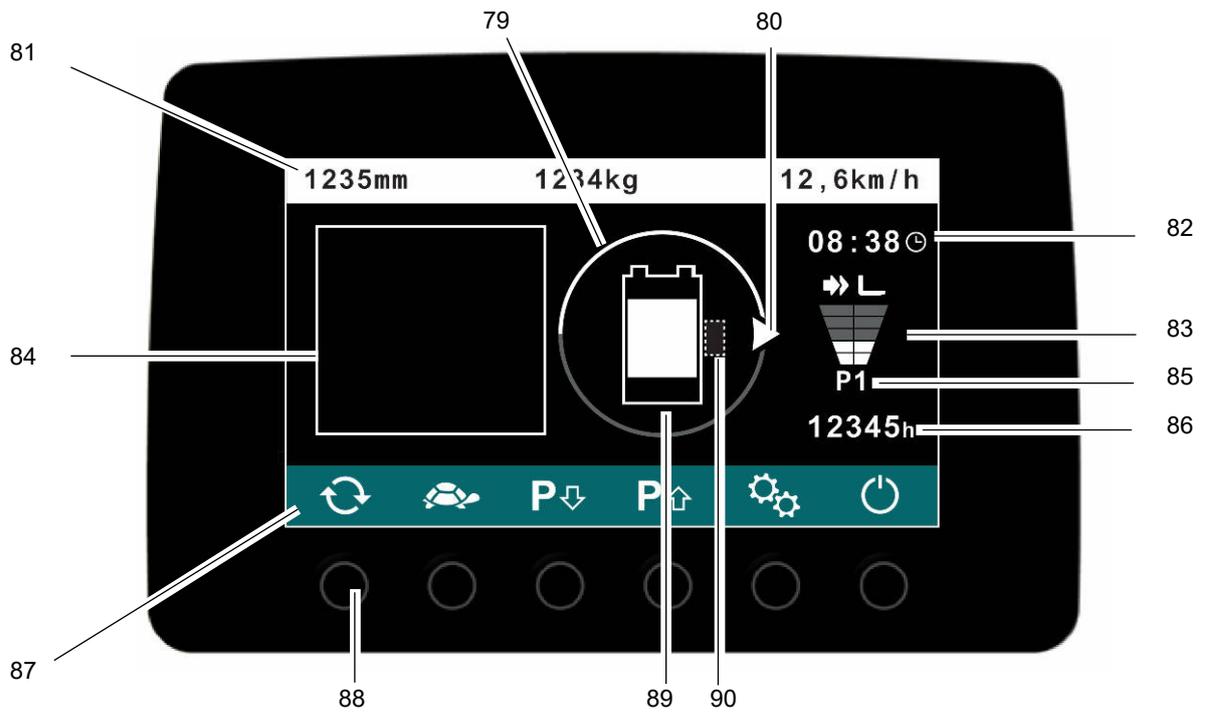
Item	Control/display		Function
72	"Truck lighting" switch	●	Activates the front/rear headlights.
		○	Switch not present with corresponding option – Truck light is permanently activated.
73	"Lower trailer" switch	○	Lowers the raised trailer.
74	"Release electrical coupling - 1" switch	○	Pressing the "Release electrical coupling - 1" (74) and "Release electrical coupling - 2" (63) switches opens the electrical coupling.
75	Left-hand steering column lever	●	<ul style="list-style-type: none"> – Indicator – Windscreen wiper – Main beam – High-beam flasher – Front washer fluid – Horn
76	Right-hand steering column lever	●	Travel direction setting.
77	Brake pedal	●	Continuously adjustable travel speed control.
78	Accelerator pedal	●	Continuously adjustable travel speed control.

2.1 Display unit

2.1.1 Display (4 Inch)

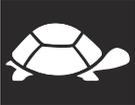


Item	Control and Display	Function
79	Direction presetting	Shows the direction selected.
80	Arrow to display the travel and steering directions	Shows the current travel direction of the truck and the current wheel position in 15° segments.
81	Information field	Displays event messages and optional information such as speed.
82	Time	Shows the time.
83	Power display	Shows the available power in the travel program selected.
84	Icon field	Displays the icons see page 56.
85	Operating program	Shows the operating program selected.
86	Service hours	Shows the truck's service hours, see page 18.
87	Button allocation	see page 54.
88	Buttons	Selection buttons for the corresponding functions.
89	Battery capacity display	Battery discharge status
90	Battery type	Empty = Standard battery 1 = Dry battery 2 = XFC battery



2.1.2 Button allocation of the display

Main menu symbols

Symbol	Meaning
	Information field toggle: Allows the information displayed in the information field to be changed.
	Slow travel: Switches slow travel on and off.
	Travel program down: To switch the travel program down
	Travel program up: To switch the travel program up
	Settings: Change to setting mode. Set time and access authorisations (optional). To change to the menu to administer the codes or transponders
	Switching off additional equipment (○): Switching off (○) is only available in the display if the truck is switched on with an access code. Switches off truck

Additional symbols

Symbol	Meaning
	Light (○): Switches the lighting on/off.
	Work lights (○): Switches the work lights on/off.
	Setting: To change to the menu to administer the codes or transponders
	Change set-up code: To change the set-up code and to activate the keypad or the transponder reader.
	Edit access code / transponder: To add or delete access codes and transponders.
	Up selection: To select access codes or transponders.
	Down selection: To select access codes or transponders.
	Delete: To delete selected access codes.
	Add: To add new access codes.
	Back: Cancels the current procedure and returns to the previous menu.
	Confirm: To confirm an entry or a transponder code.

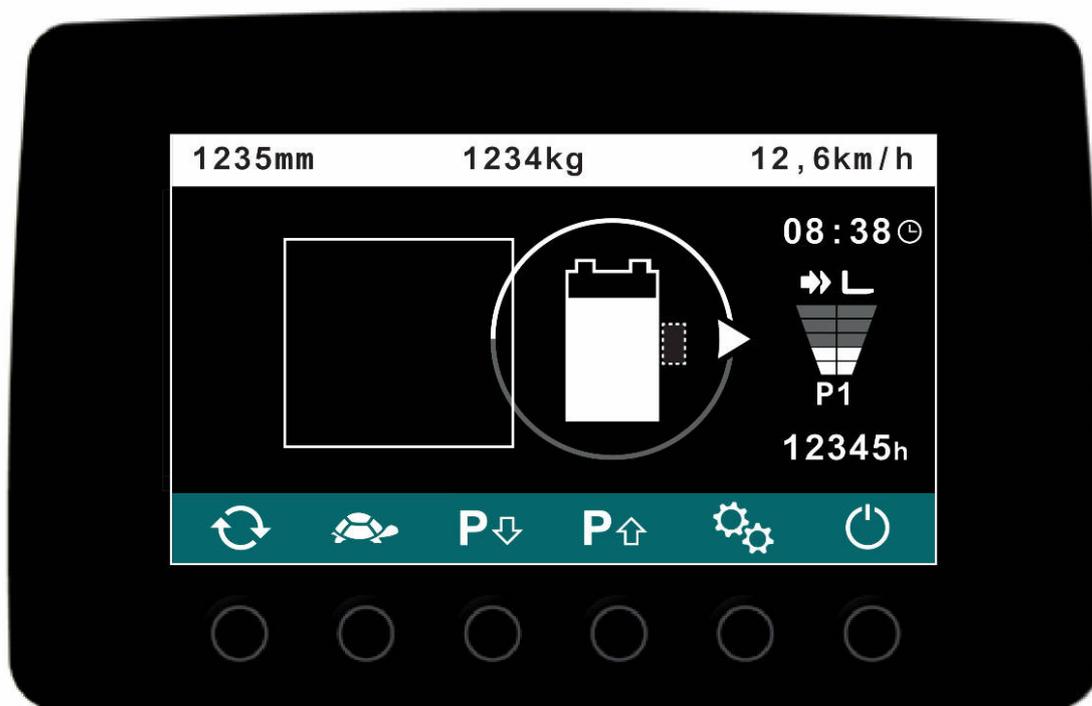
2.1.3 Symbols in the display

Any number of pictograms can be displayed in the pictogram field (84). Which pictograms are shown in the pictogram field depends on the operating and truck status.

Symbol	Meaning	Colour	Function
	Stop notice	Red	Functions deactivated due to truck malfunction
	Warning	Yellow	Operating error
		Red	Truck malfunction
	Service note	Yellow	Service due, see page 149
		Red	Safety inspection due, see page 148
	Battery display	Yellow	Battery capacity $\leq 30\%$
		Red	Battery capacity $\leq 20\%$
	Overtemperature	Yellow	Lifting, lowering and travel speeds reduced due to overtemperature.
		Red	Lifting, lowering and travel functions disabled due to overtemperature.
	Beacon/strobe light	Green	Beacon/strobe light is switched on.
	Seat switch warning indicator	Yellow	– Truck operational, but driver's seat not occupied
	Interior lighting	Green	Interior lighting is switched on.
	Shock display (ISM)	Yellow	Medium impact due to incorrect operation
		Red	Severe impact due to incorrect operation

Symbol	Meaning	Colour	Function
	Slow travel	Green	Travel speed reduction when the "slow travel" key is pressed on the display.
	Crawl speed	Yellow	Travel speed reduction when ISM prescribes a reduction.
	Indicator (warning indicator)	Green	Indicator or warning indicator active
	Coupling open	Yellow	Electrical coupling is open.
	VectorTorq	Yellow	Braking the wheel motor in the inside of the bend allows a smaller turning radius when travelling slowly. At higher speeds, this function is automatically deactivated.
	Anti-slip regulation (ASR)	Yellow	Torque reduction to prevent the wheels from spinning.

2.1.4 Setting the time



Setting the time

Symbol	Procedure
	Press the button under the settings symbol.
	Press the button under the clock symbol.
	Use the arrow up key to change the time digit selected.
	Use the arrow down key to change the time digit selected.
	Press the confirm key to move to the next digit or to confirm the time.

The time is now set.

3 Preparing the Truck for Operation

3.1 Checks and Operations to Be Performed Before Starting Daily Work

WARNING!

Damage and other truck or attachment (optional equipment) defects can result in accidents.

If damage or other truck or attachment (optional equipment) defects are discovered during the following checks, the truck must be taken out of service until it has been repaired.

- ▶ Report any defects immediately to your supervisor.
- ▶ Mark defective truck and take out of service.
- ▶ Do not return the industrial truck to service until you have identified and rectified the fault.

Inspection before daily operation

Procedure

- Check the whole of the outside of the truck for signs of damage and leaks. Damaged hoses must be replaced immediately.
- Check operator position for damage.
- Check that the battery is securely mounted and that the cable connections are free of damage and firmly secured.
- Check the battery connector is secure.
- Check the wheels for damage.
- Check that the markings and labels are all present and legible (see page 24).
- Check the panels and covers are secure and check for damage.
- Check the optional equipment for damage and make sure it is secure.

3.2 Adjusting the Driver's Seat

- The procedure for adjusting the driver's seat applies to standard models. For other models, follow the manufacturer's setting instructions. When adjusting, ensure that all controls are within easy reach.

⚠ WARNING!

Risk of accidents and damage to health

An unsecured or incorrectly adjusted driver's seat can result in accidents or damage to health.

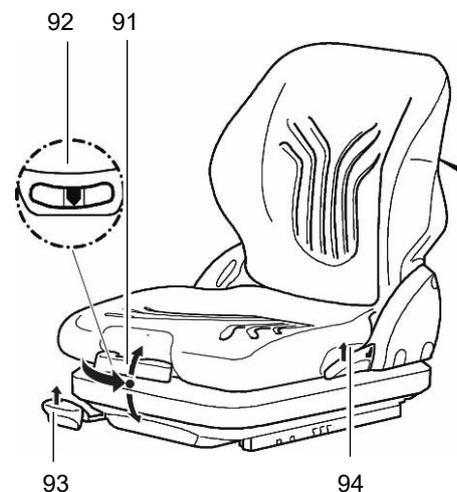
- ▶ Do not adjust the driver's seat while travelling.
- ▶ The driver's seat should lock in position after adjustment.
- ▶ Check and, if necessary, adjust the individual seat setting and driver's weight setting before starting up the truck.

Adjusting the seat position

Procedure

- Sit on the driver's seat.
- Pull up the driver's seat locking lever (93) in the direction of the arrow.
- Push the driver's seat forwards or backwards to the desired position.
- Engage the driver's seat locking lever (93) in position.

The seat position is now correctly set.



Setting the driver's weight

⚠ WARNING!

Incorrectly adjusted seat cushioning can damage your health

To achieve optimal seat damping, the driver's seat must be adjusted according to the driver's weight. Set the driver's weight when the seat is occupied.

- ▶ Hold the weight adjustment lever only by the recess; do not reach through underneath the weight adjustment lever.

Procedure

- Fold out the weight adjustment lever (91) as far as it will go in the arrow direction.
- Move the weight adjustment lever (91) up and down to set the seat to a higher weight.
- Move the weight adjustment lever (91) up and down to set the seat to a lower weight.

- The driver's weight is correct when the arrow is in the middle of the display window (92). The minimum or maximum weight setting is reached when you can feel a return stroke on the lever.

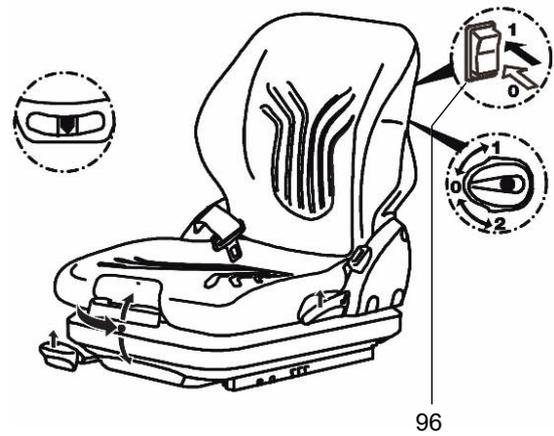
- After setting the weight, move the lever (91) back in full.

The driver's weight is now set.

Switching the seat heating on and off (O)

Procedure

- Press the seat heating switch (96).
Switch setting 1 = Seat heating on.
Switch setting 0 = Seat heating off.

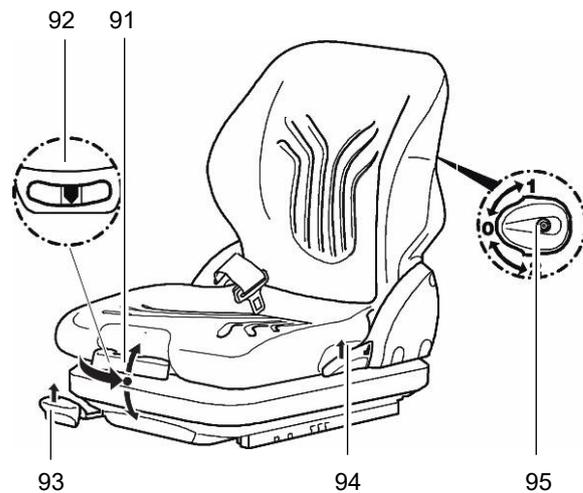


Adjusting the lumbar support (O)

Procedure

- Turn the hand wheel (95) to the required position.
Position 0 = no bending in lumbar area.
Position 1 = increasing bending in upper lumbar area.
Position 2 = increasing bending in lower lumbar area.

The lumbar support is now adjusted.



Adjusting the driver's weight automatically (O)

A compressor in the driver's seat adjusts the seat position according to the weight of the driver.

- *The driver's weight adjusts automatically without manual influence.*
- *The compressor may cause a buzzing during application.*

3.3 Preparing the truck for operation

Switching on the truck

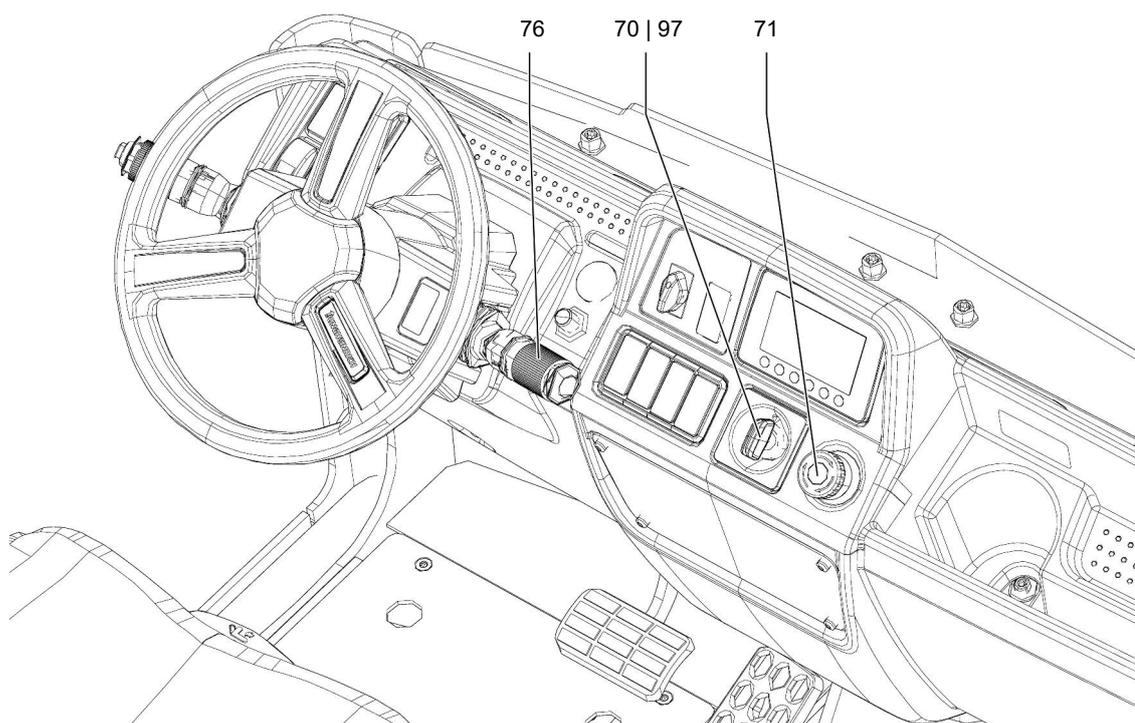
Requirements

- Checks and operations to be performed before starting daily work, see page 59.
- Right-hand steering column lever (76) in neutral position (N).

Procedure

- Adjust the steering wheel.
- Pull out the emergency disconnect switch (71).
- Switch on the truck. To do this:
 - Insert the key into the key switch (70) and turn it clockwise as far as it will go to the "I" position.
 - Enter the code in the code lock (97, ○), see page 92.
 - Hold the card or transponder in front of the ISM access module (97, ○) and, depending on the setting, press the green button on the ISM access module.

The truck is ready for operation.



3.4 Visual inspections and activities to be performed after establishing operational readiness

⚠ WARNING!

Risk of accident due to damage to or other defects in the truck and optional features

If damage or other truck or attachment (optional equipment) defects are discovered during the following checks, the truck must be taken out of service until it has been repaired.

- ▶ Report any defects immediately to your supervisor.
 - ▶ Mark defective truck and take out of service.
 - ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
-

Procedure

- Test warning indicators and safety equipment:
 - Test the function of the emergency disconnect switch by pressing the emergency disconnect switch. The main circuit is disconnected and no truck movements can be performed. Then pull the emergency disconnect switch to unlock it.
 - Test the horn by pressing the "warning signal" button (76).
 - Test the brakes, see page 72.
 - Test the steering, see page 75.
 - Test the travel functions, see page 73.
- Test the controls and displays and check for damage, see page 49.
 - Check the controls are automatically restored to the neutral position after being applied.

3.5 Parking the truck securely

WARNING!

An unsecured truck can cause accidents

Parking the truck on an incline is dangerous and is strictly prohibited.

- ▶ Always park the truck on a level surface. In special cases the truck may need to be secured with wedges.
-

Parking the truck securely

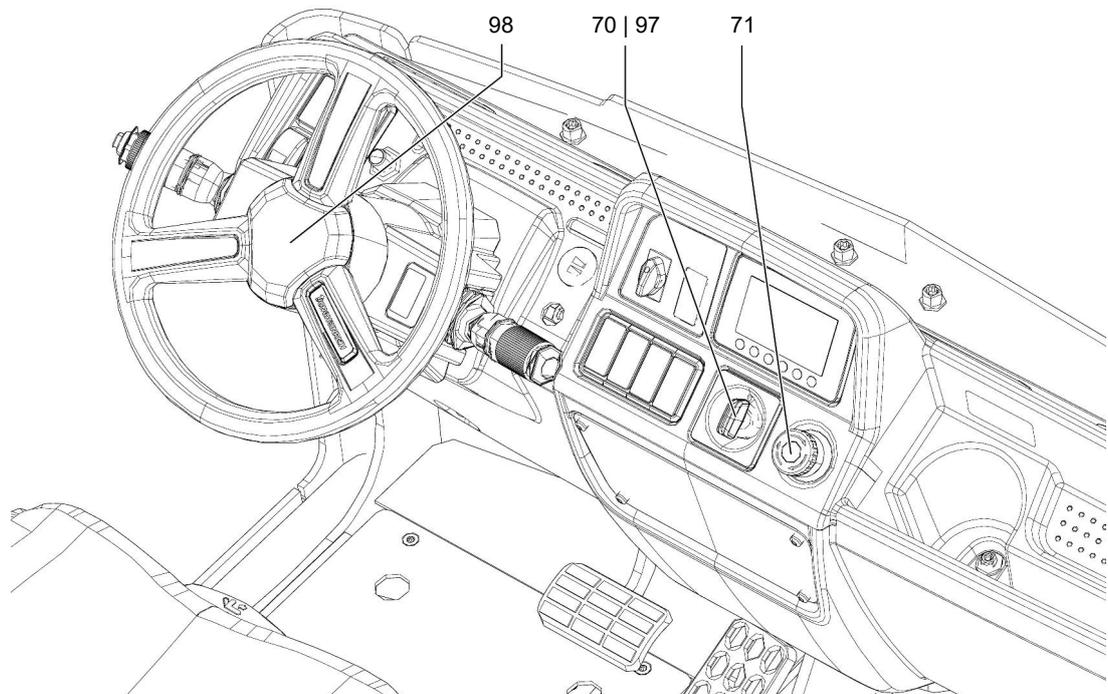
Requirements

- Right-hand steering column lever (76) in neutral position (N).

Procedure

- Park the truck on a level surface.
- Turn the steering wheel (98) to the "straight-ahead" position.
- Switch off the truck; to do this:
 - Turn the key in the key switch (70) anti-clockwise as far as it will go. Remove the key from the key switch (70).
 - For CanCode, press the O key (○).
 - Press the red key on the ISM access module (○).

The truck is parked.



4 Working with the truck

4.1 Safety regulations for travel mode

Travel paths and work areas

Only use lanes and routes specifically designated for truck traffic. Unauthorised third parties must stay away from work areas. Loads must only be stored in places specially designated for this purpose.

DANGER!

Do not exceed the permissible surface and spot load limits on the travel routes.
At blind spots get a second person to assist.

Travel conduct

The operator must adapt the travel speed to local conditions. The truck must be driven at slow speed when negotiating bends or narrow passageways, when passing through swing doors and at blind spots. The operator must always observe an adequate braking distance between the forklift truck and the vehicle in front and must be in control of the truck at all times. Abrupt stopping (except in emergencies), rapid U turns and overtaking at dangerous or blind spots are not permitted. Do not lean out or reach beyond the working and operating area.

Visibility when driving

The driver must look in the direction of travel and must always have a clear view of the route ahead.

Negotiating slopes and inclines

Negotiating slopes or inclines is only permitted if they are specifically designed as travel routes, are clean and have a non-slip surface and providing they can be safely travelled along in accordance with the truck's technical specifications. The industrial truck must not be turned, operated at an angle or parked on inclines or slopes. Inclines must only be negotiated at slow speed, with the driver ready to brake at any moment.

Negotiating lifts, loading ramps and docks

Lifts may only be negotiated if they have sufficient capacity, are suitable for driving on and authorised for truck traffic by the operating company. The driver must satisfy himself of the above before entering these areas. The truck must enter lifts with the load in front and must take up a position which does not allow it to come into contact with the walls of the lift shaft. Persons riding in the lift with the forklift truck must only enter the lift after the truck has come to a rest and must leave the lift before the truck. The driver must ensure that the loading ramp / dock cannot move or come loose during loading / unloading.

Towing trailers

Do not exceed the maximum trailer load for unbraked trailers. The trailer load must be secured in accordance with regulations and must not exceed the dimensions permitted for the travel lanes. After coupling and before starting, the driver must ensure that the trailer coupling cannot become detached. Tow tractors must be operated so as to ensure that the tugger train is driven safely and can be stopped under any conditions.

Driving in bends

When driving in bends, the operator must significantly reduce speed and only accelerate again when the entire tugger train has left the bend. Failure to do so results in the trailers that are still in the bend accelerating excessively.

Nature of the load to be carried on the loading platform

The operator must make sure that the load is in a satisfactory condition. Loads must always be positioned safely and carefully. Use suitable precautions, e.g. securing to the lashing rings, to prevent parts of the load from tipping or falling down.

WARNING!

Wind loads

When transporting large loads, wind forces can influence the tugger train's stability. If light loads are exposed to wind forces, they must be particularly well secured. Stop the truck in both cases if necessary.

⚠ WARNING!

Removing or disabling safety devices can cause accidents

Removing or disabling safety devices such as the emergency disconnect switch, panels etc. can result in accidents and injury.

- ▶ Report any defects immediately to your supervisor.
 - ▶ Defective tugger trains or trailers must be taken out of service and labelled accordingly.
 - ▶ Do not return the tugger train to service until you have identified and rectified the fault.
-

⚠ WARNING!

Electromagnetic influence can result in accidents

Strong magnets can cause electronic components such as Hall sensors to become damaged, resulting in accidents.

- ▶ Do not use magnets in the operating area of the truck. Exceptions to this rule are commercial, weak clamping magnets for attaching notices.
-

Do not park the truck in escape routes, aisles, or in access areas to stairways or safety equipment.

When parking a truck near railway tracks, no part of the truck should be closer than 2 m from the nearest railway track.

4.2 Emergency Disconnect

⚠ CAUTION!

Risk of accident from heavy braking

Applying the emergency disconnect switch during travel will cause the truck to decelerate to a halt at maximum force. This may cause the load to slide off the trailer. Locking of the rear axle may cause the truck to swerve. There is a higher risk of accidents and injury.

- ▶ Do not use the emergency disconnect switch as a service brake.
 - ▶ When travelling, only use the emergency disconnect switch in the event of danger.
-

⚠ CAUTION!

Faulty or non-accessible emergency disconnect switches can cause accidents

A faulty or non-accessible emergency disconnect switch can cause accidents. In dangerous situations the operator cannot bring the truck to a halt in time by applying the emergency disconnect switch.

- ▶ The emergency disconnect switch must not be affected by any objects placed in its way.
 - ▶ Report any defects on the emergency disconnect switch immediately to your supervisor.
 - ▶ Mark the defective truck and take it out of service.
 - ▶ Do not return the truck to service until the fault has been identified and rectified.
-

Pressing the emergency disconnect switch

Procedure

- Press the emergency disconnect switch (71).

The industrial truck brakes to a halt and all electrical functions are deactivated.

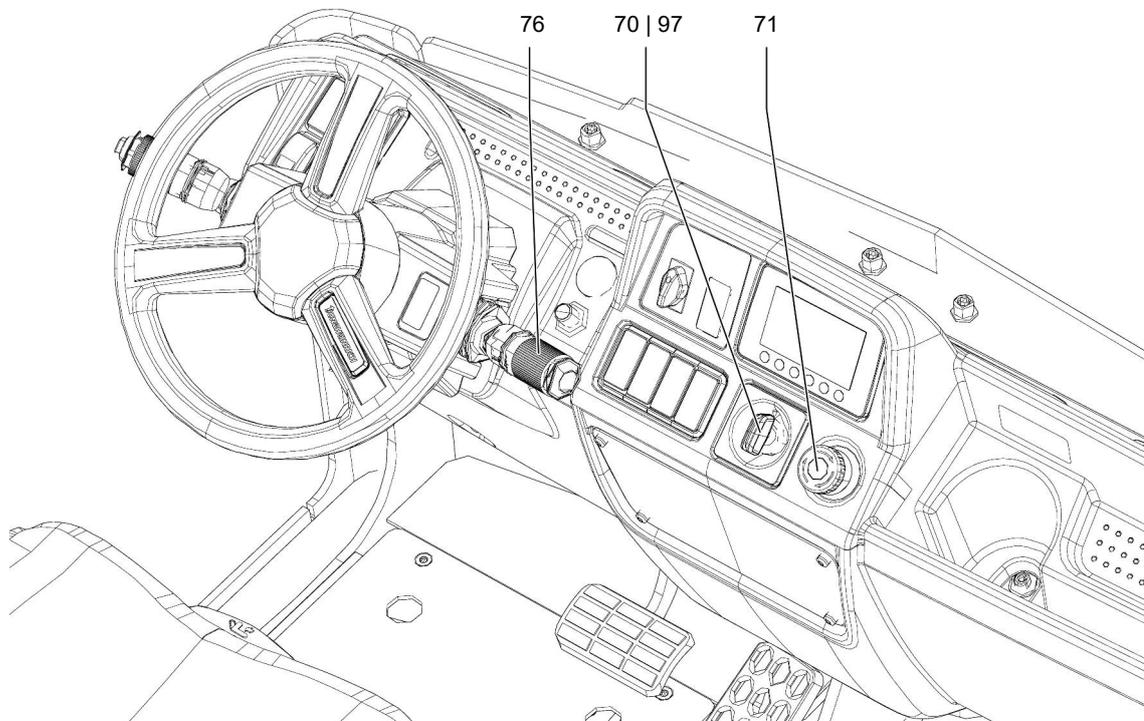
Unlocking the emergency disconnect switch

Procedure

- Turn the emergency disconnect switch (71) to unlock it.

All electrical functions are enabled and the truck is operational again (provided the truck was operational before the emergency disconnect switch was pressed).

➔ Trucks with CanCode and ISM access module remain switched off.



4.3 How to act in hazardous situations

⚠ WARNING!

Risk of the truck tipping over or falling off a loading ramp.

- ▶ Lean the upper body over the steering wheel.
 - ▶ Hold the steering wheel with both hands.
 - ▶ Never release the seatbelt.
 - ▶ Never jump off the truck.
-

- When travelling on a loading ramp, avoid large steering movements and reduce the travel speed.

4.4 Brakes

⚠ WARNING!

Accident risk

The brake pattern of the truck depends largely on the ground conditions.

- ▶ The operator must take into account the travel route conditions when braking.
 - ▶ Brake with care to prevent the load from slipping.
 - ▶ Allow for increased braking distance when travelling with an attached load.
 - ▶ Use the service brake in emergencies.
-

The truck can brake in two ways:

- With the service brake (brake pedal)
- With the coasting brake

Braking with the service brake

Procedure

- Press down on the brake pedal (77) until you reach the required deceleration.

The truck decelerates depending on the brake pedal position.

Braking with the coasting brake

Procedure

- Take your foot off the accelerator pedal (78).

The truck brakes.

4.5 Travel

⚠ WARNING!

Collision hazard when operating the truck

Collisions with personnel and equipment can result if the truck is operated with open panels and covers.

▶ Do not operate the truck unless the panels and covers are closed and properly locked.

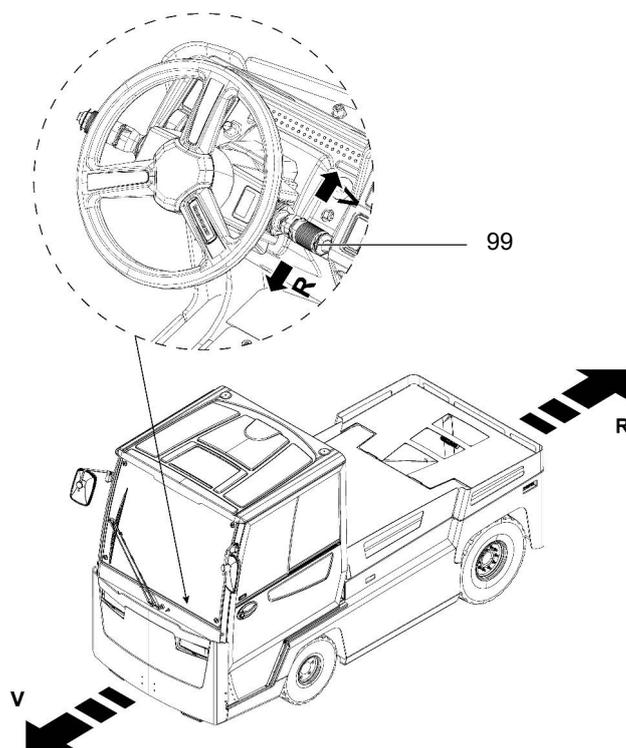
Requirements

– Commission the truck, see page 59.

Procedure

- Set the travel direction switch (99) to the required travel direction (forwards or reverse).
- When the travel direction switch is released, it remains in the selected position. The travel direction is shown on the control and display unit (69).
- Apply the accelerator pedal (78).
- The travel speed is governed by the accelerator pedal.

The truck travels in the travel direction selected.



- The truck can be operated only when the operator is sitting on the driver's seat, a travel direction has been selected with the travel direction switch and the accelerator pedal is pressed.

Anti-roll back device for slow travel on inclines

If the truck does not have sufficient speed to travel up an incline, it may roll back. Rolling back is detected by the truck's controller and the truck brakes to a halt immediately.

4.6 Steering

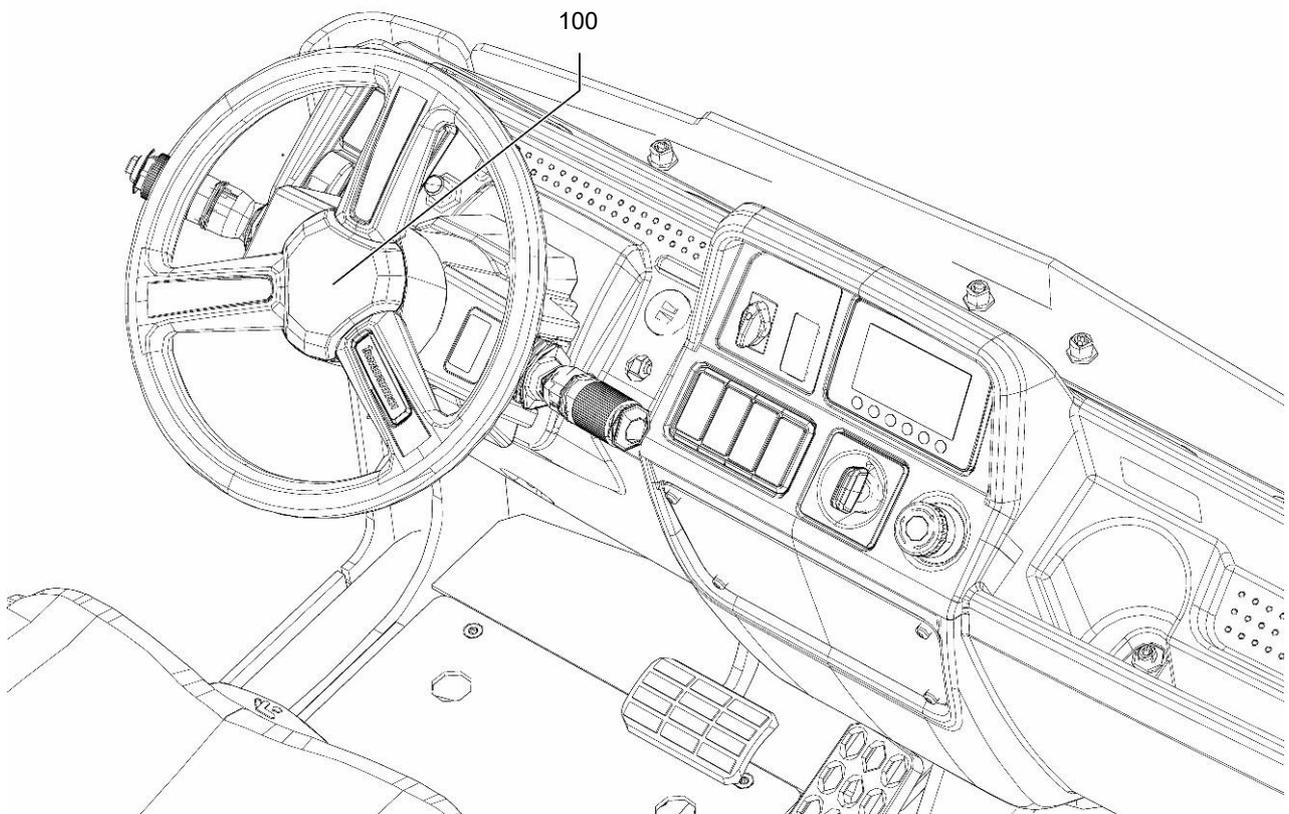
Requirements

- Start up the truck, see page 63.

Procedure

- Turn the steering wheel (100) to the left or right.

The truck is steered in the required direction.



4.7 Pedestrian mode (○)

⚠ CAUTION!

Trapping hazard from the truck during pedestrian mode

In pedestrian mode the truck can pose a trapping hazard for the operator and other people.

- ▶ Wear personal protective equipment (e.g. safety shoes, ...).
 - ▶ The operator must always stand beside the truck during pedestrian operation.
 - ▶ Ensure that nobody is sitting on the driver's seat while operating in pedestrian mode.
 - ▶ The truck must be operated with particular care and attention in pedestrian mode.
 - ▶ Ensure there are no other people standing between the truck and obstacles when operating in pedestrian mode.
 - ▶ The truck must be steered in the straight-ahead position.
-

Travel using the "pedestrian" button

Procedure

- Press the "Pedestrian" button (102,103).

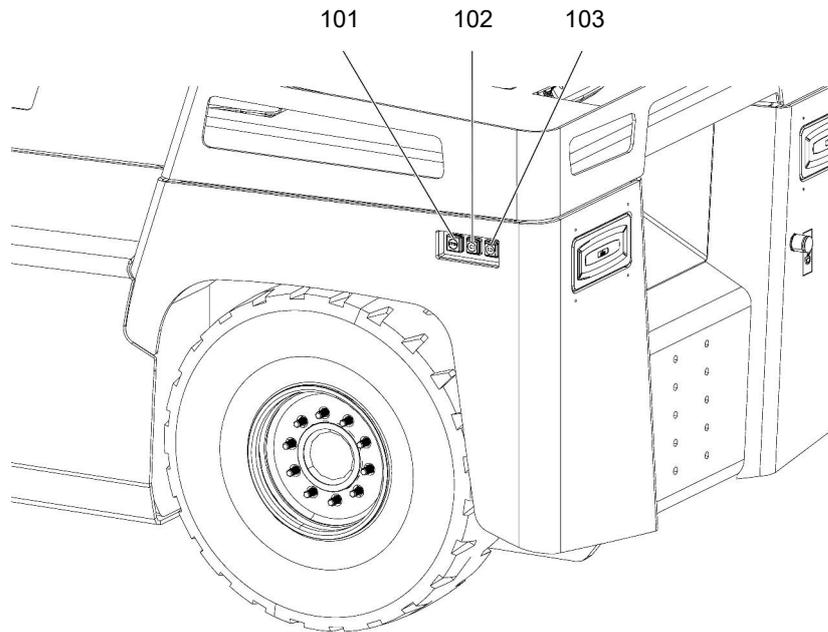
The truck travels at a pre-set reduced speed 300 mm in the selected direction each time the button is pressed.

Braking using the "Pedestrian" button

Procedure

- Release the "Pedestrian" button (102,103).

- ➔ For maximum braking in emergencies, press the emergency disconnect (101).



5 Travelling with trailers

⚠ WARNING!

Trailer load

In difficult operating conditions (inclines, smooth or slippery travel lanes), the trailer load must be reduced as necessary to ensure braking without risk of accidents. The maximum load specified applies only for towing on level, non-slip ground with sufficient capacity.

For trailer loads over 9000 kg and on inclines, use of braked trailers is recommended.

⚠ WARNING!

Wind loads

Wind forces can affect the stability of a truck when transporting loads with large surface areas. Light loads must be especially secured when they are subjected to wind forces. Stop the truck in both cases.

⚠ CAUTION!

Cornering with trailers

When cornering with long trailers and trailer trains always apply a large radius as the trailer follows the truck in a small radius.

Travelling with a trailer

Requirements

- Familiarise yourself with the brake and steering system of the trailer before travelling.

Procedure

- Set off slowly until the trailer coupling has become taut.
- Then gradually increase the speed to normal travel speed.

Stopping with a trailer

Procedure

- Reduce the speed so that both tow truck and trailer gradually slow down.
- Brake carefully.

6 Troubleshooting

This chapter enables the operator to localize and rectify basic faults or the results of incorrect operation himself. When trying to locate a fault, proceed in the order shown in the remedy table.



If, after carrying out the following remedial action, the truck cannot be restored to operation or if a fault in the electronics system is displayed with a corresponding error code, contact the manufacturer's service department.

Troubleshooting must only be performed by the manufacturer's customer service department. The manufacturer has a service department specially trained for these tasks.

In order for customer services to react quickly and specifically to the fault, the following information is essential:

- Truck serial number
- Event message from the display unit (if applicable)
- Error description
- Current location of truck.

6.1 Truck does not start

Possible Cause	Action
Battery connector not plugged in	Check the battery connector and plug it in if necessary.
Emergency Disconnect pressed.	Unlock the Emergency Disconnect
Key switch set to O.	Set the key switch to "I"
Battery charge too low	Check the battery charge and charge battery if necessary.
Faulty fuse	Check fuses

7 Moving a truck without its own drive system

⚠ WARNING!

A released parking brake can result in accidents

After releasing the parking brake, the brakes are no longer effective. There is an increased risk of accidents due to uncontrolled movements of the forklift truck.

- ▶ Do not release the parking brake on slopes or inclines.
- ▶ Move the forklift truck with increased caution.
- ▶ Do not park the truck with the parking brake released.
- ▶ Activate the parking brake when you reach your destination.

⚠ WARNING!

Only return the truck to service when you have identified and rectified the fault.

Releasing the parking brake

Requirements

- Truck parked securely, see page 65.

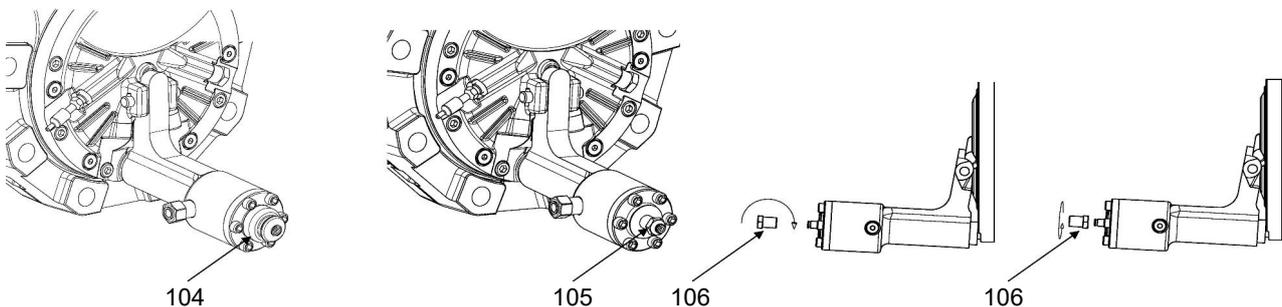
Tools and Material Required

- Spanner wrench

Procedure

- Switch off the truck, to do this:
 - Turn the key in the key switch (70) anti-clockwise as far as it will go. Remove the key from the key switch (70).
 - Press the red button on the ISM access module(○).
- Prevent the truck from rolling away.
- Remove the rubber collar (104).
- Undo the nut (105) and remove.
- Turn the nut (106) and rotate it fully on to the threaded rod.

The parking brake is now released. The truck can be moved.



8 Assistance systems

8.1 Correct Use and Application

8.1.1 General

The assistance system must be used, operated and maintained in accordance with these operating instructions. Any other type of use is beyond the scope of

application and can result in accidents and personal injury as well as damage to forklift trucks or property.

This assistance system is intended to support the driver and does not absolve him from his duty to use the truck responsibly, or to apply the necessary levels of care and attention. No liability can be accepted should the driver fail to respond to a hazardous situation in time. The assistance system is not part of any safety considerations in accordance with EN ISO 13849.

8.1.2 Instructions for the operator

In principle, assistance systems cannot fulfil a safety function, which means that they are not necessary for the safe operation of the forklift truck. Assistance systems must not be seen as a guarantee for the safe operation of the forklift truck, but should only be used to support the safe operation of the forklift truck.

Assistance systems help operators of forklift trucks to reduce the risk of accidents depending on the operational environment.

A risk assessment in accordance with country-specific rules and regulations must always be carried out when an assistance system is retrofitted. The preparation of the assessment is part of the occupational health and safety obligations of the owner of the forklift truck.

8.2 Indoor/outdoor detection

8.2.1 Safety information

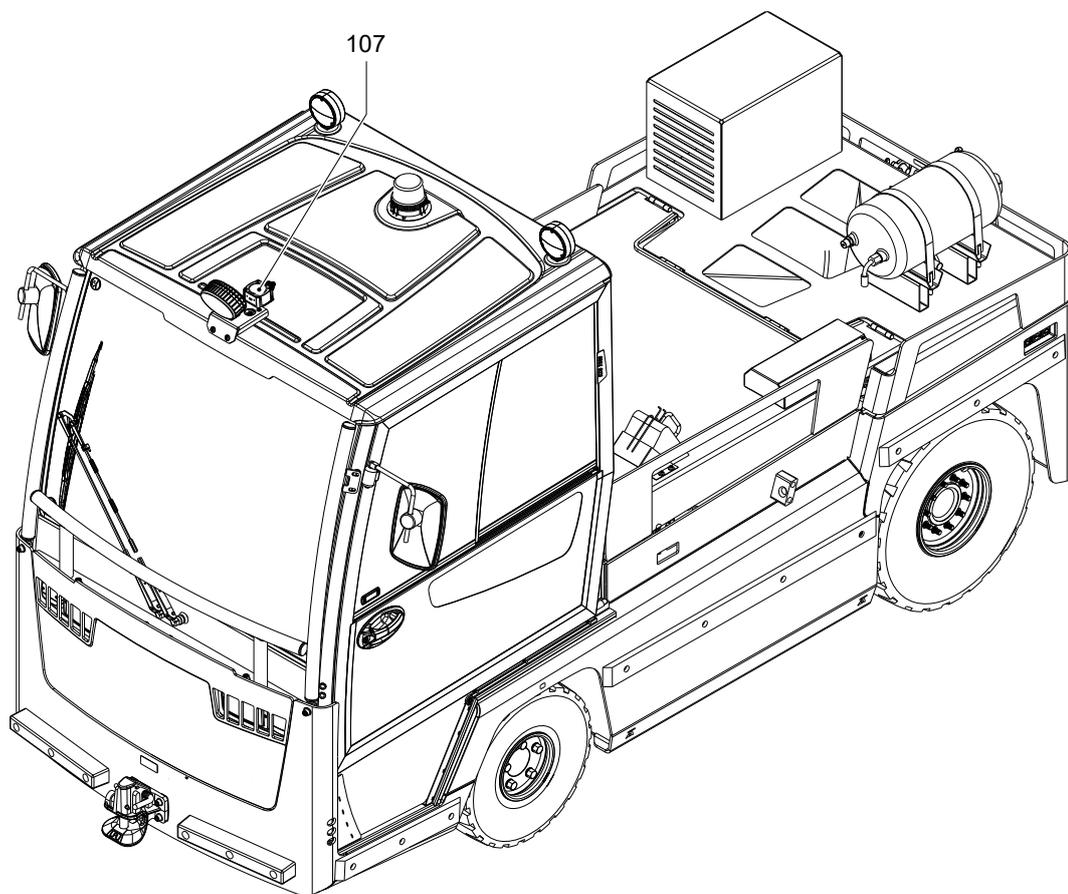
⚠ CAUTION!

Risk of accidents due to system limitations of the assistance system

Due to system limitations, reliable detection of objects is not assured in all circumstances. For example, this can depend on the size of the object, the vicinity or extreme weather conditions (rain, snow).

- ▶ Operate the truck with the necessary attention.
- ▶ Check the cleanliness of the sensor at regular intervals.
- ▶ Clean the sensor with a soft, damp cloth at regular intervals.

8.2.2 Assembly Overview



Item	Designation
107	● – Sensor for the “indoor/outdoor detection” assistance system

8.2.3 Functional Description

The truck is equipped with a radar measuring system that is capable of detecting objects (such as production hall ceilings) above the truck when the truck is switched on. When an object is detected within the preset reduction height (“indoor”), a travel speed reduction is initiated.

The “slow travel” symbol is then displayed on the truck’s display unit. When there is no longer an object within the reduction height (“outdoor”), the travel speed reduction is removed. The “slow travel” symbol disappears from the truck’s display unit.

Symbol	Meaning	Colour	Function
	Slow travel	Yellow	Lights up when the travel speed of the truck is limited to slow travel.

- In the event of a power failure/disruption, a travel speed reduction is triggered and the “slow travel” speed symbol appears on the truck’s display unit. Pay attention to objects, hall ceilings, gate entrances, etc. with regard to the vehicle height and react.
- The truck’s acceleration takes place with a reduced acceleration ramp until the specified speed of the accelerator pedal is reached. If the pedal was placed in the neutral position first, the normal acceleration ramp is used.
- Configuration and integration of the assistance system is carried out by the assistance system manufacturer’s customer service department.

8.2.4 Functional test

A functional test of the radar measuring system must be performed as part of daily commissioning of the truck. If the function is not working correctly, the truck must not be used in an area where a speed reduction is required until the assistance system manufacturer's customer service department has restored the correct operating condition.

Functional check of the radar measuring system

Procedure

- Drive the truck under an object that is below the set reduction height limit.
 - Speed reduction is activated on the truck.
 - The "slow travel" symbol appears on the truck's display unit.
- Drive the truck into an area where there is no object in the reduction height.
 - Speed reduction is deactivated on the truck.
 - The "slow travel" symbol disappears from the truck's display unit.

The functional check of the radar measuring system is complete.

Symbol	Meaning	Colour	Function
	Slow travel	Yellow	Lights up when the travel speed of the truck is limited to slow travel.

9 Optional Equipment

9.1 Coupling Types

⚠ CAUTION!

Trapping hazard

There is a trapping risk when you attach a trailer.

- ▶ Follow the instructions of the coupling manufacturer if using special trailer couplings.
 - ▶ Secure the trailer to prevent it from rolling away before coupling it.
 - ▶ Do not get caught between the truck and the tiller when coupling the trailer.
 - ▶ The tiller must be horizontal, tilted down by no more than 10° and never facing up.
-

⚠ WARNING!

An open trailer coupling can result in injuries

The trailer coupling is equipped with a compression spring. The compression spring is activated by the tow eye of the trailer. The trailer coupling closes automatically. Severe hand injuries can occur if you reach into an open trailer coupling.

- ▶ Never reach into an open trailer coupling.
 - ▶ Always travel with the trailer coupling closed.
 - ▶ Open and close the trailer coupling only immediately before attaching or detaching a trailer.
-

⚠ CAUTION!

An incorrectly locked trailer coupling can result in accidents.

If the trailer coupling is incorrectly locked, the trailer can come loose during travel.

- ▶ Make sure the trailer coupling is engaged securely before travelling.
 - ▶ The control pin must be flush with the control sleeve.
-

9.1.1 Types of couplings on the front of the truck

9.1.1.1 Coupling with hand lever

Coupling the trailer

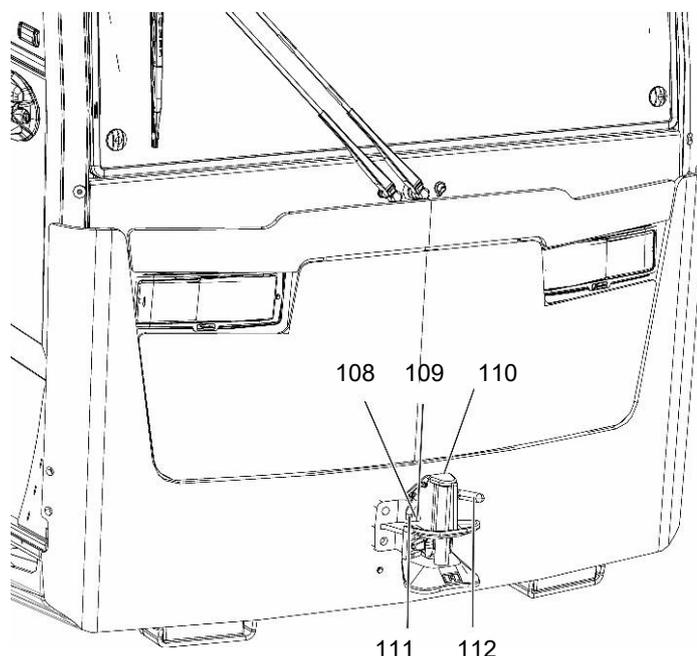
Procedure

- Push the tow eye of the trailer in front of the trailer coupling.
- Check the hitch height.
- Fully pull up on the hand lever (112).

The bolt of the trailer coupling opens.

- Slowly move truck forwards until the bolt of the coupling engages.
- Check that the control pin (108) is flush with the control sleeve (109).

The trailer coupling is closed and secured. The truck can now pull the trailer.



Uncoupling trailers

Procedure

- Prevent the trailer from rolling away.
- Fully pull up on the hand lever (112).
- Drive the truck forwards.
- Push the locking hand lever (111) down.
- Check that the control pin (108) is flush with the control sleeve (109).

The trailer coupling is closed and secured. The trailer is unhitched and the truck can continue to travel.

➔ The truck may only continue to travel with the coupling closed.

9.1.2 Types of couplings at the rear of the truck

9.1.2.1 3-way coupling

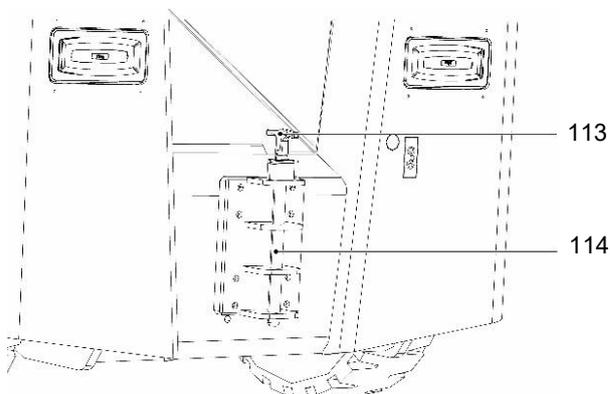
Coupling the trailer

Requirements

- Bolt (114) lifted up fully out of the trailer coupling.

Procedure

- Push the tow eye of the trailer into the trailer coupling.
- Push the bolt of the trailer coupling from the top through the holes of the trailer coupling and the tow eye.
- Turn the handle (113) to lock the coupling.



The trailer is now coupled.

Uncoupling trailers

Procedure

- Prevent the trailer from rolling away.
- Turn the handle (113) until the lock is undone.
- Pull the bolt (114) out of the coupling from the top.
- Bring the tow eye of the trailer out from the side of the coupling.
- Insert the bolt (114) back in the coupling.
- Insert the bolt into the coupling (114) and secure it.

The trailer is now uncoupled.

9.1.2.2 Coupling with hand lever or remote unlocking

⚠ WARNING!

An open trailer coupling can result in injuries

The trailer coupling is equipped with a compression spring. The compression spring is activated by the tow eye of the trailer. The trailer coupling closes automatically. Severe hand injuries can occur if you reach into an open trailer coupling.

- ▶ Never reach into an open trailer coupling.
 - ▶ Always travel with the trailer coupling closed.
 - ▶ Open and close the trailer coupling only immediately before attaching or detaching a trailer.
-

⚠ CAUTION!

An incorrectly locked trailer coupling can result in accidents.

If the trailer coupling is incorrectly locked, the trailer can come loose during travel.

- ▶ Make sure the trailer coupling is engaged securely before travelling.
 - ▶ The control pin must be flush with the control sleeve.
-

Coupling the trailer

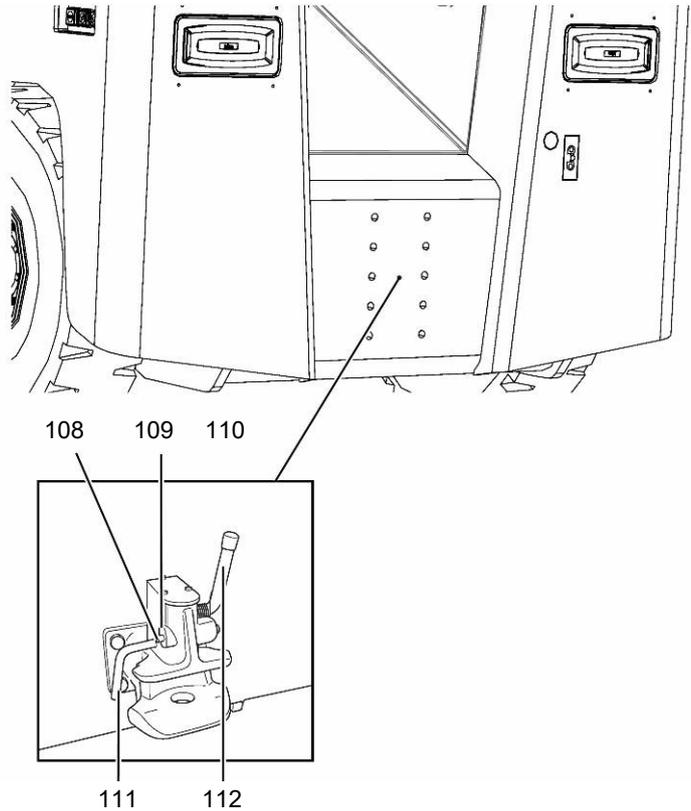
Procedure

- Push the tow eye of the trailer in front of the trailer coupling.
- Check the hitch height.
- Pull the hand lever (112) or remote unlocking (63) fully upwards.

The bolt of the trailer coupling opens.

- Slowly reverse the truck until the bolt of the coupling engages.
- Check that the control pin (108) is flush with the control sleeve (109).

The trailer coupling is closed and secured. The truck can now pull the trailer.



Uncoupling trailers

Procedure

- Prevent the trailer from rolling away.
- Pull the hand lever (112) or remote unlocking (63) fully upwards.
- Drive the truck forward.
- Push the locking hand lever (111) down.
- Check that the control pin (108) is flush with the control sleeve (109).

The trailer coupling is closed and secured. The trailer is unhitched and the truck can continue to travel.



The truck may only continue to travel with the coupling closed.

9.1.2.3 Electrical coupling

Coupling the trailer

Requirements

- Seat switch activated
- Truck stationary
- Tow eye of the trailer pushed in front of the trailer coupling
- Coupling height checked

Procedure

- Press the (74 and 63) switch at the same time.
The unlocking lever (115) is pulled upwards. The "Coupling opened" symbol is shown on the display, see page 56.
- Slowly reverse the truck until the bolt of the coupling engages.
- Check that the control pin (108) is flush with the control sleeve (109).

The trailer coupling is closed and secured. The truck can now pull the trailer.

Uncoupling trailers

Requirements

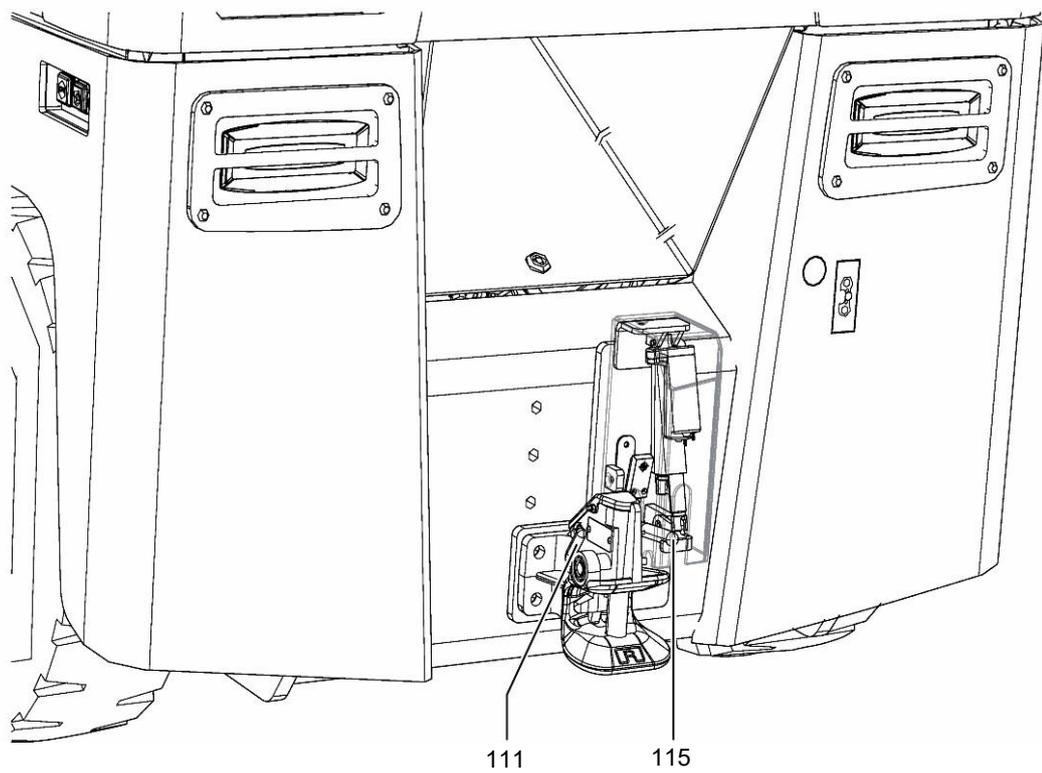
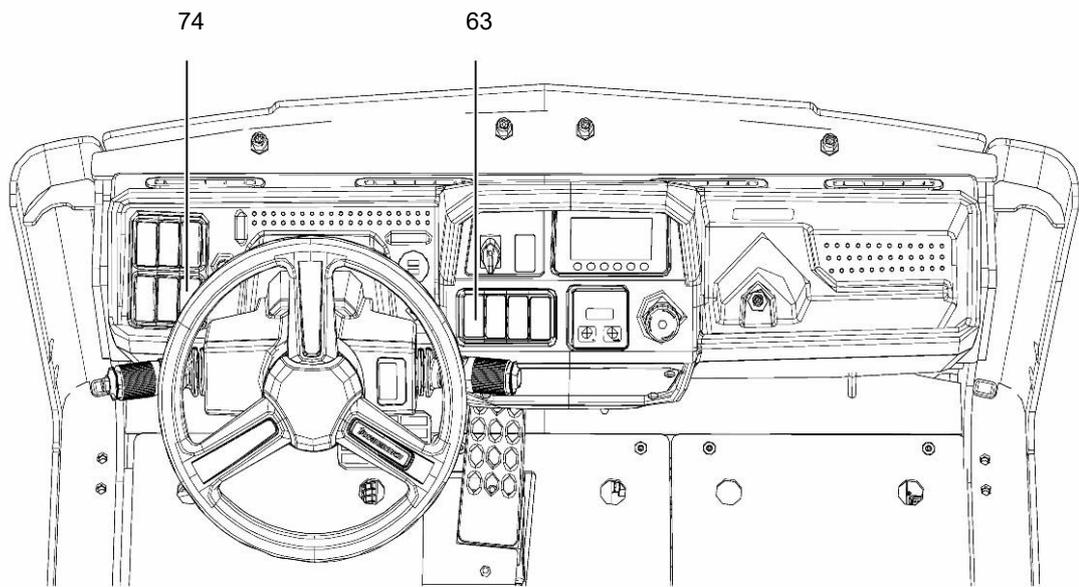
- Trailer does not exert tensile loading on the coupling.
- Trailer prevented from rolling away.

Procedure

- Press the (74 and 63) switch at the same time.
The unlocking lever (115) is pulled upwards. The "Coupling opened" symbol is shown on the display, see page 56.
- Drive the truck forward.
- Push the locking hand lever (111) down.
- Check that the control pin (108) is flush with the control sleeve (109).

The trailer coupling is closed and secured. The trailer is unhitched and the truck can continue to travel.

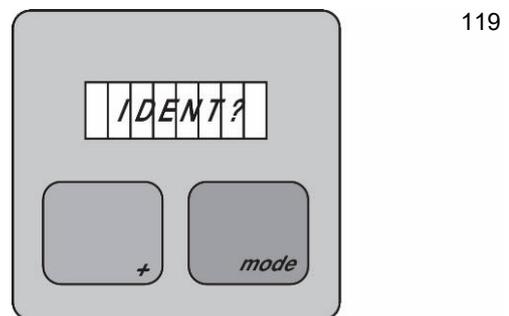
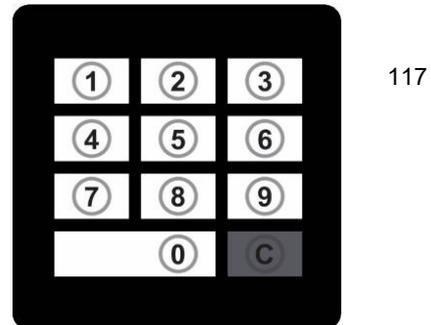
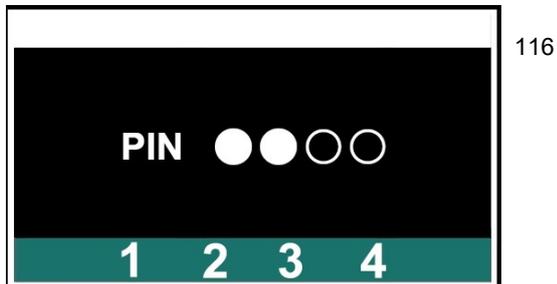
- ➔ If the electric coupling fails, it can be unlocked manually by pulling the unlocking lever (115) upwards.



→ The truck may only continue to travel with the coupling closed.

9.2 Keyless Access System

The keyless access system allows an individual code to be allocated to each operator or group of operators.



Item	Description
116	Display unit (EasyAccess Softkey): – Description, see page 52 – Entry of 4-digit set-up and access codes – Up to 10 access codes can be stored – For set-up and access codes with the numbers 1 to 4
117	Keypad (EasyAccess PINCode): – Consists of keys 0 to 9 and C (clear) – Entry of 4-digit set-up and access codes – Up to 100 access codes can be stored
118	Transponder reader (EasyAccess Transponder): – Up to 100 transponders can be stored
119	ISM Online: – If the truck is equipped with an ISM Online access module, see "ISM Online Access Module" operating instructions.

9.3 General Information about the Use of Keyless Access Systems

The default code is to be found on a sticker. When using for the first time, change the set-up code and remove the sticker!

- Default code: 1-2-3-4
- Factory set-up code: 2-4-1-2

→ When allocating the codes, ensure the rider trucks are given a different code than pedestrian trucks.

- When a valid code is entered or a valid transponder used, a green tick appears in the display unit.
When an invalid code has been entered or a invalid transponder used, a red cross is displayed, and the entry must be repeated.
- If the truck is not used for a certain length of time, the display unit switches to standby mode. Pressing any key cancels the standby mode.

The following additional settings can be performed by the manufacturer's customer service department.

9.4 Commissioning the keypad and the transponder reader

If the truck is equipped with a keypad or a transponder reader, it can only be operated using the keys in the display unit. The keypad and the transponder reader have to be activated by the operating company.

9.4.1 Activating the keypad

Procedure

- Release the emergency disconnect switch, see page 70.
- Enter the default code 1-2-3-4 using the keys below the display unit (116).

The truck is switched on.

- Press the key below the "Settings" symbol (120).
- Press the key below the "Change set-up code" symbol (121).
- Enter the set-up code 2-4-1-2 using the keypad (117).

The set-up code entered is displayed.

- When starting the truck for the first time, change the set-up code. The new set-up code must not be the same as the default set-up code or an access code.

Press the key below the "Delete" symbol (122).

The set-up code is deleted.

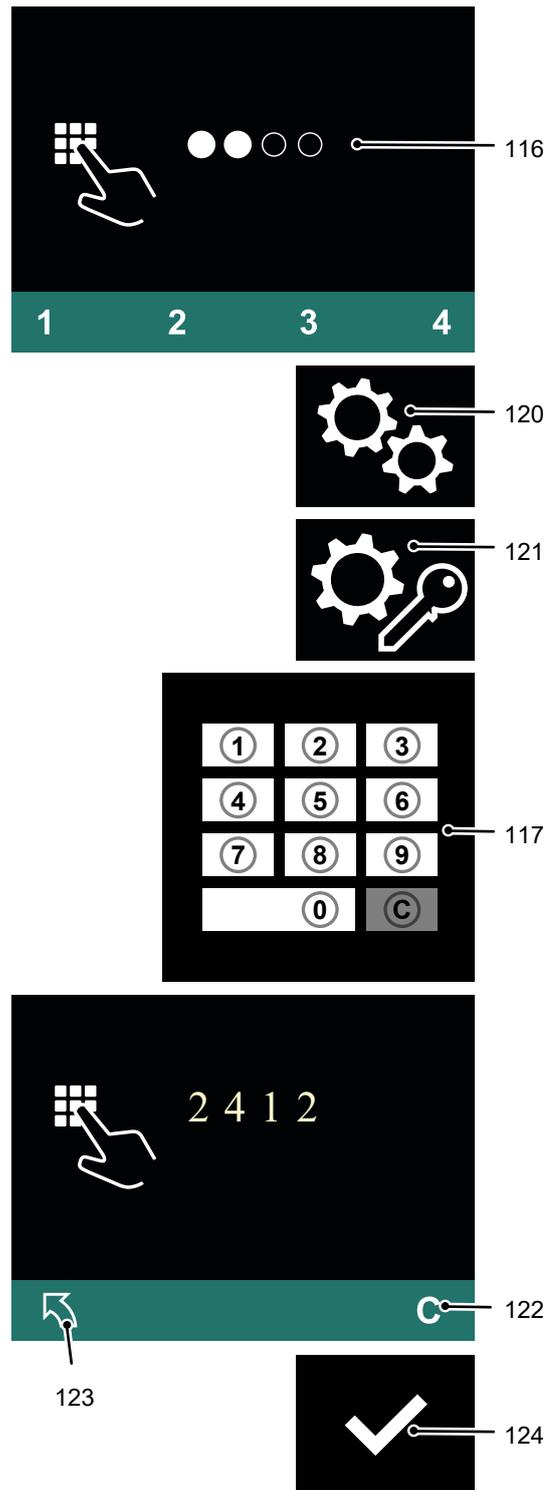
- Enter the new set-up code using the keypad (117).
- Press the key below the "Confirm" symbol (124).

The new set-up code is displayed.

- If the new set-up code was entered incorrectly, the procedure can be repeated using the key below the "Delete" symbol (122).

- To return to the main menu, press the key below the "Back" symbol (123).
- Delete the default code, see page 103.
- Create access codes, see page 102.

The keypad is active.



9.4.2 Activating the transponder reader

Procedure

- Release the emergency disconnect switch, see page 70.
- Enter the default code 1-2-3-4 using the keys below the display unit (116).

The truck is switched on.

- Press the key below the "Settings" symbol (120).
- Press the key below the "Change set-up code" symbol (121).
- Enter the set-up code 2-4-1-2 using the keys below the display unit (116).

The set-up code entered is displayed.

- Press the key below the "Delete" symbol (122).

The set-up code is deleted.

- Hold a transponder in front of the transponder reader (118).

This transponder thus becomes the set-up transponder.

- Press the key below the "Confirm" symbol (124).

The code for the set-up transponder is displayed.

→ *If the wrong transponder has been used, the procedure can be repeated using the key below the "Delete" symbol (122).*

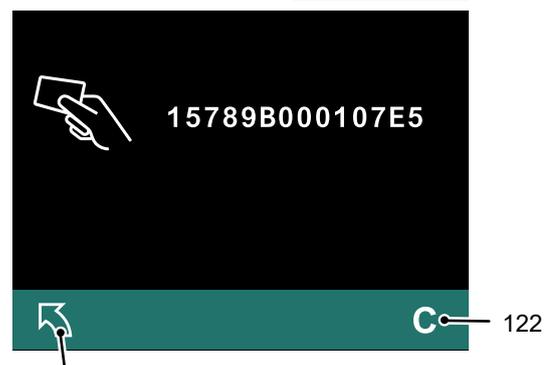
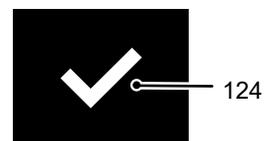
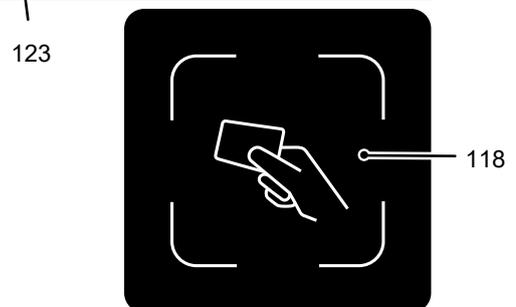
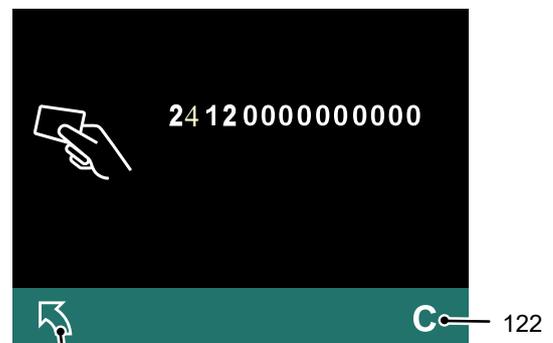
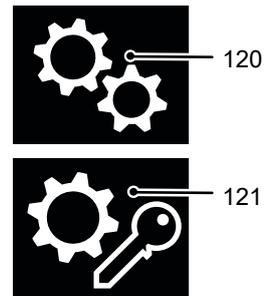
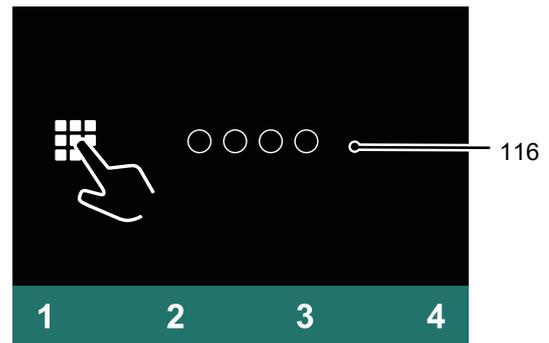
- To return to the main menu, press the key below the "Back" symbol (123).

→ The default code can no longer be used and must be deleted.

Delete the default code, see page 107.

- Add new transponders, see page 106.

The transponder reader is now active.



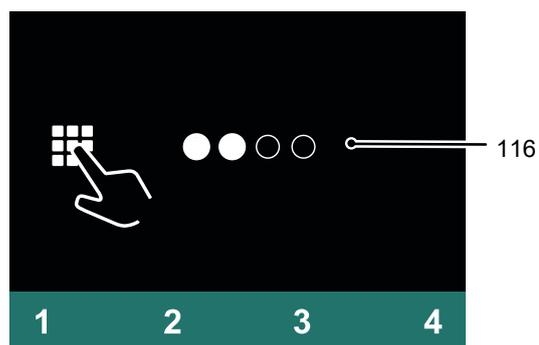
9.5 Using the Display:

9.5.1 Switching on the truck with an access code

Procedure

- Release the emergency disconnect switch, see page 70.
- Enter the access code with the buttons below the display (116).

The truck is switched on.

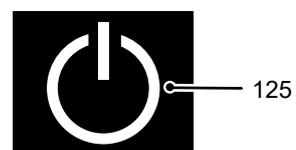


9.5.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (125) in the display unit.
- Press the Emergency Disconnect switch, see page 70.

The truck is switched off.



9.5.3 Changing the set-up code

Requirements

- The truck is switched on, see page 100.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Change set-up code" symbol (121).
- Enter the set-up code using the keys below the display unit (116).

The set-up code entered is shown as filled-in circles.

- Press the key below the "Delete" symbol (122).

The set-up code is deleted.

- Enter the new set-up code using the keys below the display unit (116).

→ The new set-up code must be different from existing access codes.

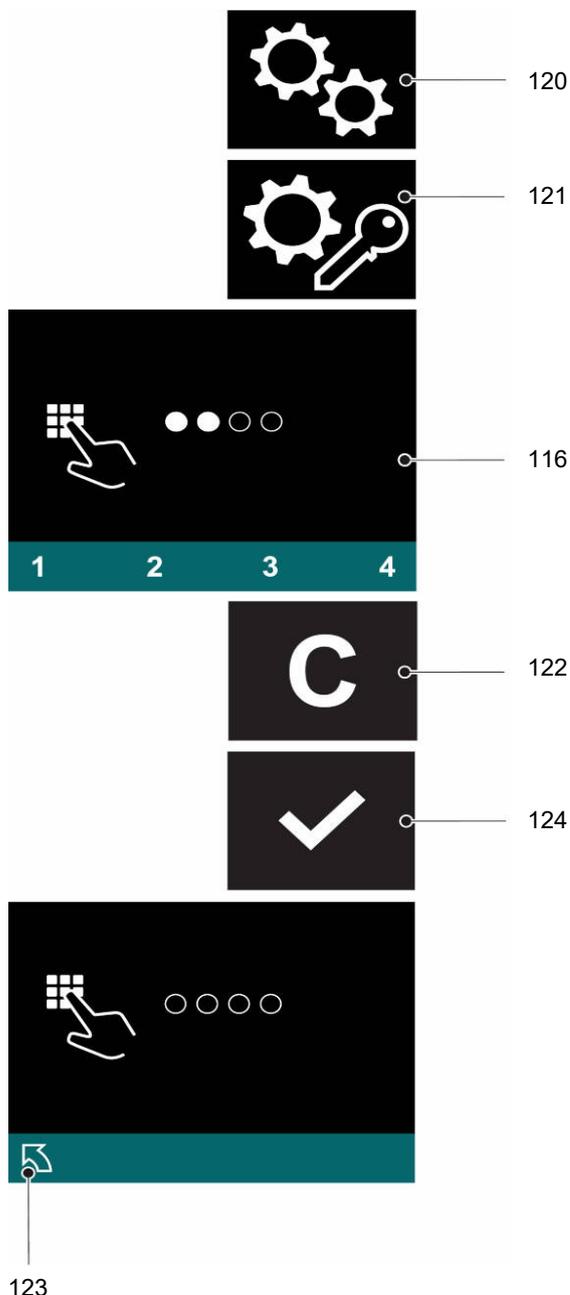
- Press the key below the "Confirm" symbol (124).

The new set-up code is displayed.

→ If the new set-up code has been entered incorrectly, delete it and add a set-up code again.

To return to the main menu, press the key below the "Back" symbol (123).

The set-up code has been changed.



9.5.4 Adding a new access code

Requirements

- The truck is switched on, see page 96.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Edit access code" symbol (126).

The set-up code is requested.

- Enter the set-up code using the keys below the display unit (116).

All the access codes are displayed.

- Press the key below the "Add" symbol (127).
- Enter the new access code using the keys below the display unit (116).

→ The new access code must be different from existing access codes.

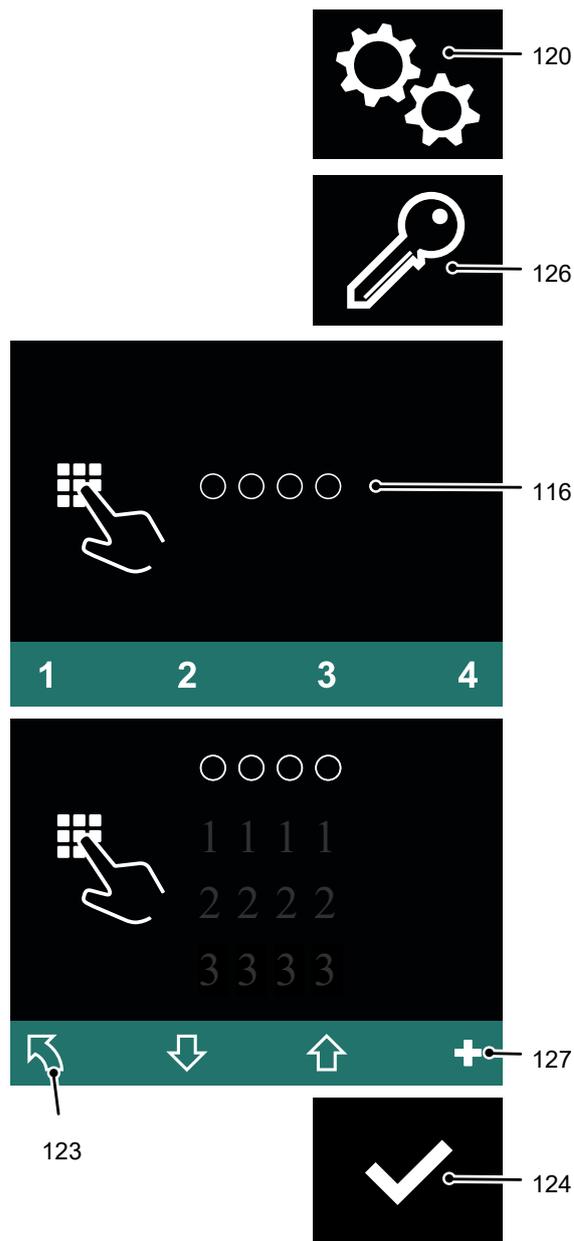
- Press the key below the "Confirm" symbol (124).

The new access code is displayed.

→ If the new access code has been entered incorrectly, delete it, see page 99, and add an access code again.

To return to the main menu, press the key below the "Back" symbol (123).

A new access code has been added.



9.5.5 Deleting an access code

Requirements

- The truck is switched on, see page 96.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Edit access code" symbol (126).

The set-up code is requested.

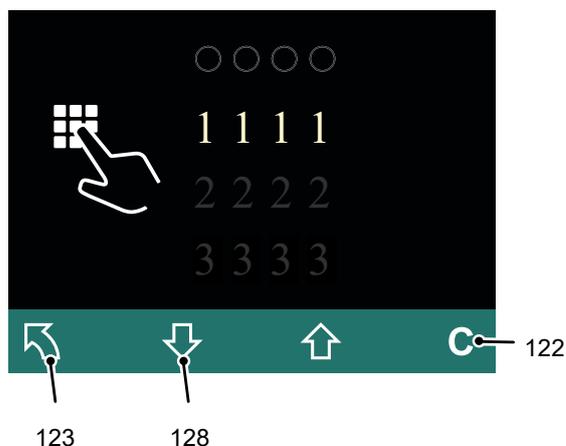
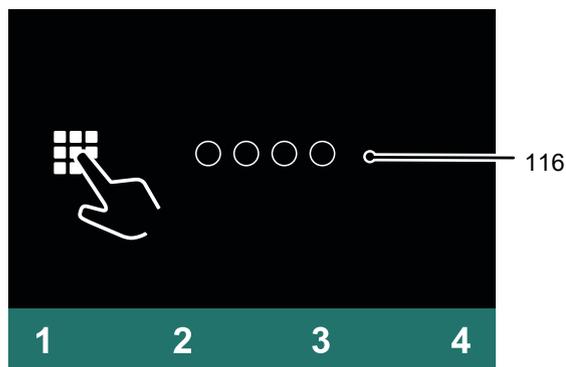
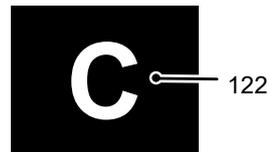
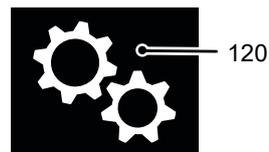
- Enter the set-up code using the keys below the display unit (116).

All the access codes are displayed.

- Select the access code to be deleted using the key below the "Down selection" symbol (128).
- Press the key below the "Delete" symbol (122).

The access code has been deleted.

- To return to the main menu, press the key below the "Back" symbol (123).



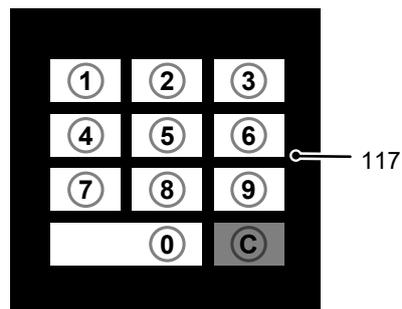
9.6 Using the Keypad

9.6.1 Switching on the truck with an access code

Procedure

- Release the emergency disconnect switch, see page 70.
- Enter the access code with the keypad (117).

The truck is switched on.

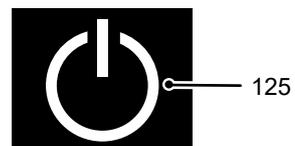


9.6.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (125) in the display unit.
- Press the Emergency Disconnect switch, see page 70.

The truck is switched off.



9.6.3 Changing the set-up code

Requirements

- The truck is switched on, see page 100.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Change set-up code" symbol (121).
- Enter the set-up code using the keypad (117).

The set-up code entered is shown in the display unit (116) as filled-in circles.

- Press the key below the "Delete" symbol (122).

The set-up code is deleted.

- Enter the new set-up code using the keypad (117).

→ The new set-up code must be different from existing access codes.

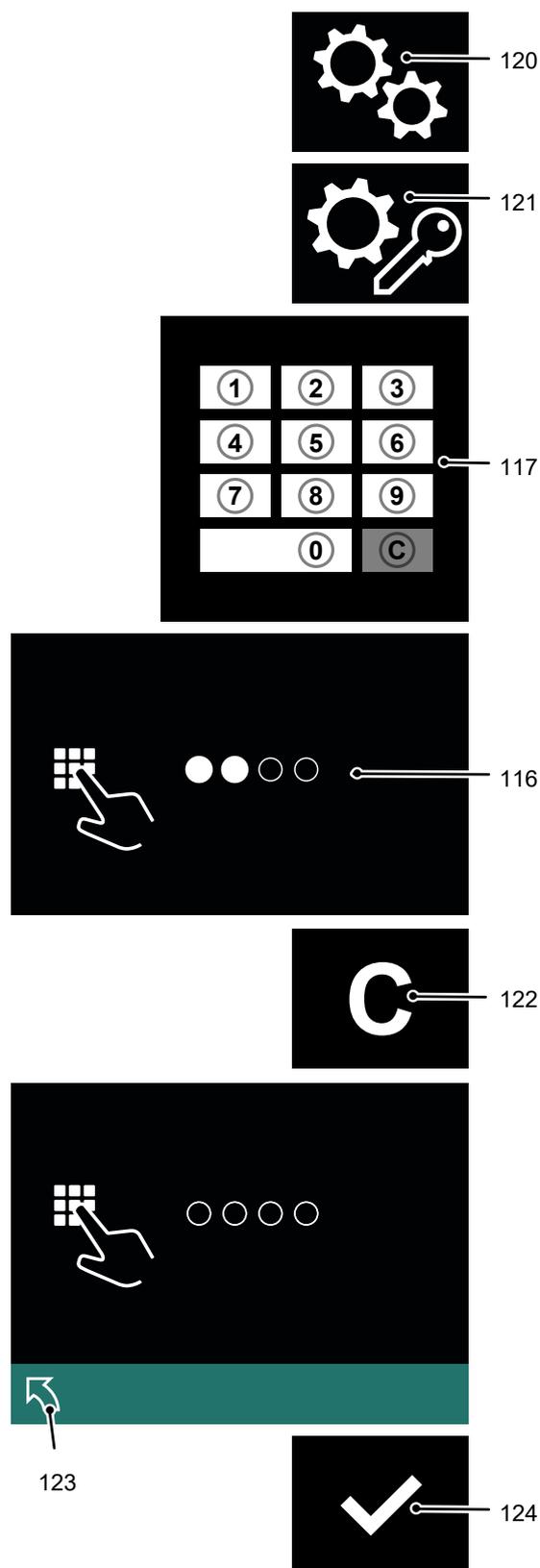
- Press the key below the "Confirm" symbol (124).

The new set-up code is displayed.

→ If the new set-up code has been entered incorrectly, delete it and enter the correct set-up code.

To return to the main menu, press the key below the "Back" symbol (123).

The set-up code has been changed.



9.6.4 Adding a new access code

Requirements

- The truck is switched on, see page 100.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Edit access code" symbol (126).

The set-up code is requested.

- Enter the set-up code using the keypad (117).

All access codes are shown on the display unit (116).

- Press the key below the "Add" symbol (127).
- Enter a new access code using the keypad (117).

→ The new access code must be different from existing access codes.

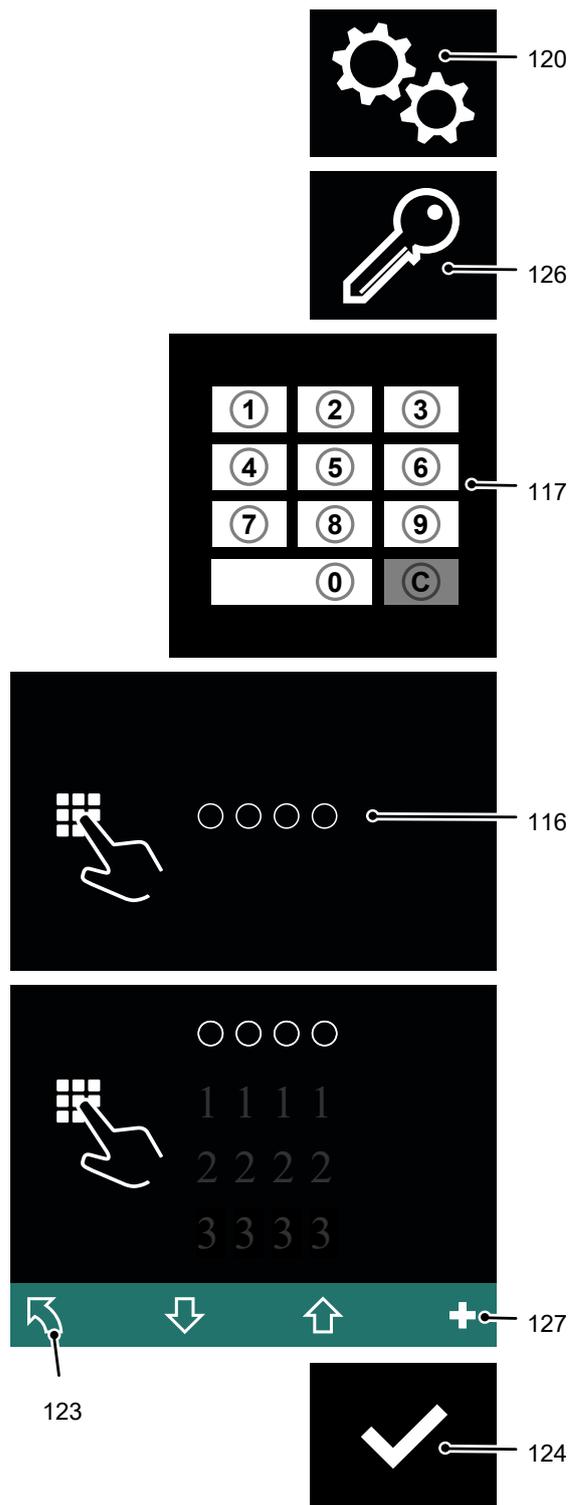
- Press the key below the "Confirm" symbol (124).

The new access code is shown on the display unit (116).

→ If the new access code has been entered incorrectly, delete it, see page 103, and enter the correct access code.

To return to the main menu, press the key below the "Back" symbol (123).

A new access code has been added.



9.6.5 Deleting an access code

Requirements

- The truck is switched on, see page 100.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Edit access code" symbol (126).

The set-up code is requested.

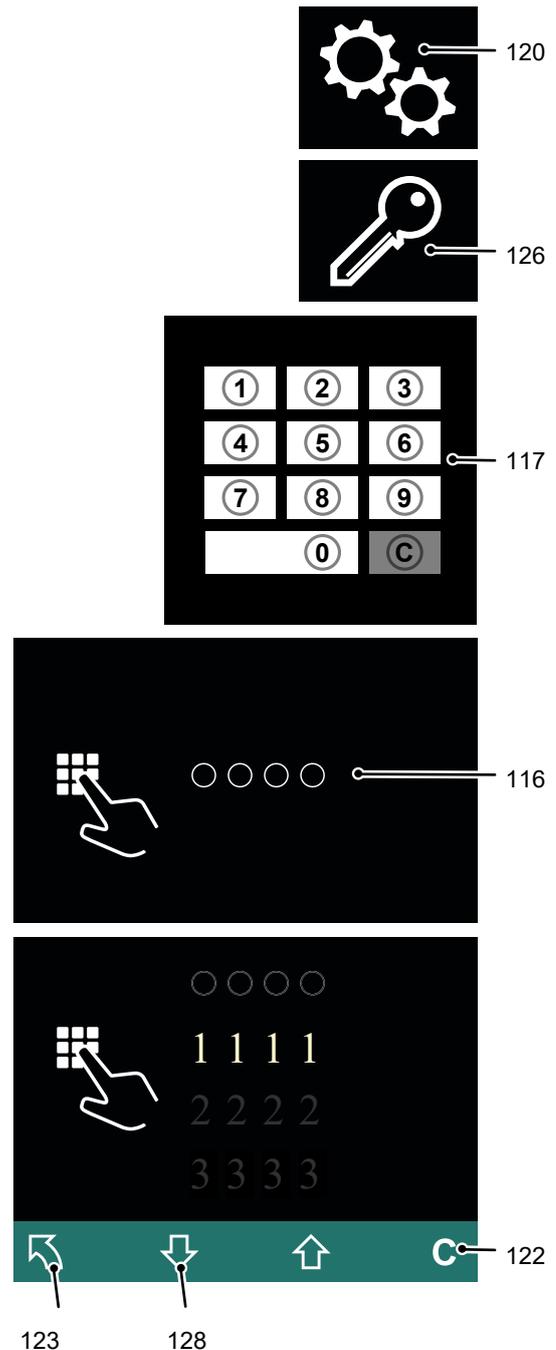
- Enter the set-up code using the keypad (117).

All access codes are shown on the display unit (116).

- Select the access code to be deleted using the key below the "Down selection" symbol (128).
- Press the key below the "Delete" symbol (122).

The access code has been deleted.

- To return to the main menu, press the key below the "Back" symbol (123).



9.7 Using the Transponder Reader

NOTICE

Take care not to damage the transponder. If the transponder is damaged, the truck cannot be switched on.

9.7.1 Switching on the truck with a transponder

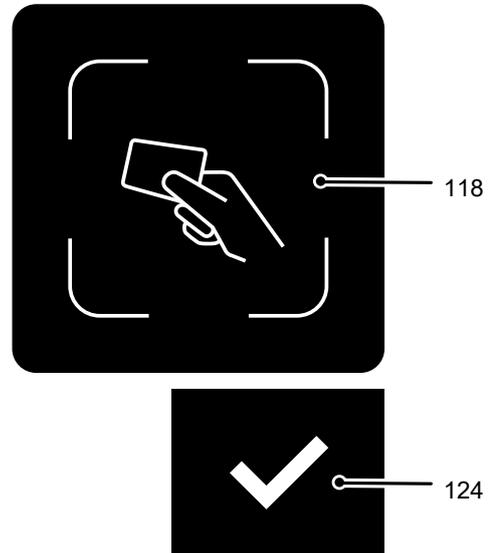
Procedure

- Release the Emergency Disconnect switch, see page 70.
- Hold the transponder in front of the transponder reader (118).

A green tick appears and remains until the transponder has been confirmed. If there is no confirmation within 20 seconds the access prompt appears.

- Press the button below the "Confirm" symbol (124).

The truck is switched on.

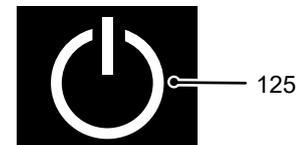


9.7.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (125) in the display unit.
- Press the Emergency Disconnect switch, see page 70.

The truck is switched off.



9.7.3 Changing the set-up transponder

Requirements

- The truck is switched on, see page 104.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Change set-up code" symbol (121).
- Place the set-up transponder on the transponder reader (118).

The code of the set-up transponder is shown on the display unit (116).

- Press the key below the "Delete" symbol (122).
- Place the new set-up transponder on the transponder reader (118).

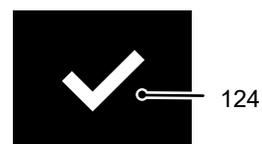
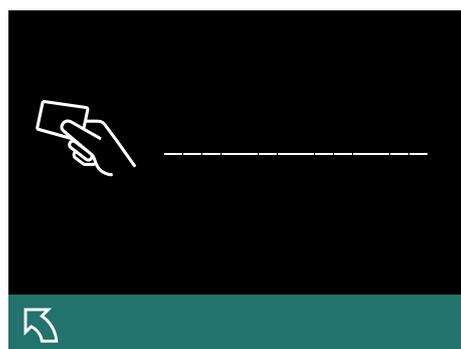
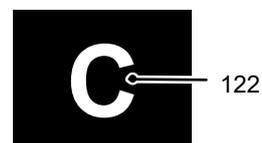
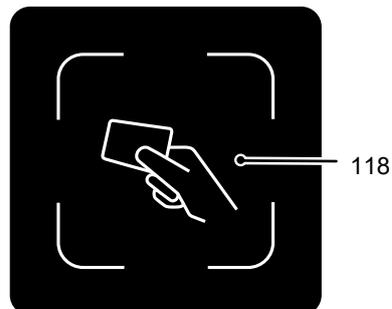
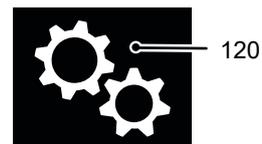
→ The new set-up transponder code must be different from existing transponder codes.

- Press the key below the "Confirm" symbol (124).
- The new code for the set-up transponder is displayed.*

→ If the wrong transponder has been used, the procedure can be repeated using the key below the "Delete" symbol (122).

To return to the main menu, press the key below the "Back" symbol (123).

The set-up transponder has been changed.



123

9.7.4 Adding a new transponder

Requirements

- The truck is switched on, see page 104.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Edit transponder" symbol (126).

The set-up transponder is requested.

- Place the set-up transponder on the transponder reader (118).

All transponder codes are shown on the display unit (116).

- Press the key below the "Add" symbol (127).
- Place the new transponder on the transponder reader (118).

→ The new transponder code must be different from existing transponder codes.

- Press the key below the "Confirm" symbol (124).

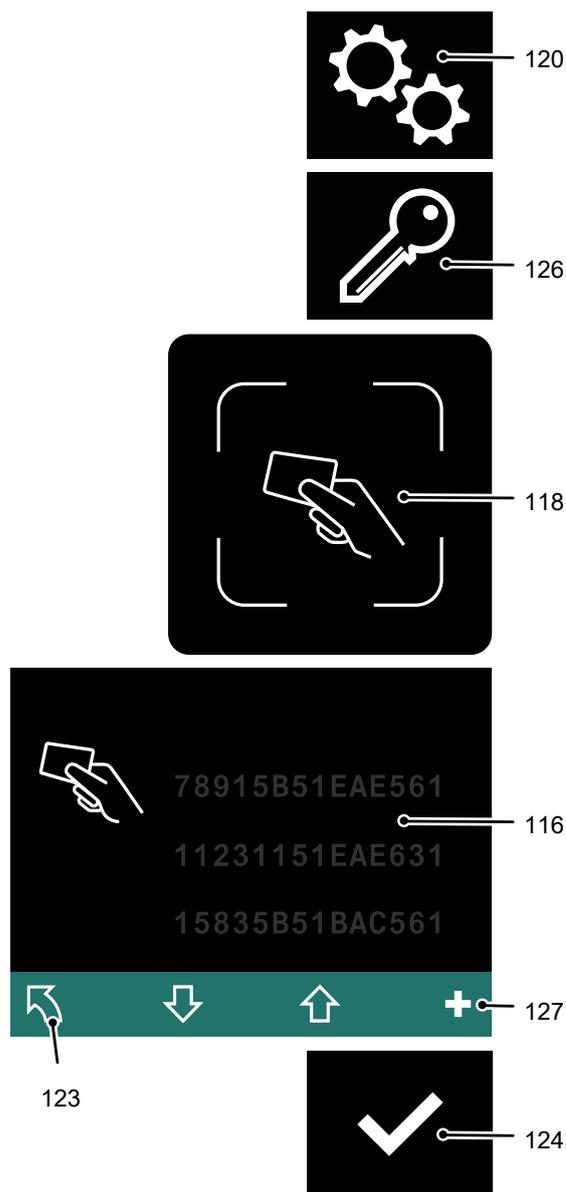
The new transponder code is displayed.

→ If the wrong transponder has been used, delete it, see page 107, and add a correct transponder.

To return to the main menu, press the key below the "Back" symbol (123).

A new transponder has been added.

→ The transponder codes saved are sorted first of all numerically and then alphabetically.



9.7.5 Deleting a transponder

Requirements

- The truck is switched on, see page 104.

Procedure

- Press the key below the "Settings" symbol (120).
- Press the key below the "Edit transponder" symbol (126).

The set-up transponder is requested.

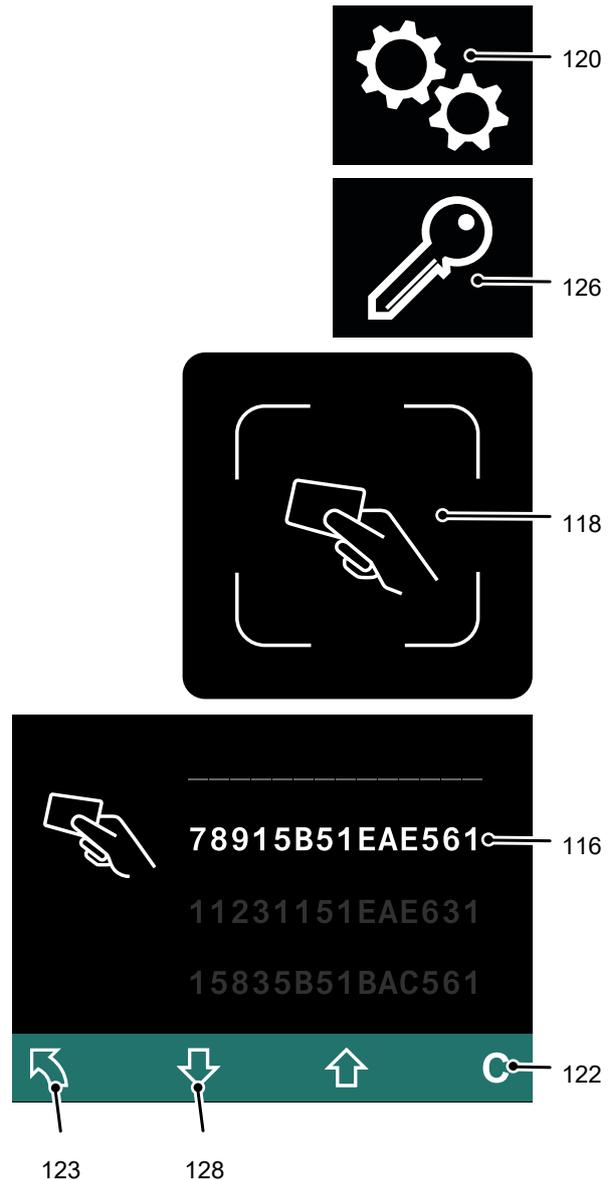
- Place the set-up transponder on the transponder reader (118).

All transponder codes are shown on the display unit (116).

- Select the transponder code to be deleted using the key below the "Down selection" symbol (128).
- Press the key below the "Delete" symbol (122).

The transponder has been deleted.

- To return to the main menu, press the key below the "Back" symbol (123).

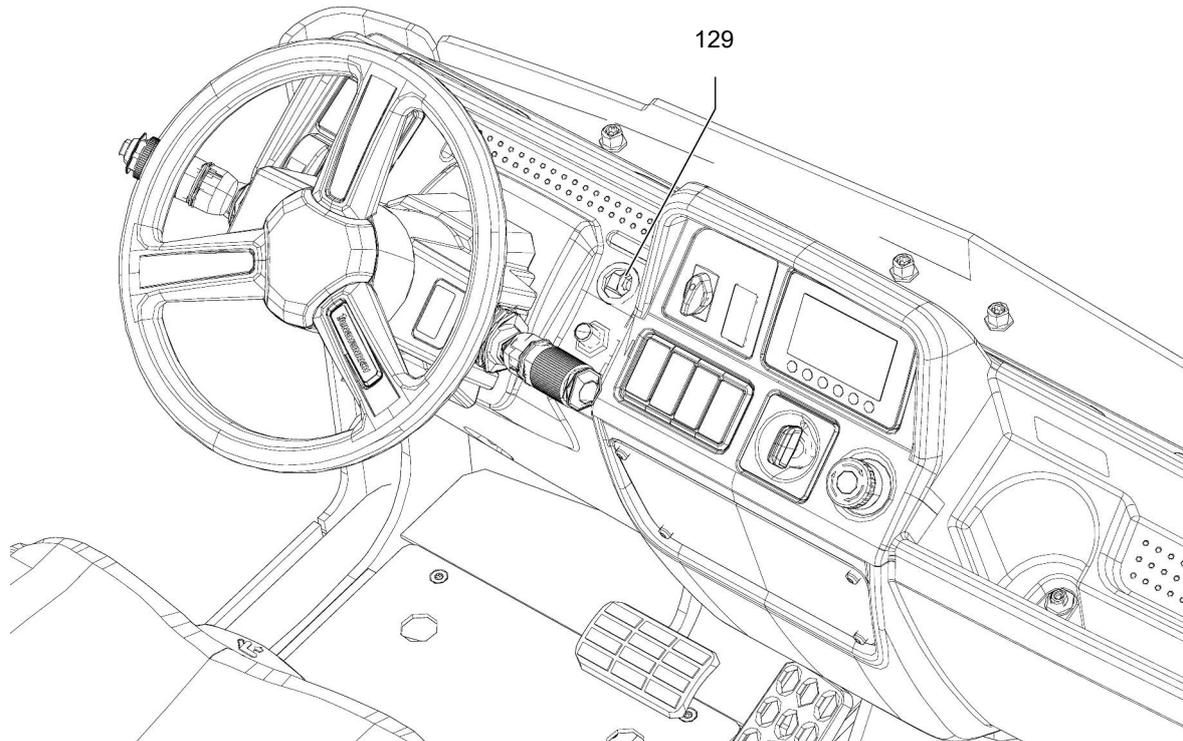


9.8 ISM access module

- If the truck is equipped with an ISM access module refer to the “ISM Access Module” operator manual.

9.9 Motor vehicle socket 24 V

The 24 V truck socket (129) delivers a maximum of 2 A.



9.10 Tugger Train

9.10.1 Safety regulations for travel mode

⚠ WARNING!

Removing or disabling safety devices can cause accidents

Removing or disabling safety devices such as the emergency disconnect switch, panels etc. can result in accidents and injury.

- ▶ Report any defects immediately to your supervisor.
 - ▶ Defective tugger trains or trailers must be taken out of service and labelled accordingly.
 - ▶ Do not return the tugger train to service until you have identified and rectified the fault.
-

⚠ WARNING!

Trapping hazard

High risk of injury between the trailers

- ▶ The operator bears the responsibility for ensuring that no one comes between the trailers during travel.
 - ▶ It is permitted to stand between the trailers only during coupling and uncoupling operations, which must be performed by the operator personally.
-

⚠ WARNING!

Trailer load

In difficult operating conditions (inclines, smooth or slippery travel lanes), the trailer load must be reduced as necessary to ensure braking without risk of accidents. The maximum load specified applies only for towing on level, non-slip ground with sufficient capacity.

⚠ WARNING!

Trailer load under difficult operating conditions

The maximum load specified applies only for the tow tractor on level, non-slip ground with sufficient capacity. Under difficult operating conditions (downhill slopes, smooth or slippery travel lanes) the following must be observed:

- ▶ Reduce the trailer load so that it is possible to brake safely.
 - ▶ Drive carefully, as the risk when operating the tugger train increases with increasing load.
-

⚠ CAUTION!

Risk of injury due to out-of-control trailers

Failure to pay attention to the tugger train can result in it getting out of control and causing injuries as well as material damage.

- ▶ Before setting off, the operator must make sure that the trailer coupling is secure.
-

⚠ CAUTION!

- ▶ Always pull, never push trailers.
 - ▶ Familiarise yourself with the travel behaviour of the tugger train when you start to travel.
-

9.10.2 Setting up the tugger train

⚠ CAUTION!

Risk of injury due to electrical interface

If the tugger train is put together starting at the tow tractor, there is a risk of electric shock in the event of physical contact with the cable connection.

- ▶ Set up the tugger train starting at the rear.
 - ▶ Plug the final connector into the last trailer.
 - ▶ The electrical connection between the first trailer and the tow tractor should be made last of all. Connect the cable connection to the trailer first and then to the tow tractor.
-

⚠ CAUTION!

The total load of the tugger train must not exceed the maximum trailer load of the tow tractor.

Setting up a tugger train with a hydraulic interface

Requirements

- Tow tractor with a suitable coupling at the same height as the towing mechanism.
- Tow tractor with a sufficient rated drawbar pull.

Procedure

- Mechanically connect all trailers in series.
- Establish hydraulic connections between trailer and trailer and between trailers and tow tractor.
- Check that the connections are secure.

The tugger train has been set up.

Setting up a tugger train with an electrical interface

Requirements

- Tow tractor with a suitable coupling at the same height as the towing mechanism.
- Tow tractor with a sufficient rated drawbar pull.

Procedure

- Mechanically connect all trailers in series.
- Connect the power connections.



Always start from the end of the tugger train!

- Plug the final connector in the truck socket of the last trailer.
- Establish the connection between the last trailer and the penultimate trailer.
- Establish any further connections.
- Establish the connection between the first trailer and the tow tractor.
 - Plug the connector into the truck socket of the trailer.
 - Plug the connector into the truck socket of the tow tractor.

The tugger train has been set up.

9.10.3 Travelling in a tugger train

⚠ CAUTION!

Risk of accident

- ▶ The tugger train is to be used only in warehouse zones that are closed off to other personnel.
 - ▶ All persons working in the warehouse must be instructed in the properties of the tugger train and be aware of its special features.
 - ▶ The tugger train operator must ensure that other persons keep a safe distance to the tugger train.
 - ▶ It is not permitted to be between the trailers.
 - ▶ It is not permitted to carry passengers.
 - ▶ It is not permitted to reverse with the tugger train.
-

NOTICE

Instability of the tugger train

Toppling of the tugger train

- ▶ The operator must ensure that the trolleys are evenly loaded.
 - ▶ To increase the stability of the tugger train, the operator must ensure that heavy loads are loaded as far to the front and light loads as far to the rear of the tugger train as possible.
 - ▶ The operator must also ensure that the trailers are always loaded from front to back.
-

9.10.4 Separating the tugger train

Separating a tugger train with a hydraulic interface

Requirements

- Tow tractor parked securely.
- Trailers parked securely.
- Tugger train is on level ground and not on any inclines.
- The trailer loads are fully lowered.

Procedure

- Disconnect the hydraulic connection between tow tractor and trailer.
 - Disconnect the connection on the tow tractor.
 - Disconnect the connection on the trailer.
- Disconnect the other hydraulic connections between trailer and trailer.
- Mechanically separate all trailers.

The tugger train has been separated.

Separating a tugger train with an electrical interface

Requirements

- Tow tractor parked securely.
- Trailers parked securely.
- Tugger train is on level ground and not on any inclines.

Procedure

- Disconnect the connection between the tow tractor and the first trailer.
 - Disconnect the connector from the truck socket of the tow tractor.
 - Disconnect the connector from the truck socket of the trailer.
- Disconnect the power connections.

 Always start from the start of the tugger train!

- Disconnect the connection between the trailers.
- Disconnect the connection between the penultimate trailer and the last trailer.
- Mechanically separate all trailers.

The tugger train has been separated.

9.11 Interface between Tow Tractor and Trailer

9.11.1 Electrical interface (○)

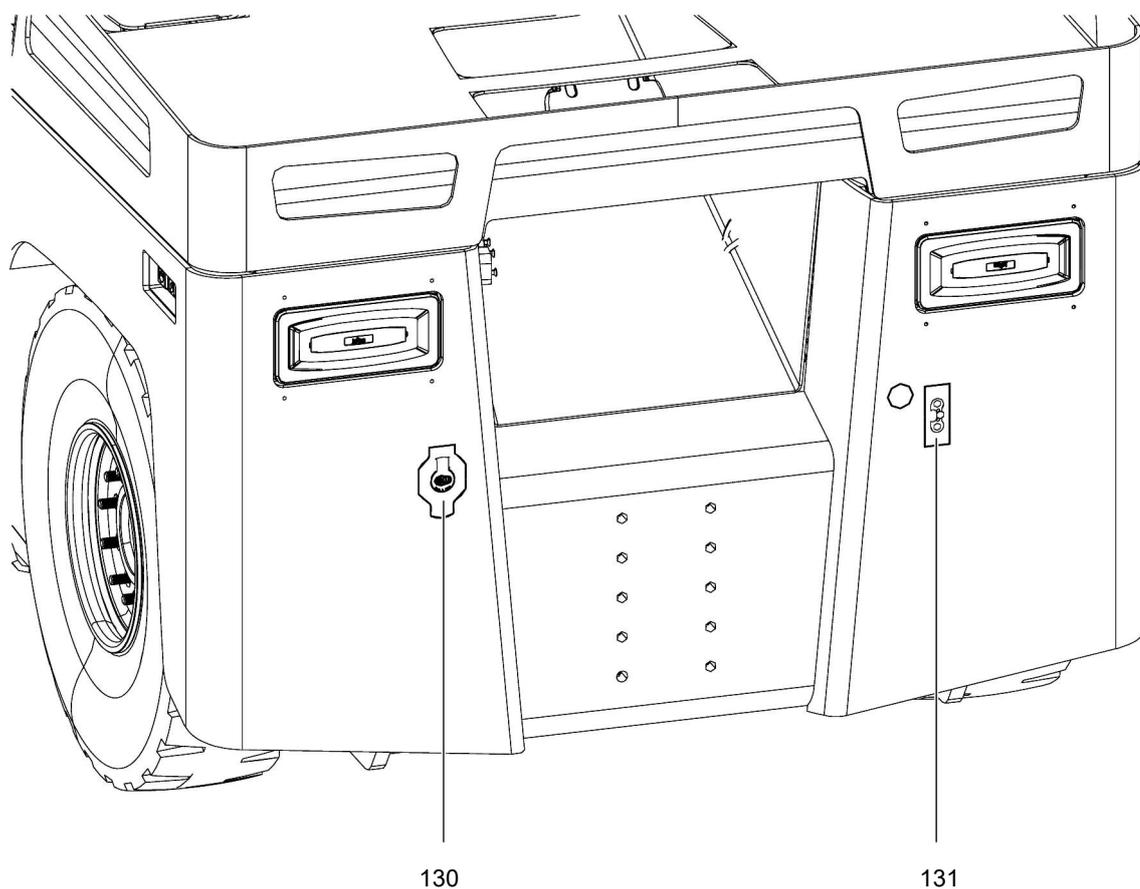
There is a connector (131) on the back of the tow tractor that ensures an electrical power supply for trailers. A standard configuration and optional configuration are available:

Standard

- Power supply
- Lift/lower via a switch on the trailer

Option

- Travel release signal when all trailers are raised with this option.
- Reduction in travel speed when tugger train is cornering, if the trailers are equipped with this option.
- Indicator lamp for lift limit when all trailers are raised with this option.
- Lighting signals via truck socket (130).



9.11.2 Hydraulic interface (○)

NOTICE

Hydraulic connection for the tugger train

All hydraulic connections must be established. Once the operating pressure is reached, the travel release is issued and the indicator lamp illuminates.

If a connection has not been properly established, the load will raise only up to the incorrect connection. The travel release will nevertheless be issued.

- ▶ Check all hydraulic connections.
- ▶ No hydraulic connection can be loosened under pressure. All loads must be lowered.

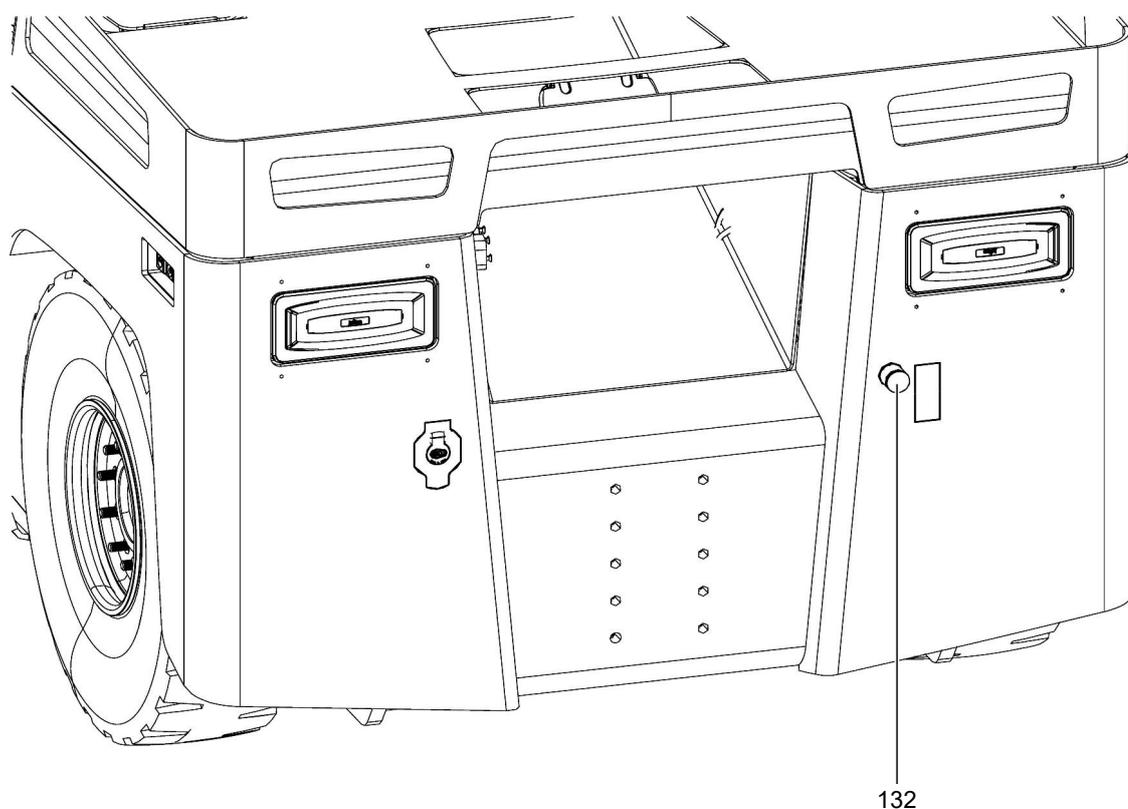
There is a hydraulic quick-release coupling (132) on the back of the tow tractor that ensures a hydraulic supply for the trailer. A basic configuration and optional configuration are available:

Basic

- Lift by actuating a seat switch.
- Travel release when pressure in system is sufficient.

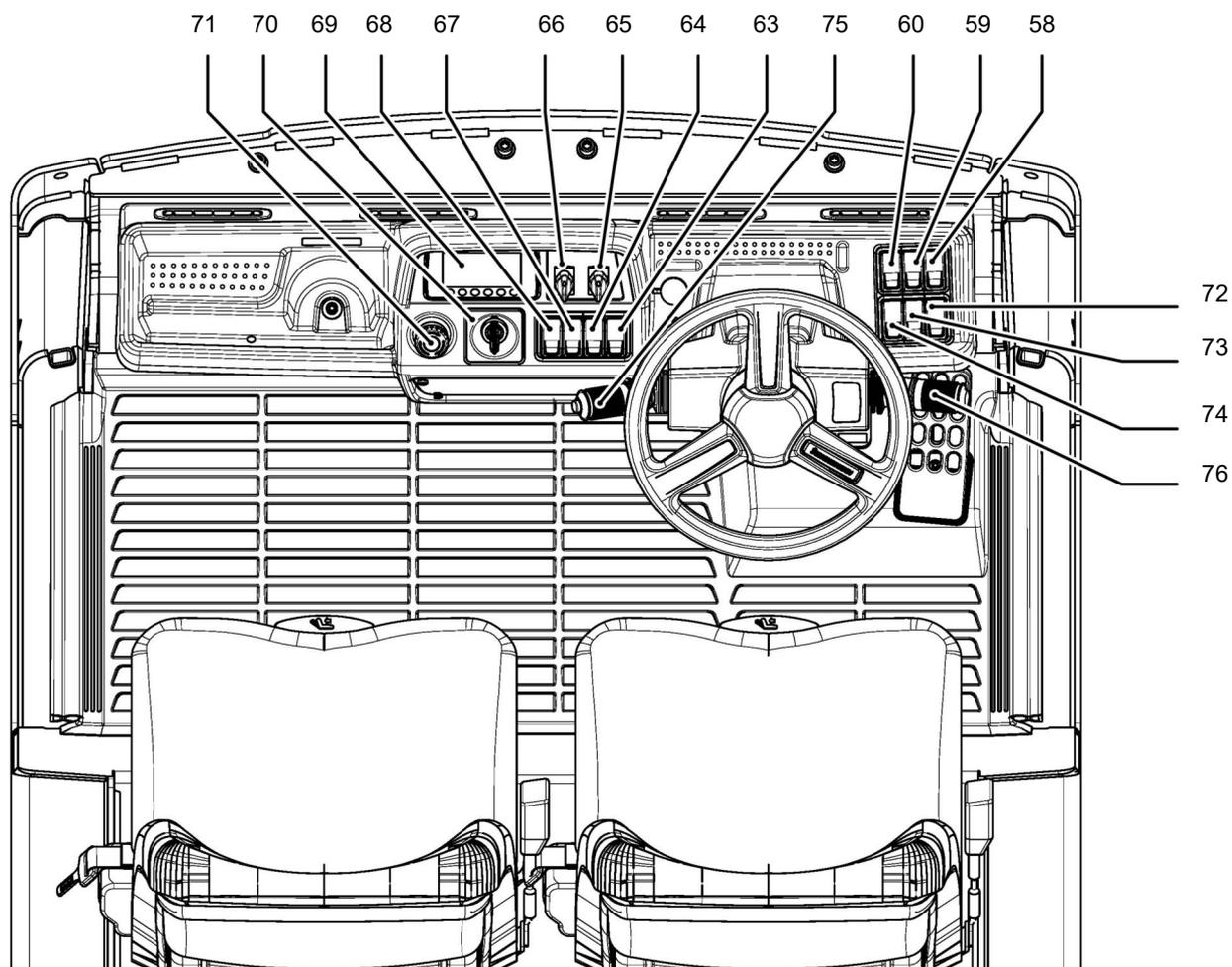
Optional

- Lift/lower via switch in instrument panel.

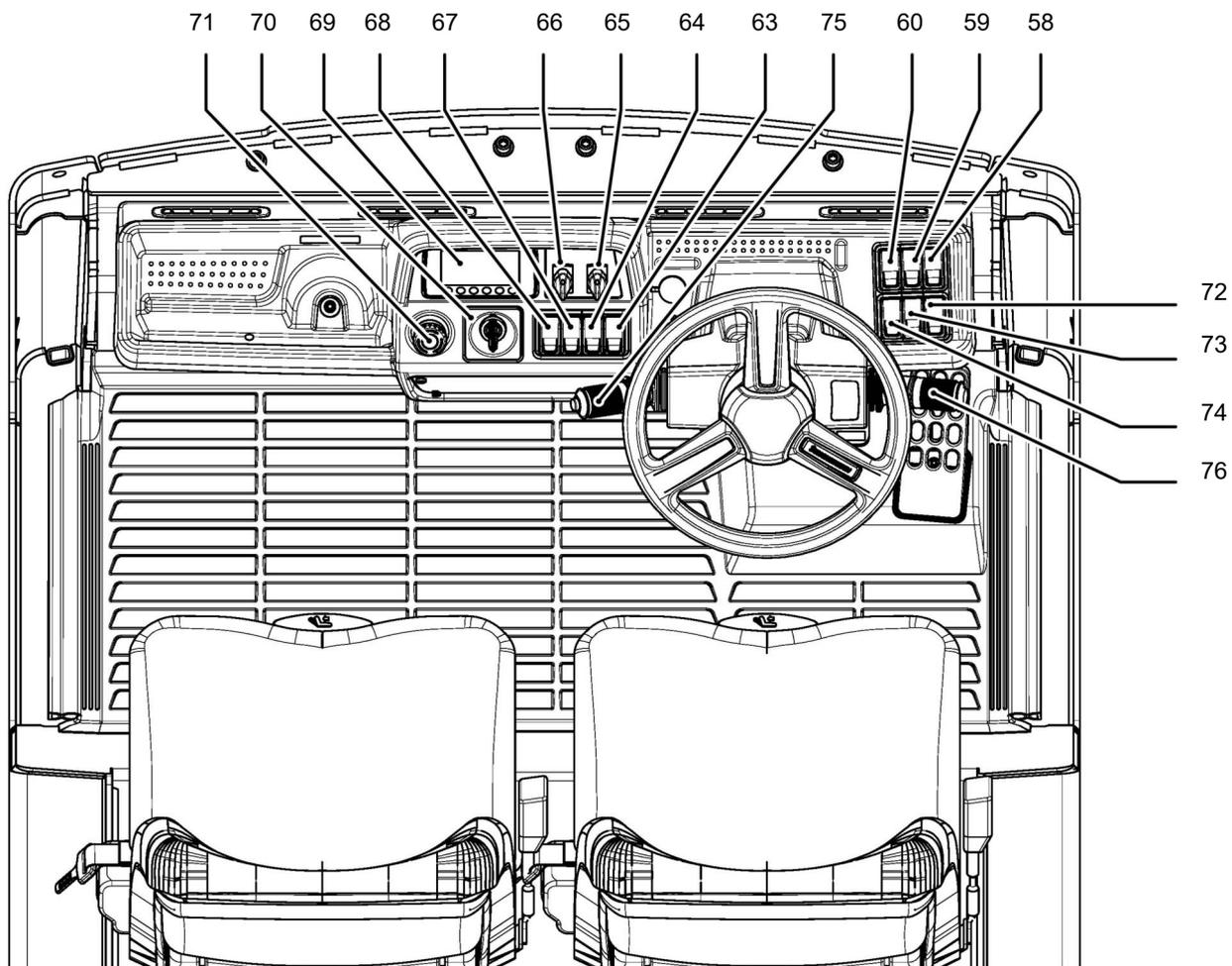


9.12 Right-hand drive

9.12.1 Displays and Controls



Item	Control /display		Function
58	"Strobe light" switch	<input type="radio"/>	Activates the strobe light
59	"Fog light" switch	<input checked="" type="radio"/>	Activates the fog lights.
60	"Hazard warning lights" switch	<input checked="" type="radio"/>	Activates the hazard warning lights.
63	"Release electrical coupling - 2" switch	<input type="radio"/>	Pressing the "Release electrical coupling - 1" (74) and "Release electrical coupling - 2" (63) switches at the same time opens the electrical coupling.
64	"Rear windscreen wiper" switch	<input type="radio"/>	Activates the rear windscreen wiper.
65	"Fan" rotary switch	<input type="radio"/>	Activates the fan
66	"Heater" rotary switch	<input type="radio"/>	Activates the heater.



Item	Control /display		Function
67	"Rear windscreen heater" switch	<input type="radio"/>	Activates the rear windscreen heater.
68	"Crawl speed" switch	<input checked="" type="radio"/>	Activates "crawl speed" travel mode. – The truck travels at reduced speed.
69	Control and display unit	<input checked="" type="radio"/>	Displays steering modes, warning indicators, incorrect operation notes and service displays. <input type="radio"/>
		<input type="radio"/>	Switches on the truck using Easy Access with PIN code.

Item	Control /display		Function
70	Key switch and key	●	<ul style="list-style-type: none"> – Activates the truck by applying the control voltage. – Removing the key prevents the truck from being switched on by unauthorised personnel.
	CanCode	○	<ul style="list-style-type: none"> Replaces the key switch – Entering the correct code activates the truck. – Travel program selection. – Code setting
	ISM	○	<ul style="list-style-type: none"> Replaces the key switch – Releases the truck via a card/transponder. – Displays readiness for operation. – Operational-data logging – Data exchange with card/transponder
71	Emergency disconnect switch	●	<ul style="list-style-type: none"> Disconnects the battery supply – All electrical functions are cut out and the industrial truck decelerates.
72	"Truck lighting" switch	●	Activates the front/rear headlights.
		○	<ul style="list-style-type: none"> Switch not present with corresponding option – Truck light is permanently activated.
73	"Lower trailer" switch	○	Lowers the raised trailer.
74	"Release electrical coupling - 1" switch	○	Pressing the "Release electrical coupling - 1" (74) and "Release electrical coupling - 2" (63) switches at the same time opens the electrical coupling.
75	Left-hand steering column lever	●	<ul style="list-style-type: none"> – Indicator – Windscreen wiper – Main beam – High-beam flasher – Front washer fluid – Horn
76	Right-hand steering column lever	●	Travel direction setting.

9.13 Floor-Spot

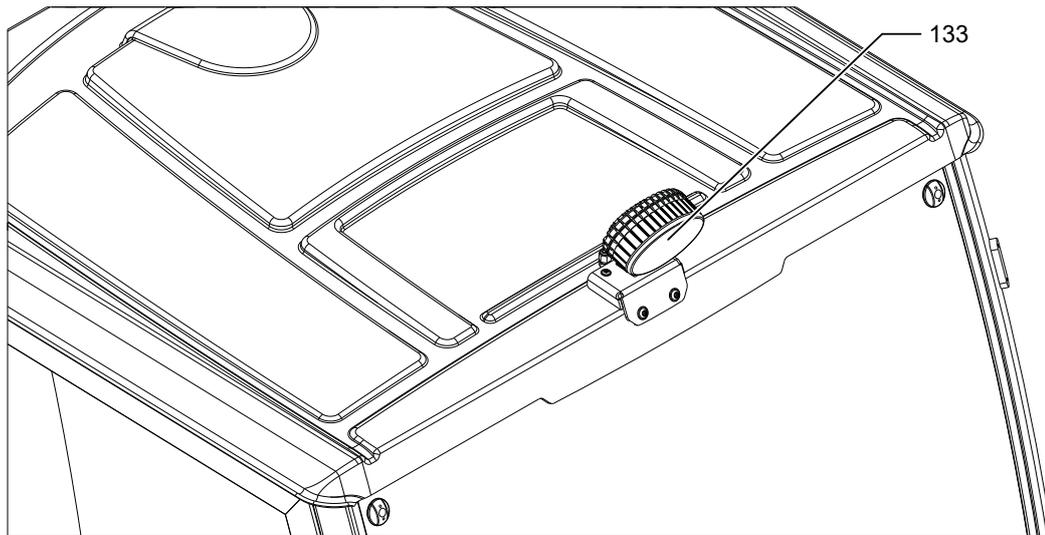
The floor spot serves as an auxiliary device and projects a coloured dot onto the ground.

⚠ CAUTION!

Risk of accident due to restricted view

Looking directly at the LED light can dazzle and temporarily impair eyesight.

- ▶ Do not look directly at the LED light.
- ▶ Practise travelling and working with the floor spot carefully.
- ▶ Do not change the factory setting.



Item	Description
133	Floor-Spot

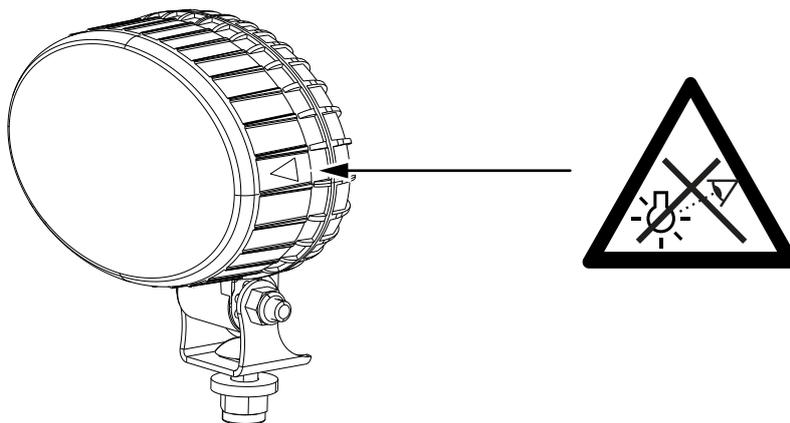
9.13.1 Additional information on Floor-Spot blue

⚠ CAUTION!

Risk of retinal damage due to blue light

The Floor-Spot on the truck is classified in risk group 2 according to the standard IEC 62471: medium risk. In the range of 400 nm to 780 nm, blue light can potentially damage the retina of the human eye.

- ▶ Check that the warning notice: "Caution! Potentially dangerous optical radiation" is present and legible, and replace if necessary.
 - ▶ Do not look directly into the light beam of the Floor-Spot.
 - ▶ When performing maintenance and repairs, take the Floor-Spot out of service, e.g. by disconnecting the battery, and secure it against unintentional recommissioning.
-



9.14 Seat Belt

⚠ WARNING!

Travelling without a seat belt increases the risk of injury.

Accidents or personal injury can result if the seat belt is not worn or is modified.

- ▶ Always put the seat belt on before starting the industrial truck.
 - ▶ Do not modify the seat belt.
 - ▶ Damaged or non-operational seat belts must be replaced by trained personnel.
 - ▶ Seat belts must always be replaced after an accident.
 - ▶ Only original spare parts must be used for retrofits or repairs.
 - ▶ Report any defects immediately to your supervisor.
 - ▶ Remove the truck from service until a functional seat belt has been fitted.
-

⚠ WARNING!

What to do if the industrial truck tips over

If the truck is in danger of tipping over, the operator should not jump out of the truck, and must keep his whole body inside the operator position.

The operator:

- ▶ Must not leave the driver's seat under any circumstance
 - ▶ Must not jump off the truck
 - ▶ Must hold onto the operator position with both hands
 - ▶ Must brace himself with both feet
 - ▶ Must lean against the direction of fall
 - ▶ Must not undo the seat belt
-

NOTICE

The driver must check the operation and condition of the seat belt each day before using the industrial truck.

- ➔ Protect the seat belt from contamination (e.g. cover it when the truck is idle) and clean it regularly. Frozen belt locks or pulleys must be thawed out and dried to prevent them from freezing up again.
The temperature of the warm air should not exceed +60 °C!

Checking the seat belt

Procedure

- Check the attachment points for wear and damage.
- Check the cover for damage.
- Pull the belt out fully from the retractor and check for damage (loose seams, fraying and nicks).
- Test the belt buckle and make sure the belt returns correctly into the retractor.

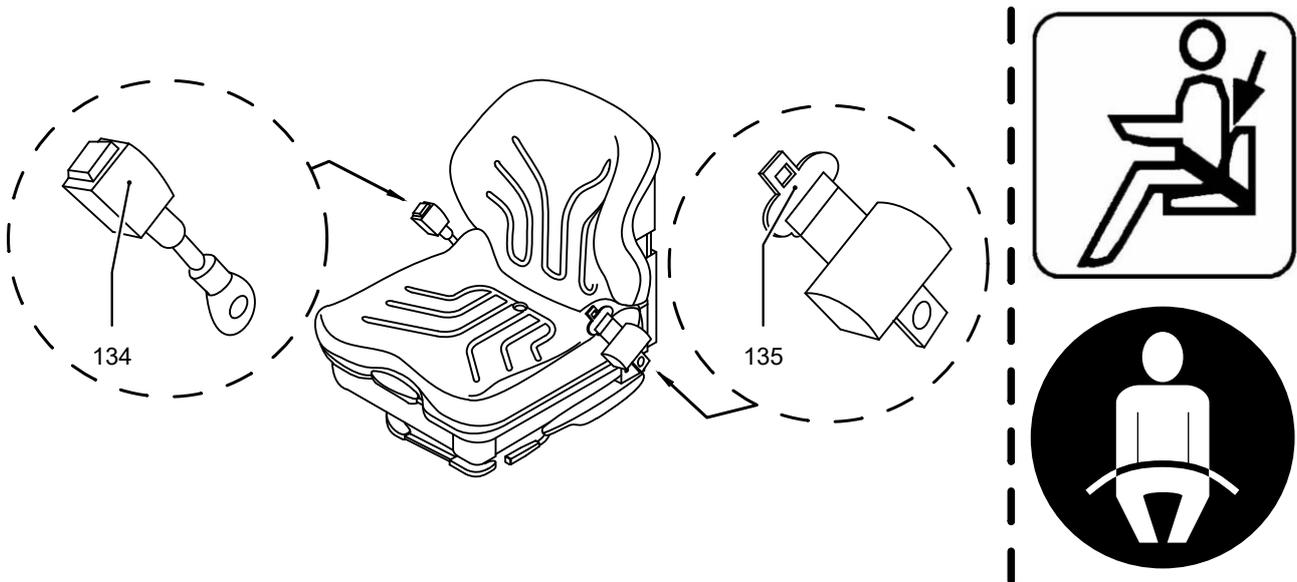
Check the automatic locking system

Procedure

- Park the truck on a level surface.
- Jerk the seat belt out suddenly.

 The locking system should prevent the belt from coming out.

The seat belt has now been checked.



Wear seat belt

Procedure

⚠ CAUTION!

Excessive belt length can be hazardous

If you sit on the front edge of the seat there is less protection afforded if the seat belt is too long.

► Place the seat belt as tightly as possible against your body.

Sit on the driver's seat so that your back is resting against the backrest.

- Pull the seat belt smoothly out of the reel.
- Place the seat belt tightly against your body over your thigh. Take care not to twist it.
- Engage the locking tongue (135) in the lock (134).

Seat belt on.

Taking off the seat belt

Procedure

- Hold onto the lock tongue (135) with one hand.
- Press the red button on the lock (134).
- Guide the lock tongue (135) manually back into the reel.

The seat belt is now removed.

F Truck maintenance

1 Spare Parts

To ensure safe and reliable operation, use only the manufacturer's original spare parts.

The manufacturer's original spare parts are consistent with the manufacturer's specifications and guarantee the highest possible quality of safety, size accuracy and material.

The installation or use of non-original spare parts can negatively affect the specified properties of the product and impair safety. The manufacturer cannot be held liable for damage caused by the use of non-original spare parts.

The product-related electronic spare parts catalogue can be found at (www.jungheinrich.de/spare-parts-search) by entering the serial number.

→ The serial number can be found on the data plate, see page 27.



2 Operational Safety and Environmental Protection

The inspections and maintenance tasks listed in chapter "Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement" must be performed according to the defined service intervals – see page 149.

The manufacturer recommends the replacement of the maintenance parts also listed in chapter "Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement" according to the specified replacement intervals – see page 149.

WARNING!

Risk of accidents and component damage

Any modification to the truck, in particular the safety mechanisms, is prohibited.

Exception: Operating companies should only make changes or have changes made to powered industrial trucks if the truck manufacturer is no longer operating in the field and there is no successor to the business; operating companies must however:

- Ensure that the changes to be made are planned, tested and performed by a specialist engineer in industrial trucks taking safety into account.
- Keep permanent records of the construction, tests and completion of changes
- Carry out and have authorised the respective changes to the capacity data plates, decals and stickers as well as the operating instructions and workshop manuals
- Attach a permanent and clearly visible marking to the truck indicating the types of changes made, the date of the changes and the name and address of the organisation responsible for the work.

NOTICE

Only original spare parts are subject to the manufacturer's quality control. To ensure safe and reliable operation, use only the manufacturer's spare parts.



On completion of inspection and service work, carry out the operations listed in the "Recommissioning the truck after cleaning or maintenance work section, see page 144.

3 Maintenance Safety Regulations

Maintenance and repair personnel

- The manufacturer has a customer service department specially trained for these tasks. A maintenance contract with the manufacturer will support trouble-free operation.

Truck maintenance, repair work and changing of parts requiring replacement must only be carried out by specialist personnel. The activities to be carried out are divided into the following target groups.

Customer Services

Customer Services are specially trained in the use of the truck and are able to carry out maintenance and repairs independently. Customer Services are aware of the relevant standards, guidelines and safety regulations as well as potential risks.

Operating company

The maintenance personal of the operating company has the technical expertise and experience to perform the activities in the maintenance check list for the operating company. The maintenance and repair work to be performed by the operating company are also written down, see page 134.

3.1 Working on the electrical system

⚠ WARNING!

Risk of accidents due to electrical current

Make sure the electrical system is voltage-free before starting work on it. The capacitors in the control unit must be completely discharged. The capacitors are fully discharged approx. 10 minutes after disconnecting the electrical system from the battery.

Before starting maintenance on the electrical system:

- ▶ Only suitably trained electricians may operate on the truck's electrical system.
 - ▶ Before working on the electrical system, take all precautionary measures to avoid electric shocks.
 - ▶ Park the truck securely – see page 65.
 - ▶ Disconnect the battery connector.
 - ▶ Remove any rings, metal wristbands etc.
-

3.2 Consumables and used parts

⚠ CAUTION!

Consumables and used parts are an environmental hazard

Used parts and consumables must be disposed of in accordance with the applicable environmental-protection regulations. Oil changes should be carried out by the manufacturer's customer service department, whose staff are specially trained for this task.

- ▶ Note the safety regulations when handling these materials.
-

3.3 Wheels

⚠ WARNING!

The use of wheels that do not match the manufacturer's specifications can result in accidents

The quality of wheels affects the stability and performance of the truck.

Uneven wear reduces truck stability and increases the stopping distance.

- ▶ After replacing wheels, make sure the truck is not skewed.
 - ▶ Always replace wheels in pairs, i.e. left and right at the same time.
-

- ➔ When replacing wheels fitted at the factory, only use the manufacturer's original spare parts. Otherwise the truck's rated performance cannot be ensured, see page 125.

3.4 Hydraulic system

⚠ WARNING!

Leaky hydraulic systems can result in accidents

Hydraulic oil can escape from leaky and faulty hydraulic systems.

- ▶ Report any defects immediately to your supervisor.
 - ▶ Mark defective truck and take out of service.
 - ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
 - ▶ Remove any spilled hydraulic immediately with an appropriate bonding agent.
 - ▶ The bonding agent / consumable mixture must be disposed of in accordance with regulations.
-

⚠ WARNING!

Faulty hydraulic hoses can result in injury and infection

Pressurised hydraulic oil can escape from fine holes or hairline cracks in the hydraulic hoses. Brittle hydraulic hoses can burst during operation. People standing near the truck can be injured by the hydraulic oil.

- ▶ Call for a doctor immediately in the event of an injury.
 - ▶ Do not touch pressurised hydraulic hoses.
 - ▶ Report any defects immediately to your supervisor.
 - ▶ Mark defective truck and take it out of service.
 - ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
-

→ The manufacturer has a service department specially trained for these tasks.

NOTICE

Testing and replacing hydraulic hoses

Hydraulic hoses can become brittle through age and must be checked at regular intervals. The application conditions of the industrial truck have a considerable impact on the ageing of the hydraulic hoses.

- ▶ Check the hydraulic hoses at least annually and replace if necessary.
 - ▶ If the operating conditions become more arduous the inspection intervals must be reduced accordingly.
 - ▶ In normal operating conditions a precautionary replacement of the hydraulic hoses is recommended after 6 years. The owner must carry out a risk assessment to ensure safe, prolonged use. The resulting protection measures must be observed and the inspection interval reduced accordingly.
-

4 Lubricants and Lubrication Schedule

4.1 Handling consumables safely

Handling consumables

Consumables must always be handled correctly. Follow the manufacturer's instructions.

⚠ WARNING!

Improper handling is hazardous to health, life and the environment

Consumables can be flammable.

- ▶ Keep consumables away from hot components and naked flames.
 - ▶ Always keep consumables in prescribed marked containers.
 - ▶ Always fill consumables in clean containers.
 - ▶ Do not mix up different grades of consumable. The only exception to this is when mixing is expressly stipulated in the Operating Instructions.
-

⚠ CAUTION!

Spilled consumables can cause slipping and endanger the environment

Risk of slipping from spilled consumables. The risk is greater when combined with water.

- ▶ Do not spill consumables.
 - ▶ Spilled consumables must be removed immediately with an appropriate bonding agent.
 - ▶ The bonding agent / consumable mixture must be disposed of in accordance with regulations.
-

⚠ WARNING!

Improper handling of oils can be hazardous

Oils (chain spray / hydraulic oil) are flammable and poisonous.

- ▶ Dispose of used oils in accordance with regulations. Store used oil safely until it can be disposed of in accordance with regulations.
 - ▶ Do not spill oil.
 - ▶ Spilled oils must be removed immediately with an appropriate bonding agent.
 - ▶ The mixture consisting of the bonding agent and oil must be disposed of in accordance with regulations.
 - ▶ Observe national regulations when handling oils.
 - ▶ Wear safety gloves when handling oils.
 - ▶ Prevent oil from coming into contact with hot motor parts.
 - ▶ Do not smoke when handling oil.
 - ▶ Avoid contact and digestion. If you swallow oil do not induce vomiting but seek medical assistance immediately.
 - ▶ Seek fresh air after breathing in oil fumes or vapours.
 - ▶ If oil has come into contact with your skin, rinse your skin with water.
 - ▶ If oil has come into contact with your eyes, rinse them with water and seek medical assistance immediately.
 - ▶ Replace oil-soaked clothing and shoes immediately.
-

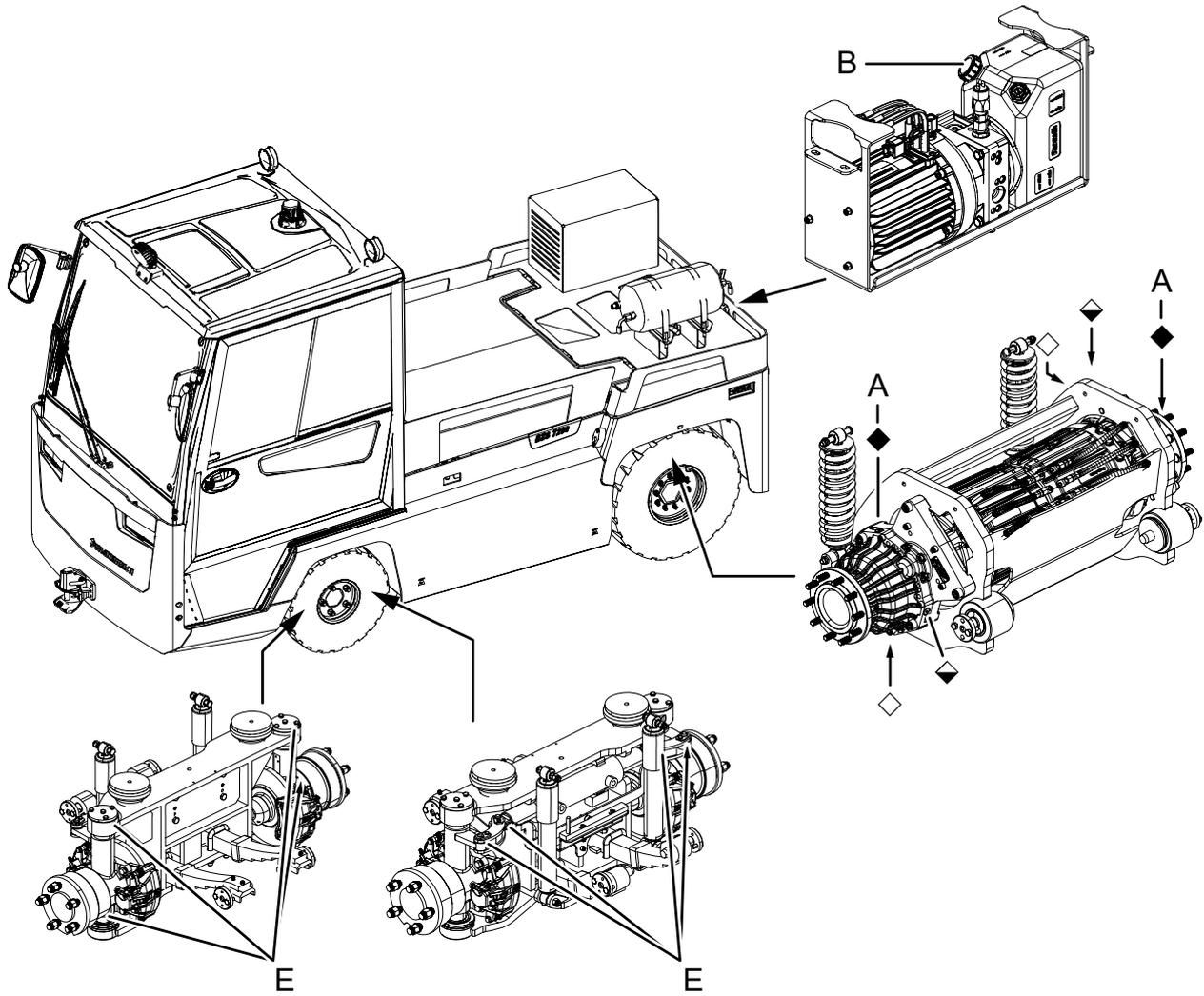
⚠ CAUTION!

Consumables and used parts are an environmental hazard

Used parts and consumables must be disposed of in accordance with the applicable environmental-protection regulations. Oil changes should be carried out by the manufacturer's customer service department, whose staff are specially trained for this task.

▶ Note the safety regulations when handling these materials.

4.2 Lubrication Schedule



◆	Transmission oil filler neck
◇	Transmission oil drain plug
◆	Oil level plug

4.3 Consumables

Code	Order no.	Supplied quantity	Designation	Used for	Fill quantity
A	51295261	5 l	SAE 50	Transmission	1.2 l ¹
B	51132826	1.0 l	HVLP 32	Hydraulics	
	51132827	5.0 l			
E	50354629	400 g	Grease, grease/lubricant Renolit LX-PEP 2	Lubrication service	

¹⁾ Where the transmission is dry. When the oil is changed, some oil will remain in the transmission, which means that approx. 0.9 l - 1.0 l must be added. Use the oil level plug to check.

Grease guidelines

Code	E
Saponification	Lithium
Dew point	>220 °C
Worked penetration at 25 °C	280 - 310
NLG1 class	2
Operating temperature	-38 °C / +120 °C

5 Maintenance and repairs

5.1 Preparing the truck for maintenance and repair work

All necessary safety measures must be taken to avoid accidents when carrying out maintenance and repairs. The following preparations must be made:

Procedure

- Park the truck on a level surface.
- Park the truck securely, see page 65.
- Disconnect the battery to prevent the truck from being switched on accidentally.
- When working under a raised lift truck, secure it to prevent it from lowering, tipping or sliding away.

⚠ WARNING!

Risk of accidents when working underneath the industrial truck

- ▶ When working under a raised truck, secure it to prevent the truck from lowering, tipping or sliding away.
 - ▶ When raising the truck, follow the instructions, see page 29. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with chocks).
-

5.2 Lifting and jacking up the truck safely

WARNING!

Lifting and jacking up the truck safely

In order to raise the truck, the lifting gear must only be secured to the points specially provided for this purpose.

In order to raise and jack up the truck safely, proceed as follows:

- ▶ Jack up the truck only on a level surface and prevent it from moving accidentally.
 - ▶ Always use a jack with sufficient capacity. When jacking up the burden carrier, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).
 - ▶ In order to raise the truck, the lifting accessories must only be secured to the points specially provided for this purpose, see page 29.
-

5.3 Cleaning

5.3.1 Cleaning the truck

- Cleaning tasks may only take place in the designated locations, which adhere to the stipulations of the country of use.

⚠ CAUTION!

Fire hazard

Do not use flammable liquids to clean the industrial truck.

- ▶ Disconnect the battery before starting cleaning work.
 - ▶ Carry out all necessary safety measures to prevent sparking before cleaning (e.g. by short-circuiting).
-

⚠ CAUTION!

Risk of component damage when cleaning the truck

Cleaning with a pressure washer can result in malfunctions due to humidity.

- ▶ Cover all electronic system assemblies (controllers, sensors, motors etc.) before cleaning the truck with a pressure washer.
 - ▶ Do not hold the jet of the pressure washer by the marked points to avoid damaging them (see page 24).
 - ▶ Do not clean the truck with pressurised water.
-

Requirements

- Truck prepared for maintenance and repair work – see page 134.

Tools and Material Required

- Water-based cleaning agents
- Sponge or cloth

Procedure

- Clean the surface of the truck with water-based solvents and water. Use a sponge or cloth to clean.
- In particular, clean the following areas:
 - Window(s)
 - Oil filler caps and their surroundings
 - Grease nipples (before lubrication)
- Dry the truck after cleaning, e.g. with compressed air or a dry cloth.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" – see page 144.

The truck is now clean.

5.3.2 Cleaning the electrical system assemblies

NOTICE

Risk of electrical-system damage

Cleaning the electronic system assemblies (controllers, sensors, motors etc.) with water can damage the electrical system.

- ▶ Do not clean the electrical system with water.
- ▶ Clean the electrical system with weak suction or compressed air (use a compressor with a water trap) and a non-conductive, anti-static brush.

Cleaning the electrical system assemblies

Requirements

- Truck prepared for maintenance and repair work – see page 134.

Tools and Material Required

- Compressor with water separator
- Non-conductive, antistatic brush

Procedure

- Expose the electrical system – see page 40.
- Clean the electrical system assemblies with weak suction or compressed air (use a compressor with a water separator) and a non-conductive, anti-static brush.
- Fit the electrical system cover – see page 40.
- Carry out all the tasks listed in the section "Recommissioning the truck after cleaning or maintenance work" – see page 144.

The electrical-system assemblies are now clean.

5.4 Replacing the wheels

- ➔ Wheels must only be replaced by authorised service personnel.

5.5 Tightening the wheel nuts

- The wheel nuts must be retightened in accordance with the maintenance intervals in the maintenance checklist, see page 149.

Tightening the wheel nuts

Requirements

- Prepare the truck for maintenance and repairs, see page 134.

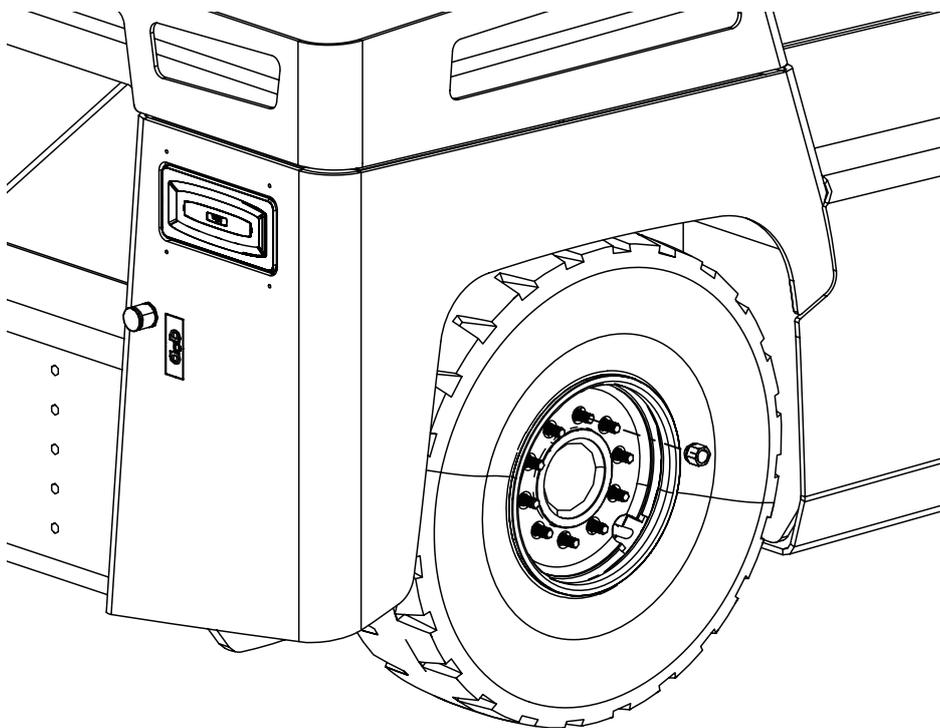
Tools and Material Required

- Torque wrench

Procedure

- Initially torque all wheel nuts cross-wise using the torque wrench to 10 Nm.
- Torque the wheel nuts for the front wheels cross-wise using the torque wrench to 350 Nm.
- Torque the wheel nuts for the drive wheels cross-wise using the torque wrench to 260 Nm.

The wheel nuts are tightened.



5.6 Checking the electrical fuses

Checking fuses

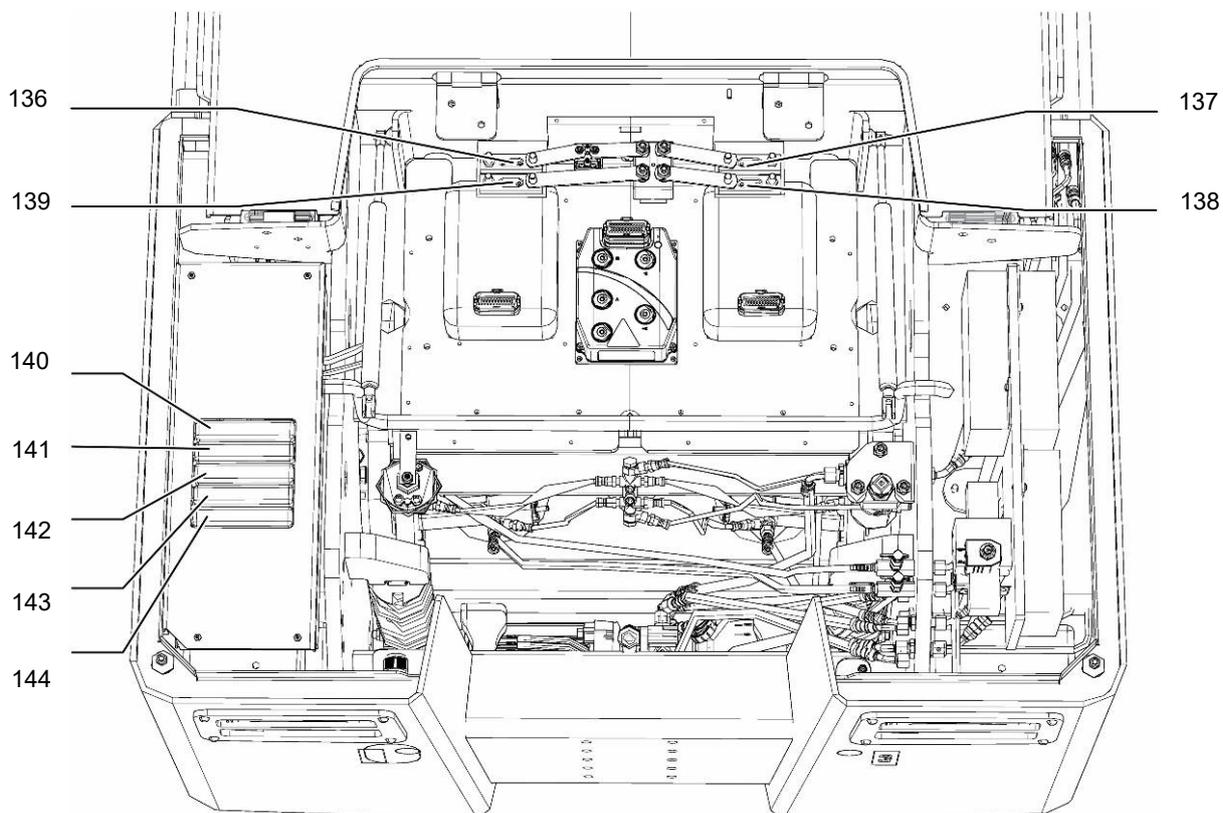
Requirements

- Truck prepared for maintenance and repairs, see page 134.
- Engine cover opened, see page 144.

Procedure

- Check the fuse ratings against the table and replace if necessary.

The fuses have been checked.



Item	Description	Function	Rating (A)
136	2F1	80 V - high-current fuse	7.5
137	1F2	80 V - high-current fuse	425
138	1F1	80 V - high-current fuse	425
139	F8	80 V - high-current fuse	425

(140) holder 1

Item	Description	Function	Rating (A)
1	F2.1	Emergency disconnect	7.5
2	F1.2	Main fuse for voltage converter and control	20
3	7F3	Fuse upstream of voltage converter U27	10
4	7F4	Fuse upstream of voltage converter 7U3	10
5	7F5	Fuse upstream of voltage converter 8U3	10
6	F3.1	Standard downstream of voltage converter U27	15
7	F1	Switch-on	5
8	4F5	Warning indicator	5

(141) holder 2

Item	Description	Function	Rating (A)
1	4F1	Horn	4
2	9F33.1	Front washer fluid	2
3	F14.1	Heater	10
4	4F4	Strobe light	2
5	5F22	Rear fog light	2
6	4H19	Floor spot	2
7	4F2	Reversing buzzer	2
8	F17	Radio data	10

(142) holder 3

Item	Description	Function	Rating (A)
1	5F14.1	Left parking light	2
2	5F14.2	Right parking light	2
3	5F9.1	Left dipped light	3
4	5F9.2	Right dipped light	3
5	5F15.1	Left main beam	4
6	5F15.2	Right main beam	4
7	4F6.1	Left brake light	2
8	4F6.2	Right brake light	2

(143) holder 4			
Item	Description	Function	Rating (A)
1	4F5.1	Left indicator	2
2	4F5.2	Right indicator	2
3	5F3.1	Left tail light	2
4	5F3.2	Right tail light	2
5	5F23	Trailer 24 V	15
6			
7	F3.3	Fuse downstream of voltage converter 8U3	20
8	F3.2	Fuse downstream of voltage converter 7U3	20

(144) holder 5			
Item	Description	Function	Rating (A)
1	7F12	Trailer coupling actuator	5
2	5F21	Coupling light	2
3	9F1.1	Rear windscreen wiper	4
4	9F33.2	Rear washer fluid	2
5	9F5	Rear windscreen heater	5
6	9F1	Front windscreen wiper	4
7	9F43	Cigarette lighter	3
8	9F23	Raise/lower trailer	2

5.7 Checking the Hydraulic Oil Level (○)

Checking the hydraulic oil level and replenishing if necessary

Requirements

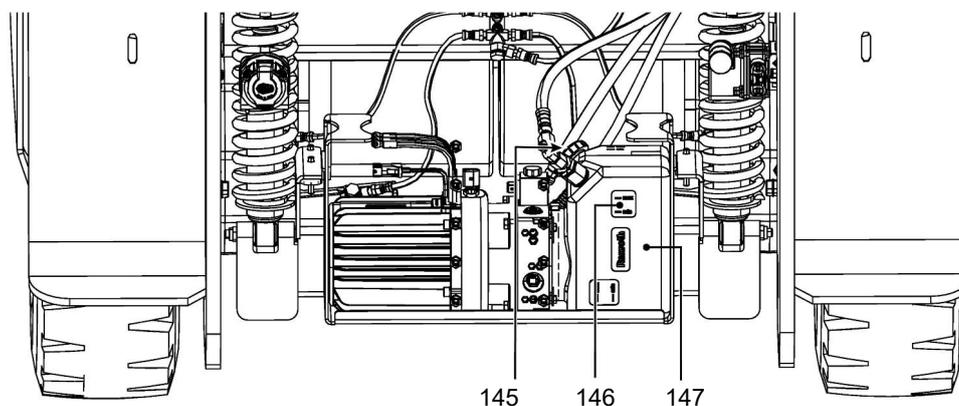
- Open the engine cover, see page 144
- Prepare the truck for maintenance and repair work, see page 134.

Procedure

- Empty braking system accumulator.
 - Apply the brake pedal until no resistance is felt. (At least 15 times)
- Check the oil level in the hydraulic reservoir (147).
- ➔ There are two markings (146) on the hydraulic reservoir (147). With the braking system accumulator fully emptied, the hydraulic oil level in the reservoir should lie between the min. and max. markings (146).
- Add hydraulic oil if necessary:
 - Turn the lid (145) anti-clockwise from the hydraulic reservoir (147).
 - Add hydraulic oil of the correct grade until the hydraulic oil level lies between the markings (see page 133).
 - Turn the lid (145) clockwise on the hydraulic reservoir (147).
- Close the engine cover.
- Restore the truck to service after maintenance and repairs, see page 144.

The hydraulic oil level is now checked.

- ➔ If a leak is discovered in the hydraulic system (cylinders; unions, lines), the truck must be decommissioned and repaired by specialist personnel.



Hydraulic oil	Maximum volume
51132826 (1 l)	2.2 l
51132827 (5 l)	

5.8 Restoring the truck to service after maintenance and repairs

Procedure

- Thoroughly clean the truck, see page 136.
- Lubricate the truck according to the lubrication schedule, see page 132.
- Clean the battery, grease the terminal screws and connect the battery.
- Charge the battery, see page 41.
- Start up the truck, see page 59.

5.9 Opening or closing the engine cover

⚠ WARNING!

An unsecured truck can cause accidents

Parking the truck on an incline is dangerous and is strictly prohibited.

- ▶ Always park the truck on a level surface. In special cases the truck may need to be secured with wedges.
-

⚠ CAUTION!

Trapping hazard

- ▶ Make sure there is nothing between the battery cover and the truck when you fit the battery cover.
-

Requirements

- Park the truck on a horizontal surface.
- Park the truck securely, see page 65.

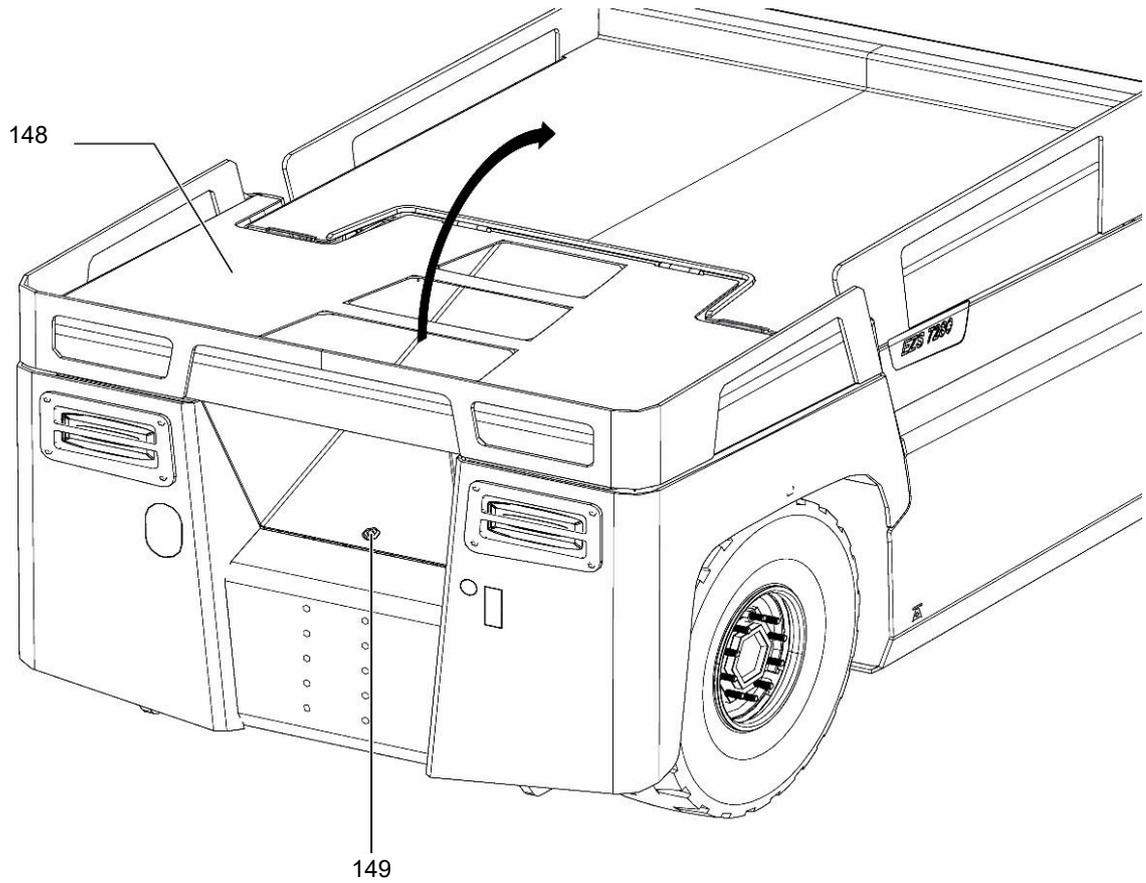
Tools and Material Required

- Allen key

Procedure

- Unscrew the lock (149) with the key.
- Open the engine cover (148).

The engine cover is now open.



6 Decommissioning the Industrial Truck

If the truck is to be out of service for more than a month, it must be stored in a frost-free and dry room. All necessary measures must be taken before, during and after decommissioning as described hereafter.

When the truck is out of service it must be jacked up so that all the wheels are clear of the ground. This is the only way of ensuring that the wheels and wheel bearings are not damaged.

→ Jack up the truck, see page 135.

If the truck is to be out of service for more than 6 months, agree further measures with the manufacturer's customer service department.

6.1 Prior to decommissioning

Procedure

- Thoroughly clean the truck, see page 136.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see page 133.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication schedule, see page 132.
- Charge the battery, see page 41.
- Disconnect the battery, clean it and grease the terminals.

→ In addition, follow the battery manufacturer's instructions.

6.2 During decommissioning

NOTICE

Full discharge can damage the battery

Self-discharge can cause the battery to fully discharge. Full discharge shortens the useful life of the battery.

▶ Charge the battery at least every 2 months.

→ Charge the battery, see page 41.

6.3 Restoring the truck to service after decommissioning

Procedure

- Thoroughly clean the truck, see page 136.
- Lubricate the truck according to the lubrication schedule, see page 132.
- Clean the battery, grease the terminal screws and connect the battery.
- Charge the battery, see page 41.
- Start up the truck, see page 59.

7 Safety tests to be performed at intervals and after unusual incidents

The truck must be inspected at least annually (refer to national regulations) or after any unusual event by a qualified inspector. The manufacturer offers a safety inspection service which is performed by personnel specifically trained for this purpose.

A complete test must be carried out on the technical condition of the truck with regard to safety. The truck must also be examined thoroughly for damage.

The operating company is responsible for ensuring that faults are rectified immediately.

8 Final de-commissioning, disposal

→ Final de-commissioning or disposal of the truck in must be performed in accordance with the regulations of the country of use. In particular, regulations governing the disposal of batteries, consumables and electronic and electrical systems must be observed.

The truck must only be disassembled by trained personnel in accordance with the procedures as specified by the manufacturer.

9 Human vibration measurement

→ Vibrations that affect the operator over the course of the day are known as human vibrations. Excessive human vibrations will cause the operator long term health problems. The European "2002/44/EC/Vibration" operator directive has therefore been established to protect operators. To help operators to assess the application situation, the manufacturer offers a service of measuring these human vibrations.

G Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement

⚠ WARNING!

Lack of maintenance can result in accidents

Failure to perform regular maintenance and inspections can lead to truck failure and poses a potential hazard to personnel and equipment.

- ▶ Thorough and expert maintenance and inspections are among the most important requirements for the safe operation of the industrial truck.

NOTICE

The application conditions of an industrial truck have a considerable impact on component wear. The following service, inspection and replacement intervals are based on single-shift operation under normal operating conditions. The intervals must be reduced accordingly if more stringent requirements are placed on the equipment, e.g., use in conditions of extreme dust, temperature fluctuations or multiple shifts.

- ▶ To prevent damage due to wear, the manufacturer recommends an on-site application analysis to agree on appropriate intervals.

The following chapter defines the tasks to be performed, the respective intervals to be observed and the maintenance parts for which replacement is recommended.

1 Maintenance Contents EZS 7280

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1.1 Owner

To be performed every 50 service hours, but at least once a week.

1.1.1 Maintenance contents

1.1.1.1 Standard equipment

Brakes

Test the brake.

1.1.1.2 Optional Equipment

Windscreen washing system

Chassis/structure

Correct the fill level of the windscreen washer reservoir.

Hydraulic trailer supply

Hydraulic operations

Correct the hydraulic-oil level.

Compressed air trailer supply

Power supply

Drain the tank.

Travel

Clean the air filter.

Correct the engine oil level.

Lead-acid battery, international

Power supply

Correct the battery-acid level using demineralised water.

Lead-acid battery

Power supply

Correct the battery-acid level using demineralised water.

1.1.2 Inspection contents

1.1.2.1 Standard equipment

The following points must be checked:

Brakes
Check connections and lines for leaks and damage

Electrical system
Warning and safety equipment in accordance with the operating instructions
Functionality of display and controls
Test lighting and check for damage
Test emergency disconnect switch and check for damage

Power supply
Check battery and battery components for damage
Battery connector for secure fit, functionality and damage

Chassis/structure
Industrial truck for damage and leaks
Check labels for legibility, completeness and plausibility
Check doors or covers for damage
Test driver's seat restraint system and check for damage

1.1.2.2 Optional Equipment

The following points must be checked:

Windscreen washing system

Chassis/structure
Check windscreen washer reservoir for leaks and damage

Trailer coupling

Chassis/structure
Trailer coupling for functionality and damage

Electrical heating

Chassis/structure
Test the heater

Optional equipment

Chassis/structure
Test optional equipment such as mirrors, storage compartments, handles, windscreen wipers and windscreen washing systems, etc. and check for damage

Strobe light/warning beacon

Electrical system

Test strobe light/warning beacon and check for damage

Lead-acid battery, international

Power supply

Check the battery cable connections for secure attachment

Check battery and battery components for damage

Lead-acid battery

Power supply

Check the battery cable connections for secure attachment

1.2 Customer Service

In accordance with the EZS 7280 service interval, to be performed every 1000 service hours, but at least once a year.

1.2.1 Maintenance contents

1.2.1.1 Standard equipment

Brakes
Test the brake.
Pressure accumulator for proper function. (Seven braking actions with the truck switched off)

Electrical system
Test the contactors and/or relays.
Perform insulation inspection.
Evaluate the logbook.

Travel
Note: The first transmission-oil change should be made after 100 service hours.

Agreed services
Carry out a test run with the rated capacity or a customer-specific load.
Lubricate the truck according to the lubrication schedule.
Demonstration after maintenance.

Steering
Correct the fill level of the hydraulic oil of the hydraulic steering.

1.2.1.2 Optional Equipment

Windscreen washing system

Chassis/structure
Correct the fill level of the windscreen washer reservoir.

Radio data

System components
Clean the scanner and terminal.

Cabin

Chassis/structure
Check that the cab opens easily.

24V trailer electrical supply

Travel

Test the immobiliser on non-raised trailers.

Hydraulic trailer supply

Hydraulic operations

Correct the hydraulic-oil level.

Compressed air trailer supply

Power supply

Clean function-determining parts of the compressed air supply.

Note: After 3000 operating hours, the cylinder head should be removed and the valves checked for function.

Drain the tank.

Travel

Clean the air filter.

Correct the engine oil level.

Hydraulic operations

Note: When replacing the carbon brushes apply compressed air to the motor.

Lead-acid battery, international

Electrical system

Perform insulation inspection.

Power supply

Clean the battery.

Clean and grease the battery terminals.

Measure acid density and battery voltage.

Correct the battery-acid level using demineralised water.

Lead-acid battery

Electrical system

Perform insulation inspection.

Power supply

Clean the battery.

Clean and grease the battery terminals.

Measure acid density and battery voltage.

Correct the battery-acid level using demineralised water.

1.2.2 Inspection contents

The following points must be checked:

1.2.2.1 Standard equipment

Brakes
Pressure accumulator of the brake for attachment, damage, corrosion and leaks.
Check connections and lines for leaks and damage
Brake linings for wear and damage
Electrical system
Cables and motor for secure fit and damage
Warning and safety equipment in accordance with the operating instructions
Functionality of display and controls
Test lighting and check for damage
Test emergency disconnect switch and check for damage
Contactors and/or relays for wear and damage
Check electrical wiring for damage (insulation damage, connections) and check whether the fuse ratings are correct
Power supply
Battery connector for secure fit, functionality and damage
Travel
Touch mode for correct functionality
Drive system bearings for wear and damage
Transmission for noise and leaks
Check wheels for wear, damage and secure mounting
Check wheel bearings and mounting of wheels for wear and damage
Spring package to ensure it is secure and check for damage
Bumpers for leaks and damage
Chassis/structure
Industrial truck for damage and leaks
Check chassis connections and screw connections are securely attached and check for damage
Check labels for legibility, completeness and plausibility
Check driver's seat for damage
Check driver's seat is securely attached and test adjustment mechanism
Check doors or covers for damage
Test driver's seat restraint system and check for damage

Steering

Test the hydraulic steering and its components and check for damage

Check steering hoses and pipe lines for leaks and damage
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Check the mechanical parts of the steering column for wear and damage

1.2.2.2 Optional Equipment

Electrolyte recirculation

Power supply

Hose connections and pump for correct function
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Aquamatic

Power supply

Aquamatic plug, hose connections and float for functionality and sealing
--

Flow indicator for functionality and sealing
--

Battery refill system

Power supply

Refill system for functionality and leaks

Windscreen washing system

Chassis/structure

Check windscreen washer reservoir for leaks and damage
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Test the windscreen washer pump and hoses and check for damage
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Test windscreen wipers and check for damage

Trailer coupling

Chassis/structure

Trailer coupling for functionality and damage

Seat heating

Electrical system

Check connections and cables are securely attached and check for insulation damage and other signs of damage
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Shock sensor/data recorder

Electrical system

Check shock sensor/data recorder is securely attached and check for damage
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Radio data

System components

Scanner and terminal for secure fit, functionality and damage

Fuses for correct ratings

Check cables are securely attached and check for damage

Fire extinguisher

Accessories

Check fire extinguisher is present and securely attached and check the inspection interval

Access module

Electrical system

Check access module is securely attached, test and check for damage

Optional controls

Electrical system

Ensure optional controls are present and plausible

Electrical heating

Chassis/structure

Test the heater

Optional equipment

Chassis/structure

Test optional equipment such as mirrors, storage compartments, handles, windscreen wipers and windscreen washing systems, etc. and check for damage

Strobe light/warning beacon

Electrical system

Test strobe light/warning beacon and check for damage

Audible warning devices

Electrical system

Check buzzer/warning alarm is securely attached, test and check for damage

Cabin

Chassis/structure

Check cable guide in the cab is secure and check for damage

Check the cab for cracks and damage

24V trailer electrical supply

Electrical system
Contactors and/or relays for wear and damage
Check connections and cables are securely attached and check for insulation damage and other signs of damage
Electrical connection cables of the trailer for damage

Travel
Sensors/switches for secure fit, functionality and damage

Hydraulic trailer supply

Travel
Sensors/switches for secure fit, functionality and damage

Hydraulic operations
Hydraulic unit for leaks and damage
Check hydraulic connections, hoses and pipes are securely attached and check for leaks and damage

Compressed air trailer supply

Electrical system
Check carbon brushes for wear

Power supply
Compressor for leaks and damage

Electric trailer coupling

Chassis/structure
Electrical trailer coupling for proper function, wear and damage

Hydraulic operations
Check that pivot arm, bolts and bearings are present and function correctly; check for wear and damage

Lead-acid battery, international

Power supply
Check battery, battery cables and cell connectors are securely attached and check for damage
Ensure safety labels are present and check for damage

Lead-acid battery

Power supply
Check battery, battery cables and cell connectors are securely attached and check for damage

1.2.3 Maintenance parts

The manufacturer recommends the replacement of the following maintenance parts at the specified intervals.

1.2.3.1 Standard equipment

maintenance part	service hours	months
Accumulator		60
Gear oil	1000	12
Hydraulic oil	1000	12
Hydraulic oil filter	1000	12
Hydraulic oil filter alternative	1000	12