

# EFG 425k - 435

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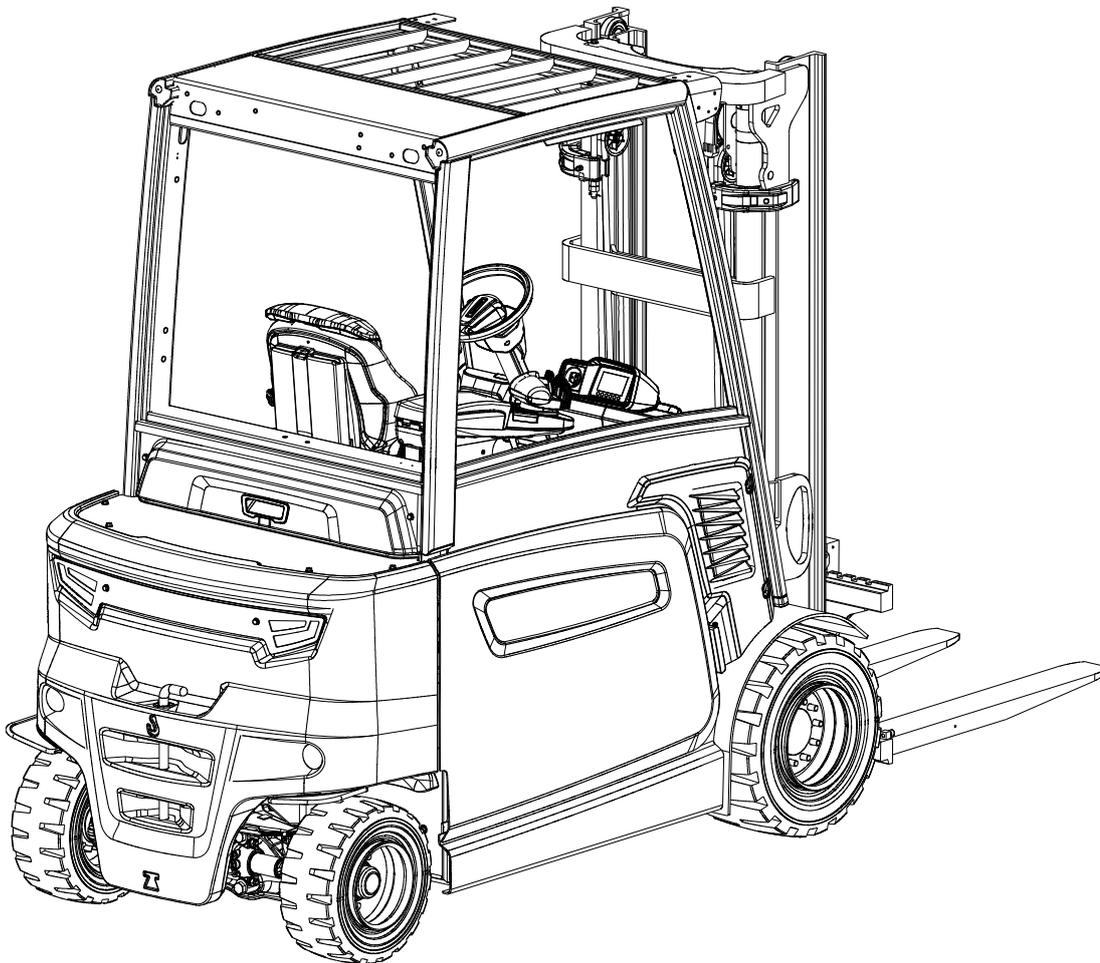
Operating instructions

en-GB

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EFG 425  
EFG 425k  
EFG 430  
EFG 430k  
EFG S30  
EFG 435



**JUNGHEINRICH**



# Declaration of Conformity



## Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

<b>Description</b>  <b>Industrial truck</b>
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Type	Option	Serial no.	Year of manufacture
EFG 425 EFG 425k EFG 430 EFG 430k EFG S30 EFG 435			

**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:** EFG 425k - 435  
Serial number/type number

**Manufacturer:** Jungheinrich Aktiengesellschaft  
22039 Hamburg, Germany

**UK representative:** Jungheinrich UK Ltd  
Sherbourne House  
Sherbourne Drive  
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Milton Keynes  
MK7 8HX

**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.

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### **⚠ WARNING!**

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

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### **⚠ 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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# Contents

<b>A</b>	<b>Correct Use and Application</b> .....	<b>13</b>
1	General .....	13
2	Correct application .....	14
3	Approved application conditions .....	16
3.1	Instructions for Trucks with Lithium-Ion Batteries .....	18
3.2	Internal Operation Combined with Brief External or Cold Store Operation (●).....	19
3.3	Indoor Application Predominantly inside the Cold Store (○).....	20
3.4	Hot country or tropical use (○).....	22
3.5	Ambient Conditions for Charging.....	23
4	Residual risk .....	24
5	Proprietor responsibilities.....	25
6	Adding attachments and/or optional equipment.....	25
7	Removal of components.....	25
<b>B</b>	<b>Truck Description</b> .....	<b>27</b>
1	Application.....	27
1.1	Truck models and rated capacity .....	27
2	Assemblies and Functional Description.....	28
2.1	Travel direction definition .....	28
2.2	Assembly Overview .....	29
2.3	Functional Description.....	30
3	Technical Specifications.....	32
3.1	Performance data .....	33
3.2	Dimensions .....	37
3.3	Weights.....	40
3.4	Mast versions .....	41
3.5	Tyre type.....	44
3.6	Motor Output.....	45
3.7	EN norms.....	46
3.8	Electrical requirements.....	47
3.9	Specifications according to RED guideline (Radio Equipment Directive) for radio units.....	47
4	Identification Points and Data Plates .....	48
4.1	Indication Points .....	48
4.2	Data plate .....	53
4.3	Truck capacity plate.....	55
4.4	Attachment capacity plate.....	57
5	Stability .....	59
5.1	Wind loads.....	59
<b>C</b>	<b>Transport and Commissioning</b> .....	<b>61</b>
1	Transport.....	61
2	Truck laden.....	61
2.1	Centre of gravity.....	61
2.2	Lifting the truck by crane .....	62
2.3	Loading the truck with a second truck .....	65
3	Securing the truck during transport.....	66

4	Using the Truck for the First Time .....	68
<b>D</b>	<b>Battery - Servicing, Recharging, Replacement.....</b>	<b>69</b>
1	General notes on handling batteries .....	69
1.1	Potential hazards.....	69
1.2	Touch voltage hazard.....	70
1.3	Battery handling safety regulations.....	70
2	Safety Regulations for Handling Lead-Acid Batteries.....	71
3	Safety regulations for handling lithium-ion batteries.....	72
3.1	Fire Hazard .....	72
3.2	Particular hazard from combustion products.....	72
3.3	Special fire fighting protective equipment.....	73
3.4	Additional fire fighting instructions.....	73
3.5	Instructions for cooling an overheated, non physically damaged battery .....	73
4	Battery types.....	74
5	Battery dimensions.....	76
6	Exposing the Battery.....	77
7	Removing or installing the battery.....	79
7.1	Removal and Installation Using a Pallet Truck with SnapFit Battery Holder (○).....	80
7.2	Removing or installing the battery using a fork shoe.....	86
7.3	Removing or installing the battery using a roller conveyor.....	87
7.4	Removal and installation using a hand pallet truck with SnapFit (○).....	88
7.5	Removing or installing the battery using a pallet truck or hand pallet truck and no "SnapFit" battery holder.....	90
7.6	Removal or Installation with Battery Holder (SnapFit) and Crane Cross Member (○).....	91
8	Transporting the batteries by crane.....	92
9	Charging the battery.....	94
9.1	Charging the Lead Battery.....	95
9.2	Charging lithium-ion batteries (○).....	97
<b>E</b>	<b>Operation .....</b>	<b>99</b>
1	Safety Regulations for the Operation of Forklift Trucks.....	99
2	Displays and Controls.....	102
2.1	Controls .....	102
2.2	Pilots .....	104
2.3	Function symbols for the Pilots.....	106
2.4	Armrest Control Panel Buttons.....	109
2.5	Control panel with display unit.....	113
2.6	Symbols in the display.....	116
2.7	Battery discharge indicator.....	121
2.8	Battery discharge monitor.....	121
2.9	Residual time display.....	121
2.10	Operating Programs.....	122
2.11	Hourmeter.....	122
2.12	Button allocation of the display.....	123
2.13	Setting the time .....	134
2.14	Side compartment control panel switch (○).....	135
3	Preparing the Truck for Operation.....	137
3.1	Checks and Operations to Be Performed Before Starting Daily Work.....	137

3.2	Entering or exiting .....	141
3.3	Trucks with reduced headroom (○).....	142
3.4	Setting up the operator position .....	143
3.5	Restraint systems.....	150
3.6	Seat Belt.....	150
4	Working with the truck.....	152
4.1	Safety regulations for travel mode.....	152
4.2	Preparing the truck for operation .....	156
4.3	Activating the lithium-ion battery (○).....	157
4.4	Parking the truck securely .....	158
4.5	Emergency Disconnect.....	159
4.6	Travel.....	161
4.7	Steering .....	165
4.8	Brakes.....	166
4.9	Adjusting the forks.....	171
4.10	Replacing the forks.....	173
4.11	Lifting, transporting and depositing loads.....	174
4.12	Operating the lift mechanism and integrated attachments.....	178
4.13	Safety instructions for operating additional attachments .....	188
4.14	Operating additional attachments with soloPILOT .....	192
4.15	Operating additional attachments with multiPILOT.....	195
4.16	Operating additional attachments with duoPILOT.....	197
4.17	Fitting additional attachments.....	200
4.18	Assistance systems.....	205
5	Towing trailers.....	207
6	Optional Equipment.....	210
6.1	Keyless Access System.....	210
6.2	General Information about the Use of Keyless Access Systems.....	211
6.3	Commissioning the keypad and the transponder reader.....	211
6.4	Keyless access system - display unit .....	214
6.5	Keyless access system - keypad.....	219
6.6	Keyless access system - transponder reader .....	224
6.7	Tilt angle display .....	229
6.8	Steel cab .....	230
6.9	Optional Cabin Interior Equipment.....	235
6.10	Sliding windows.....	237
6.11	Gate.....	238
6.12	Panel door.....	240
6.13	Operator position extension.....	242
6.14	Entering or exiting with the hip restraint on the driver's seat.....	242
6.15	Heater, fan, air conditioning system .....	243
6.16	Switching off the operating hydraulics.....	247
6.17	USB Charger Module in Armrest.....	248
6.18	USB Charger Module in Storage Facility.....	248
6.19	Voltage Transformer.....	249
6.20	Sound module.....	250
6.21	Load Weighing.....	254
6.22	Load Weighing Plus.....	255
6.23	Removable load backrest.....	257
6.24	Roof Protective Grille.....	257
6.25	Load damping.....	258
6.26	Lift cut-off.....	260
6.27	Sideshifter Centre Position.....	261

6.28	Fork Tilt Horizontal.....	262
6.29	Fire extinguisher .....	263
6.30	Simple Manoeuvring Coupling with Pin.....	264
6.31	Trailer Coupling with Hand Lever or Remote Control.....	266
6.32	Control layout "N" .....	268
6.33	Operating the auxiliary hydraulics without pressing the acknowledgement key.....	270
6.34	Special control layout.....	274
6.35	Warning Zone Light .....	278
6.36	Optional Equipment for Road Traffic According to StVZO .....	283
6.37	Horn Button on Overhead Guard.....	285
6.38	Options bracket.....	286
6.39	Antistatic strap .....	288
7	Troubleshooting.....	289
7.1	Troubleshooting.....	289
7.2	Moving a truck without its own drive system.....	294
7.3	Emergency lowering.....	297
7.4	Exiting the Driver's Cab via the Right-Hand Side Window or the Rear Windscreen (Emergency Exit).....	298
<b>F</b>	<b>Truck maintenance.....</b>	<b>301</b>
1	Spare Parts.....	301
2	Operational Safety and Environmental Protection .....	302
3	Maintenance Safety Regulations.....	303
3.1	Working on the electrical system.....	304
3.2	Consumables and used parts.....	305
3.3	Wheels.....	305
3.4	Attachment Repairs and Inspection.....	305
3.5	Lift Chains.....	306
3.6	Hydraulic system .....	306
3.7	Air conditioning system.....	307
4	Lubricants and Lubrication Schedule.....	308
4.1	Handling consumables safely.....	308
4.2	Lubrication Schedule .....	310
4.3	Consumables .....	312
5	Maintenance and repairs.....	314
5.1	Preparing the truck for maintenance and repair work.....	314
5.2	Checking the bonding adhesive on the roof window .....	316
5.3	Lifting and jacking up the truck safely.....	317
5.4	Opening or closing the rear panel.....	319
5.5	Disassembling or assembling the floor plate.....	320
5.6	Replacing the wheels.....	321
5.7	Checking the attachment of the wheels.....	323
5.8	Hydraulic system .....	324
5.9	Checking the gear oil level.....	328
5.10	Automatic Brake in the Axle.....	329
5.11	Brake .....	332
5.12	Heater and Air Conditioning.....	333
5.13	Adding window washer system fluid.....	334
5.14	Checking the electrical fuses.....	335
5.15	Connector overview.....	347
5.16	Cleaning .....	355
5.17	Restoring the truck to service after maintenance and repairs.....	359

6	Decommissioning the Industrial Truck.....	360
6.1	Prior to decommissioning.....	360
6.2	During decommissioning.....	361
6.3	Restoring the truck to service after decommissioning.....	361
7	Safety tests to be performed at intervals and after unusual incidents.....	362
8	Final de-commissioning, disposal.....	362
9	Human vibration measurement.....	362
<b>G</b>	<b>Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement.....</b>	<b>363</b>
1	Maintenance Contents EFG 425k-435 / S30.....	364
1.1	Owner.....	364
1.2	Customer Service.....	366



# A Correct Use and Application

## 1 General

### **WARNING!**

#### **Risk of accident, risk of injury and risk of material damage due to improper use of trucks, misconduct or failure to observe the operating instructions**

Improper use of trucks, misconduct or failure to observe the operating instructions can lead to accidents, injuries and material damage.

- ▶ The operator must be trained to operate the truck, the optional equipment and the attachments.
  - ▶ The operator must be familiar with the contents of the operating instructions and must observe these at all times.
  - ▶ Only use trucks, optional equipment and attachments for their intended purpose.
  - ▶ Avoid all risks to life and limb posed to the operator or third parties.
  - ▶ Comply with accident prevention regulations, other safety regulations and operating, maintenance and servicing guidelines.
- 

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 load and load distance are indicated on the capacity plate and must not be exceeded.

The load must rest on the load handler or be lifted by an attachment approved by the manufacturer.

The load must be fully raised, see page 174.

---

The following operations are in accordance with regulations and are permitted:

- Lifting and lowering loads.
- Stacking and retrieving loads.
- Transporting lowered loads over short distances.
  - The mast must be tilted back when transporting loads that are not secured against slipping and falling.
- Travelling with a load when the mast is tilted back.
  - The mast must be tilted back when transporting loads that are not secured against slipping and falling.
- Travel at an adapted travel speed.
  - The operator must adjust the travel speed so that the load does not slip off the load handler during acceleration and braking, changes in direction and when driving on ramps.
- Picking up and using attachments and optional equipment approved by the manufacturer; this may require additional approval from local authorities or an expert opinion.
- Occasional towing of trailer loads with the trailer coupling.

→ When towing trailers, the load must be secured on the trailer. The permissible trailer load must not be exceeded.

The following operations are prohibited:

- Travelling with a raised load (> 30 cm).
- Transporting persons.
  - No persons may be transported in addition to the operator, neither on the load handler nor in the operating area.
- Lifting persons without approved attachments or optional equipment. <sup>a)</sup>
- Pushing or pulling loads, with the exception of occasional towing of trailers with the trailer coupling.
- Transporting suspended loads without expert certification and without authorised optional equipment.
- Use on public roads (exception: operation may only take place with existing statutory approval and the necessary optional equipment).

→ If the truck is to be operated with suspended loads, proof of sufficient operational stability under local operating conditions must be obtained from a specialist assessor.

a) Lifting passengers with a working platform or a work basket may be permitted in some countries. This must be verified by the owner.

→ Germany: DGUV information 208-031 (BGI/GUV-5183) Use of Working Platforms on Industrial Trucks with Masts

- Australia: AS 2359.1 Powered Industrial Trucks, General Requirements; AS 2359.2 Powered Industrial Trucks, Operations

### 3 Approved application conditions

#### **⚠ DANGER!**

Do not exceed the permissible surface and point loading on the travel lanes.

At blind spots get a second person to assist.

The driver must ensure that the loading dock /dock leveller cannot be removed or come loose during loading/unloading.

---

#### **⚠ WARNING!**

##### **Operation under extreme conditions**

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

- ▶ Uncontrolled and unintentional movements of the mast may occur during commissioning under extreme conditions (outside the permissible operating conditions).
  - ▶ 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 is not authorised for use in nuclear plants.
  - ▶ Use is not permitted in areas at risk of explosion.
  - ▶ Use under high, continuous load can lead to a reduction in performance with regard to the working functions (travel and hydraulic functions) due to high heat input.
  - ▶ In adverse weather conditions (thunder, lightning) the industrial truck must not be operated outside or in hazardous areas.
- 

- Operation in industrial and commercial environments.
- Permissible temperature range – see page 19 and following.
- Operation only on secure, level surfaces with sufficient capacity.
- Do not exceed the permissible surface and point loading limits on the travel paths.
- Operation only on routes that are visible and approved by the operating company.
- Negotiating slopes up to a maximum of 15 %.
- Do not travel across or at an angle on slopes. Travel with the load facing uphill.
- Use in non-public transport.
- Permissible altitude during operation up to 2000 m above the average sea level.

→ For the use of the industrial truck, the operating conditions from the operating instructions of the installed options must also be observed, e.g. lithium-ion battery (○).

→ The respective permissible minimum operating conditions of the industrial truck or battery are binding and decisive.

##### **Changing the application areas and thawing**

- The application areas can be changed, but in general this should be minimised due to thawing and possible corrosion.
- Thawing is permissible only if the truck can be subsequently dried thoroughly.

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

### 3.1 Instructions for Trucks with Lithium-Ion Batteries

#### **WARNING!**

##### **Danger of accidents due to regenerative braking fault**

Regenerative braking faults can result in extended stopping distances and accidents, particularly when travelling on inclines. Other persons can be injured in the truck's hazardous area.

- ▶ Keep all persons out of the hazardous area during travel operations.
  - ▶ Instruct other people to move out of the hazardous area of the truck. Stop working with the truck if people do not leave the hazardous area.
  - ▶ In emergencies, use the service brake for braking.
- 

Equipping the truck with a lithium-ion battery can affect the permissible operating conditions. The operating conditions of the truck and the various battery types are listed in this section.

- Travel and hydraulic functions: The usable battery capacity and power are reduced at low temperatures. If the lithium-ion battery is in the low-temperature range, the lift function may be impaired and regenerative braking with the coasting brake may not function correctly.
- High ambient temperatures increase the charging time of the lithium-ion battery.
- The permissible application range of the lithium-ion battery does not increase the permissible application range of the truck.

 A notification symbol appears on the display unit when the temperature of the lithium-ion battery is outside the permissible range – see page 116

### 3.2 Internal Operation Combined with Brief External or Cold Store Operation (●)

In addition to the permissible operating conditions in industrial and commercial environments, the truck can also be used in outdoor environments, cold stores and fresh food areas. Secure parking is only permissible indoors or in a cold store environment.

#### NOTICE

##### Damage to the lead battery due to low state of charge and extreme temperatures

Elevated temperatures accelerate chemical reactions and self-discharge of the battery. Discharging at a low state of charge then considerably shortens the battery's useful and service life.

Temperatures that are too low limit battery capacity. Low state of charge and deep discharge will then occur more quickly, and further discharge will significantly shorten the battery's useful and service life.

- ▶ Note permissible temperature ranges.
- ▶ Avoid a low state of charge at low temperatures below -5 °C , charge the battery immediately.
- ▶ Avoid a low state of charge at low temperatures between -5 °C and +5 °C **as far as possible**, charge the battery as soon as possible.
- ▶ Avoid a low state of charge at high temperatures between +35 °C and +40 °C **as far as possible**, charge the battery as soon as possible.

- 
- When working below -10 °C, the truck must be operated permanently.
  - Secured parking is not permitted at temperatures below -10 °C.
  - Use and secured parking are not permitted at temperatures above +40 °C.

Operating and ambient conditions for trucks as standard versions <sup>1</sup>	
Permissible temperature range in operation	-20 °C to +40 °C
Temperature range for secure parking	-10 °C to +40 °C
Maximum air humidity	95% non-condensing
<i><sup>1)</sup> Different operating and ambient conditions apply to trucks as cold store or tropical versions.</i>	

→ The permissible operating conditions are different for trucks with a lithium-ion battery (○); see the operating instructions for the lithium-ion battery.

### 3.3 Indoor Application Predominantly inside the Cold Store (○)

The truck is manufactured as a cold store version (○) and is equipped with hydraulic oil suitable for cold stores. In addition to the permissible operating conditions in industrial and commercial environments, the truck remains predominantly in the cold store and may only leave the cold store briefly for load transfer.

#### NOTICE

#### Damage to the lead battery due to low state of charge and extreme temperatures

Elevated temperatures accelerate chemical reactions and self-discharge of the battery. Discharging at a low state of charge then considerably shortens the battery's useful and service life.

Temperatures that are too low limit battery capacity. Low state of charge and deep discharge will then occur more quickly, and further discharge will significantly shorten the battery's useful and service life.

- ▶ Note permissible temperature ranges.
  - ▶ Avoid a low state of charge at low temperatures below  $-5\text{ °C}$ , charge the battery immediately.
  - ▶ Avoid a low state of charge at low temperatures between  $-5\text{ °C}$  and  $+5\text{ °C}$  **as far as possible**, charge the battery as soon as possible.
  - ▶ Avoid a low state of charge at high temperatures between  $+35\text{ °C}$  and  $+40\text{ °C}$  **as far as possible**, charge the battery as soon as possible.
- 

- In cold store areas below  $-10\text{ °C}$ , the truck must be operated permanently.
- Short-term use in a deep-freeze store is possible. The truck is cooled down to  $-20\text{ °C}$ , works for max. 5 min. at max.  $-28\text{ °C}$  and then goes back into the cold store at max.  $-20\text{ °C}$  and stays there for at least 10 minutes. Another period of use at up to  $-28\text{ °C}$  is then possible in accordance with the described procedure.
- When used below  $-10\text{ °C}$  and above  $+30\text{ °C}$ , the performance of the truck is only available with restrictions.
- When using hydraulic oil suitable for cold stores, increased lowering speeds may occur above approx.  $+20\text{ °C}$ .
- Use and secured parking are not permitted at temperatures above  $+40\text{ °C}$ .

<b>Operating and ambient conditions for trucks as cold store versions <sup>1</sup></b>	
Permissible temperature range in operation	-20 °C to +30 °C, short-term -28 °C to +40 °C
Typical temperature range in continuous use	-20 °C to +20 °C
Temperature range for secure parking	-10 °C to +40 °C
Maximum air humidity	95% non-condensing
<i><sup>1)</sup> Different operating and ambient conditions apply to trucks as standard or tropical versions.</i>	

- The permissible operating conditions are different for trucks with a lithium-ion battery (○); see the operating instructions for the lithium-ion battery.

### 3.4 Hot country or tropical use (○)

The truck is manufactured as a tropical version (○) and is equipped with hydraulic oil specially designed for use at high temperatures.

#### NOTICE

#### Damage to the lead battery due to low state of charge and extreme temperatures

Elevated temperatures accelerate chemical reactions and self-discharge of the battery. Discharging at a low state of charge then considerably shortens the battery's useful and service life.

Temperatures that are too low limit battery capacity. Low state of charge and deep discharge will then occur more quickly, and further discharge will significantly shorten the battery's useful and service life.

- ▶ Note permissible temperature ranges.
- ▶ Avoid a low state of charge at low temperatures below -5 °C , charge the battery immediately.
- ▶ Avoid a low state of charge at low temperatures between -5 °C and +5 °C **as far as possible**, charge the battery as soon as possible.
- ▶ Avoid a low state of charge at high temperatures between +35 °C and +40 °C **as far as possible**, charge the battery as soon as possible.
- ▶ Avoid a low state of charge at high temperatures above +40 °C , charge the battery immediately.

- 
- In areas of low temperature between -10 °C and -5 °C, the truck must be operated permanently.
  - When using hydraulic oil suitable for high temperatures, reduced lowering speeds may occur below approx. +20 °C.
  - Secured parking is not permitted at temperatures above +40 °C.
  - Use is not permitted at temperatures above +50 °C.

Operating and ambient conditions for trucks as tropical versions <sup>1</sup>	
Permissible temperature range in operation	-5 °C to +50 °C, short-term -10 °C to +50 °C
Typical temperature range in continuous use	+30 °C to +50 °C
Temperature range for secure parking	-5°C to +40 °C
Maximum air humidity	95% non-condensing
<i><sup>1)</sup> Different operating and ambient conditions apply to trucks as standard or cold store versions.</i>	

- The permissible operating conditions are different for trucks with a lithium-ion battery (○); see the operating instructions for the lithium-ion battery.

### 3.5 Ambient Conditions for Charging

The industrial truck may be charged in closed rooms and also in covered outdoor areas protected from moisture.

- Observe the permissible operating and ambient conditions of the battery and the battery charger.

**⚠ CAUTION!**

**Risk of electrical-system damage**

If the electronic system assemblies (controllers, sensors, motors etc.) come in contact with water, this can damage the electrical system.

- ▶ Protect the industrial truck from moisture when charging in a covered outdoor area.

Operating temperature for charging	
Truck with lead battery	+5 °C to +40 °C
Truck with lithium-ion battery (○)	See the lithium-ion battery operating instructions
Maximum relative air humidity	95% non-condensing

## 4 Residual risk

### WARNING!

#### **Risk of accident and injury due to incorrect behaviour in the case of unavoidable residual risks**

Incorrect behaviour or failure to observe the operating instructions can lead to accidents and injuries.

- ▶ The operator must be instructed in the operation of the truck, optional equipment and attachments, specifically with regard to appropriate behaviour in hazardous areas as well as in situations where unavoidable residual risks exist or implemented safety measures cannot be fully effective.
- ▶ The operator must be familiar with the contents of the operating instructions and must observe these at all times.

---

Residual risks are particular hazards that arise when working with the truck but cannot be eliminated despite the safety-compliant design of the system. Residual risks are not immediately apparent and are a potential cause of accidents, injuries or health problems.

The transport, setup, operation and maintenance of the truck, optional equipment and attachments – as well as any other reasonably foreseeable use of thereof – can take place under the designated conditions without exposing persons to specific hazards.

Risks are eliminated or minimised to as great an extent as possible. Improper use is prevented if it entails specific risks. Appropriate safety measures are implemented to counter unavoidable risks.

Residual risks that cannot be eliminated by means of risk mitigation are highlighted explicitly in the operating instructions.

Residual risks can be further reduced by trained and technically qualified personnel as well as responsible, safety-conscious conduct during operation and maintenance.

## 5 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 proprietor is considered the person who, in accordance with existing contractual agreements between the owner and user of the industrial truck, is charged with operational duties.

The proprietor must ensure that the industrial truck is used only for the purpose it is intended for and that danger 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 operating company must ensure that all users have read and understood these operating instructions.

### NOTICE

Failure to comply with the operating instructions invalidates 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.

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- Compliance with the operating instructions and proper use of the industrial truck with possible optional equipment and attachments does not release the owner from the obligation to identify and assess all hazards and health risks present at a workplace or triggered by an activity.

## 6 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.

## 7 Removal of components

Disassembly and assembly of truck components is only permitted if it is carried out in accordance with the "Maintenance and Repairs" section of these operating instructions.

The truck may only be put back into operation once all the disassembled components have been properly reassembled.

Modifying or disassembling other truck components, especially protective and safety equipment, is prohibited.

- If in doubt, contact the manufacturer's customer service department.



# B Truck Description

## 1 Application

The EFG 425k - 435 is a four-wheel electric sit-down forklift truck. It is a cantilever counterbalanced truck which can lift, transport and deposit loads using the load handler attached in front.

Closed bottom pallets can also be lifted.

### 1.1 Truck models and rated capacity

The rated capacity depends on the model. The rated capacity can be derived from the model name.

**e.g. EFG 425k**

EFG	Type designation
4	Series
25	Rated capacity x 100 kg
k	Short

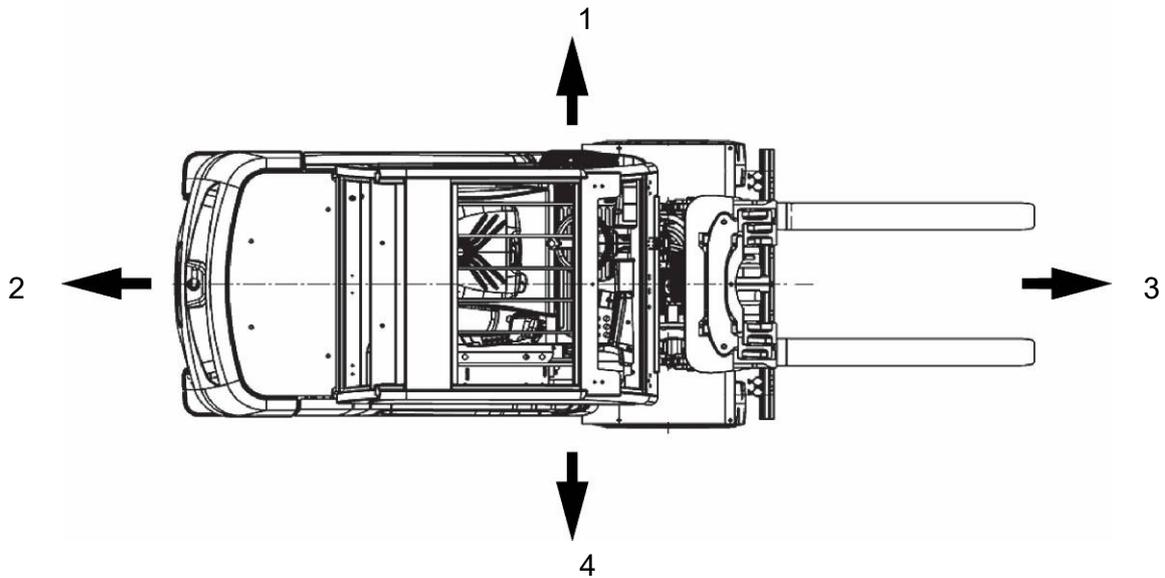
**e.g. EFG S30**

EFG	Type designation
S	Load centre = 600 mm
30	Rated capacity x 100 kg

The rated capacity is not generally the same as the permissible capacity. The capacity can be found on the capacity plate attached to the truck.

## 2 Assemblies and Functional Description

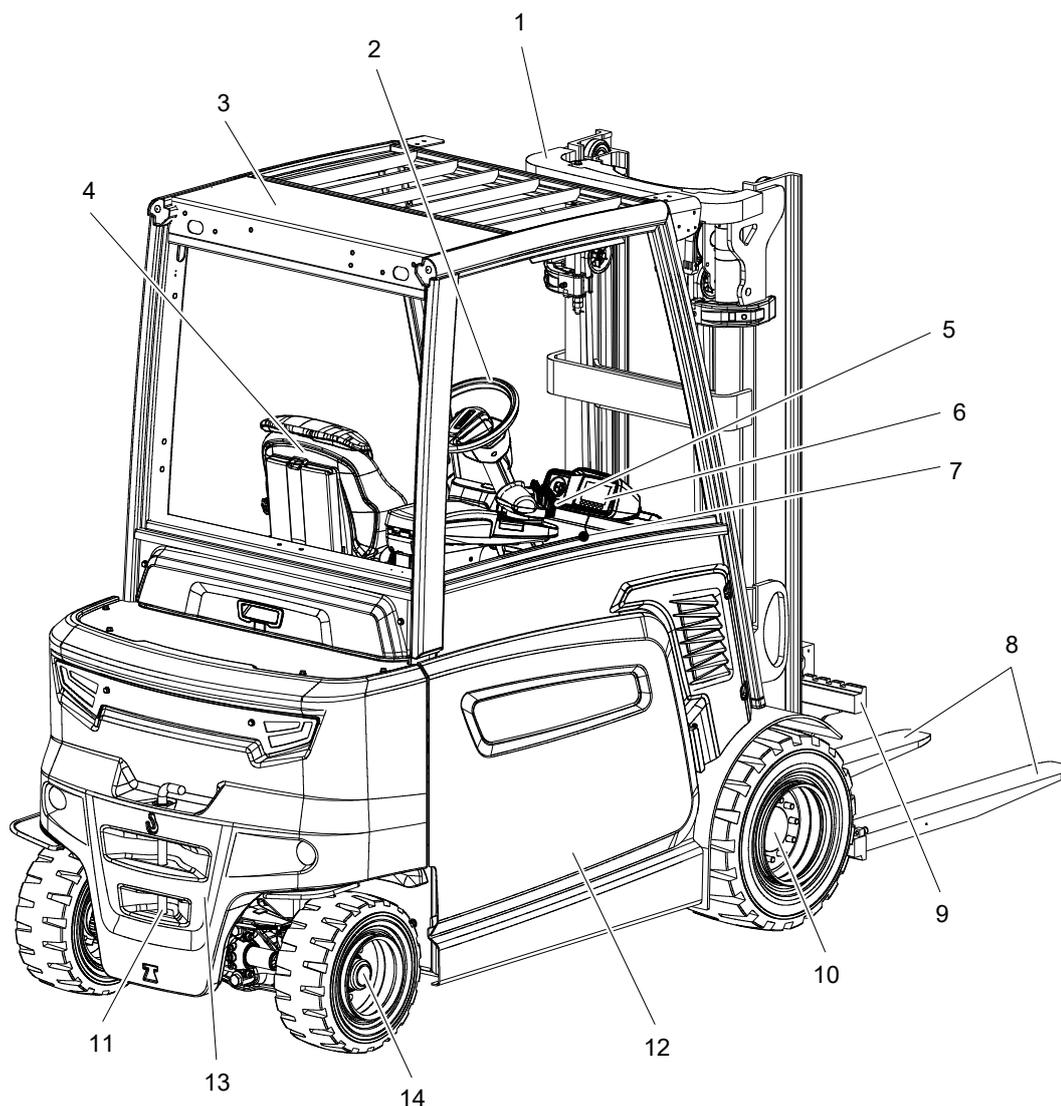
### 2.1 Travel direction definition



The following conventions have been agreed for travel direction specification:

Item	Travel direction
1	Left
2	Reverse
3	Forward
4	Right

## 2.2 Assembly Overview



Item	Designation	Item	Designation
1	Mast	8	Fork arms
2	Steering wheel	9	Fork carriage
3	Overhead guard	10	Drive system
4	Driver's seat	11	Trailer coupling
5	Lift mechanism control	12	Battery door
6	Control and display unit	13	Counterweight
7	Emergency disconnect switch	14	Steer axle

## 2.3 Functional Description

### Chassis

The chassis, in conjunction with the counterweight, forms the supporting base structure of the truck. It is used to support the main components.

### Operator position and overhead guard

The overhead guard comes in a range of models and protects the operator from falling objects and other external influences. All the controls are ergonomically arranged. The steering column and driver's seat can be adjusted individually.

The controls and warnings on the control and display unit enable the system to be monitored during operation, thereby ensuring a very high level of safety.

### Drive system and brake

The 2 motor front drive provides maximum traction to the drive wheels at all times. When cornering, the exact speed required for the wheel on the inside or outside of the bend respectively is set in proportion to the steer angle.

The oil-bath multi-plate brake is operated as a service brake with a hydraulic brake pedal and is maintenance free. In addition, regenerative braking is applied when braking with the drive motor. This minimises overall energy consumption.

The automatic parking brake (●) is automatically activated a set time (0 to 60 sec) after the truck comes to a standstill. The factory setting for this is 30 sec. If the operating position is vacated, the automatic parking brake becomes active after approximately 1 second.

### Hydraulic steering

The height and tilt angle of the steering column are adjustable and can be set to suit all operators. The steer cylinder of the hydrostatic steering is integrated in the steer axle and is controlled by the power steering.

### Steer axle

The steer axle is pendulum-mounted in the counterweight to ensure excellent grip even on non-level surfaces.

### Wheels

All wheels are within the truck geometry. A choice of super-elastic tyres (SE) (●), solid tyres (○) or pneumatic tyres (○) is available.

### Electrical system

The industrial truck is supplied with energy by the exchangeable 80-volt battery installed in the chassis of the drive section.

Voltage transformers supply the 24-volt cabin section with display unit, controls and optional components. The cabin section is connected to the drive section via interfaces.

## **Hydraulic system for operating functions**

A multi-function control valve allows for sensitive operation of the functions via the controls. A speed-controlled hydraulic pump ensures a proportionate and efficient supply to the hydraulic functions.

### **Mast**

Two or three-stage masts, optionally with free lift function; narrow mast sections ensure excellent visibility of the forks and attachments. Fork carriage and mast run on permanently lubricated and hence maintenance-free support rollers.

### **Attachments**

The trucks can be optionally fitted with mechanical and hydraulic attachments.

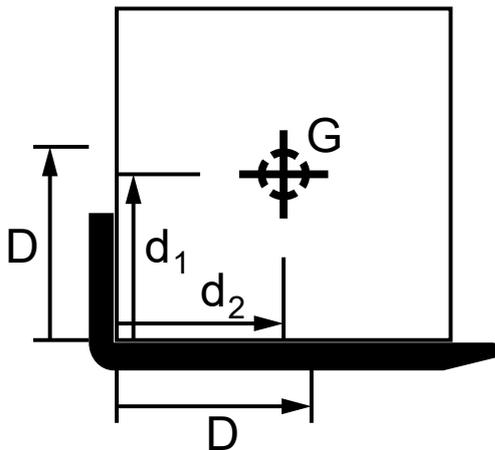
### 3 Technical Specifications

All technical specifications refer to a standard truck with Continental tyres. All values marked with \*) may vary depending on the type of equipment used (mast, cabin, tyres etc.).

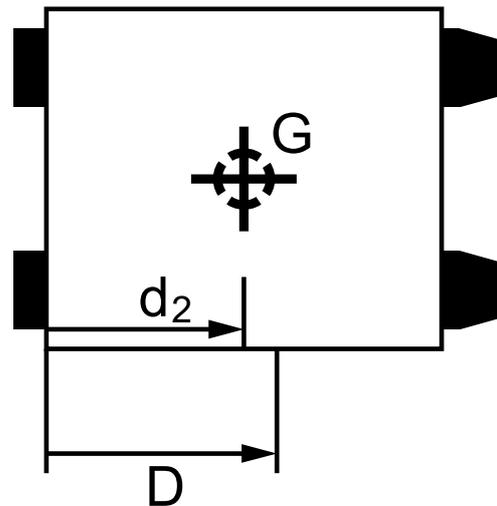
- The technical specifications comply with the German "Industrial Truck Data Sheet" Guidelines.  
Technical modifications and additions reserved.

#### Load centre distance

Side view from the right



View from above



The load centre distance  $D$  of the load handler is specified as the horizontal distance from the front face and the vertical distance from the upper edge of the load handler.

- The capacity plate for standard load handlers specifies valid load centre distances of 500 mm, 600 mm and 700 mm.

The distances  $d_1$  and  $d_2$  depicted in the illustration between the load handler and the actual centre of gravity  $G$  of the load must be smaller or equal to the load centre distance  $D$  ( $d_1 \leq D$  and  $d_2 \leq D$ ) to avoid the risk of overturning, see page 174.

### 3.1 Performance data

Designation		EFG 425 Li-ion	EFG 425k Li-ion	EFG 430 Li-ion	
Capacity (Q) <sup>1</sup>		2500	2500	3000	kg
Load centre (D)		500	500	500	mm
Travel speed * with/ without load	drive&liftPLU S	20 / 20	20 / 20	20 / 20	km/h
	Efficiency	17 / 17	17 / 17	17 / 17	km/h
Lift speed with/ without load	drive&liftPLU S	0.64 / 0.68	0.64 / 0.68	0.57 / 0.63	m/s
	Efficiency	0.58 / 0.62	0.58 / 0.62	0.50 / 0.52	m/s
Lowering speed with / without load	drive&liftPLU S	0.59 / 0.62	0.59 / 0.62	0.58 / 0.64	m/s
	Efficiency	0.59 / 0.62	0.59 / 0.62	0.58 / 0.64	m/s
Gradeability (30 min) with / without load *	drive&liftPLU S	19 / 30	19 / 30	16 / 25	%
	Efficiency	12 / 18	12 / 18	10 / 15	%
Max. gradeability <sup>2</sup> (5 min) with / without load	drive&liftPLU S	27 / 38	27 / 34	22 / 33	%
	Efficiency	18 / 28	18 / 28	18 / 28	%
Acceleration * (15 m) with / without load	drive&liftPLU S	5.3 / 5.0	5.3 / 5.0	5.5 / 5.0	s
	Efficiency	6.1 / 5.7	6.1 / 5.7	6.1 / 5.4	s
Drawbar pull with load S2 60 min with / without load	drive&liftPLU S	10000 / 10000	10000 / 10000	10000 / 10000	N
	Efficiency	8000 / 8000	8000 / 8000	7000 / 7000	N
Max. drawbar pull with load S2 5 min with / without load	drive&liftPLU S	19500 / 19500	19500 / 19500	19500 / 19500	N
	Efficiency	16000 / 16000	16000 / 16000	16000 / 16000	N
Throughput performance	drive&liftPLU S	188	188	219	t/h
	Efficiency	173	173	204	t/h
Energy consumption at max. throughput	drive&liftPLU S	9.4	9.4	10.3	kWh/ h
	Efficiency	7.8	7.8	8.9	
<p><sup>1)</sup> With vertical mast</p> <p><sup>2)</sup> The values specified indicate the maximum gradeability to overcome minor differences in height and unevenness in the travel lane (travel-lane edges). Operation on slopes of more than 15% is prohibited.</p>					

Designation		EFG 425 Li-ion	EFG 425k Li-ion	EFG 430 Li-ion	
CO2 equivalent according to EN 16796	drive&liftPLU S	3.2	3.2	3.5	kg/h
	Efficiency	3.3	3.3	3.7	
Max. operating pressure		240	240	240	bar
Oil flow for attachments		45	45	45	l/min
<p>1) <i>With vertical mast</i></p> <p>2) <i>The values specified indicate the maximum gradeability to overcome minor differences in height and unevenness in the travel lane (travel-lane edges). Operation on slopes of more than 15% is prohibited.</i></p>					

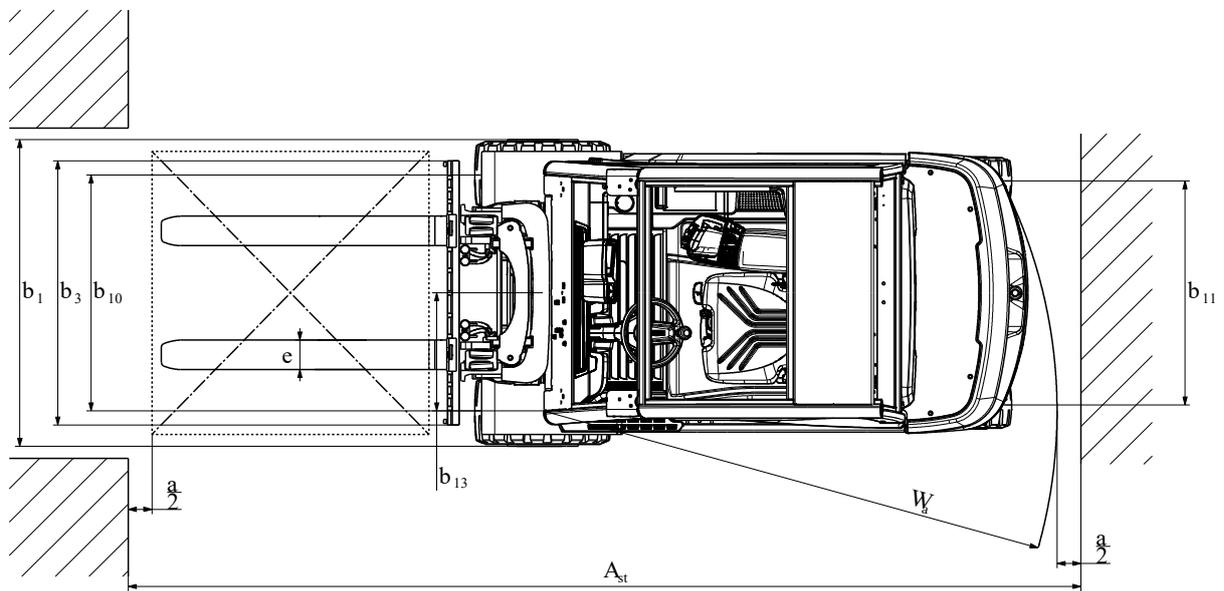
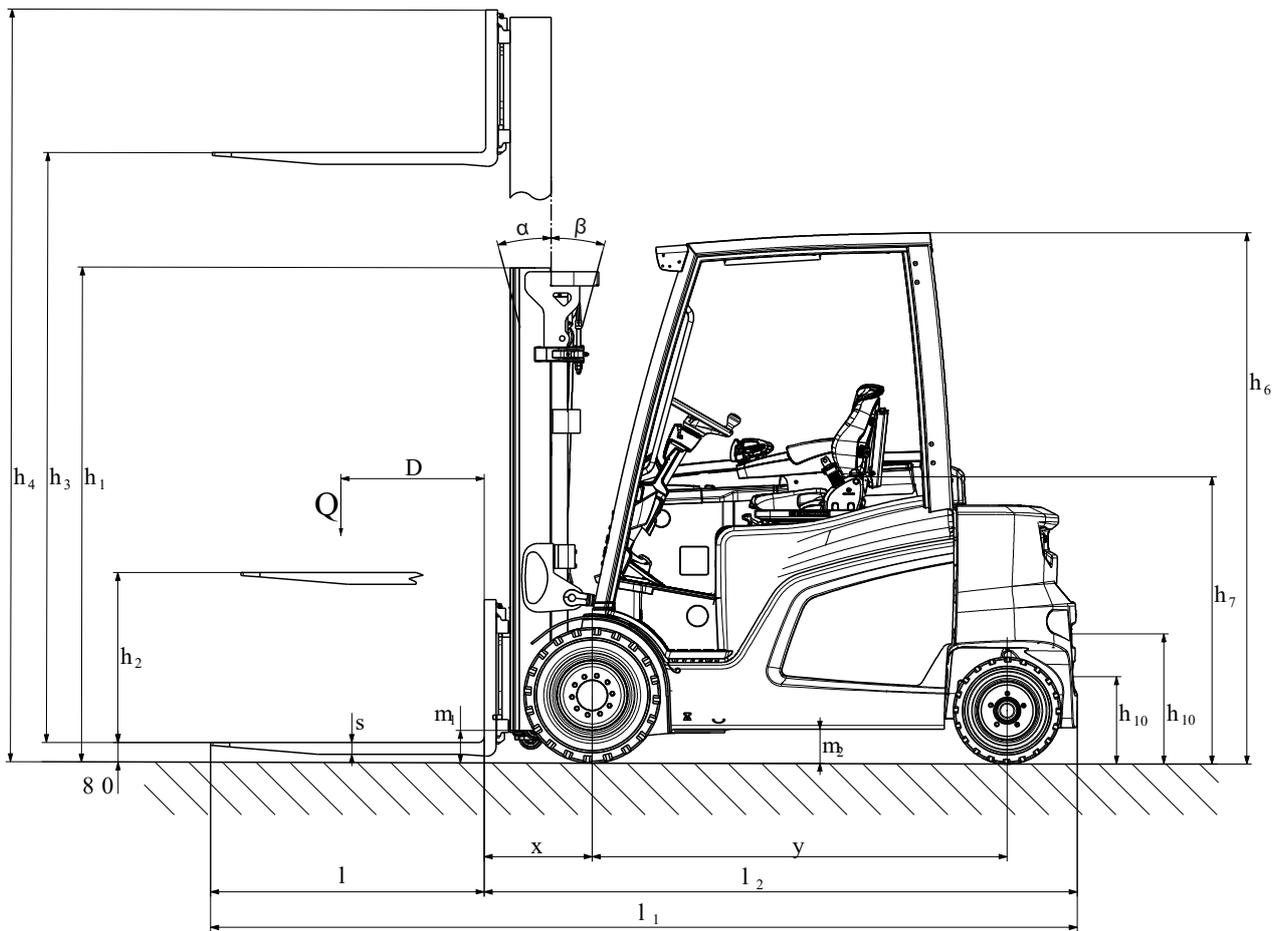
<b>Designation</b>		<b>EFG 430k Li-ion</b>	<b>EFG S30 Li-ion</b>	<b>EFG 435 Li-ion</b>	
Capacity (Q) <sup>1</sup>		3000	3000	3500	kg
Load centre (D)		500	600	500	mm
Travel speed * with/ without load	drive&liftPLU S	20 / 20	20 / 20	20 / 20	km/h
	Efficiency	17 / 17	17 / 17	17 / 17	km/h
Lift speed with/ without load	drive&liftPLU S	0.57 / 0.63	0.57 / 0.63	0.50 / 0.53	m/s
	Efficiency	0.50 / 0.52	0.50 / 0.52	0.44 / 0.51	m/s
Lowering speed with / without load	drive&liftPLU S	0.58 / 0.64	0.58 / 0.64	0.56 / 0.59	m/s
	Efficiency	0.58 / 0.64	0.58 / 0.64	0.56 / 0.59	m/s
Gradeability (30 min) with / without load *	drive&liftPLU S	16 / 25	16 / 25	14 / 23	%
	Efficiency	10 / 15	10 / 15	10 / 15	%
Max. gradeability <sup>2</sup> (5 min) with / without load	drive&liftPLU S	22 / 33	22 / 33	20 / 33	%
	Efficiency	18 / 28	18 / 28	17 / 28	%
Acceleration * (15 m) with / without load	drive&liftPLU S	5.5 / 5.0	5.5 / 5.0	5.6 / 5.1	s
	Efficiency	6.1 / 5.4	6.1 / 5.4	6.4 / 5.5	s
Drawbar pull with load S2 60 min with / without load	drive&liftPLU S	10000 / 10000	10000 / 10000	10000 / 10000	N
	Efficiency	7000 / 7000	7000 / 7000	7000 / 7000	N
Max. drawbar pull with load S2 5 min with / without load	drive&liftPLU S	19500 / 19500	19500 / 19500	19500 / 19500	N
	Efficiency	16000 / 16000	16000 / 16000	16000 / 16000	N
Throughput performance	drive&liftPLU S	219	219	238	t/h
	Efficiency	204	201	224	t/h
Energy consumption at max. throughput	drive&liftPLU S	10.3	10.3	10.7	kWh/ h
	Efficiency	8.9	8.8	9.2	
<p><sup>1)</sup> <i>With vertical mast</i></p> <p><sup>2)</sup> <i>The values specified indicate the maximum gradeability to overcome minor differences in height and unevenness in the travel lane (travel-lane edges). Operation on slopes of more than 15% is prohibited.</i></p>					

Designation		EFG 430k Li-ion	EFG S30 Li-ion	EFG 435 Li-ion	
CO2 equivalent according to EN 16796	drive&liftPLU S	3.6	3.6	4.5	kg/h
	Efficiency	3.7	3.8	4.5	
Max. operating pressure		240	240	240	bar
Oil flow for attachments		45	45	45	l/min
<p>1) <i>With vertical mast</i></p> <p>2) <i>The values specified indicate the maximum gradeability to overcome minor differences in height and unevenness in the travel lane (travel-lane edges). Operation on slopes of more than 15% is prohibited.</i></p>					

## 3.2 Dimensions

	Designation	EFG 425 Li-ion	EFG 425k Li-ion	EFG 430 Li-ion	
a/2	Safety clearance	100	100	100	mm
h <sub>1</sub>	Mast height retracted *	2325	2325	2322	mm
h <sub>2</sub>	Free lift *	150	150	150	mm
h <sub>3</sub>	Lift *	3300	3300	3300	mm
h <sub>4</sub>	Mast height extended *	3900	3900	4057	mm
h <sub>6</sub>	Overhead guard height *	2240	2240	2240	mm
h <sub>7</sub>	Seat height / standing height *	1226	1226	1226	mm
H <sub>1</sub>	Seating room	924	924	924	mm
h <sub>10</sub>	Coupling height	380/530	380/530	380/530	mm
α	Mast tilt, fwd.	6	6	6	°
β	Mast tilt, back	8	8	8	°
l <sub>1</sub>	Length including fork *	3632	3484	3637	mm
l <sub>2</sub>	Length including fork shank *	2482	2334	2487	mm
b <sub>1</sub>	Overall width *	1200	1200	1200	mm
s / e / l	Fork arm dimensions	40 / 100 / 1150	40 / 100 / 1150	45 / 125 / 1150	mm
b <sub>3</sub>	Fork carriage width *	1120	1120	1120	mm
b <sub>10</sub>	Track width, front	990	990	950	mm
b <sub>11</sub>	Track width, rear	940	940	940	mm
b <sub>13</sub>	Smallest pivot point distance	630	580	630	mm
m <sub>1</sub>	Ground clearance, laden, below mast	110	110	110	mm
m <sub>2</sub>	Ground clearance, centre of wheelbase	135	135	135	mm
A <sub>st</sub>	Aisle width for 800 x 1200 pallets, lengthways	4072	3922	4077	mm
A <sub>st</sub>	Aisle width for 1000 x 1200 pallets, transverse	3872	3722	3877	mm
W <sub>a</sub>	Turning radius	2230	2080	2230	mm
x	Load distance *	442	442	447	mm
y	Wheelbase	1740	1595	1745	mm

	<b>Designation</b>	<b>EFG 430k Li-ion</b>	<b>EFG S30 Li-ion</b>	<b>EFG 435 Li-ion</b>	
a/2	Safety clearance	100	100	100	mm
h <sub>1</sub>	Mast height retracted *	2322	2322	2352	mm
h <sub>2</sub>	Free lift *	150	150	150	mm
h <sub>3</sub>	Lift *	3300	3300	3300	mm
h <sub>4</sub>	Mast height extended *	4057	4057	4086	mm
h <sub>6</sub>	Overhead guard height *	2240	2240	2240	mm
h <sub>7</sub>	Seat height / standing height *	1226	1226	1226	mm
H <sub>1</sub>	Seating room	924	924	924	mm
h <sub>10</sub>	Coupling height	380/530	380/530	380/530	mm
α	Mast tilt, fwd.	6	6	6	°
β	Mast tilt, back	8	8	8	°
l <sub>1</sub>	Length including fork *	3489	3637	3637	mm
l <sub>2</sub>	Length including fork shank *	2339	2487	2487	mm
b <sub>1</sub>	Overall width *	1200	1300	1300	mm
s / e / l	Fork arm dimensions	45 / 125 / 1150	45 / 125 / 1150	45 / 125 / 1150	mm
b <sub>3</sub>	Fork carriage width *	1120	1120	1120	mm
b <sub>10</sub>	Track width, front	950	1000	1000	mm
b <sub>11</sub>	Track width, rear	940	940	950	mm
b <sub>13</sub>	Smallest pivot point distance	580	630	630	mm
m <sub>1</sub>	Ground clearance, laden, below mast	110	110	110	mm
m <sub>2</sub>	Ground clearance, centre of wheelbase	135	135	135	mm
A <sub>st</sub>	Aisle width for 800 x 1200 pallets, lengthways	3927	4077	4077	mm
A <sub>st</sub>	Aisle width for 1000 x 1200 pallets, transverse	3727	3877	3877	mm
W <sub>a</sub>	Turning radius	2080	2230	2230	mm
x	Load distance *	447	447	447	mm
y	Wheelbase	1595	1745	1745	mm



### 3.3 Weights

→ All dimensions in kg.

<b>Description</b>	<b>EFG 425 Li-ion</b>	<b>EFG 425k Li-ion</b>	<b>EFG 430 Li-ion</b>
Net weight (including battery)	4642	4691	5143
Front axle load (with load)	6466	6414	7395
Rear axle load (with load)	676	776	748
Front axle load (without load)	2595	2419	2741
Rear axle load (without load)	2047	2272	2402

<b>Description</b>	<b>EFG 430k Li-ion</b>	<b>EFG S30 Li-ion</b>	<b>EFG 435 Li-ion</b>
Net weight (including battery)	5298	5435	5664
Front axle load (with load)	7404	7605	8239
Rear axle load (with load)	895	829	926
Front axle load (without load)	2594	2771	2805
Rear axle load (without load)	2704	2664	2859

### 3.4 Mast versions

#### EFG 425 / EFG 425k

ZT / ZZ / DZ masts					
	Lift $h_3$ (mm)	Free lift $h_2$ (mm)	Retracted height $h_1$ (mm)	Extended height $h_4$ (mm)	Mast weight (kg)
ZT	2900	150	2125	3500	553
	3100	150	2225	3700	570
	3300	150	2325	3900	587
	3500	150	2425	4100	604
	3700	150	2525	4300	621
	4000	150	2675	4600	647
	4300	150	2875	4950	700
	4500	150	2975	5150	718
ZZ	3100	1600	2190	3690	599
	3300	1700	2290	3890	617
	3500	1800	2390	4090	635
	3700	1900	2490	4290	654
	4000	2050	2640	4590	681
DZ	4400	1500	2090	4990	762
	4700	1600	2190	5290	788
	5000	1700	2290	5590	814
	5500	1900	2490	6090	865
	6000	2100	2690	6590	939
	6500	2300	2890	7090	990
	7000	2500	3090	7590	1041
	7500	2700	3290	8090	1093
→	<i>ZT = Two-stage mast with low free lift</i> <i>ZZ = Two-stage auxiliary-lift mast with full free lift</i> <i>DZ = Three-stage auxiliary-lift mast with full free lift</i>				

Special trucks are not included in this overview.

**EFG 430 / EFG 430k / EFG S30**

<b>ZT / ZZ / DZ masts</b>					
	<b>Lift <math>h_3</math> (mm)</b>	<b>Free lift <math>h_2</math> (mm)</b>	<b>Retracted height <math>h_1</math> (mm)</b>	<b>Extended height <math>h_4</math> (mm)</b>	<b>Mast weight (kg)</b>
<b>ZT</b>	2900	150	2122	3657	589
	3100	150	2222	3857	607
	3300	150	2322	4057	625
	3500	150	2422	4257	643
	3700	150	2522	4457	661
	4000	150	2672	4757	688
	4300	150	2872	5057	744
	4500	150	2972	5257	762
<b>ZZ</b>	3100	1450	2187	3837	618
	3300	1550	2287	4037	636
	3500	1650	2387	4237	654
	3700	1750	2487	4437	673
	4000	1900	2637	4737	700
<b>DZ</b>	4400	1350	2087	5137	806
	4700	1450	2187	5437	833
	5000	1550	2287	5737	861
	5500	1750	2487	6237	914
	6000	1950	2687	6737	991
	6500	2150	2887	7237	1045
	7000	2350	3087	7737	1099
	7500	2550	3287	8237	1153
<p>→ <i>ZT = Two-stage mast with low free lift</i>  <i>ZZ = Two-stage auxiliary-lift mast with full free lift</i>  <i>DZ = Three-stage auxiliary-lift mast with full free lift</i></p>					

Special trucks are not included in this overview.

EFG 435

ZT / ZZ / DZ masts					
	Lift $h_3$ (mm)	Free lift $h_2$ (mm)	Retracted height $h_1$ (mm)	Extended height $h_4$ (mm)	Mast weight (kg)
ZT	2900	150	2152	3686	598
	3100	150	2252	3886	616
	3300	150	2352	4086	635
	3500	150	2452	4286	654
	3700	150	2552	4486	672
	4000	150	2702	4786	700
	4300	150	2902	5086	737
	4500	150	3002	5286	775
ZZ	3100	1451	2217	3866	661
	3300	1551	2317	4066	680
	3500	1651	2417	4266	699
	3700	1751	2517	4466	718
	4000	1901	2667	4766	746
DZ	4400	1351	2117	5166	826
	4700	1451	2217	5466	854
	5000	1551	2317	5766	883
	5500	1751	2517	6266	938
	6000	1951	2717	6766	1017
	6500	2151	2917	7266	1072
	7000	2351	3117	7766	1128
	7500	2551	3317	8266	1184
→	<i>ZT = Two-stage mast with low free lift</i> <i>ZZ = Two-stage auxiliary-lift mast with full free lift</i> <i>DZ = Three-stage auxiliary-lift mast with full free lift</i>				

Special trucks are not included in this overview.

### 3.5 Tyre type

#### **⚠ WARNING!**

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

The quality of the tyres affects the operational stability and performance of the truck. Uneven wear reduces the operational stability of the truck and increases the stopping distance.

- ▶ When replacing tyres, make sure the truck is not skewed.
- ▶ Always replace tyres in pairs, i.e. left and right at the same time.
- ▶ For pneumatic tyres, only remove the steel ring when the tyre is depressurised.

- When replacing rims and tyres fitted at the factory, only use the manufacturer's original spare parts. Otherwise the manufacturer's specifications cannot be ensured. If you have any queries, contact the manufacturer's customer service department.
- During the wear test, the wear limit of the respective wheel must be observed.

Designation		EFG 425 / EFG 425k / Li-ion	EFG 430 / Li-ion	EFG 430k / Li-ion
Front tyres	SE (●)	225/75-10 (23 x 9 - 10)	250/60-12 (23 x 10 - 12)	250/60-12 (23 x 10 - 12)
	Solid (○)	22 x 8 x 16	22 x 9 x 16	22 x 9 x 16
	Pneumatic (○)	23 x 10 - 12	23 x 10 - 12	1
	Tyre pressure	9.75 bar <sup>2</sup>	9.75 bar <sup>2</sup>	
		10.0 bar <sup>3</sup>	10.0 bar <sup>3</sup>	
Torque	320 Nm			
Rear tyres	SE (●)	180/70-8	180/70-8	200/50-10
	Solid (○)	18 x 6 x 12 1/8"	18 x 6 x 12 1/8"	18 x 7 x 12 1/8"
	Pneumatic (○)	18 / 7 - 8	18 / 7 - 8	1
	Tyre pressure	10.0 bar <sup>2</sup>	10.0 bar <sup>2</sup>	
		10.0 bar <sup>3</sup>	10.0 bar <sup>3</sup>	
Torque	220 Nm			
<p><sup>1)</sup> No provision for pneumatic tyres  <sup>2)</sup> Manufacturer: Camso  <sup>3)</sup> Manufacturer: Trelleborg</p>				

Description		EFG S30 / Li-ion	EFG 435 / Li-ion
Front tyres	SE (●)	315 / 45 - 12	315 / 45 - 12
	Solid (○)	22 x 10 x 16	22 x 10 x 16
	Pneumatic (○)	1	1
	Tyre pressure		
	Torque	320 Nm	
Rear tyres	SE (●)	200 / 50 - 10	200 / 50 - 10
	Solid (○)	18 x 7 x 12 1/8"	18 x 7 x 12 1/8"
	Pneumatic (○)	1	1
	Tyre pressure		
	Torque	220 Nm	
1) No provision for pneumatic tyres			

- The tyre sizes specified in the table correspond to the standard size. Other tyres may be fitted depending on the truck equipment.
- Within the scope of the StVZO, only use wheels whose outer diameter corresponds to the ETRTO, as the actual speed is greater than the displayed speed if larger wheels are used.

### 3.6 Motor Output

Description		EFG 425k - 435
Drive motor output S2 60 min	drive&liftPLUS	2 x 11.3 kW
	Efficiency	2 x 8.9 kW
Lift motor Output S3 15%	drive&liftPLUS	22 kW
	Efficiency	19.5 kW

## 3.7 EN norms

### Noise emission level

- Efficiency: 69 dB(A)
- drive&liftPLUS: 70 dB(A)

\*+/- 3 dB(A) depending on the truck's equipment

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

- EFG 425k/425: < 0,5 m/s<sup>2</sup>
- EFG 430/430k/S30/435: < 0,5 m/s<sup>2</sup>

according to EN 13059 in standard version.

- The internal accuracy of the measuring chain for at 21 °C at 0,02 m/s<sup>2</sup>. Further deviations may occur in particular through the positioning of the sensor and different driver weights.
- Different seat and tyre equipment may result in different vibration levels in accordance with EN 13059.
- The vibration acceleration acting on the body in its operating position is the linearly integrated, weighted acceleration in the vertical axis according to the standard. It is calculated when travelling over thresholds at constant speed (standard truck version). These recordings were taken on a single occasion for the truck and must not be confused with the human vibrations of the operator directive. The manufacturer offers a special service to measure these human vibrations, see page 362.

### 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.

### 3.8 Electrical requirements

The manufacturer certifies compliance with the requirements for the design and manufacture of electrical equipment, according to EN 1175 "Industrial Truck Safety - Electrical Requirements", provided the truck is used for its intended purpose.

### 3.9 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.

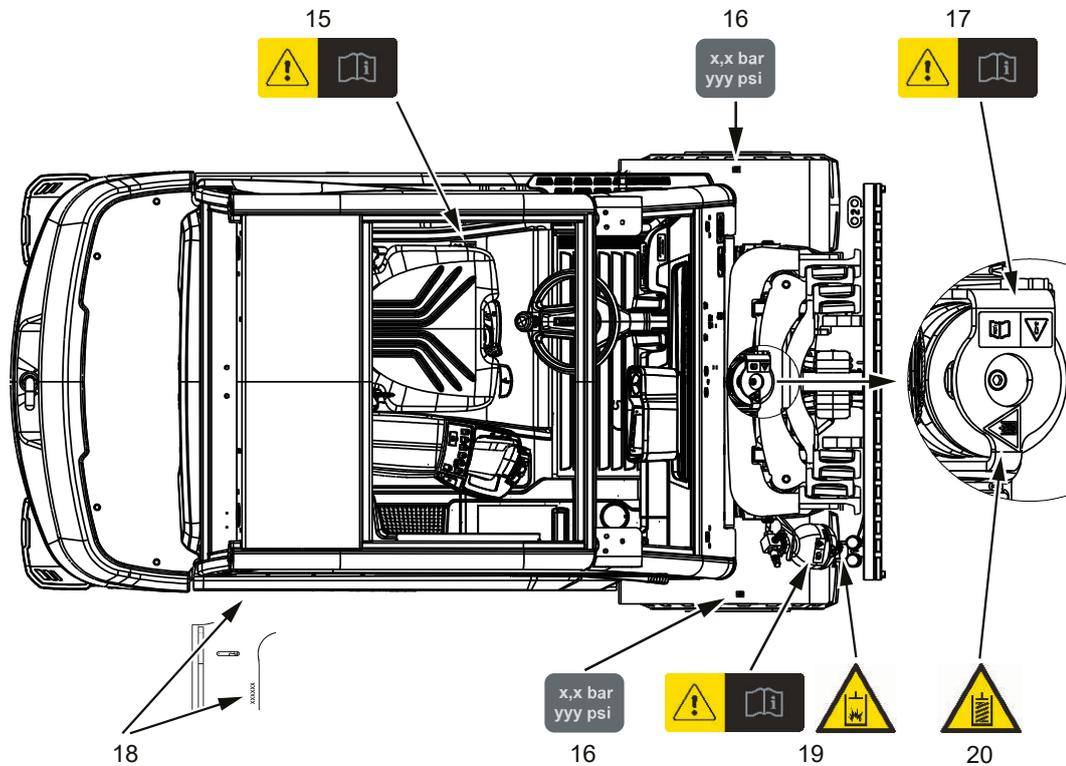
Component	Frequency range	Transmission power
WMT 210	2.4 GHz	< 100 mW
WMT 210	5.0 GHz	< 200 mW
Radio module (ISM Online)	433.05 - 434.79 MHz	< 10 mW
Access module (ISM Online)	13.56 MHz	< 100 mW
Transponder reader	13.56 MHz	< 100 mW
Transponder reader (EasyKey)	2.4 GHz	≤ 67,6 mW
Transponder reader (EasyKey)	5.8 GHz	≤ 66,1 mW
Transponder reader Plus	125 kHz	< 500 mW
Transponder reader Plus	13.56 MHz	< 500 mW
Telematics Box Basic	2G 850 /900 MHz	< 2 W
Telematics Box Basic	2G 1800/1900 MHz	< 1 W
Telematics Box Basic	3G 800 - 2100 MHz	< 250 mW
Telematics Box Plus	4G 700-2100 MHz	< 200 mW
Telematics Box Plus	2.4 GHz	< 100 mW
Telematics Box Plus	2.4 GHz	< 10 mW
Telematics Box Plus	5 GHz	< 100 mW
Telematics Box Plus	2G 850/900 MHz	< 2 W
Telematics Box Plus	2G 1800/1900 MHz	< 1 W
Telematics Box Plus	3G 800-2100 MHz	< 250 mW
Telematics Box Plus	4G 700-2100 MHz	< 200 mW
Soundmodul Premium - Bluetooth	2.402 - 2.480 GHz	< 100 mW
Soundmodul Premium - Radio FM	76 - 108 MHz	-
Soundmodul Premium - Radio DAB	174 - 240 MHz	-
Soundmodul Premium - Radio DAB	1452 - 1492 MHz	-
Indoor/outdoor detection	24.00 - 24.25 GHz	100 mW

When subsequently integrating attachments into the truck, remember that the rules on interference must be observed.

## 4 Identification Points and Data Plates

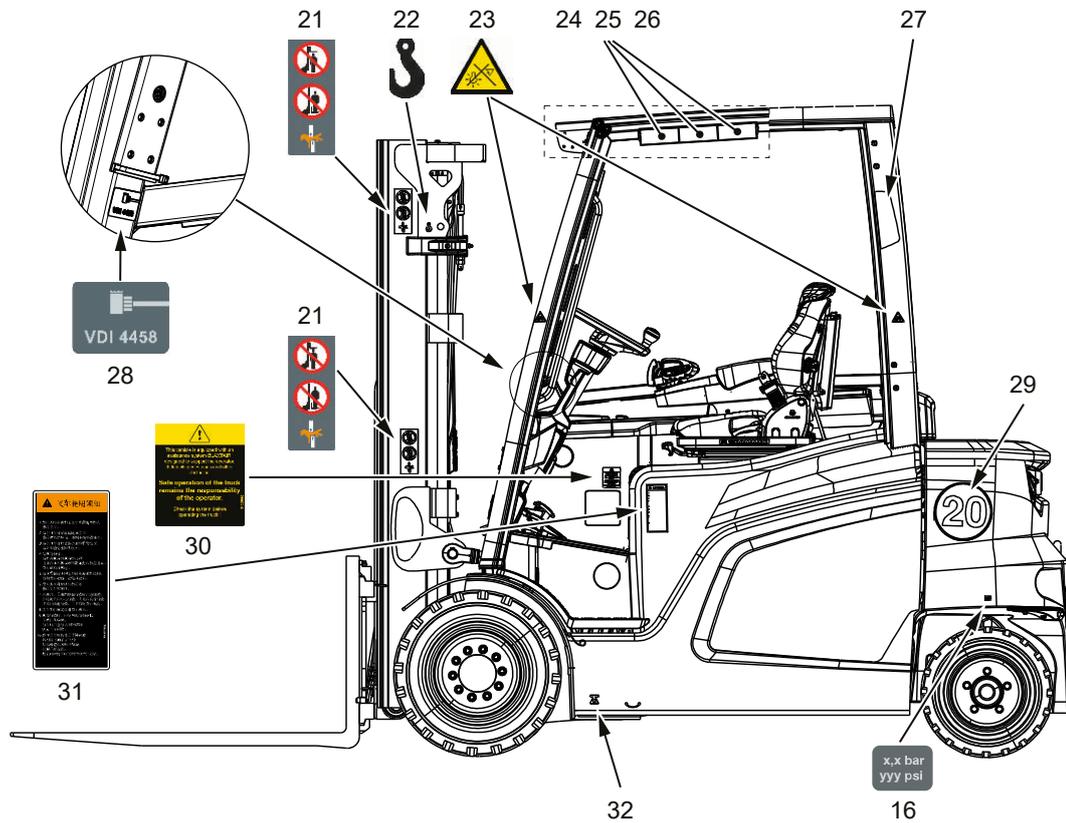
### 4.1 Indication Points

- Warnings and notices such as capacity plates, attachment points and data plates must be legible at all times. Replace if necessary.



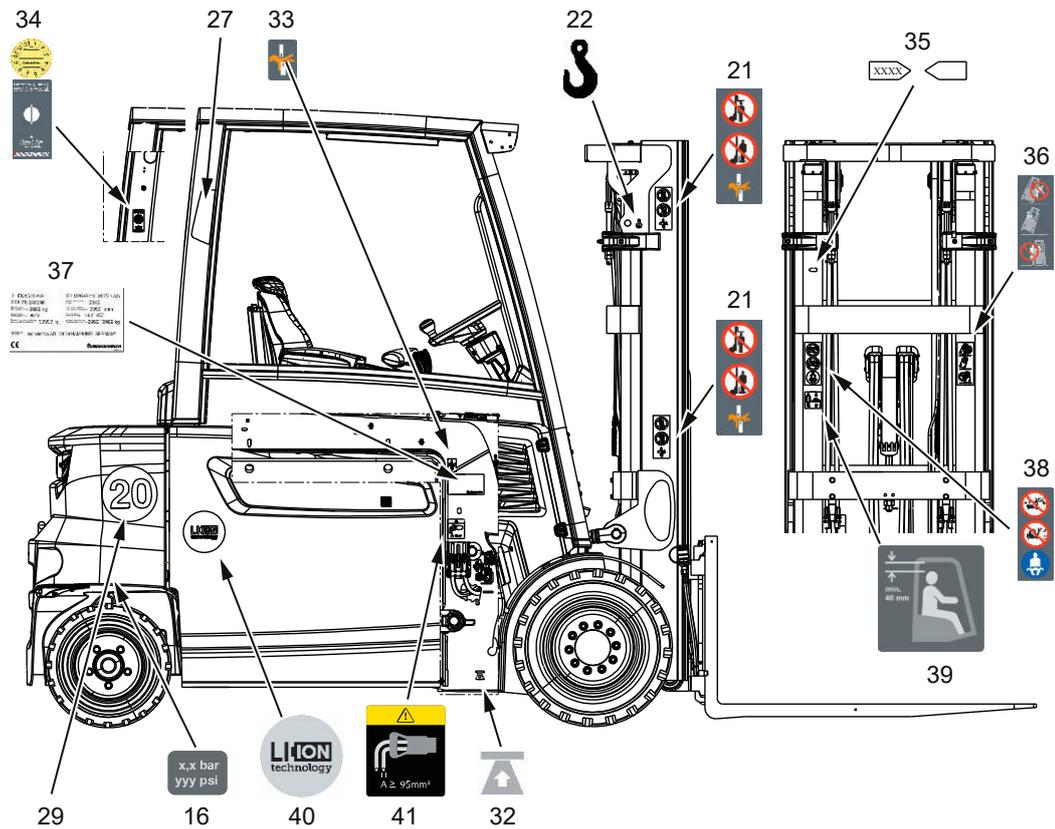
Item	Description
15	Observe the operating instructions
16	Tyre pressure (○)
17	Observe the operating instructions <sup>1</sup>
18	Serial number, engraved in the chassis next to the counterweight <sup>2</sup>
19	Load damping (○) – see page 258: Observe operating instructions, energy-storing pressure vessel (hydraulic accumulator)
20	Energy-saving spring system – see page 294 <sup>1</sup>

<sup>1)</sup> The marking is covered by a floor plate.  
<sup>2)</sup> The marking is covered by the closed service door.

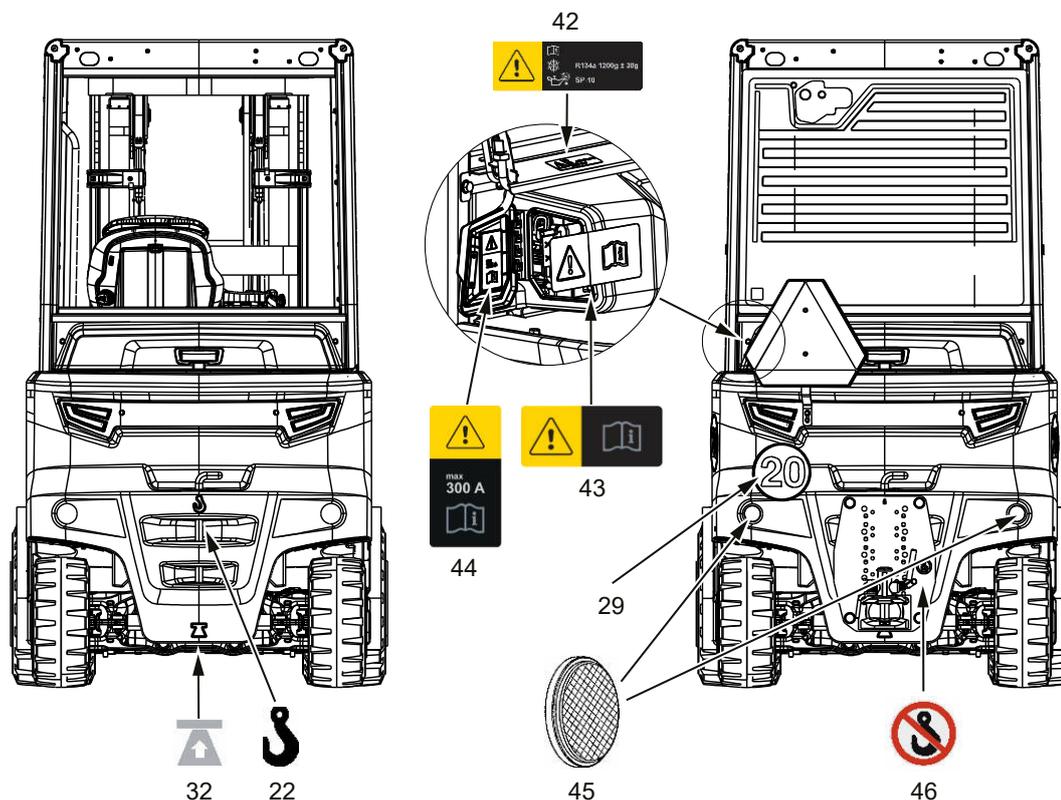


Item	Description
16	Tyre pressure (○)
21	No standing on the load handler, No standing under the load handler, Risk of crushing when the mast moves <sup>1</sup>
22	Attachment point for loading by crane
23	Potentially dangerous optical radiation (○)
24	Truck capacity plate
25	Attachment capacity plate (○)
26	Additional capacity plate (○)
27	Model description
28	Assistance interface (○)
29	Speed (○)
30	BLAXTAIR assistance system (○)
31	Basic rules for safe handling of the industrial truck (CN)
32	Jacking point

<sup>1)</sup> The position of the sign depends on the available space.

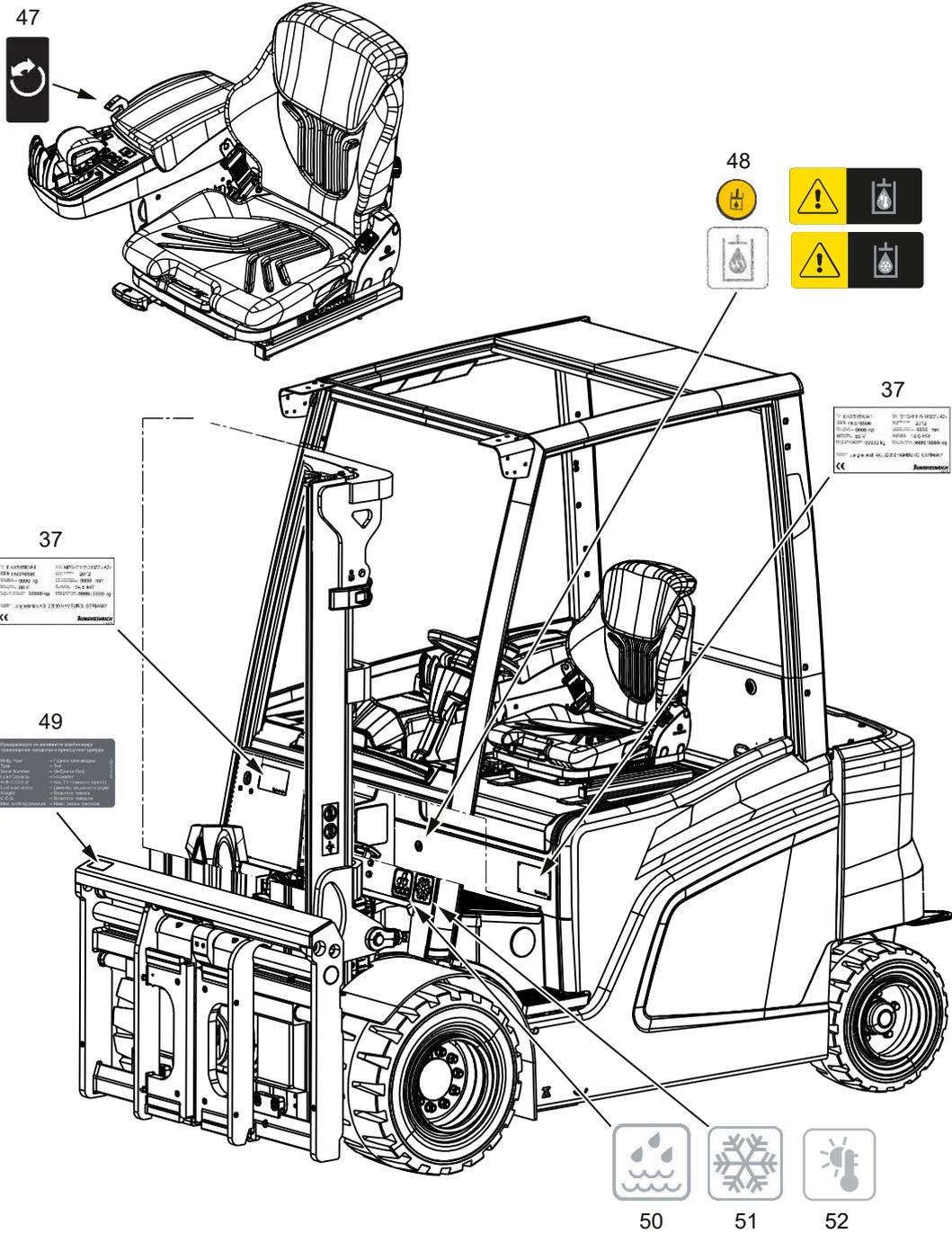


Item	Designation
16	Tyre pressure (○)
21	No standing on the load handler, No standing under the load handler, Risk of crushing when the mast moves <sup>1</sup>
22	Attachment point for loading by crane
27	Type designation
29	Speed (○)
32	Attachment point for jack
33	Risk of shearing / risk of crushing
34	Inspection plaque (○)
35	Lift height limits
36	Procedure when truck at risk of tip-over, no passengers
37	Type plate (standard position)
38	Do not travel with a raised load or operate the mast forward tilt with a raised load, fasten the seat belt
39	Minimum headroom (○)
40	Equipment with Li-ion battery (○)
41	Required battery-cable cross-section (95 mm <sup>2</sup> )
<sup>1)</sup> The position of the sign depends on the available space.	



Item	Description
22	Attachment point for loading by crane
29	Speed (○)
32	Jacking point
42	Coolant for air-conditioning system (○)
43	Transport seal for the comfort charging socket (○) <sup>1</sup> Observe the operating instructions: Charge the battery only at designated charging points – see page 94.
44	Observe the operating instructions: Use only battery chargers with a maximum 300 A charge current at the comfort charging socket (○) – see page 94.
45	Reflectors (○)
46	Trailer coupling (not an attachment point) (○)

<sup>1)</sup> Remove the transport seal when using the comfort charging socket for the first time.

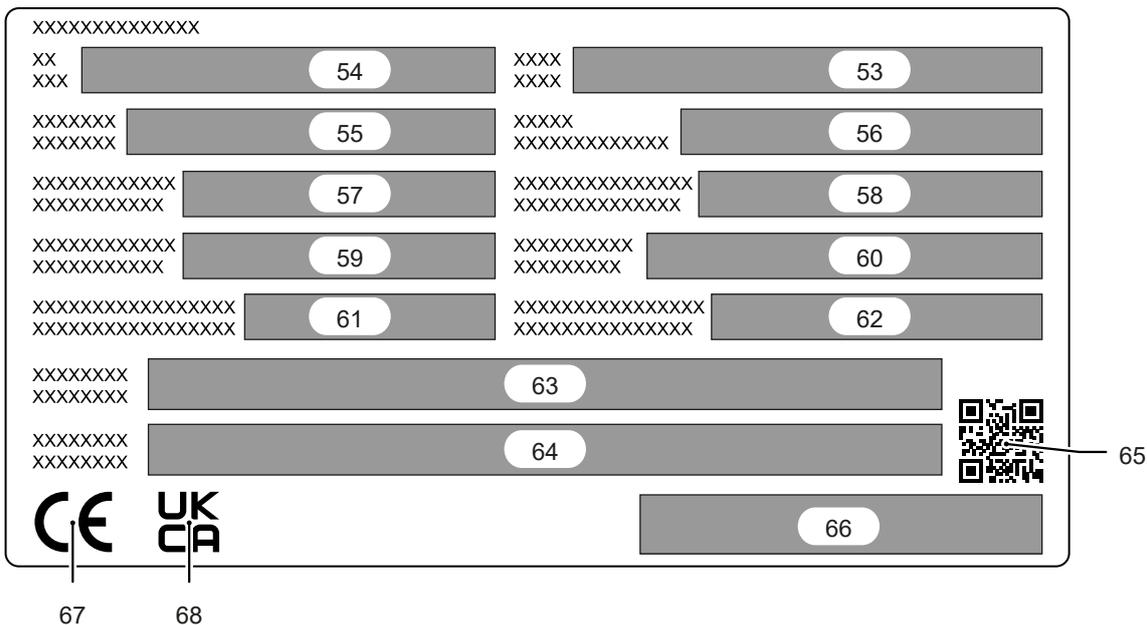


Item	Designation
37	Type plate (alternative position, e.g. for TÜV inspection) (○) <sup>1</sup>
47	Actuator for the swivel seat (○)
48	Marking for hydraulic oil for the hydraulic system, e.g. Jungheinrich hydraulic oil (●) or BIO hydraulic oil (○)
49	Attachment type plate (○)
50	Industrial truck with special corrosion protection (○)
51	Industrial truck in cold store version (○)
52	Industrial truck in tropical version (○)

<sup>1)</sup> The position of the sign depends on the available space.

## 4.2 Data plate

→ The illustration shows the standard version for EU member states. The data plate may differ in other countries.



Item	Description	Item	Description
53	Year of manufacture	61	Net weight without battery [kg]
54	Type	62	Min./max. battery weight [kg]
55	Serial number	63	Manufacturer
56	Option	64	Importer - imported by (O)
57	Rated capacity [kg]	65	QR code
58	Load centre distance [mm]	66	Manufacturer's logo
59	Battery voltage [V]	67	CE marking <sup>1)</sup>
60	Drive output [kW]	68	UKCA marking (O) <sup>2)</sup>

→ For queries regarding the truck or when ordering spare parts, always quote the truck serial number (55).

### NOTICE

The truck serial number (55) is indicated on the data plate (37) and is stamped on the chassis (18) (see page 48).

<sup>1)</sup> Conformité Européenne

<sup>2)</sup> United Kingdom Conformity Assessed

#### 4.2.1 Option

The option contains information on the design of the truck and is shown on the type plate.

e.g. DL G+E 115+310 ZZ

DL	Option code
G+E	Load handler
115	Fork length (cm)
310	Lift height (cm)
ZZ	Mast version

##### Option code

E	Efficiency
DL	drive&liftPLUS

##### Load handler

G	Fork Carriage
GE	Integrated side shift
G+E	Attached side shift Attached fork positioner

##### Mast version

ZT	Two-stage telescopic mast with low free lift
ZZ	Two-stage duplex mast with full free lift
DZ	Three-stage duplex mast with full free lift

#### 4.2.2 QR code

##### QR code

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



→ The QR code (65) is shown on the type plate (37).

### 4.3 Truck capacity plate

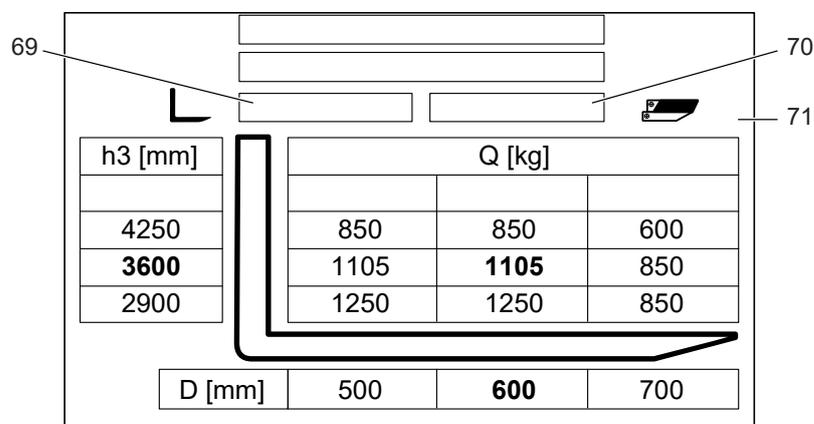
**⚠ WARNING!**

#### Replacing the fork arms can cause accidents

If you replace the fork arms with ones that differ from the originals, the capacity will change.

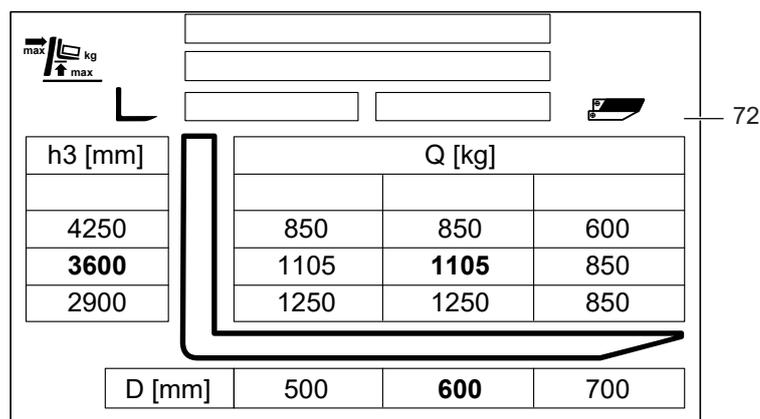
- ▶ An additional capacity plate must be attached to the truck when replacing the fork arms.
- ▶ The capacity of the fork arms must correspond to the capacity of the truck.
- ▶ Trucks supplied without fork arms are given a capacity plate for standard fork arms (length: 1150 mm).

The capacity plate (71) gives the capacity  $Q$  (in kg) of the truck for a vertical mast. A table indicates the maximum capacity with a given load centre distance  $D$  (in mm) and the required lift height  $h_3$  (in mm).



The truck capacity plate specifies the type and serial number of the truck and indicates the capacity with the fork arms (●) (69) or the fork extensions (○) (70) in as-delivered condition.

Capacity plate version in accordance with Australian guidelines (72)

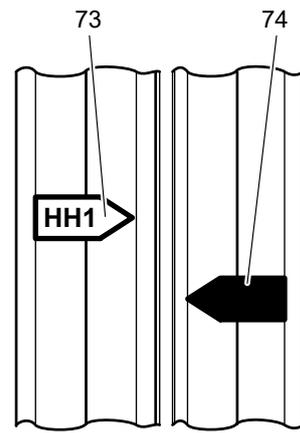


#### Example of how to calculate the maximum capacity

With a load centre distance ( $D$ ) of 600 mm and a maximum lift height of ( $h_3$ ) 3600 mm the max. capacity ( $Q$ ) is 1105 kg.

## Lift height limits

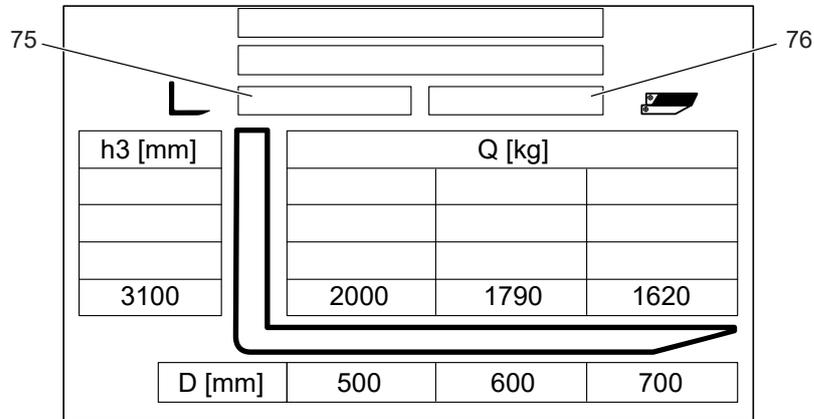
The arrow shaped markings (73 and 74) on the inner and outer masts show the operator when the prescribed lift limits have been reached.



## 4.4 Attachment capacity plate

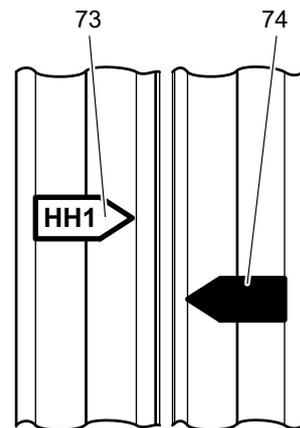
The attachment capacity plate is next to the truck capacity plate and gives the truck capacity  $Q$  (in kg) in conjunction with the attachment and the specified fork arms (●) (75) and where applicable fork extensions (○) (76).

The model name and/or serial number for the attachment indicated on the attachment capacity plate must match the data plate of the attachment.

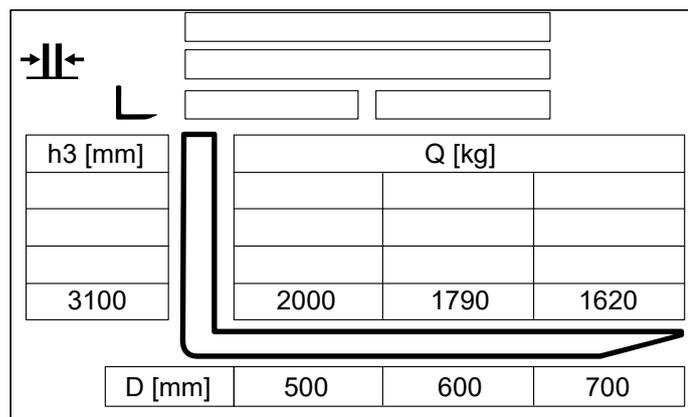


### Lift height limits

The arrow shaped markings (73 and 74) on the inner and outer masts show the operator when the prescribed lift limits have been reached.



### 4.4.1 Attachment with fork positioning



#### 4.4.2 Attachment with up to 100 mm side shift

h3 [mm]	Q [kg]		
3100	2000	1790	1620
D [mm]	500	600	700

#### 4.4.3 Attachment with More Than 100 mm Side Shift

**⚠ WARNING!**

**Risk of accident from offset load centre of gravity**

The capacity of the truck is reduced when using side shifts that are more than 100 mm outside the truck centre.

► Note the capacity plate with the reduced capacity.

h3 [mm]	Q [kg]		
3100	810	730	660
D [mm]	500	600	700

## 5 Stability

### **⚠ WARNING!**

#### **Loss of operational stability can cause accidents**

Changing the components can affect operational stability.

- ▶ Do not exceed permissible loads and load centre distances.
  - ▶ Only manufacturer-approved components may be used on the truck. Do not use components that have not been approved by the manufacturer.
  - ▶ The components listed must be replaced only with the agreement of the manufacturer. If necessary, sufficient operational stability under the local operating conditions must be proven by an expert opinion.
- 

The truck's stability has been tested according to latest technological standards. These take into account the dynamic and static tipover forces that can occur if used correctly.

The operational stability of the truck can also be affected by factors such as:

- Tyres
- Battery weight
- Mast
- Attachment
- Transported load (size, weight and centre of gravity)

### **5.1 Wind loads**

Wind forces can affect the stability of a truck when lifting, lowering and transporting loads with large surface areas.

Light loads must be especially secured when they are subjected to wind forces. This will prevent the load from sliding or falling.

Stop the truck in both cases.



# C Transport and Commissioning

## 1 Transport

The truck can be transported in two different ways, depending on the height of the mast and the local conditions.

- Vertically, with the mast assembled (for low heights)
- Vertically, with the mast removed (for large heights), all mechanical connections and all hydraulic lines between the basic unit and the mast separated.
- The manufacturer's customer service department must be consulted for installation and removal of the mast.

## 2 Truck laden

### 2.1 Centre of gravity

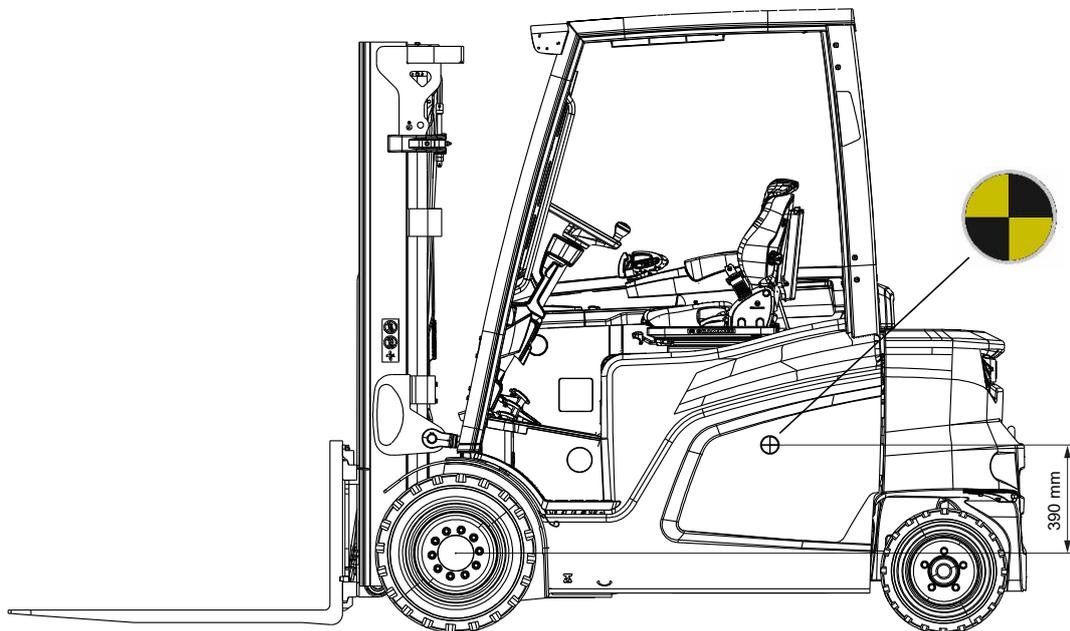
#### **⚠ WARNING!**

**An altered centre of gravity can result in tipovers when cornering.**

The overall centre of gravity can vary depending on the truck's equipment (especially the mast version).

For trucks without a mast the centre of gravity will move significantly in the direction of the counterweight.

► Drive carefully and with modified speed to avoid tipping over.



The picture shows the approximate centre of gravity position of the truck.

## 2.2 Lifting the truck by crane

### **DANGER!**

#### **Crane lifting gear can tear, resulting in accidents**

A tear in the crane lifting gear may result in severe, irreparable accidents or even death if there are persons within the hazardous area.

- ▶ Only use crane lifting gear with sufficient capacity.
  - ▶ Loading weight = unladen weight of the truck (+ battery weight for electric trucks).
  - ▶ The mast must be tilted back fully.
  - ▶ Always secure crane lifting gear to the prescribed attachment points and prevent it from slipping.
  - ▶ The crane lifting gear on the mast must have a minimum clear length of 2 m.
  - ▶ The lifting accessories of the crane lifting gear should be fastened in such a way that they do not come into contact with any attachments or the overhead guard when lifting.
  - ▶ Do not stand under a swaying load.
  - ▶ The truck should only be loaded by people who are trained in using lifting accessories and lifting gear.
  - ▶ Wear safety shoes when loading by crane.
  - ▶ Do not enter or stand in the hazardous area.
- 

### **WARNING!**

#### **Danger when using untrained personnel for crane transport**

Incorrect loading by crane due to untrained personnel can cause the truck to fall. There is a risk of injury to personnel and a risk of material damage to the truck.

- ▶ Loading by crane is only intended for the initial transport before the truck is used for the first time.
  - ▶ 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 working with load securing equipment. Correct dimensioning and implementation of load securing measures must be ensured in each individual case.
- 

 Truck net weight: see page 53.

 When a truck is delivered from the factory with a battery charger, the battery charger is delivered lashed to the forks. Before loading the crane, remove the battery charger from the forks of the truck.

#### ***Loading the truck by crane***

##### ***Requirements***

- Mast properly fitted.
- Load handler lowered.
- Mast tilted back fully.
- Parking brake applied.
- Key removed from the key switch.
- Truck switched off and parked.

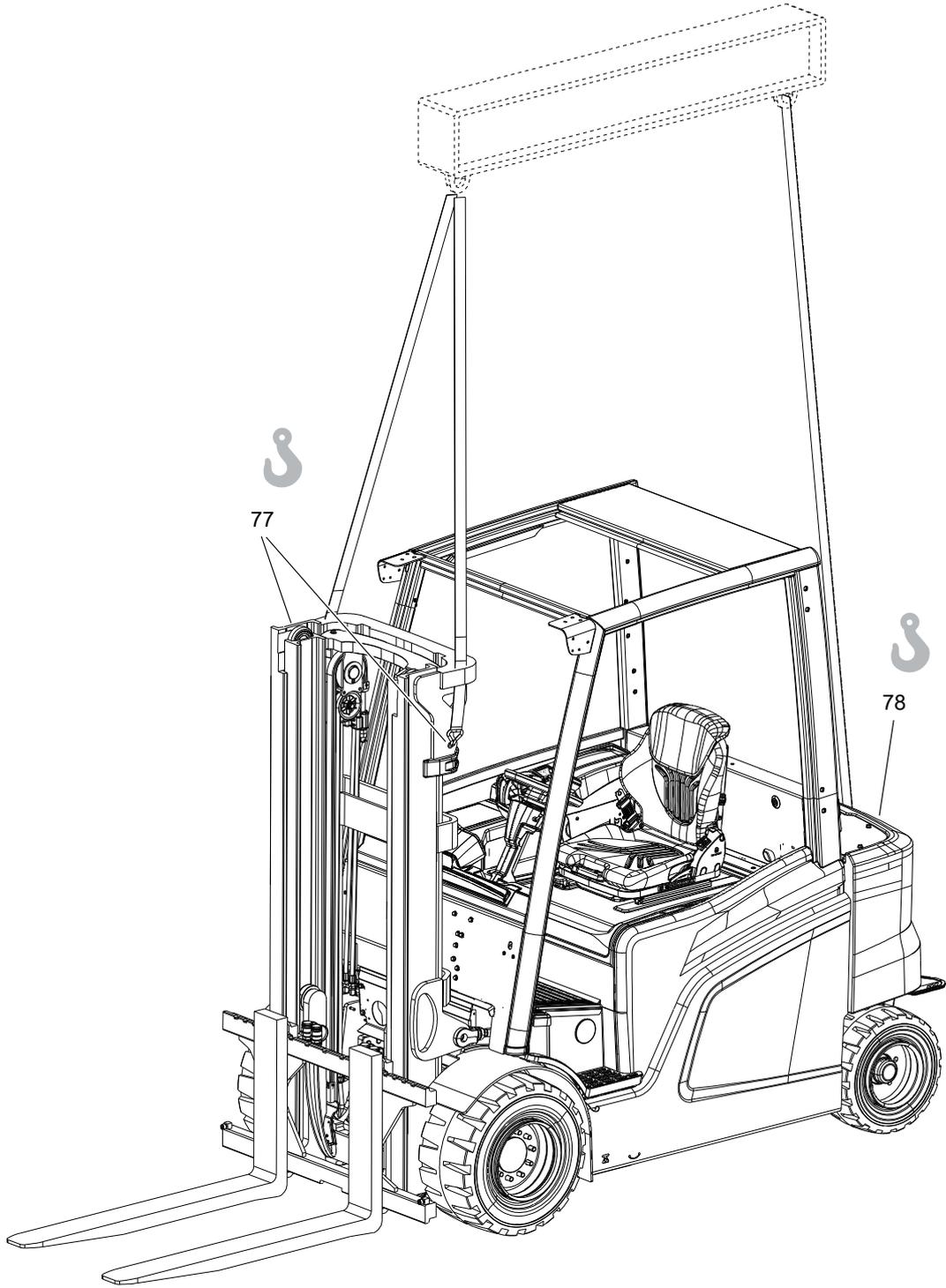
### *Tools and Material Required*

- Crane lifting gear
- Suitable cross members (crane cross members or spreader cross members (rope cross members)) with 2,5 m Span

### *Procedure*

- Secure the crane lifting gear at the attachment points (77) and (78) using the cross members.
  - Observe the permissible rope angle of max.  $\pm$  with respect to the vertical.
- Raise and load the truck.
- Lower and deposit the truck carefully, see page 158.
- Secure the truck with wedges to prevent it from rolling away unintentionally, or secure it for transport (see page 66).

*Loading by crane is now completed.*



## 2.3 Loading the truck with a second truck

### **⚠ WARNING!**

#### **The truck can be damaged**

The truck to be loaded can be damaged when loading with another industrial truck.

- ▶ Only trained specialist personnel should load the truck.
- ▶ Use only trucks with sufficient capacity for loading.
- ▶ Only for loading and unloading.
- ▶ The forks of the second industrial truck must be sufficiently long
- ▶ Transporting over long distances prohibited.

### **NOTICE**

The centre of gravity of the truck to be loaded must be in a central position between the fork arms, especially if the truck is not completely assembled (missing battery or lift mast).

### **NOTICE**

Pick up the truck only from the left-hand side of the truck. Make sure that the truck is not picked up from the battery door.

#### ***Loading the truck with a second industrial truck***

##### *Requirements*

- Truck parked securely, see page 158.

##### *Procedure*

- Open the battery door.
- Raise the truck with the forks at the side between the axles. To achieve safe lifting, position the forks below the front jacking point and rear end of the floor plate close to the wheels.
- Raise the truck slightly and make sure it is securely positioned on the forks. If necessary adjust the forks or secure them with lifting equipment.
- Carefully load/unload the truck, see page 174.
- Lower the truck slowly onto the ground and prevent it from rolling away.

*The truck is now loaded.*

### 3 Securing the truck during transport

#### **⚠ WARNING!**

#### **Danger due to uncontrolled movement of the truck or the mast during transport**

If the truck and mast are not properly secured during transport, serious accidents can occur. Slipping lashing straps can lead to uncontrolled movements of the truck or mast and even a fall during transport. Accidents caused by this can result in property damage and fatal injuries.

- ▶ 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 working with load securing equipment. Correct dimensioning and implementation of load securing measures must be ensured in each individual case.
- ▶ The truck or mast must be professionally and securely fastened when transported on a lorry or trailer.
- ▶ The loading platform must have permissible lashing points.
- ▶ Use only lashing straps with sufficient tensile strength. Attach the lashing straps so that they cannot slip.
- ▶ Use non-slip materials to secure the transport aids (pallet etc.), e.g. non-slip mats.

#### ***Securing the truck for transport***

##### *Requirements*

- Truck securely deposited on lorry or trailer – see page 158.

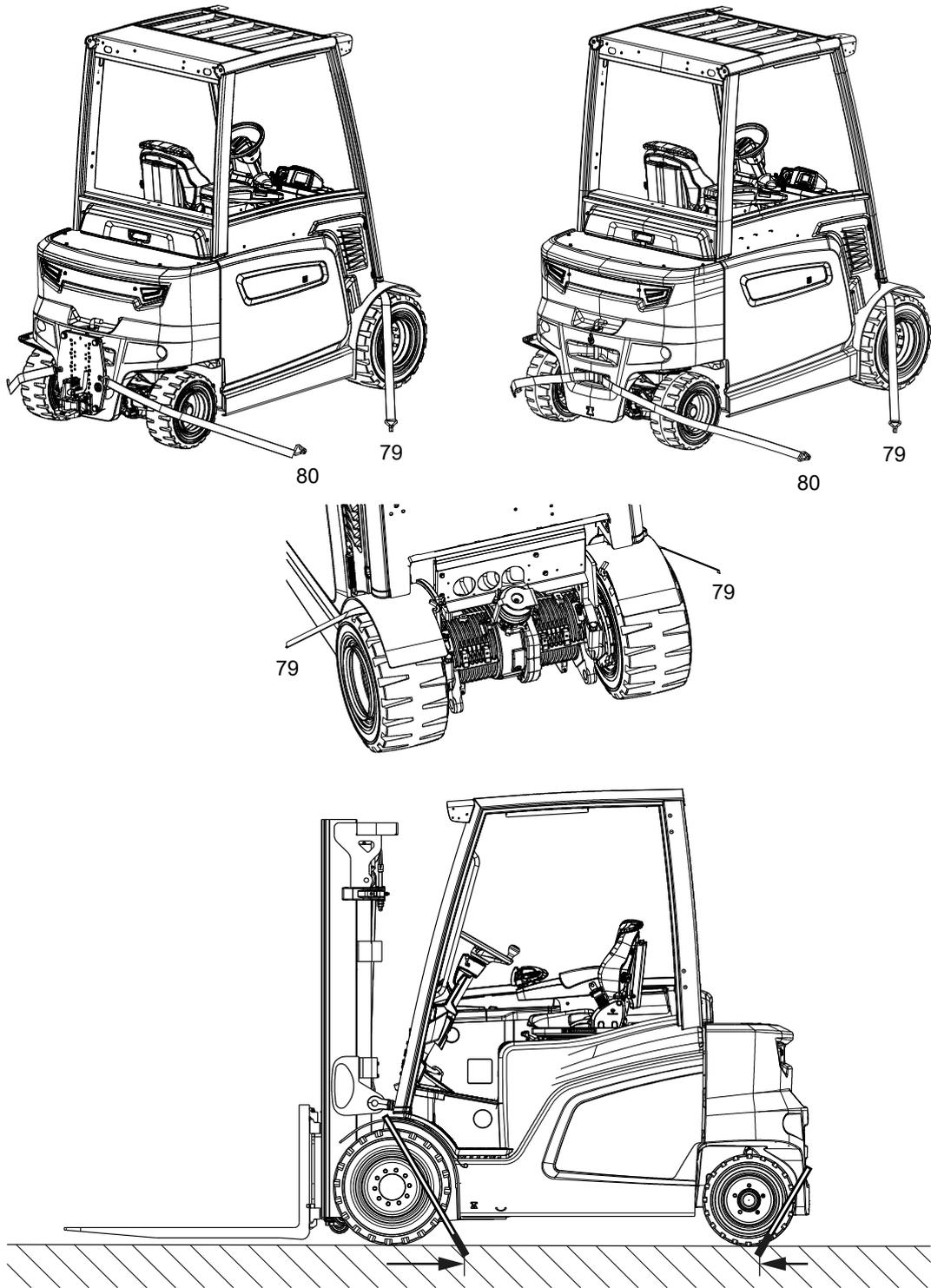
##### *Tools and Material Required*

- Three to four lashing straps with tensioner

##### *Procedure*

- Fasten the front lashing straps (79) to the inside of the mudguards and towards the centre of the truck to the lashing points on the loading platform.
- Fasten the rear lashing straps (80) to the counterweight and towards the centre of the truck to the lashing points on the loading platform.
  - If the industrial truck does not have a trailer coupling, use the counterweight hitch pin for fastening.
  - If the industrial truck has a trailer coupling, use the adapter plate of the trailer coupling for fastening.
- Tighten the fastening belts with the tensioner.

*The truck is now secured for transport.*



## 4 Using the Truck for the First Time

### Safety instructions for assembly and commissioning

#### **⚠ WARNING!**

##### **Incorrect assembly can result in accidents**

The assembly of the truck at the application site, commissioning and operator training must only be performed by the manufacturer's customer service representatives who have been specially trained for these tasks.

---

#### **⚠ 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 mm<sup>2</sup>.
- 

##### ***Preparing for operation after delivery or transport***

###### *Procedure*

- Check that the equipment is complete.
- Check the hydraulic oil level – see page 325.
- Check the transmission oil level – see page 328.
- Check the brake fluid level – see page 332.
- Install the battery if necessary – see page 79.
- Charge the battery – see page 94.

*The truck can now be started* – see page 137.

- ➔ To operate the truck without its own drive system, see page 294.

# D Battery - Servicing, Recharging, Replacement

## 1 General notes on handling batteries

### 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.

The truck must be parked securely before all work on the batteries, see page 158.

### 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.

## 1.1 Potential hazards

### **WARNING!**

#### **Danger when using unsuitable batteries that have not been approved for the truck by the manufacturer**

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 the manufacturer can lead to a deterioration of the braking system during energy recovery operations and also cause considerable damage to the electrical control system. In addition, overloading of and over temperature in the battery elevate the risk of fire. The use of batteries that have not been approved by the manufacturer can therefore affect the health and safety of personnel.

- ▶ Only manufacturer-approved batteries may be used on the truck.
  - ▶ Battery equipment must only be replaced with the agreement of the manufacturer.
  - ▶ 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.
-

## 1.2 Touch voltage hazard

### **WARNING!**

#### **Touch voltage hazard**

Hazardous touch voltages may occur in the event of a technical or mechanical defect on the battery. Touch voltages also occur on seemingly discharged batteries. Touching the battery terminals or live attachments (battery cable, battery connector etc.) can result in dangerous current flows through the body. There is a risk of serious, irreversible or fatal injuries.

- ▶ Tag out the faulty battery and take out of service.
  - ▶ Do not touch faulty batteries.
  - ▶ Do not place any objects or tools on the battery to avoid short-circuiting the battery.
  - ▶ Do not short-circuit the battery.
  - ▶ Notify the customer service department.
- 

With this kind of defect, the battery must not be touched and must not come into contact with metal objects – see page 69.

## 1.3 Battery handling safety regulations

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.

## 2 Safety Regulations 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.
- 

#### **Fire protection measures**

### **⚠ WARNING!**

#### **Short circuits can result in fire**

Damaged cables can cause short circuits, setting the forklift truck and battery on fire.

- ▶ Before closing the battery cover make sure that the battery cables are not damaged.
- 

### **⚠ 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.
- 

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.

#### **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.

### **⚠ CAUTION!**

Before closing the battery panel make sure that the battery cable cannot be damaged. There is a risk of short circuits with damaged cables.

---

## 3 Safety regulations for handling lithium-ion batteries

### 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 (CO<sub>2</sub>) to cool the fire and reduce the chemical reaction.
  - ▶ Use carbon dioxide extinguishers (CO<sub>2</sub>) 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 (CO<sub>2</sub>) 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.

### 3.2 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.

### **3.3 Special fire fighting protective equipment**

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

### **3.4 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 (CO<sub>2</sub>)

### **3.5 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

### **⚠ WARNING!**

#### **Danger of electric shock and risk of fire due to short circuit or over temperature**

A short circuit or electric shock can occur on batteries without a cover or without insulation of live parts.

Damaged or unsuitable cables (wire diameter too small) can cause a short circuit or electric shock or heat up impermissibly.

Over temperature can lead to fire.

- ▶ Always use batteries whose covers and live components are insulated.
  - ▶ Only use batteries whose battery cables have a wire diameter of at least 95 mm<sup>2</sup>.
  - ▶ Place the battery cables on the battery in such a way that there will be no damage by pinching, squeezing, twisting or rubbing.
- 



The battery weights are indicated on the battery data plate.

The truck will be equipped with different battery models, depending on the application. The following table shows which combinations are included as standard:

#### Lead-acid batteries

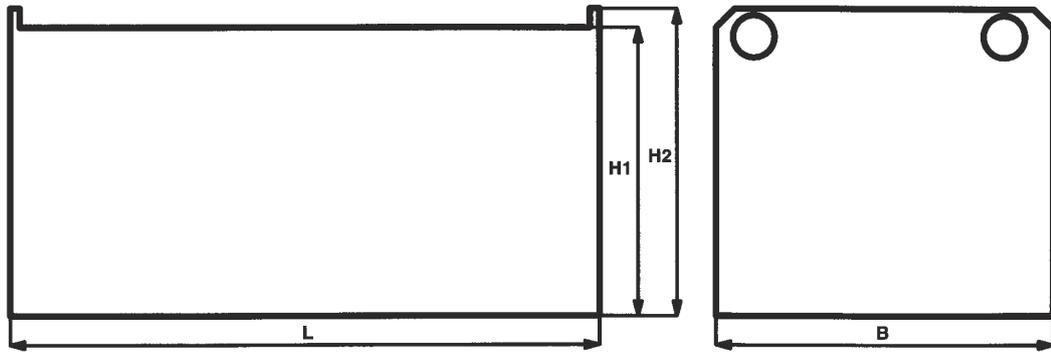
Truck type	Description	Capacity
EFG 425k EFG 430k	80 V - 4PzS	560 - 620 Ah
EFG 425 EFG 430 EFG S30 EFG 435	80 V - 5PzS	700 - 775 Ah

#### Lithium-ion batteries

Truck type	Description	Capacity
EFG 425k EFG 430k	76.8 V - Li-ion type S	420 / 630 / 840 Ah
EFG 425 EFG 430 EFG S30 EFG 435	76.8 V - Li-ion type M	
EFG 425k EFG 430k	80.3 V - Li-ion type TS	592 Ah
EFG 425 EFG 430 EFG S30 EFG 435	80.3 V - Li-ion type TM	740 Ah
EFG 425k EFG 430k	80.3 V - Li-ion type TS-H	592 Ah
EFG 425 EFG 430 EFG S30 EFG 435	80.3 V - Li-ion type TM-H	740 Ah
EFG 425k EFG 430k	86.4 V - Li-ion type S	500 Ah
EFG 425 EFG 430 EFG S30 EFG 435	86.4 V - Li-ion type M	

## 5 Battery dimensions

Truck	Dimension (mm)				Nominal weight (-5/+8%) in kg
	L max.	B max.	H1 ± 2 mm	H2 ± 2 mm	
EFG 425k/430k	1028	711	769	784	1558
EFG 425/430/S30/435	1028	855	769	784	1863



**⚠ DANGER!**

If the centre of gravity of the battery deviates from the geometrical centre of gravity of the battery, contact the manufacturer.

## 6 Exposing the Battery

### **⚠ WARNING!**

#### **Danger of electric shock and risk of fire due to arcing**

Disconnecting the battery connector under load may cause electric shock or arcing. Electric shocks or arcs can damage adjacent parts and result in fire.

- ▶ Do not disconnect the battery connector under load. Switch off the emergency disconnect switch before disconnecting the battery connector.
- ▶ Do not use the battery connector as an emergency disconnect device.
- ▶ Only use batteries with intact battery cables and intact battery connectors.
- ▶ Place the battery cables on the battery in such a way that there will be no damage by pinching, squeezing, twisting or rubbing.

#### *Requirements*

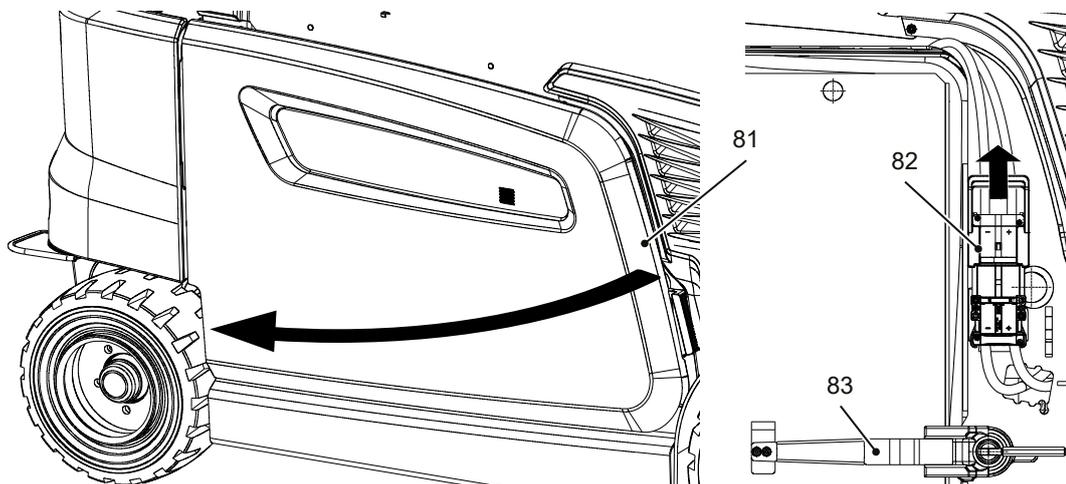
- Park the truck securely, see page 158.
- Load handler lowered.
- Key switch set to OFF.
- Key removed.
- Set the Emergency Disconnect OFF.

#### *Procedure*

- Open the battery door (81) as far as the stop.
- Pull the battery connector (82) and let it hang down in front of the battery. The battery latch (83) can now be released.

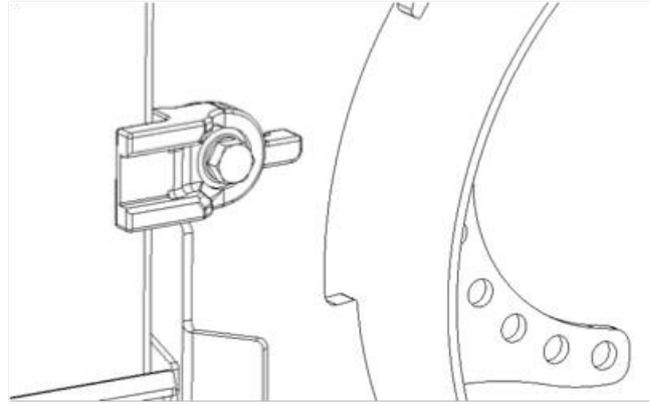
*The battery is now exposed.*

- Avoid collisions when opening and closing the battery latch.



There is an alternative battery latch for lithium-ion batteries:

The lithium-ion battery may only be removed from the industrial truck by qualified personnel during maintenance. Check the lithium-ion battery for firm seating at regular intervals and retighten, if necessary. The tightening torque of the screw is 250 Nm and must be observed.



**⚠ WARNING!**

**Risk of uncontrolled movements and even loss of battery**

If the torques are not observed, this can lead to uncontrolled movements and even loss of the battery.

- ▶ Always observe and adhere to the torques.
  - ▶ Only allow work to be carried out by trained personnel.
-

## 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 governing the handling of lead-acid batteries, see page 71.
  - ▶ Wear safety shoes when removing and installing the battery.
  - ▶ Use only batteries with insulated cells and terminal connectors.
  - ▶ Park the truck on a level surface to prevent the battery from sliding out.
  - ▶ 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.
- 

### **⚠ CAUTION!**

#### **Trapping hazard**

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
  - ▶ Wear safety shoes.
- 

- Deviating procedure for equipment with a lithium ion battery (○):  
When performing the activities outlined below, disconnect the truck-side control line from the connection on the battery tray or from the interface converter (○) on the battery before unplugging/disconnecting the battery connector.  
Then disconnect the battery connector.
- Deviating procedure for equipment with a lithium ion battery (○):  
After connecting the battery connector, reconnect the truck-side control line to the connection on the battery tray or to the interface converter (○) on the battery.

## 7.1 Removal and Installation Using a Pallet Truck with SnapFit Battery Holder (O)

### ⚠ CAUTION!

#### Trapping hazard

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
- ▶ Wear safety shoes.

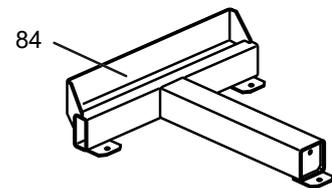
#### Removing the battery

##### Requirements

- Truck parked securely, see page 158.
- Battery exposed – see page 77.

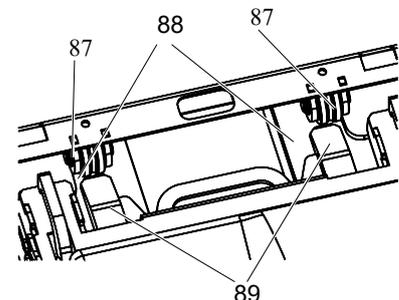
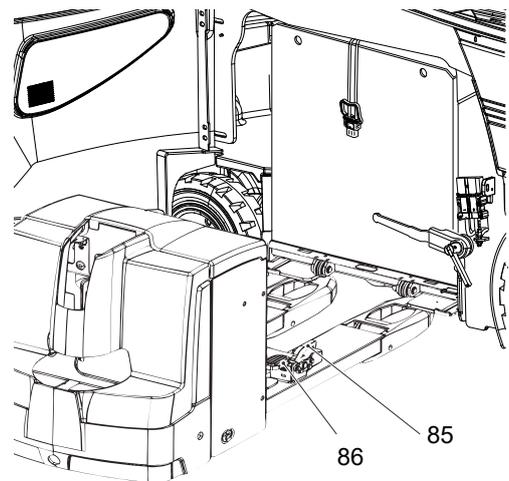
##### Tools and Material Required

- Battery trolley with six rollers
- Pallet truck with SnapFit battery holder
- Charging station designed for the battery type (84) (○)



##### Procedure

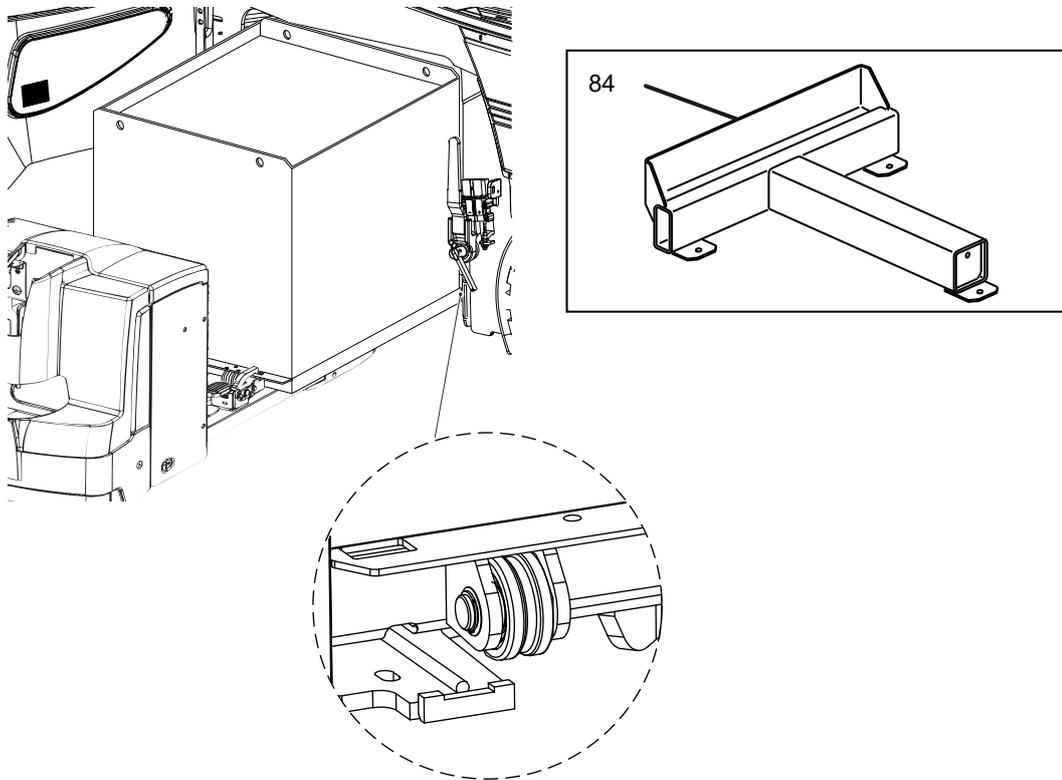
- Close the safety catches (85).
  - To do this, press the pedals (86).
- Move the pallet truck approx. 200 mm underneath the truck base so that it is central with the battery.
- Raise the fork arms of the pallet truck until they are just under the truck base.
- Insert the battery connector (82) in the bracket.
- Push the ramps (89) underneath the rollers (87) of the battery trolley and align them with the chassis (88).



- Engage the safety catches (85) on the battery trolley.
  - Check that both safety catches (85) are firmly engaged in the battery trolley.

- ➔ Do not raise the forks.
- Undo the catch (90).

- Undo the battery latch (83).
- Remove the battery with the pallet truck at slow travel as far as it will go (98).
- Raise the fork arms until the battery can be pulled clear of the battery compartment.
- Bring the battery to the charging station for charging.
- Place the battery carefully onto the charging station (84).
- Undo the safety catches (85) and remove the pallet truck.



## NOTICE

### Risk of material damage

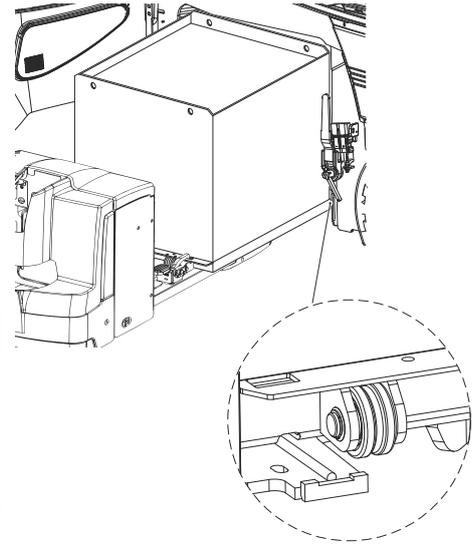
Risk of material damage to the truck chassis while the battery is being pulled out.

- Raise the fork tines. While pulling out the battery, do not allow it to strike the truck chassis on the top or bottom.

## Installing the battery

### Procedure

- Drive the EJE pallet truck and battery up to the truck.
- Deposit the battery trolley with the rollers (87) on the base of the truck.
- Lower the forks of the EJE pallet truck until the battery is horizontal.  
Align the heights and push the forks of the EJE pallet truck underneath the truck base.



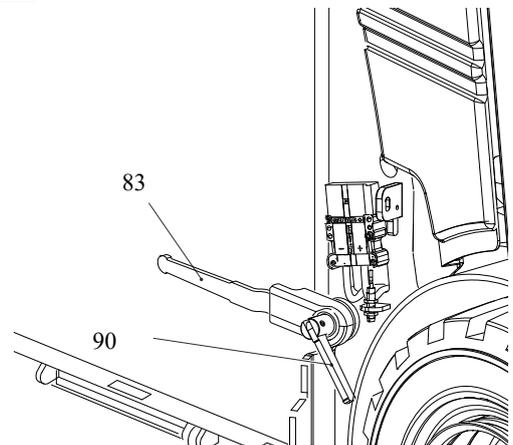
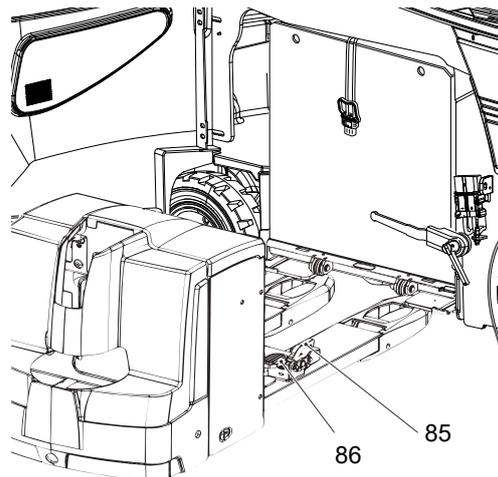
### NOTICE

#### Risk of material damage

Inserting the battery can cause material damage to the truck chassis.

- ▶ Lower the forks and avoid striking the top or bottom parts of the chassis when inserting the battery.

- Close the battery latch (83).
- Close the catch (90) and position it in the green area.
- Undo the safety



catches (85).

- To do this, press the pedals (86).
- Move the pallet truck away from the forklift truck.
- Attach the battery connector to the truck connector.
- Close the battery door.

*The battery is now installed.*

## 7.1.1 Battery holder assembly

### **⚠ CAUTION!**

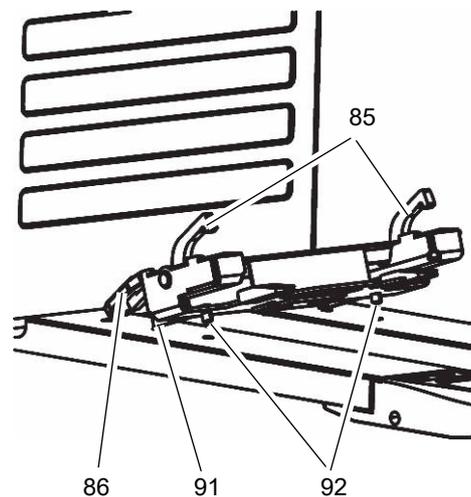
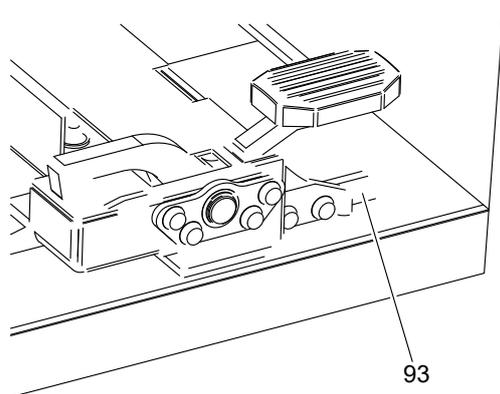
The battery holder can only be fitted to pallet trucks or hand pallet trucks with notice signs.

#### *Requirements*

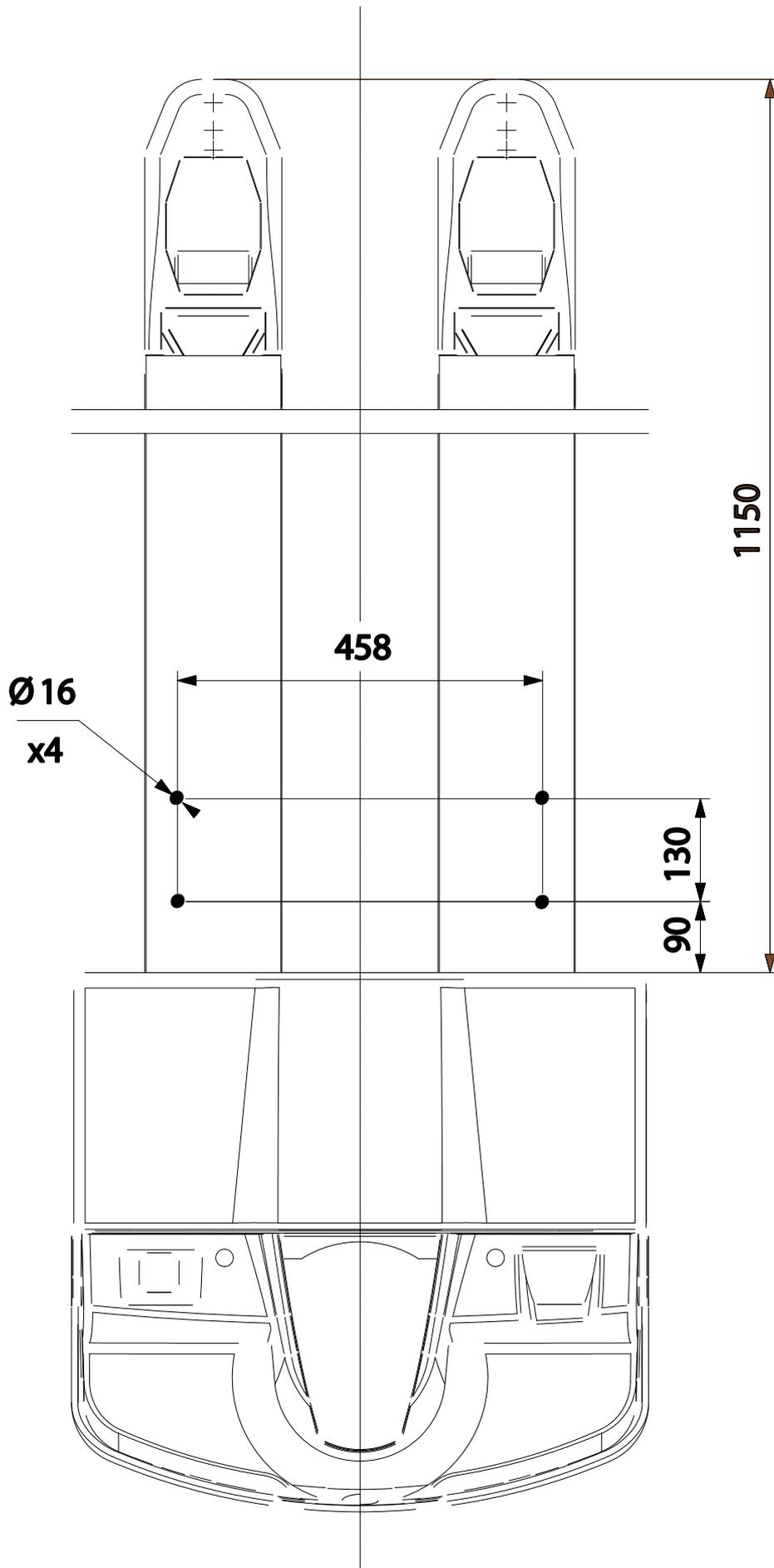
- Pallet truck or hand pallet truck available with holes in accordance with assembly instructions, see page 84.

#### *Procedure*

- Open the safety catches (85).
  - To do this, press the pedals (86).
- Insert bent pins (91) into the forks of the pallet truck or hand pallet truck.
- Push the battery holder down and fit the bolts (92) in the holes.
- Close the safety catches (85).
  - To do this, press the pedals (86).
- Secure the locking plate (93) against theft with 4 screws (○).



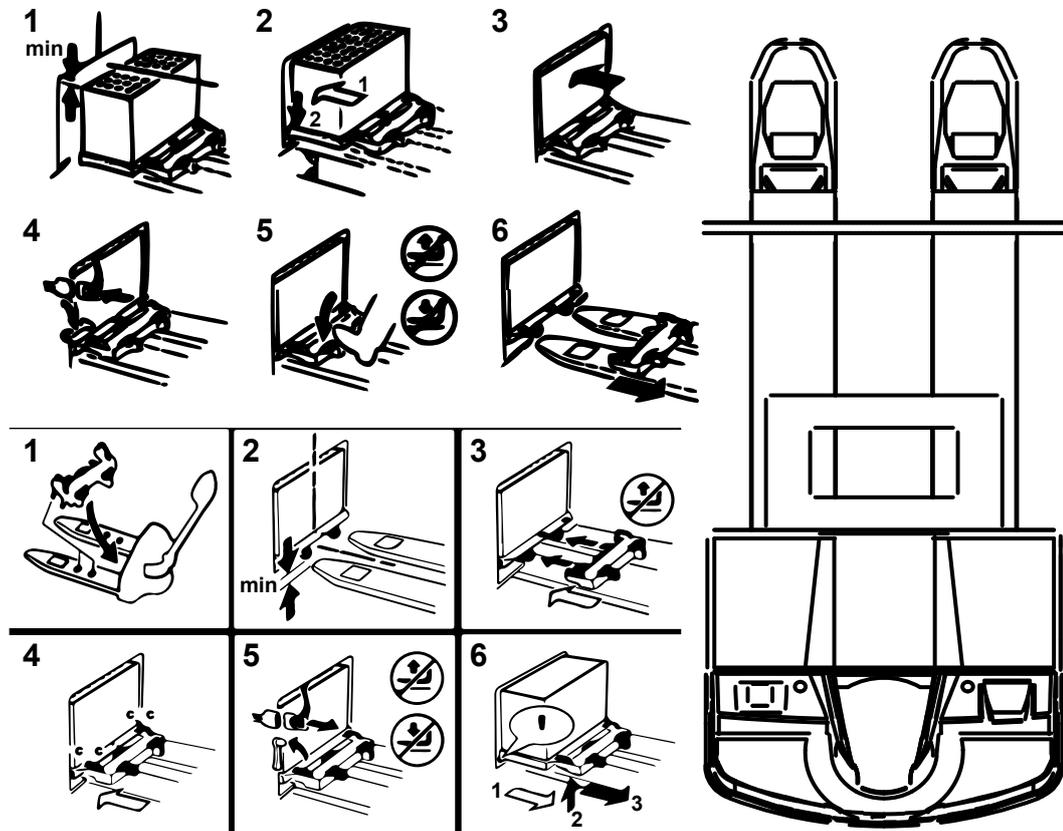
## 7.1.2 Assembly instructions



*Procedure*

- Drill 4 holes with a 16 mm diameter into the pallet truck or hand pallet truck according to the drill patterns.
- Make sure there is sufficient distance between the connecting rod and the bottom of the forks.

→ Attach safety notices to the pallet truck.



## 7.2 Removing or installing the battery using a fork shoe

### **⚠ CAUTION!**

#### **Trapping hazard**

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
- ▶ Wear safety shoes.

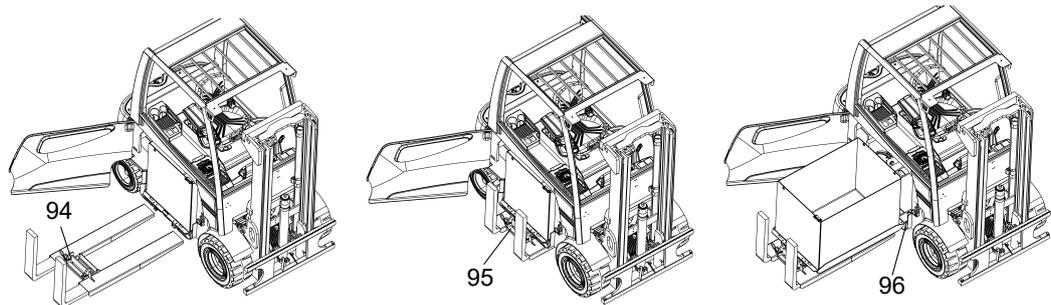
#### **Battery removal and installation**

##### *Requirements*

- Truck parked securely, see page 158.
- Battery exposed – see page 77.
- Battery disconnected.
- Battery latch (83) released.

##### *Tools and Material Required*

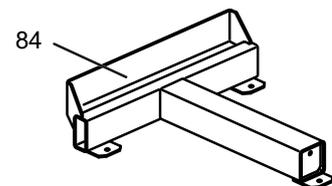
- Fork shoe designed for the battery type
- Second fork lift truck with a capacity to match the battery weight. The battery weight is given on the battery data plate.
- Battery replacement trolley designed for the battery type with four rollers
- Charging station designed for the battery type (84) (○)



##### *Procedure*

- Place the fork shoe onto the forks of a second truck and secure it to the fork carriage with a chain (94).
- Tilt the mast forward.
- Move the fork shoe up to the stop (95) underneath the battery.
- Raise the fork carriage until the battery is resting on the forks.
- Pull out the battery as far as the stop (96) on the truck chassis.
- Raise the fork carriage.
- Tilt the mast back fully and bring the battery to the charging station to be charged.
- Place the battery carefully onto the charging station (84).

*The battery is now removed and positioned securely for charging.*



Battery installation is the reverse order.

Make sure the battery trolley rollers are inserted into the guides in the battery compartment.

## 7.3 Removing or installing the battery using a roller conveyor

### **⚠ WARNING!**

After inserting the battery close the battery lock.

### **⚠ CAUTION!**

#### **Trapping hazard**

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
- ▶ Wear safety shoes.

#### ***Battery removal and installation***

##### *Requirements*

- Park the truck securely, see page 158.
- Battery exposed, see page 77.
- Battery disconnected.
- Battery lock released.

##### *Tools and Material Required*

- External roller guided replacement device

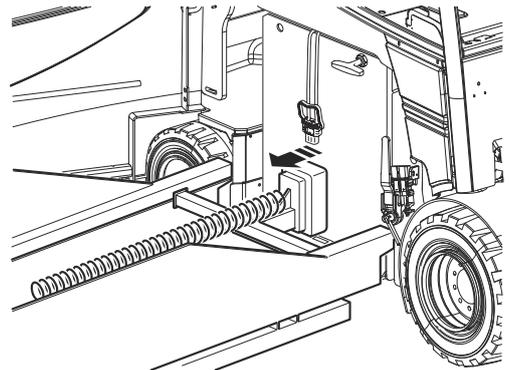
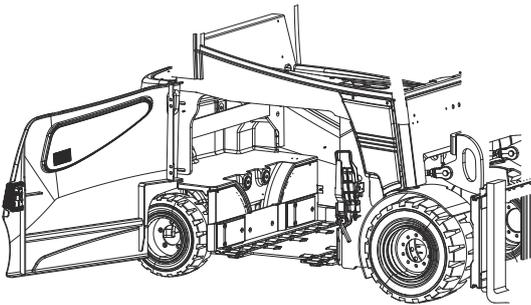
##### *Procedure*

- ➔ Note the instructions of the replacement device manufacturer.

Bring the external replacement device up to the truck.

- Pull out the battery with the external replacement device and transport it to the charging station for charging.
- Deposit the battery securely.

*The battery is now removed.*



- ➔ Battery assembly is the reverse order.

## 7.4 Removal and installation using a hand pallet truck with SnapFit (○)

### **⚠ WARNING!**

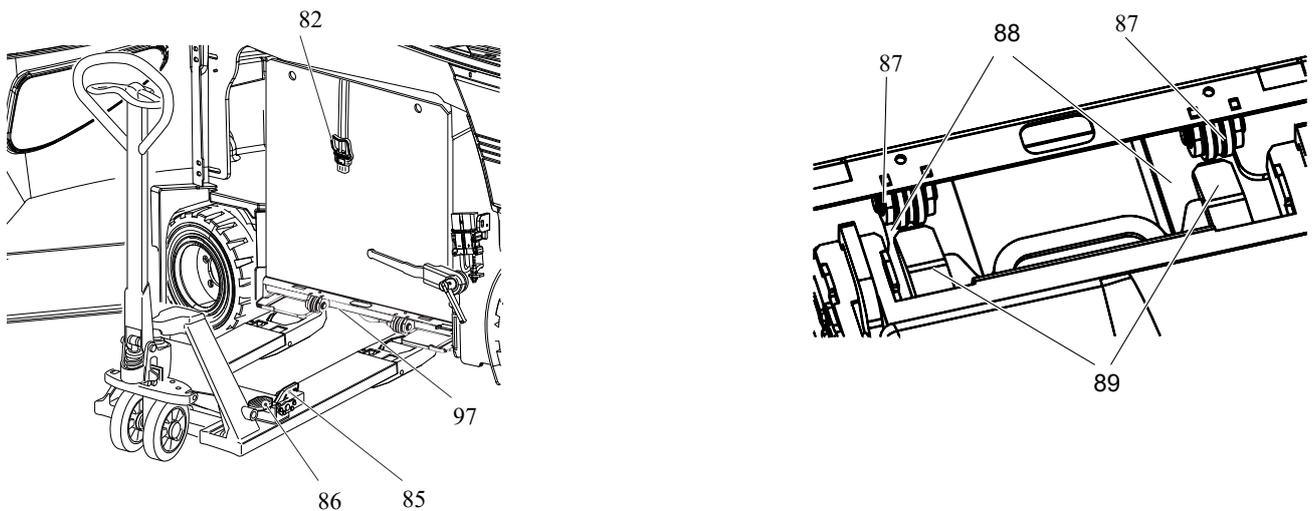
After inserting the battery close the battery lock and then lower the pallet truck.

### **⚠ CAUTION!**

#### **Trapping hazard**

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
- ▶ Wear safety shoes.



### **Battery removal and installation**

#### **Requirements**

- Truck parked securely, see page 158.
- Battery exposed – see page 77.

#### **Tools and Material Required**

- Battery trolley with six rollers
- Hand pallet truck with battery holder inserted

#### **Procedure**

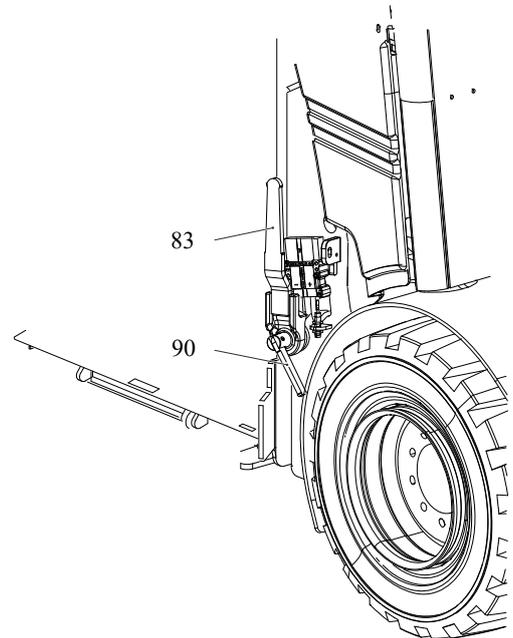
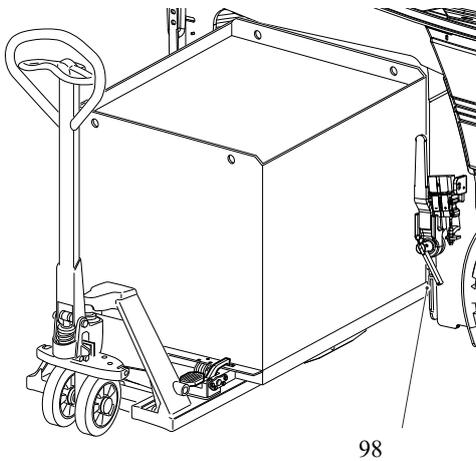
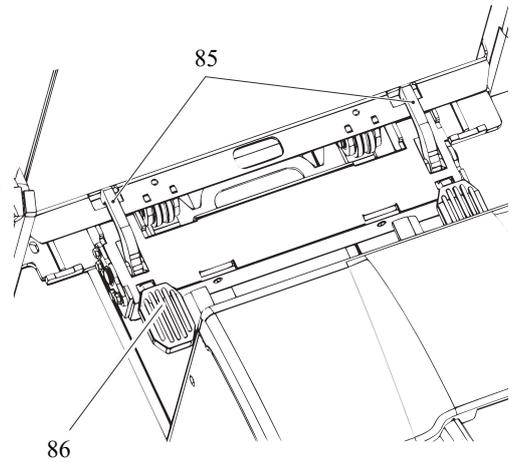
- Close the safety catches (85).
  - To do this, press the pedals (86).
- Move the hand pallet truck approx. 200 mm underneath the truck base so that it is central with the battery.
- Raise the fork arms of the hand pallet truck until they are just under the floor plate (97).
- Insert the battery connector (82) in the bracket.
- Push the ramps (89) underneath the rollers (87) of the battery trolley and align them with the chassis (88).
- Slowly bring the hand pallet truck right up to the battery.

- Engage the safety catches (85) on the battery trolley.
- To do this, press the pedals (86).

→ Do not raise the forks.

- Undo the catch (90).
- Undo the battery latch (83).
- Using the hand pallet truck, slowly remove the battery as far as the stop (98).

*The battery is now removed for maintenance and can be checked.*



→ Battery assembly is the reverse order.

## 7.5 Removing or installing the battery using a pallet truck or hand pallet truck and no "SnapFit" battery holder

### **⚠ WARNING!**

After inserting the battery close the battery lock and then lower the pallet truck.

### **⚠ CAUTION!**

#### **Trapping hazard**

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
- ▶ Wear safety shoes.

#### **Battery removal and installation**

##### *Requirements*

- Park the truck securely, see page 158.
- Battery exposed, see page 77.
- Battery disconnected.

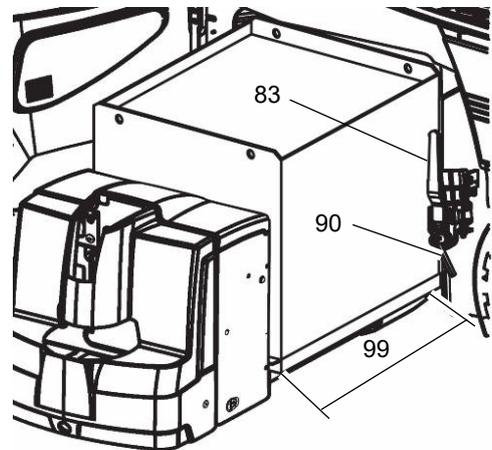
##### *Tools and Material Required*

- Battery trolley with four wheels
- Pallet truck or hand pallet truck with a fork length of 1150 mm

##### *Procedure*

- Measure dimension (99) 1050 mm from the fork tip of the pallet truck or hand pallet truck and mark it on the fork.
- Slide the pallet truck or hand pallet truck under the battery as far as the mark on the fork.
- Raise the battery with the pallet truck or hand pallet truck until the battery is resting on the fork arms and is not touching the chassis.
- Undo the catch (90).
- Undo the battery latch (83).
- Remove the battery for maintenance.

*The battery is now removed for maintenance and can be checked.*



➔ Battery assembly is the reverse order.

## 7.6 Removal or Installation with Battery Holder (SnapFit) and Crane Cross Member (○)

### ⚠ CAUTION!

#### Trapping hazard

Trapping hazard when replacing the battery.

- ▶ When replacing the battery do not reach between the battery and the chassis.
- ▶ Wear safety shoes.

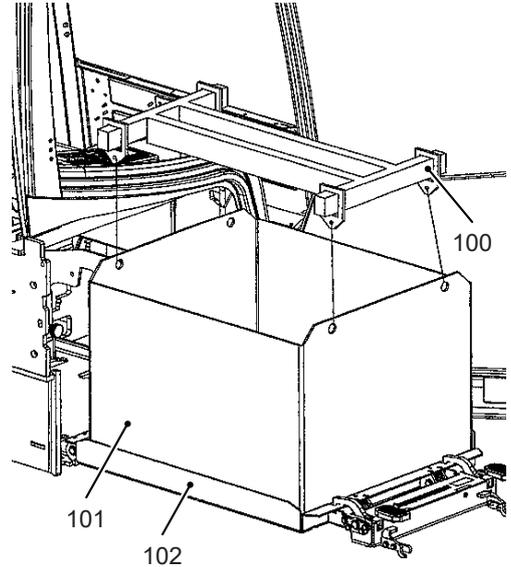
#### Removing the battery

##### Requirements

- Truck parked securely – see page 158.
- Battery exposed – see page 77.
- Battery disconnected.

##### Tools and Material Required

- Battery trolley with six rollers
- Pallet truck with SnapFit battery holder or hand pallet truck with SnapFit battery holder
- Suitable crane with suitable crane cross member to lift the battery by crane – see page 92
- Charging station intended for the battery type (○)



##### Procedure

- Lift out the battery using the pallet truck with SnapFit (see page 80) or the hand pallet truck with SnapFit (see page 88).
- Attach the crane cross member (100) to the battery tray (101) in such a way that the hooks cannot fall onto the battery cells later when the crane lifting gear is released.
- Use the crane cross member to lift the battery approx. 90 mm until the battery is lifted clear of the battery trolley (102).
- Use the crane to move the battery to the side.
- Place the battery carefully onto the charging station.

*The battery is now removed for maintenance and can be checked.*



Battery assembly is the reverse order.

## 8 Transporting the batteries by crane

### **⚠ DANGER!**

#### **Crane lifting gear can tear, resulting in accidents**

- ▶ Only use crane lifting gear with a cross member and sufficient capacity.
  - ▶ Observe the crane lifting gear operating instructions.
  - ▶ Lifting accessories of the crane lifting gear must be fastened in such a way that they do not come into contact with any attachments when lifting.
  - ▶ Only use intact crane eyes; bent or defective crane eyes must be replaced by the customer service department.
  - ▶ Do not stand under a swaying load.
  - ▶ Instruct other people to move out of the hazardous area of the truck.
  - ▶ The battery should only be loaded by people who are trained in using lifting accessories and lifting gear.
  - ▶ Wear safety shoes when loading by crane.
  - ▶ Do not walk into or stand in a hazardous area.
  - ▶ Always secure crane lifting gear to the prescribed attachment points and prevent it from slipping.
- 

### **⚠ WARNING!**

#### **Improper loading of the battery by crane can cause accidents and property damage**

The use of unsuitable lifting gear and the improper use of correct lifting gear can cause the battery to suffer damage and to fall when being loaded by crane.

- ▶ Prevent the battery from striking other objects when raising, and avoid any uncontrolled movement. If necessary secure the battery with guide ropes.
  - ▶ Do not tip or pull the battery at an angle when lifting it.
  - ▶ The battery should be loaded only by people who are trained in using the 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 battery weight see battery data plate).
  - ▶ Always secure crane lifting gear to the crane eyes on the battery tray and prevent it from slipping.
  - ▶ Use the lifting accessories only in the prescribed load direction.
- 

### **⚠ WARNING!**

#### **All persons involved in loading by crane must be trained**

Incorrect crane loading procedures due to untrained personnel can result in the battery falling. There is a risk of injury to personnel and a risk of material damage to the battery.

- ▶ 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.
-

### *Requirements*

- To prevent short circuits, batteries with exposed terminals must be covered with a rubber mat.
- Battery connector disconnected from the truck connector.
- Battery removed – see page 79.

### *Procedure*

- Pick up the battery at the four crane eyes with suitable crane lifting gear.
  - ☞ Crane lifting gear may only exert vertical pull on the battery trough to prevent the battery trough from being compressed.
  - Lift the battery. The battery should be suspended horizontally from the crane lifting gear.
  - Set the battery down safely and unhook the crane lifting gear from the eyes.
- 
- ☞ Do not place or drop crane lifting gear on the battery.
  - ☞ Observe the battery operating instructions.

## 9 Charging the battery

### **⚠ WARNING!**

#### **Risk of injury due to use of an unsuitable battery charger.**

Voltage peaks may occur when using a battery charger with an incompatible voltage, charging capacity and battery technology. Voltage peaks can permanently damage the battery charger, truck and battery. Spark formation and uncontrolled movement of electronically controlled components may cause injury.

- ▶ The battery may only be charged with the Jungheinrich battery charger designed for this battery.
  - ▶ Use only battery chargers approved by the manufacturer.
- 

### **⚠ WARNING!**

#### **Risk of electric shock and fire due to insufficient or inappropriate residual current devices**

A lack of residual current devices or the use of inappropriate residual current devices can result in fatal injury due to electric shocks or electrical fires in the event of a fault.

- ▶ The owner must conduct an operational risk assessment of the usage location.
  - ▶ An RCD switch (residual current device, circuit breaker) of type B or B+ must be used where necessary.
- 

### **NOTICE**

#### **Battery damage**

If the battery charge is low, the battery can be damaged as the temperature decreases.

- ▶ If the battery charge is low, do not use the truck in temperatures from -20°C to -5°C.
  - ▶ If the battery charge is low, avoid using the truck in temperatures from -5°C to +5°C where possible.
  - ▶ Charge the battery – see page 94
-

## 9.1 Charging the Lead Battery

### **⚠ WARNING!**

#### **Risk of explosion due to gases produced while charging**

The battery gives off a mixture of oxygen and hydrogen (oxyhydrogen 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 compatible with the battery in terms of voltage and charge capacity.
- ▶ Before charging, check all cables, plug connections and coding pins for visible signs of damage.
- ▶ Ventilate the room in which the truck is being charged.
- ▶ 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 must be no combustible material or consumables capable of creating sparks within a minimum distance of 2,5 m from the truck.
- ▶ Fire control equipment must be available.
- ▶ Do not place any metallic objects on the battery.
- ▶ Always follow the safety regulations of the battery manufacturer and the charging station manufacturer.

Charge the battery only at designated charging points.

### 9.1.1 Charging the Lead Battery with a Stationary Battery Charger

- When charging, the battery door must be exposed by at least 200 mm to provide sufficient ventilation.

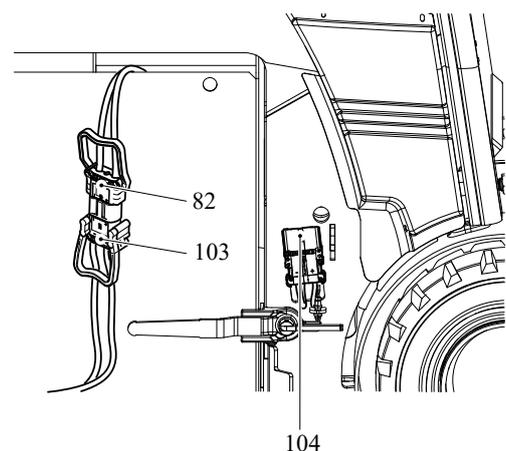
#### *Requirements*

- Truck parked securely, see page 158.
- Battery exposed, see page 77.
- Battery charger switched off.
- Disconnect the battery connector (82) from the truck connector (104).

#### *Procedure*

- Connect the battery connector (82) to the charger cable (103) of the stationary battery charger and switch on the battery charger.

*The battery is charged.*



## 9.1.2 Charging the lead battery with a comfort charger socket (○)

### Charging

#### **⚠ WARNING!**

#### **Risk of explosion due to gases produced while charging**

▶ Always check the fans each time you charge.

#### *Requirements*

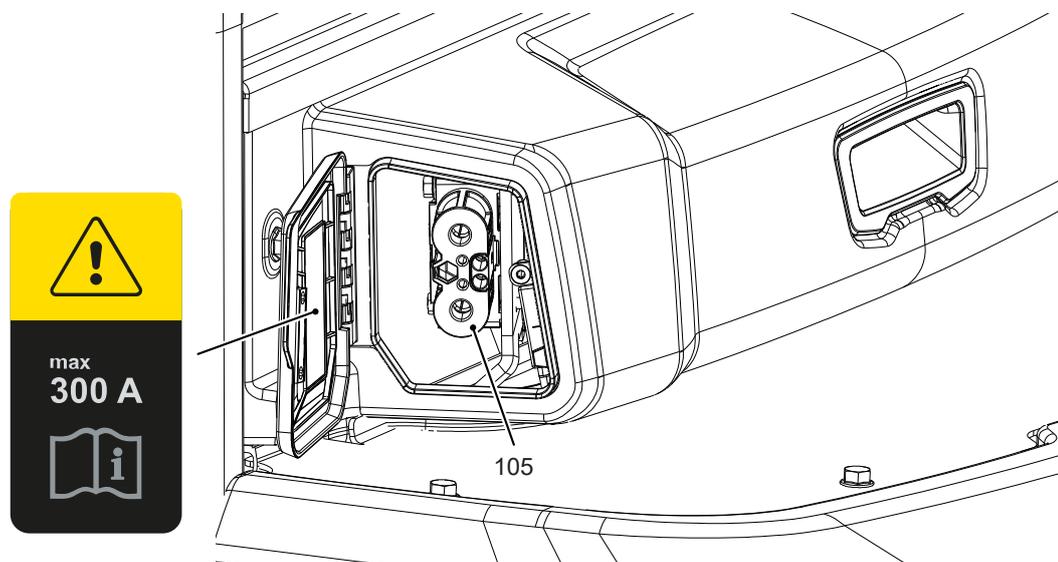
– Truck parked securely – see page 158.

#### *Procedure*

- Connect the charger cable of the battery charging station to the charging socket (105).
- Test the fan. If the fan is not working, do not charge the battery via the comfort charging socket; use the battery connector instead.
- Switch on the battery charging station and charge the battery in accordance with the instructions of the battery manufacturer and the charging station manufacturer.
- After charging, test the fans and remove the connector. If the fan is not working, open the battery door at least 200 mm to ventilate the battery compartment.

➔ Use only battery chargers with a maximum charge current of 300 A.

*Battery is charged.*



## 9.2 Charging lithium-ion batteries (○)

### → Intermediate charging of the lithium-ion battery

A lithium-ion battery that is not fully discharged can be partially or fully recharged at any time. Note the following information to ensure reliable function of the lithium-ion battery:

- ▶ In the event of frequent intermediate charging, charge the lithium-ion battery fully every 4 weeks. If the battery charger features the "balancing" function, make sure that the balancing phase at the end of charging is completed. For further information on the "balancing" function, refer to the operating instructions for the battery charger.
- ▶ Turn off the battery charger before disconnecting the lithium-ion battery from the battery charger. Manual interruption of the charging process: see page 97. When the lithium-ion battery is fully charged, charging ends automatically.

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.

Charge the battery only at designated charging points.

### 9.2.1 Charging the Lithium-Ion Battery with a Stationary Battery Charger

#### Charging

##### *Requirements*

- Truck parked securely – see page 158.

##### *Procedure*

- 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.
-

## 9.2.2 Charging the lithium-ion battery with a comfort charger socket (○) on the truck

### Charging

#### Requirements

- Truck parked securely, see page 158.

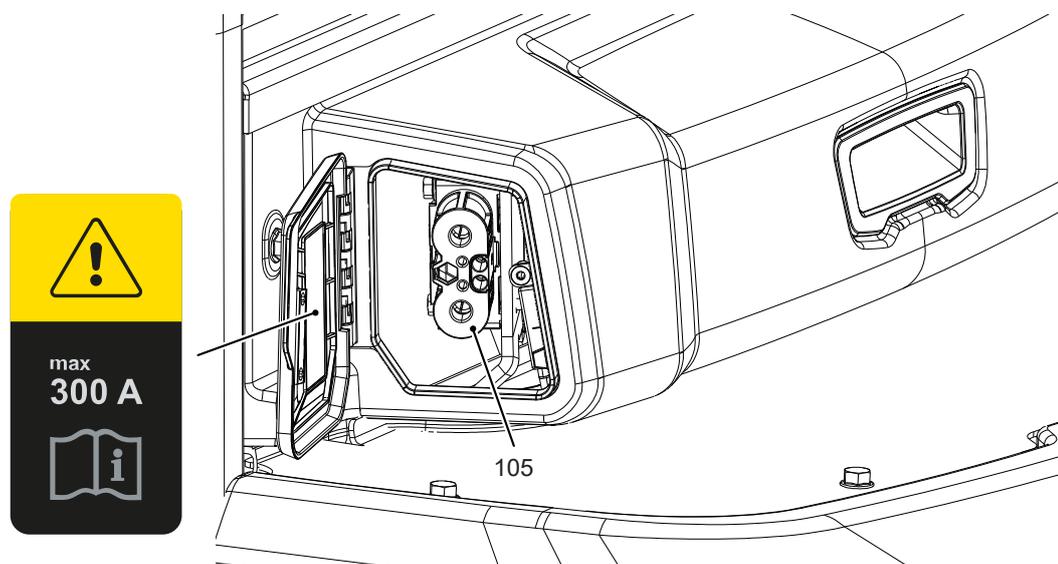
#### Procedure

- Connect the charger cable of the battery charger station to the charger socket (105).
- 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.

- Regular charging when the truck is out of service:  
to charge the battery, insert the truck-side control line into the connection on the battery trough.  
After charging the battery, remove the truck-side control line from the connection on the battery trough.



# 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.

Operators must be competent to operate the industrial trucks safely in terms of ability to see and hear and also in terms of physical and mental capacity.

The operator must not be under the influence of intoxicants, medication or otherwise physically or mentally impaired in any way.

### Operator's rights, obligations and responsibilities

The operator 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.

### Do not allow unauthorised persons to use the truck

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. Do not carry passengers or lift other people.

When leaving the industrial truck, the operator must ensure that the industrial truck is secured against unauthorised use, e.g. remove the key or keep the access code secret.

### 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**

A hazardous area is defined as the area in which people are at risk due to travel or lifting operations of the truck, its load handler or the load. This also includes the area within reach of falling loads or lowering/falling operating equipment.

- ▶ Instruct unauthorised persons to leave the hazardous area.
  - ▶ In case of danger to third parties, give a warning signal in good time.
  - ▶ If unauthorised persons are still within the hazardous area, stop the truck immediately.
-

## **⚠ WARNING!**

### **Falling objects can cause accidents**

Falling objects can injure the operator while the truck is being operated.

- ▶ The operator must remain within the protected area of the overhead guard while the truck is being operated.
- 

A roof protective grille (○) is available for more demanding applications, e.g. when working at great lift heights or with loads with special characteristics. The manufacturer recommends that the equipment is tested and assessed for its suitability for the local ambient and application conditions.

## **⚠ WARNING!**

### **Risk of accident due to operator not paying attention**

If the working time is too long, the operator may become careless due to fatigue, for example. This can lead to accidents.

- ▶ Comply with statutory working hours.
  - ▶ Take sufficient breaks.
- 

### **Safety devices, warning signs and warning instructions**

Safety devices, warning signs (see page 48) and warning instructions in the present operating instructions must be strictly observed.

No welding work may be carried out on the truck without the manufacturer's approval.

## **⚠ WARNING!**

### **Risk of accidents due to fogged, icy mirrors and windows**

Windows (e.g. rear windscreen, front window) and mirrors may be fogged or iced up. This can lead to accidents and injuries.

- ▶ Always clean or de-ice the windows and mirrors before operation.
-

## **⚠ WARNING!**

### **Health hazard due to non-adapted workplace or failure to meet the minimum headroom**

Failure to adapt the workplace or to meet the minimum headroom can cause stress and endanger the operator and may lead to lasting ill health due to an unhealthy posture and excessive strain on the operator.

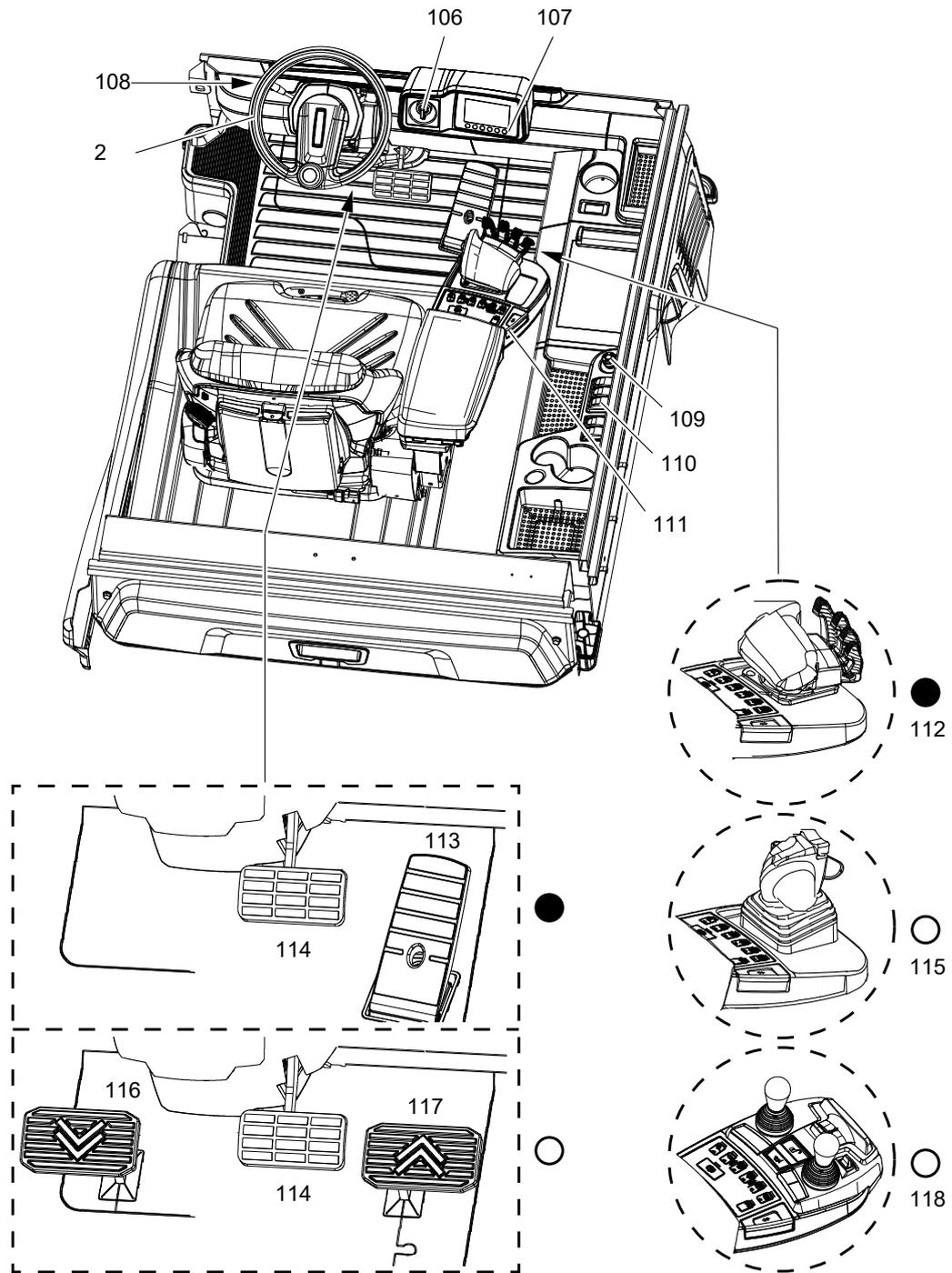
The equipment of the industrial truck can influence the headroom. Trucks with reduced headroom are equipped with a warning notice within the operator's field of view.

There is an increased risk of head injury if the minimum headroom is not met.

- ▶ Always ensure a minimum headroom of 40 mm at the operator position when the seat is correctly adjusted.
  - ▶ Ensure the minimum headroom even when wearing a safety helmet.
  - ▶ The operating company must ensure that truck operators maintain the prescribed minimum headroom.
  - ▶ The operating company must check that each operator can sit in a normal and upright position without having to strain when the seat is adjusted.
-

## 2 Displays and Controls

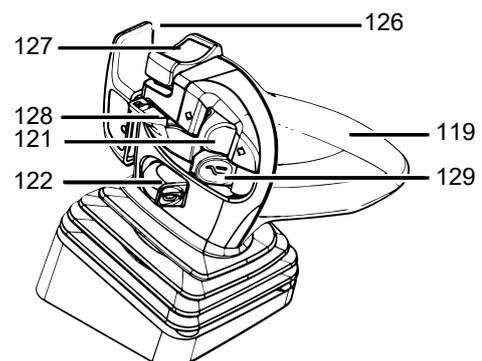
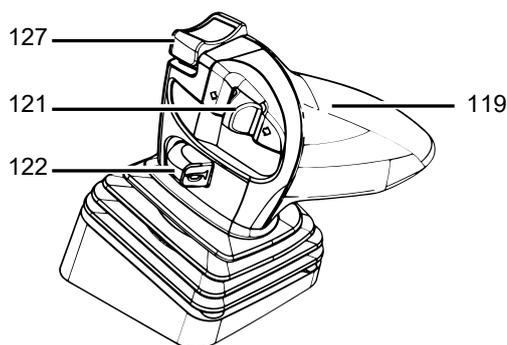
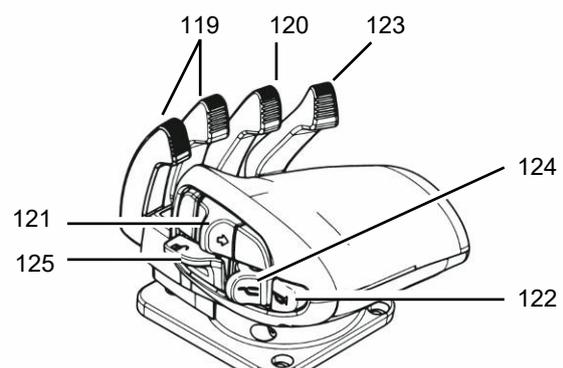
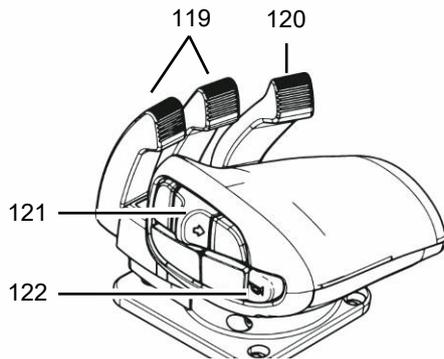
### 2.1 Controls

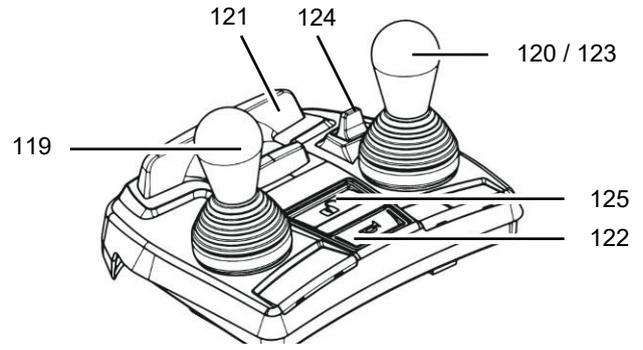
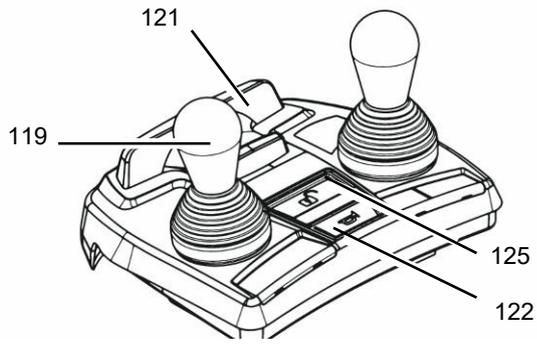


Item	Controls and displays		Function
106	Key switch	●	Switches the truck on and off.
	Keyless access system	○ →	Switches the truck on. Truck is switched off via the "switch off" button on the display unit.
107	Display unit buttons	●	Buttons for the functions that can be operated via the display unit.
		○	Keyless access system: Switches the truck on (depending on equipment), switches the truck off.
108	Indicator stalk on the left-hand side	○	Switches on and off the indicators on the left or right-hand side.
2	Steering wheel	●	Steering the industrial truck.
109	Emergency disconnect switch	●	Switches off all travel, steering and hydraulic functions. The truck brakes to a halt – see page 159.
110	Side storage-facility control panel switches	○	Used to switch optional electrical equipment on and off.
111	Armrest control panel buttons	●	Actuating the parking brake.
		○	Actuating additional functions, switching on and off optional equipment.
113	Accelerator pedal	●	Infinitely variable travel speed control.
114	Brake pedal	●	Provides infinitely variable braking control.
116	"Reverse" accelerator twin pedal control	○	Truck reverse travel, continuously adjustable travel speed.
117	"Forwards" accelerator twin pedal control	○	Truck forwards travel, continuously adjustable travel speed.
112	soloPILOT	●	Controls the following functions: – Fwd/rev. travel direction – Load handler lift/lower – Mast forward/reverse tilt – "Horn" button – Side shift left/right (○) – Auxiliary hydraulics (○)
115	multiPILOT	○	
118	duoPILOT	○	

## 2.2 Pilots

Item	Control / display		Function
119	Basic hydraulic functions lever	●	Lever for operating the basic lift / tilt hydraulic functions.
120	Side shift / auxiliary hydraulics 1 optional button / lever	●	Button for side shift or auxiliary hydraulics 1
121	Travel direction switch (not available with twin-pedal control)	●	Selects travel direction / neutral position.
122	"Horn" button	●	Activates an audible warning signal.
123	Fork positioner / auxiliary hydraulics 2 button / lever - optional	○	Button for fork positioner or auxiliary hydraulics 2
124	Toggle switch	○	Switches to the second function of the respective lever / button
128	Acknowledgement button	○	Additional operating means for hydraulic functions requiring acknowledgement



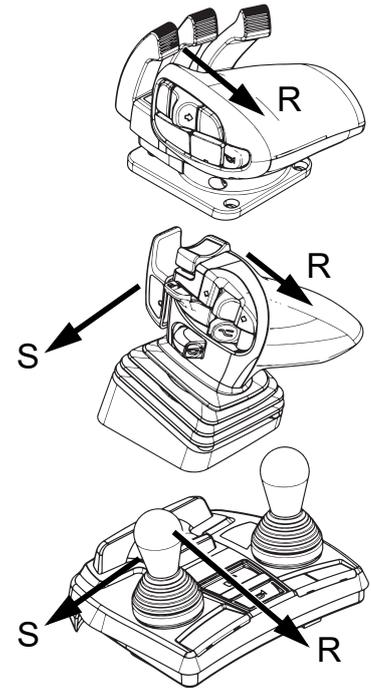


## 2.3 Function symbols for the Pilots

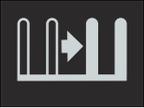
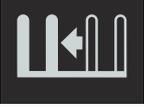
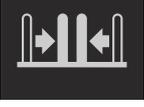
The pictogram shows the direction of movement that is executed when the operator pulls the lever in direction (R). The counter-movement of the work function is achieved by the operator pushing the lever accordingly.

For controls that operate at right angles to the travel direction, the function is shown with the actuation to the left (S) from the operator's perspective. The counter-movement of the work function is achieved by actuating the lever to the right from the operator's perspective.

→ The symbols shown are examples. The actual direction of movement of the hydraulic functions must be determined from the labels on the levers of the Pilots.

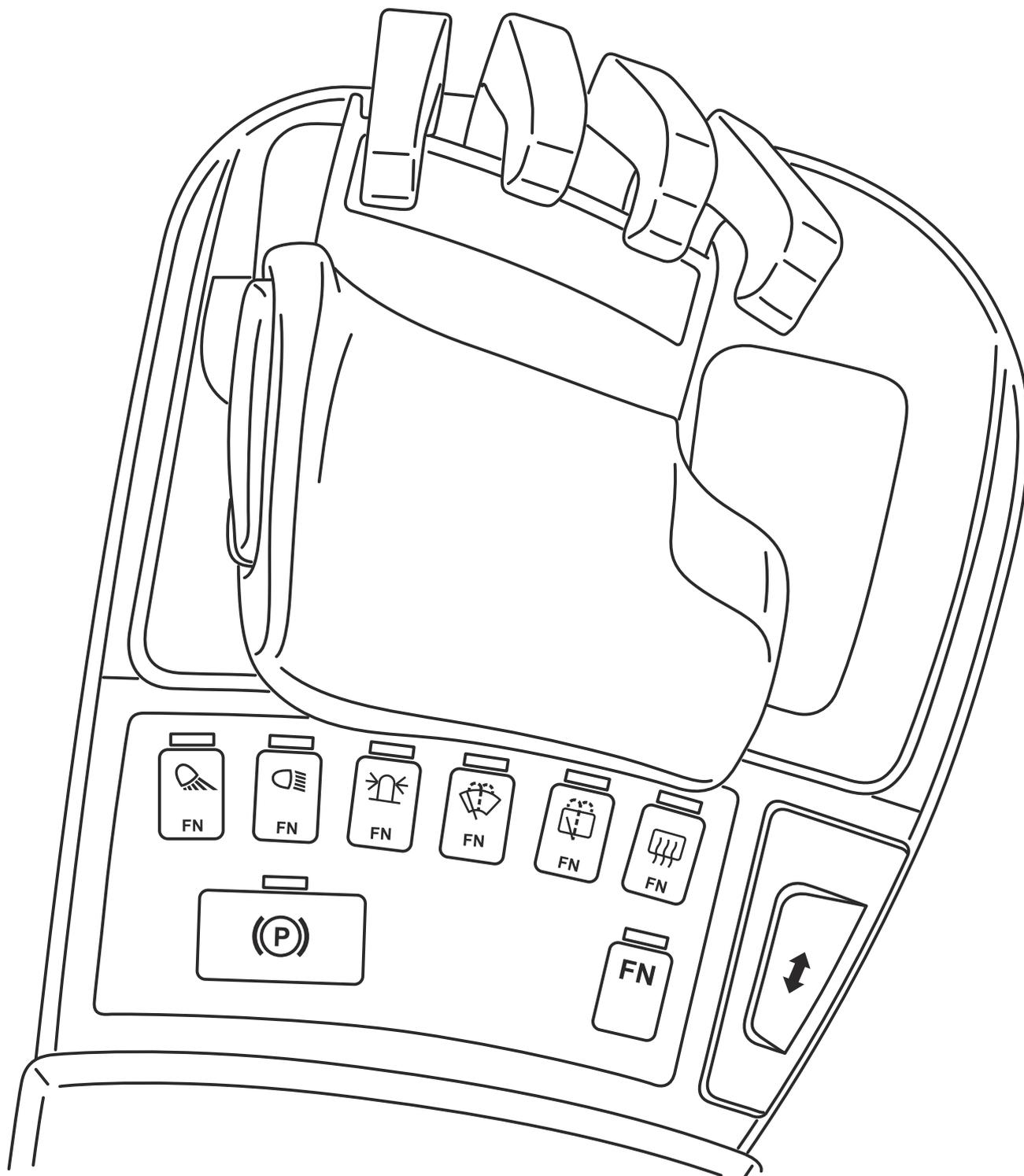


Symbol	Meaning
	Marking: Second function of a hydraulic function → Selection via toggle function
	Toggle function → Switch between main functions and second functions for hydraulic functions
	Marking: Hydraulic function requiring acknowledgement
	Acknowledgement button → Hydraulic function requiring acknowledgement can then be operated within 2 seconds.
	Lift
	Lower
	Tilt
	Side shift

Symbol	Meaning
	Side shift right
	Side shift left
	Fork positioner
	Outside fork positioner
	Inside fork positioner
	Left fork positioner
	Right fork positioner
	Clamp
	Reach fork
	Telescopic fork
	Rotate
	Double lift
	Tip
	Locking mechanism

Symbol	Meaning
	Crane
	Scoop
	Load holder
	Folding fork
	Empty container
	Pusher
	Adapters ZH1 to ZH4 (example symbol: ZH1)
	Changing attachments 1 to 4 (example: attachment 2)

## 2.4 Armrest Control Panel Buttons



Symbol	Function
	Work light – Brief press > switch on / switch off
	Dimmable work lights (○) – Brief press > switch on / switch off – Press and hold > dim brightness – Two brief presses > high beam / normal operation
	Travel light / auxiliary spotlights – Brief press > switch on / switch off
	Dimmable travel light (○) – Brief press > switch on / switch off – Press and hold > dim brightness – Two brief presses > high beam / normal operation
	Beacon / strobe light – Brief press > switch on / switch off
	Front windscreen wiper – 1 press > button flashes green - intermittent operation – 2 press > button lights up green - continuous operation – 3 press > switch off – Press and hold > windscreen washing system

Symbol	Function
	<p>Rear windscreen wiper</p> <ul style="list-style-type: none"> <li>– 1 press &gt; button flashes green - intermittent operation</li> <li>– 2 press &gt; button lights up green - continuous operation</li> <li>– 3 press &gt; switch off</li> <li>– Press and hold &gt; windscreen washing system</li> </ul>
	<p>Rear windscreen heater (●) Rear windscreen heater and front window heating (○)</p> <ul style="list-style-type: none"> <li>– Brief press &gt; switch on / switch off</li> </ul>
	<p>Parking brake button</p> <ul style="list-style-type: none"> <li>– Press to deactivate the activated parking brake and enable the travel function</li> <li>– Press to activate the deactivated parking brake, e.g. to securely park the truck</li> </ul> <p>→ Applying during travel will cause the truck to brake to a halt in a controlled manner.</p>
<b>FN</b>	<p>→ Only when equipped with display unit with 4-inch display</p> <p>FN button with status lamp</p> <ul style="list-style-type: none"> <li>– Activate, switch through and deactivate additional functions on the armrest, see page 112.</li> </ul> <p>Whenever the status lamp is lit via the FN button, the first six buttons are assigned additional functions as shown on the display unit, see page 123.</p> <p>Whenever the status lamp above the FN key is not lit, the display unit can only be operated using its keypad.</p> <p>→ If the FN button is held down for 1 second, the display unit changes to the main menu – see page 126.</p>

→ Not all buttons are assigned. Button assignment depends on the truck's equipment.

→ In the event of a fault or failure of the windscreen wiper or windscreen washing system, manually clean the window that needs to be cleaned in an appropriate manner.

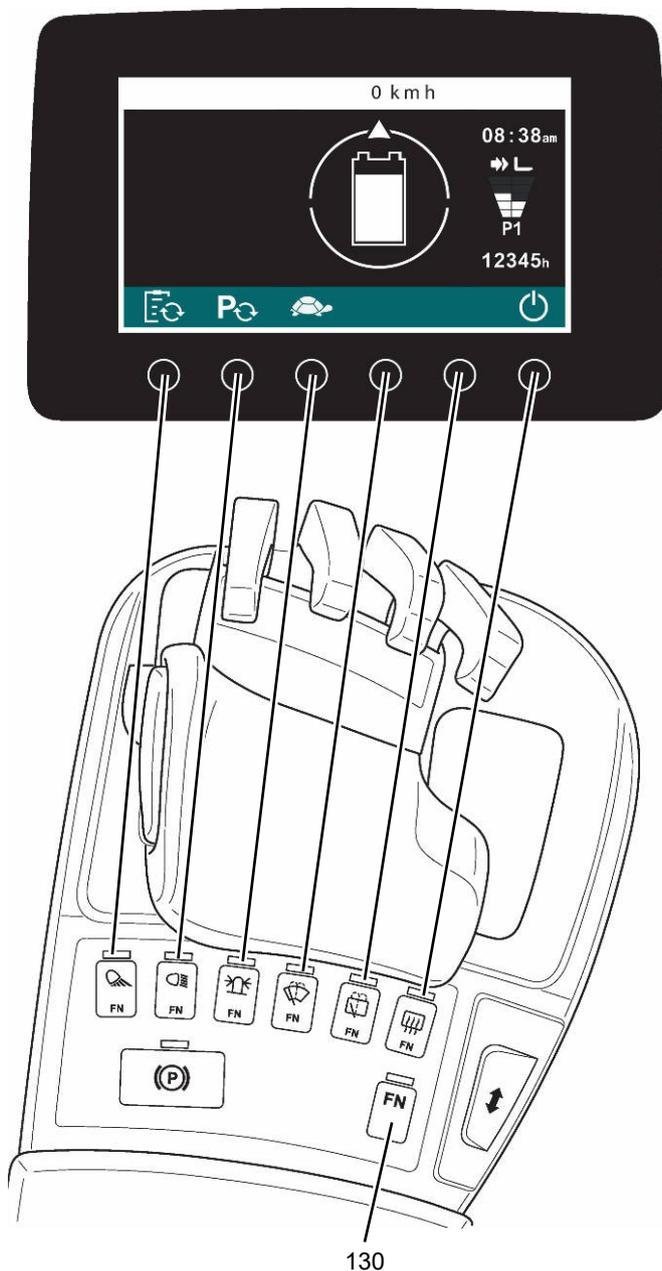
## 2.4.1 Activating the auxiliary functions on the armrest

- Only when equipped with display unit with 4-inch display
- Functions and operator menus that can be operated via buttons on the armrest control panel depend on the operating situation as well as the scope and settings of the truck, see page 123.

### Procedure

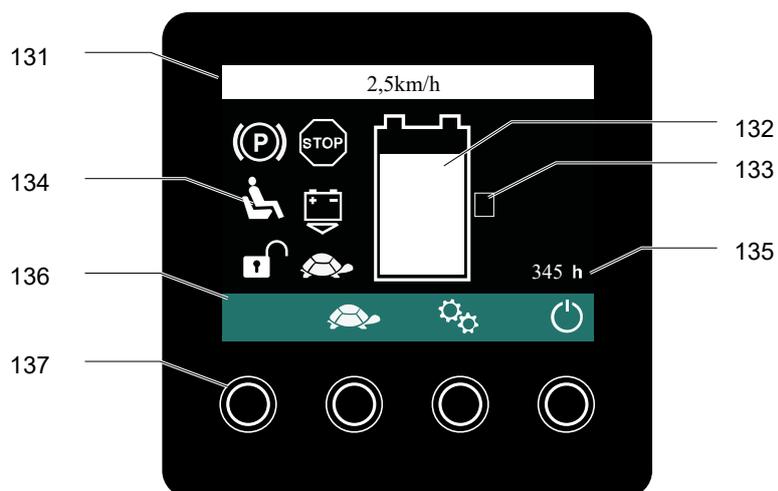
- Press the FN (130) button. Status lamp above the FN button lights up. Additional functions are shown in the display.
- Press the corresponding button in the armrest control panel or on the display unit keypad and activate/deactivate the auxiliary option. The symbols of the activated auxiliary functions have white backgrounds.
- To switch to other auxiliary functions (where available, depending on equipment), press the FN button again.
- If no additional functions are available, normal operating mode resumes after you press the FN button, and the status lamp above the FN button extinguishes.

*Auxiliary function is activated or deactivated.*



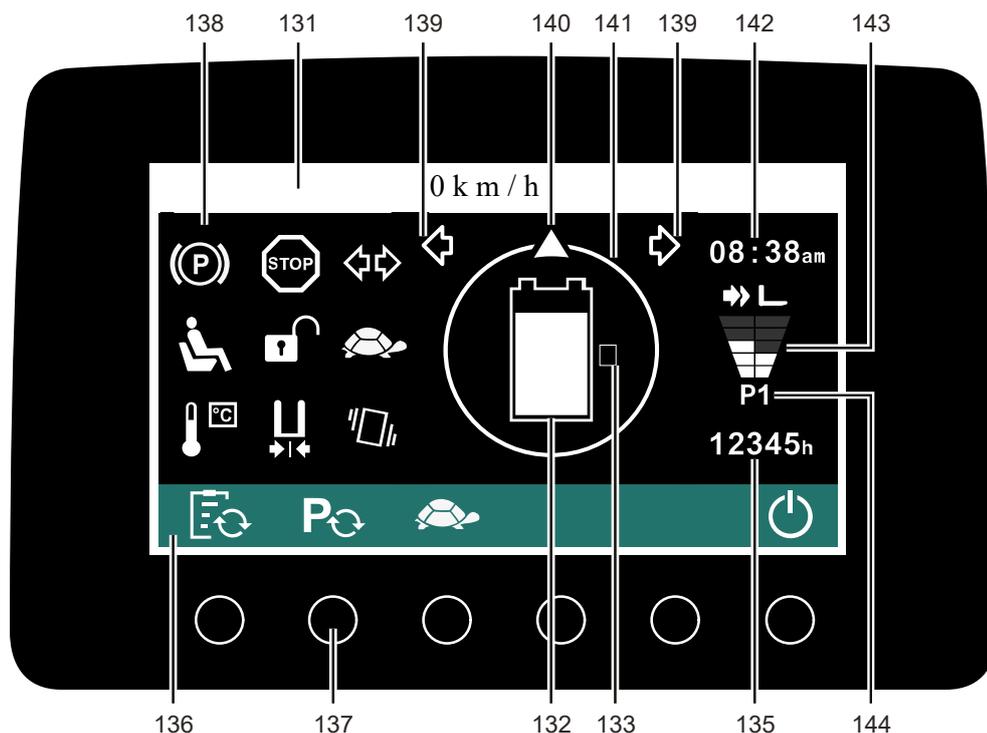
## 2.5 Control panel with display unit

### 2.5.1 Display unit with 2-inch display



Item	Control or display element	Function
131	Information line	Displays event messages and information such as speed
132	Battery capacity display	Battery discharge status.
133	Battery type	Empty = Standard battery 1 = Dry battery
134	Icon field	Displays the symbols, see page 116.
135	Hour meter	Shows the truck operating hours – see page 122.
136	Key allocation	Key allocation for keypad – see page 123.
137	Keypad	Selection keys for the corresponding functions.

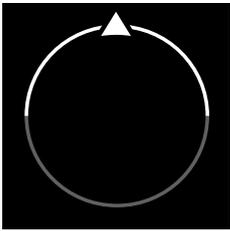
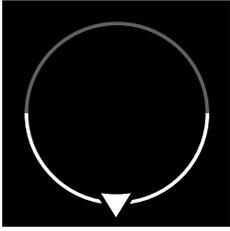
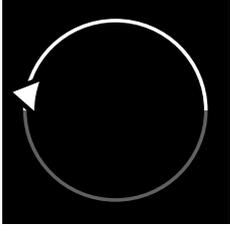
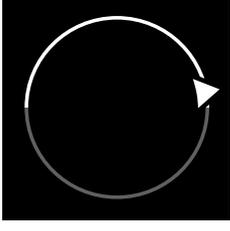
## 2.5.2 Display unit with 4-inch display



Item	Control or display element	Function
131	Information line	Displays event messages and information such as speed, load weight (○), tilt angle (○).
132	Battery capacity display	Shows the battery discharge status.
133	Battery type	Empty = Standard battery 1 = Dry battery
135	Hour meter	Shows the truck operating hours – see page 122.
136	Key allocation	Key allocation for the keypad or for the armrest control panel buttons – see page 123.
137	Keypad	Selection keys for the corresponding functions.
138	Icon field	Displays the icons – see page 116.
139	Indicator	Indicates turn signals or hazard warning lights.
140	Travel-direction and steer-angle arrow	Indicates the direction of current travel and the current wheel position.
141	Travel direction selection (white semicircle)	Shows the travel direction engaged.
142	Time	Shows the time.
143	Power display	Shows the travel and lifting performance of the operating program selected – see page 122.
144	Operating program	Shows the active operating program – see page 122.

## Depiction of travel direction and steer angle on the display unit

The travel direction engaged is depicted by a white semicircle. The direction of current travel and the current wheel position are displayed by a white travel-direction and steer-angle arrow.

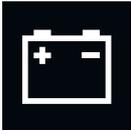
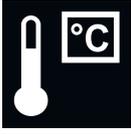
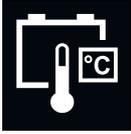
Symbol	Meaning
	<ul style="list-style-type: none"> <li>- Travel direction engaged: forwards</li> <li>- Current direction of travel: forwards</li> <li>- Travelling straight ahead</li> </ul>
	<ul style="list-style-type: none"> <li>- Travel direction engaged: reverse</li> <li>- Current direction of travel: reverse</li> <li>- Travelling straight ahead</li> </ul>
	<ul style="list-style-type: none"> <li>- Travel direction engaged: forwards</li> <li>- Current direction of travel: forwards</li> <li>- Left turn</li> </ul> <p>→ The steering wheel is at full lock.</p>
	<ul style="list-style-type: none"> <li>- Travel direction engaged: forwards</li> <li>- Current direction of travel: forwards</li> <li>- Right turn</li> </ul> <p>→ The steering wheel is at full lock.</p>

→ When the truck is stationary and the travel direction switch is in the neutral position, the display alternates between forwards and reverse travel.

## 2.6 Symbols in the display

→ The symbols shown depend on the truck equipment.

Symbol	Meaning	Colour	Function
	Indicator	Green	Indicator or warning indicator active
	Slow travel	Green	Slow travel activated by operator
		Yellow	Slow travel activated by truck
		Red	Emergency travel operation (speed 2 km/h) with reduced performance, activated by truck
	Service note	Flashing yellow	Next service due in less than 150 operating hours
		Yellow	Service required: Contact the manufacturer's customer service department.
		Red	Safety inspection required
	Warning	Flashing yellow	Operating error or info message
		Flashing red	Error
	Stop notice	Green	The selected travel direction is not blocked by an optional component, the other travel direction travel is blocked.
		Yellow	The selected travel direction is blocked by an optional component, or both travel directions are blocked.
		Red	Functions deactivated due to truck malfunction
	Impact display (○)	Green	Mild shock
		Yellow	Medium shock
		Red	Severe shock
	Truck disabled	Yellow	Travel function disabled or working hydraulics disabled Lights up when the truck has been disabled due to a serious event. Possible causes: – Fault in drive system – Fault in hydraulic system – Shock event (truck with fleet management system)
	Steering-assistance failure	Red	Emergency steering mode

Symbol	Meaning	Colour	Function
	Regenerative brake fault	Yellow	Effect of regenerative braking is reduced. Maximum travel speed is reduced.
		Red	Effect of regenerative braking is considerably reduced. Maximum travel speed is considerably reduced. Special attention when on slopes: Do not travel faster than crawl speed.
	Automatic parking brake	Green	Automatic parking brake active – see page 170.
	Manual parking brake	Red	Parking brake button actuated – see page 169.
	Parking brake error	Red	Parking brake has control error or sensing error – Immediately bring the industrial truck to a standstill, decommission it and secure it against rolling away and restarting.
	Battery indicator, low residual capacity	Yellow	Residual capacity < 25% The battery must be charged soon.
		Flashing yellow	Residual capacity < 13% Battery charging is recommended.
		Red	Residual capacity < 1% The battery must be charged immediately to avoid damage. The travel speed is limited to 2 km/h and the lift cut-off is activated.
	Battery latch / battery door Charging connection	Red	Battery latch / battery door open Cover flap for charging connection open
	Battery acid level	Red	Battery acid level low
	Overtemperature	Red	Converter overtemperature. Consumers that are not absolutely necessary are switched off. – Switch off consumers if possible.
	Battery excess temperature	Yellow	Overtemperature detected. Lifting, lowering and travel functions reduced
		Red	Overtemperature detected. Lifting, lowering and travel functions are deactivated.

Symbol	Meaning	Colour	Function
	Battery low temperature	Yellow	Temperature of the lithium-ion battery is below 5°C. Discharge currents and energy recovery are reduced.
		Red	Temperature of the lithium-ion battery is below 0°C. Lithium-ion battery below permissible temperature range.
	Seat switch	Fixed yellow	Seat switch not actuated
		Flashing yellow	<ul style="list-style-type: none"> <li>– Seat switch not actuated, actuated function requires seated operator</li> <li>– Seated operator / activated seat switch implausible. Vacate the driver's seat.</li> <li>– Seat switch operated continuously for more than 6 hours. Vacate the driver's seat.</li> </ul>
		Flashing red	Error on seat switch
	Seat belt lock control system	Flashing yellow	<ul style="list-style-type: none"> <li>– Seat belt lock not locked, actuated function requires operator wearing seat belt</li> <li>– Operating position with locked seat belt lock implausible. Open the seat belt lock.</li> </ul>
	Presence switch (○)	Yellow	<ul style="list-style-type: none"> <li>– Travel release not granted</li> <li>– Footwell switch not actuated</li> </ul>
	Acknowledgement active	Green	Acknowledgement active
	Acknowledgement feature malfunction	Yellow	Acknowledgement feature malfunction: Hydraulic function requiring acknowledgement activated without acknowledgement
	Toggle function	Yellow	Second hydraulic control lever function activated
	Forks tilted back significantly	Yellow	Forks tilted back significantly, mast tilt < -4 °
	Forks tilted back slightly	Yellow	Forks tilted back slightly, mast tilt -4° to -1°

Symbol	Meaning	Colour	Function
	Fork tilt horizontal	Green	Forks horizontal, mast tilt 0°
	Forks tilted forward slightly	Yellow	Forks tilted forward slightly, mast tilt +1° to +4°
	Forks tilted forward significantly	Yellow	Forks tilted forward significantly, mast tilt > +4 °
	Side shift centred	Green	Side shift centred
		Yellow	Side shift not centred
	Lift end sensor	Green	Lift cut-off overridden
		Yellow	Lift cut-off initiated
	Lowering end sensor	Green	Lower cut-off overridden
		Yellow	Lower cut-off initiated
	Working hydraulics cut-off	Yellow	Cut-off activated
	Observe the operating instructions	Yellow	When triggering functions or processes, observe the safety instructions and meet the necessary requirements.
	Door opened	Yellow	Warning given when door open, no travel release
		Flashing yellow	Warning given when door open and accelerator pedal actuated or pilot actuated, no travel release – Operated function requires closed door
	Front Floor-Spot warning device	Yellow	Front Floor-Spot warning device deactivated
	Rear Floor-Spot or Floor-Bow warning device, side Floor-Stripes warning device	Yellow	Rear Floor-Spot or Floor-Bow warning device deactivated, Side Floor-Stripes warning device deactivated
	Reversing buzzer cut-off	Yellow	Reversing buzzer deactivated until truck shutdown
	Bucket use (special parameterisation)	Yellow	Bucket use not activated
		Green	Bucket use activated

## Maintenance notice with advance warning and travel speed reduction ○

Regulations require the industrial truck to undergo maintenance after 1000 hours. 150 hours before maintenance is due, the yellow maintenance interval symbol flashes on the display for approx. 60 seconds after switching on the industrial truck. The time remaining until maintenance is also displayed. If the prescribed maintenance is not carried out after 1000 hours, the maintenance interval symbol lights up permanently and the travel speed is reduced to 2.5 km/h.

The permanently lit maintenance notice symbol can only be reset by the manufacturer's customer service department after maintenance has been completed.

Symbol	Meaning	Colour	Function
	Service note	Flashes yellow	Maintenance due in xxx h (xxx h corresponds to the remaining operating hours <=150 hours)
		Steady yellow light	Maintenance due (1000 h). Travel speed reduction to 2.5 km/h.

## 2.7 Battery discharge indicator

### NOTICE

#### Full discharge can damage the battery

The standard setting for the battery discharge indicator is based on standard batteries. When using maintenance-free batteries (gel batteries), the display must be reset.

- ▶ This adjustment should only be made by the manufacturer's customer service department.
- ▶ The battery discharge indicator shows the battery's residual capacity.
- ▶ Charge the battery, see page 94.

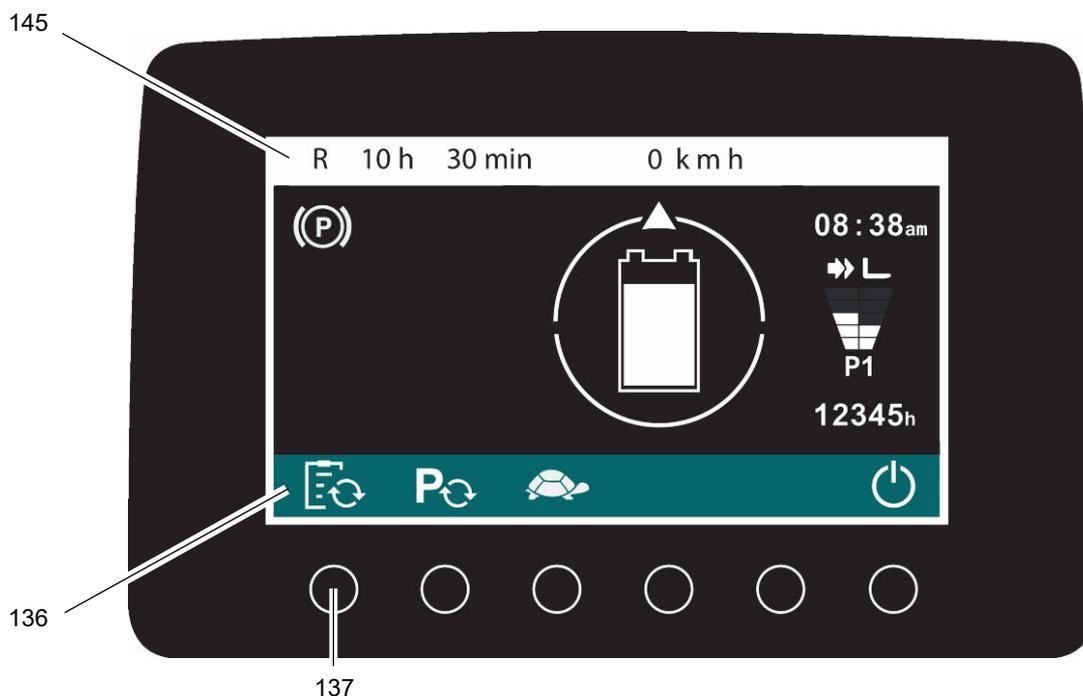
The battery charge status is shown on the truck display via a battery symbol (132). When a battery is discharged to the permissible discharge level, the battery symbol (132) is displayed empty.

## 2.8 Battery discharge monitor

At approx. 10% residual capacity, truck performance is reduced by approx. 10%. The lift function is deactivated and the travel speed is reduced. A corresponding message appears on the display. The lift function is only enabled when the battery connected is at least 40% charged.

- ➔ Switching the truck off and back on again enables hydraulic functions to be performed for approx. 30 seconds.

## 2.9 Residual time display



#### Setting the residual time display

The residual time display (145) is switched on and off via the display toggle button (136/137).

## 2.10 Operating Programs

Five operating programs with different performance levels are available to adapt the travel and operating functions to the application at hand.

<b>Operating program</b>	<b>Function</b>
Operating program 1	<ul style="list-style-type: none"><li>– Significantly reduced travel speed</li><li>– Slow response</li><li>– Significantly reduced lift speed</li><li>– Optional special parameterisation possible</li></ul>
Operating program 2	<ul style="list-style-type: none"><li>– Reduced travel speed</li><li>– Slow response</li><li>– Reduced lift speed</li></ul>
Operating program 3	<ul style="list-style-type: none"><li>– Maximum travel speed</li><li>– Rapid response</li><li>– Slightly reduced lift speed</li></ul>
Operating program 4	<ul style="list-style-type: none"><li>– Maximum forward travel speed</li><li>– Slightly reduced reverse travel speed</li><li>– Rapid response</li><li>– Performance-optimised speed pattern</li><li>– Slightly reduced lift speed</li></ul>
Operating program 5	<ul style="list-style-type: none"><li>– Maximum forward travel speed</li><li>– Maximum reverse travel speed</li><li>– Rapid response</li><li>– Performance-optimised speed pattern</li><li>– Maximum lift speed</li></ul>

When equipped with a display unit with 4-inch display, it is possible to choose between the five operating programs.

When equipped with a display unit with 2-inch display, operating program 5 is selected at the factory.

If necessary, the operating programs can also be adapted or restricted to suit the customer. Contact the manufacturer's customer service department.

## 2.11 Hourmeter

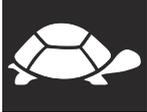
The service hours are counted when the truck is switched on and the seat switch is closed.

## 2.12 Button allocation of the display

Functions and operator menus that can be operated via the icons and keys of the display unit depend on the operating situation as well as the scope and settings of the truck.

### 2.12.1 Display unit with 2-inch display

#### Button assignment in the main menu

Symbol	Meaning
	Slow travel (activation by the operator): Switches slow travel on/off. → Not for switching off slow travel activated by the truck or for switching off emergency travel.
	Function menu for settings and extra functions – Setting access authorisations (○) – see page 210. – Switching to extra functions (○)
	Shutdown (○): Shutdown of the industrial truck is initiated. The shutdown option is only included on the display if the truck is switched on via a keyless access system.

#### Button assignment for extra functions (○)

Symbol	Meaning
	Depressurisation of auxiliary hydraulics, e.g. before changing an attachment. – Press the button for more than 5 seconds – Follow the procedure – see page 200.
	Activation of the front Floor-Spot warning device (○) – see page 278
	Deactivation of the front Floor-Spot warning device (○)
	Activation of the rear Floor-Spot warning device (○), see page 278, or Floor-Bow (○), see page 280, Activation of the side Floor-Stripes warning device (○), see page 282
	Deactivation of the rear Floor-Spot (○) or Floor-Bow (○) warning device – Deactivation of the side Floor-Stripes warning device (○)
	Lighting on the mast (○): To switch on/off the lighting on the mast.

Symbol	Meaning
	Front work lights (○): To switch on/off the front work lights.
	Rear work lights (○): To switch on/off the rear work lights.
	Roof windscreen wiper (○): <ul style="list-style-type: none"> <li>- 1 press &gt; button flashes green - intermittent operation</li> <li>- 2 press &gt; button lights up green - continuous operation</li> <li>- 3 press &gt; switch off</li> <li>- Press and hold &gt; windscreen washing system</li> </ul>
	Mast hydraulics cut-off (○): Cut-off of the work functions on the mast – see page 247
	Lift limit override (○): One-off override of the lift cut-off, see page 260.
	Lower limit override (○): One-off override of the lower cut-off
	Side shift centre position (○): Activates the side shift centre position function, see page 261.
	Reversing buzzer cut-off (○)

## Button allocation in menu for managing codes or transponders (○)

Symbol	Meaning
	Back: Cancels the current procedure and returns to the previous menu.
	Log-in history: Displays the chronological log-in history
	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 or transponders

## Button allocation in the submenus

Symbol	Meaning
	Selection up: To select access codes or transponders, to scroll back during the log-in process
	Selection down: To select access codes or transponders, to scroll forward during the log-in process
	Delete: To delete access codes selected
	Add: To add a new access code
	Confirm: To confirm an entry or a transponder code

## 2.12.2 Display unit with 4-inch display

- Activate the display of auxiliary functions in the display unit via the FN button on the armrest control panel – see page 112.

While the status lamp above the FN button is illuminated, the first six buttons on the control panel can be used instead of the display unit buttons – see page 109.

### Button assignment in the main menu

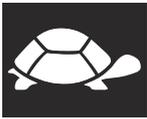
Symbol	Meaning
	Information field toggle: Changes the information displayed in the information bar.
	Assign a favourites button: Press and hold the button for changing the assignment of a favourites button (see below).
	Cycle operating program: Switches to the next operating program.
	Favourites buttons (selectable if no fixed assignment): Switches to the selected operating menu or activates/deactivates the selected function.  → The "slow travel" function is recommended for the first favourites button.
	Shutdown (○): Shutdown of the industrial truck is initiated. The shutdown option is only included on the display if the truck is switched on via a keyless access system.

## Assign a favourites button

Symbol	Meaning
	Assign a favourites button: Press and hold the button for the changing the assignment of a favourites button. If you then press a favourites button at the same time, this takes you to the selection of the available symbols, thus allowing you to assign the relevant function or operating menu (see below).
	Change button assignment: Displays the symbols for other available functions and operating menus (depending on equipment).
	Favourite buttons (button positions 3 to 6 can be selected, if no fixed assignment): Press and hold until the display switches to the symbols for the available functions and operating menus (depending on equipment).
	Switching off (○) (button position 6 ): Switches off the truck. "Shutdown" is only included on the display if the truck is switched on with an access code. In this case, button position 6 cannot be assigned as a favourite button.

→ The "slow travel" function is recommended for the first favourites button.

## Button assignment for extra functions (○)

Symbol	Meaning
	Slow travel (activation by the operator): Switches slow travel on/off. → Not for switching off slow travel activated by the truck or for switching off emergency travel.
	Depressurisation of auxiliary hydraulics, e.g. before changing an attachment. – Follow the procedure – see page 200.
	Settings function menu – Setting the time, see page 134. – Setting access authorisations (○), see page 210. – Setting other functions.
	Activation of the front Floor-Spot warning device (○) – see page 278
	Deactivation of the front Floor-Spot warning device (○)
	Activation of the rear Floor-Spot warning device (○), see page 278, or Floor-Bow (○), see page 280, Activation of the side Floor-Stripes warning device (○), see page 282

Symbol	Meaning
	Deactivation of the rear Floor-Spot (○) or Floor-Bow (○) warning device – Deactivation of the side Floor-Stripes warning device (○)
	Lighting on the mast (○): To switch on/off the lighting on the mast.
	Front work lights (○): To switch on/off the front work lights.
	Rear work lights (○): To switch on/off the rear work lights.
	Roof windscreen wiper (○): – 1 press > button flashes green - intermittent operation – 2 press > button lights up green - continuous operation – 3 press > switch off – Press and hold > windscreen washing system
	Load weighing (○) – see page 254. Load weighing plus options menu (○)
	Media player option menu – see page 250 Switching on "sound module premium" (○)
	Mast hydraulics cut-off (○): Cut-off of the work functions on the mast – see page 247
	Lift limit override (○): One-off override of the lift cut-off, see page 260.
	Lower limit override (○): One-off override of the lower cut-off
	Side shift centre position (○): Activates the side shift centre position function, see page 261.
	Mast tilt (○): Activates the fork tilt horizontal function – see page 262.
	Reversing buzzer cut-off (○)

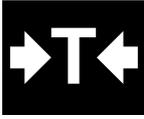
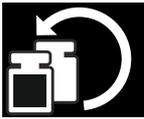
## Button allocation in menu for managing codes or transponders (○)

Symbol	Meaning
	Back: Cancels the current procedure and returns to the previous menu.
	Log-in history: Displays the chronological log-in history
	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 or transponders

## Button allocation in the submenus

Symbol	Meaning
	Selection up: To select access codes or transponders, to scroll back during the log-in process
	Selection down: To select access codes or transponders, to scroll forward during the log-in process
	Delete: To delete access codes selected
	Add: To add a new access code
	Confirm: To confirm an entry or a transponder code

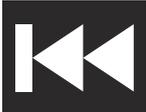
## Button allocation in load weighing plus option menu (○)

Symbol	Meaning
	Save the currently recorded individual weight as tare → Tare: Difference between the currently recorded gross individual weight and the net individual weight currently shown → Compensate for the weight of an attachment
	Total function: Add the currently shown net individual weight to the total weight, increase the number of weights recorded
	Total function: Subtract the currently shown net individual weight from the total weight, reduce the number of weights recorded → Reset the addition of a net individual weight
	Set zero point: Reset the total weight, the number of weights recorded and all saved net individual weights (○)
	Last weights: Individual weights submenu (○)
	Back: Returns to the previous menu.

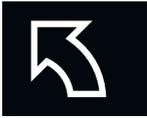
## Button allocation in individual weights submenu (○)

Symbol	Meaning
	Reset the addition of the last net individual weight
	Last weights
	Back: Returns to the previous menu.

## Button assignment in media player options menu (○)

Symbol	Meaning
	Playback control of the audio source connected via Bluetooth® (where supported and available): Play the current audio file from the beginning, play the previous audio file, skip back to previous audio files
	"FM" radio: Station selection – select the previous available station
	"DAB": Select the previous station in the station list (press button for less than 2 seconds), start the automatic station scan (press button for more than 2 seconds)
	Playback control of the audio source connected via Bluetooth® (where supported and available): Play the next audio file, skip to next audio files
	"FM" radio: Station selection – select the next available station
	"DAB": Select the next station in the station list (press button for less than 2 seconds), start the automatic station scan (press button for more than 2 seconds)
	Reduce volume  Press and hold the button to mute.
	Increase volume
	Sound module settings menu
	Back: Returns to the previous menu.

## Button assignment in sound module settings menu

Symbol	Meaning
	Switch off the sound module
	Source selection: Switch between "FM" radio, "DAB" radio, an audio source connected via Bluetooth® ("Bluetooth", only when connected to digital end device) and an audio signal connected to the analogue input "Aux In"
<b>BASS</b>	Bass intensity setting: Gradual increase (0 (default), I, II, III) and decrease
<b>TREB</b>	Treble intensity setting: Gradual increase (0 (default), I, II, III) and decrease
	Hands-free system settings menu, with "Bluetooth pairing" function → The settings menu for the hands-free system can be accessed directly with a double-press of the FN button.
	Back: Returns to the previous menu.

## Button assignment in hands-free system options menu (○)

Symbol	Meaning
	Answer incoming phone call End current phone call
	Mute
	Reduce volume → When pressed, the volume is muted.
	Increase volume
	Bluetooth pairing – see page 250
	Back: Returns to the previous menu.

- The settings menu for the hands-free system can be accessed directly with a double-press of the FN button.
- As soon as a phone call is received on the connected phone, the current menu automatically switches to the hands-free options menu.

## 2.13 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.*



## 2.14 Side compartment control panel switch (○)

→ The switches available in the side control panel depend on the truck equipment.

### 2.14.1 Battery Activation Button

A preset time after actuating the emergency disconnect switch and to protect against deep discharge and malfunctions, the lithium-ion battery deactivates and switches to energy-saving mode. To activate the sufficiently charged lithium-ion battery back into normal operation, actuate the battery activation button on the control panel.

An insufficiently charged, deactivated lithium-ion battery must be sufficiently charged before it can be activated and used for trouble-free operation of the industrial truck.

→ Depending on the equipment, the battery activation button may be located on the battery tray – see page 157.

#### **Activating the lithium-ion battery**

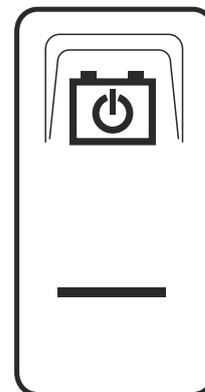
##### *Requirements*

- Key switch set to OFF.
- Key removed.
- Emergency disconnect switch actuated.

##### *Procedure*

- Actuate the battery activation button for approx. 3 seconds.

*The lithium-ion battery is activated.*



### 2.14.2 Warning Indicator

The warning indicator is activated by actuating the switch on the control panel.

#### **Activating the warning indicator**

##### *Procedure*

- Press the warning indicator switch.

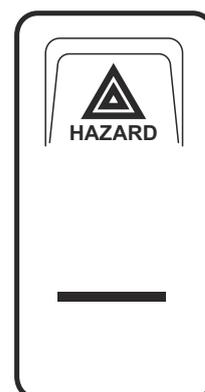
*Warning indicator is activated.*

#### **To deactivate the warning lights**

##### *Procedure*

- Press the warning indicator switch back to home position.

*Warning indicator is deactivated.*



### 2.14.3 Parking Light

The parking light is activated by actuating the switch on the control panel.

#### ***Activating the parking light***

##### *Procedure*

- Press the parking light switch.

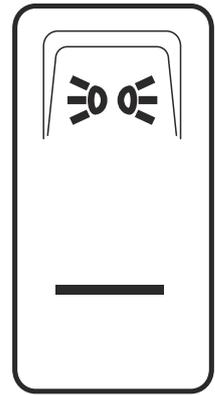
*The parking lights are activated.*

#### ***To deactivate the parking lights***

##### *Procedure*

- Press the parking light switch back to home position.

*The parking lights are deactivated.*



## 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.
- 

#### **CAUTION!**

##### **Risk of accident due to slippery surfaces**

There is a risk of accident due to slipping when walking on slippery surfaces with unsuitable footwear.

- ▶ Wear safety shoes or sturdy footwear with non-slip soles.
  - ▶ Use the non-slip step and the floor mat for entry and exit.
  - ▶ Look out for snow and ice when boarding and alighting the truck in cold temperatures. There is a risk of slipping.
- 

-  Safety shoes, and where applicable additional personal protective equipment, must be worn for some activities.

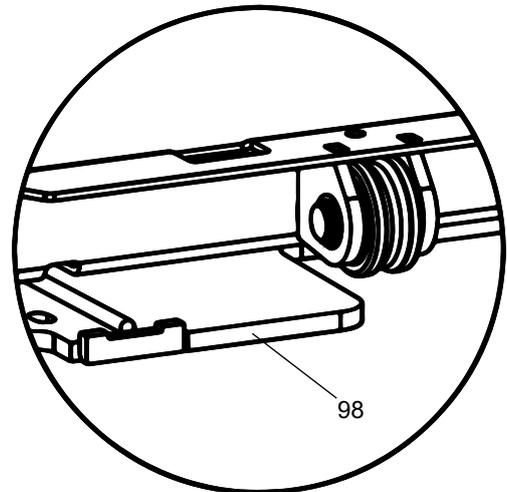
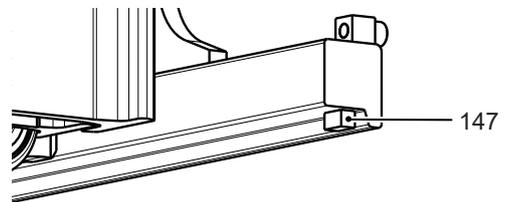
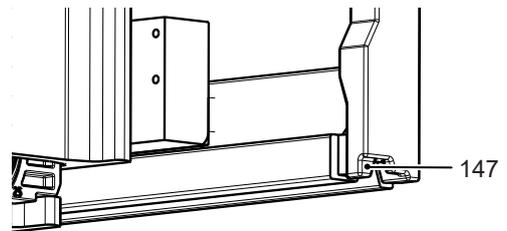
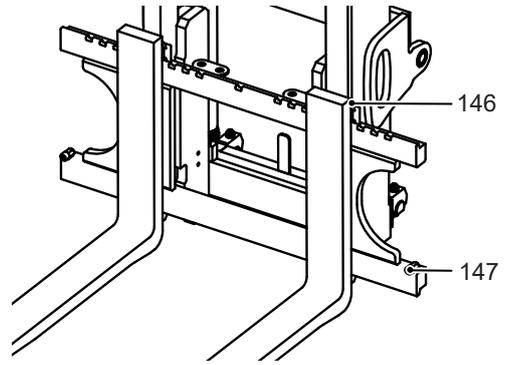
## Checks before daily operation

### Procedure

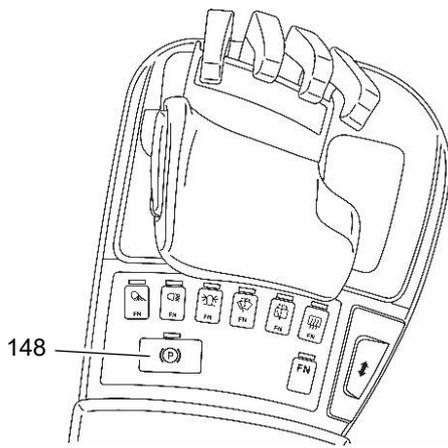
- Visually inspect the entire truck (in particular mud flaps, wheels, wheel bolts and load handler) for damage.
  - For pneumatic tyres (○): check the air pressure.
- Visually inspect the visible area of the hydraulic system for damage and leaks.
- Check that the load chains are evenly tensioned.
- Check the fork stop (146) and fork retaining mechanism (147).

→ Depending on the fork carriage, the fork arms are secured (147) with retaining bolts (85 Nm) or fixed stops.

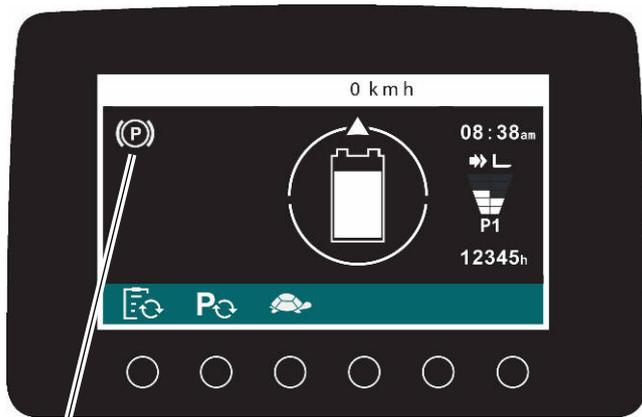
- Check the locking of the fork extension (○).
- Check the load damper hydraulic accumulator for damage (○).
- Visually inspect the battery attachment and cable connections.
- Check the battery latch is present and working.
- For trucks with lateral battery removal: Check stops (98) on the right and left of the battery compartment for damage.
- Visually inspect the antistatic strap (○) for integrity and cleanliness.
- Visually inspect the front window for cracks and other damage. Visually inspect the laminate (○) of the front window for cracks, cloudiness, discolouration and other damage. If damaged, the front window must be replaced immediately by the manufacturer's customer service department. The truck must not be used until it is repaired.
- Visually inspect the roof window and the adhesive bonding on the underside of the roof window for cracks and other damage. If damaged, the roof window must be replaced immediately by the manufacturer's customer service department. The truck must not be used until it is repaired.
- Visually inspect the other windows for cracks and other damage. Damaged windows must be replaced immediately by the manufacturer's customer service department. The truck must not be used until it is repaired.
- Check that the roof protective grille (○) is secure and check for damage.
- Check that the capacity plate and warning notices are legible, see page 48.
- Check the fluid level of the windscreen washing system (○), see page 334.
- Check that the emergency hammer (○) is present – see page 298.
- Check that the armrest and the steering wheel have been adjusted to the correct position.



- Check that the driver's seat has been adjusted to the correct position.
- Test the seat switch: When the driver's seat is vacated, it should not be possible to operate the working hydraulics.
- Test the controls and displays.
- Test the indicators (○).
- Test the lighting present (○) and additional equipment with lights (○).
- Test the horn, and where applicable, the reversing buzzer (○).
- Test all hydraulic functions (lift/lower, tilt, auxiliary functions, changeover functions, hydraulic functions requiring acknowledgement) and, if applicable, the attachment.
- Test the steering.
- Test the steer angle display: Turn the steering wheel in both directions as far as the stop and check that the wheel position is shown on the display unit.
- Check the seat belt, see page 150.
- Check the restraint system.
- Check the functionality of the restraint systems via the display unit.
  - Belt lock control symbol (see page 116) lights up when the belt is not locked.
  - Cabin door monitoring symbol (see page 116) lights up when the summer door (○), the swivelling gate (○) or the cabin door (○) is not closed properly.
- Check the accelerator pedal can move freely while the parking brake is applied (parking brake symbol (149) lit red) and the truck is idling, by pressing it several times.
- Test the service brake and parking brake button (148): Drive off carefully and test the effectiveness of the brake pedal, see page 166.
- Check the driveCONTROL (○):
  - Raise the fork carriage without load beyond the reference point on the mast. The slow travel symbol lights up in the display.
  - Slowly apply the accelerator pedal on a clear route with good visibility. The maximum speed should be restricted to walking pace (3 km/h).



- Version in accordance with Australian guidelines:
  - ZZ and DZ masts: Check that the travel speed is reduced to 3 km/h and limited as of the free lift.
  - ZT mast: Check that the travel speed is reduced to 3 km/h and limited from a lift height of 800 mm.



149

## 3.2 Entering or exiting

### **⚠ CAUTION!**

#### **Risk of accident due to slippery surfaces**

There is a risk of accident due to slipping when walking on slippery surfaces with unsuitable footwear.

- ▶ Wear safety shoes or sturdy footwear with non-slip soles.
- ▶ Use the non-slip step and the floor mat for entry and exit.
- ▶ Look out for snow and ice when boarding and alighting the truck in cold temperatures. There is a risk of slipping.

- Safety shoes, and where applicable additional personal protective equipment, must be worn for some activities.

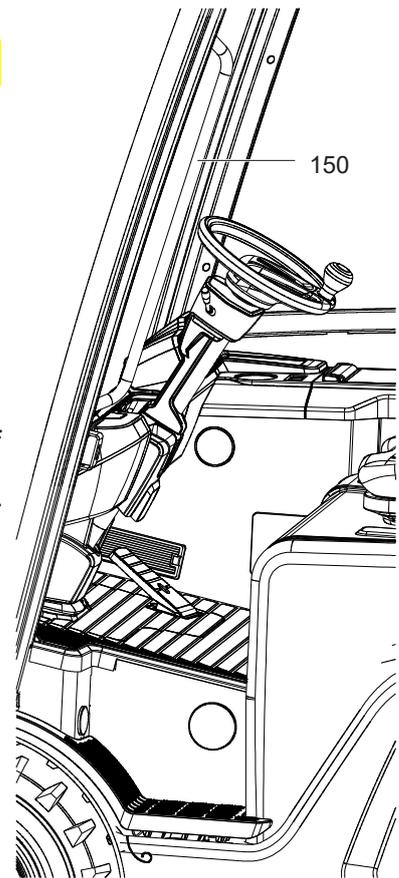
#### *Requirements*

- Truck stationary.

#### *Procedure*

- Cab door open (if applicable).
- To enter and exit, use the step and hold onto the handle (150) with one hand.
- Choose a third point of contact on the truck for support, e.g. a floor plate as an additional step, the battery panel, the driver's seat or the B-pillar.
- Always face the truck when entering and exiting.

- An additional step is provided for the driver position extension (○).



### 3.3 Trucks with reduced headroom (○)

#### **⚠ WARNING!**

#### **Health hazard due to non-adapted workplace or failure to meet the minimum headroom**

Failure to adapt the workplace or to meet the minimum headroom can cause stress and endanger the operator and may lead to lasting ill health due to an unhealthy posture and excessive strain on the operator.

The equipment of the industrial truck can influence the headroom. Trucks with reduced headroom are equipped with a warning notice within the operator's field of view.

There is an increased risk of head injury if the minimum headroom is not met.

- ▶ Always ensure a minimum headroom of 40 mm at the operator position when the seat is correctly adjusted.
  - ▶ Ensure the minimum headroom even when wearing a safety helmet.
  - ▶ The operating company must ensure that truck operators maintain the prescribed minimum headroom.
  - ▶ The operating company must check that each operator can sit in a normal and upright position without having to strain when the seat is adjusted.
- 



## 3.4 Setting up the operator position

### ⚠ WARNING!

#### Accidents can occur if the driver's seat, steering column and armrest are not engaged

The driver's seat, steering column and armrest can accidentally adjust during travel and therefore cannot be operated safely.

▶ Do not adjust the driver's seat, steering column or armrest while travelling.

#### Procedure

- Before starting to travel, adjust the driver's seat, steering column and armrest (if necessary) so that all the controls are within reach and can be applied without having to strain.
- Adjust the visibility aid equipment (mirrors, camera systems etc.) so that the working environment can be clearly seen.

### 3.4.1 Adjusting the driver's seat

### ⚠ WARNING!

#### Risk of accidents and damage to health

An incorrectly adjusted driver's seat can result in accidents and 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.
- ▶ Hold the weight setting lever only by the recess; do not reach through underneath the lever.

#### Adjusting the seat position

### ⚠ CAUTION!

#### An unsecured driver's seat can cause injury

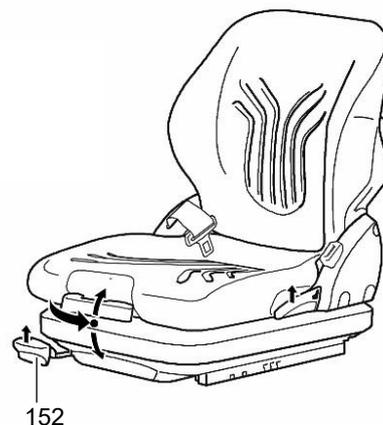
An unsecured driver's seat can slide out of its guide during travel, resulting in accidents.

- ▶ The driver's seat must be locked in position.
- ▶ Do not adjust the driver's seat while travelling.

#### Procedure

- Sit on the driver's seat.
- Pull up the driver's seat locking lever<sup>152</sup> 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 (152) in position.

*The seat position is now correctly set.*



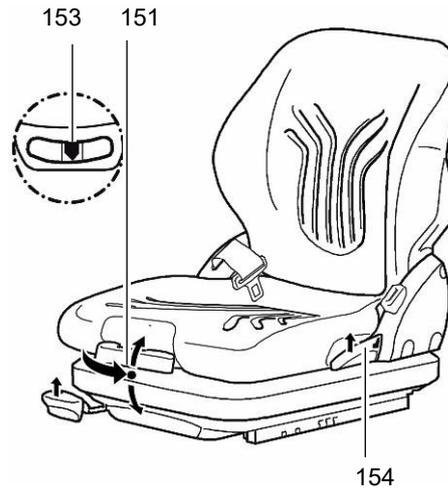
## Setting the driver's weight

### **⚠ 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 setting lever only by the recess; do not reach through underneath the lever.



#### *Procedure*

- Fold out the weight setting lever (151) as far as it will go in the direction of the arrow.
- Move the weight adjuster (151) up to set the seat to a higher weight.
- Move the weight adjuster (151) down to set the seat to a lower weight.

→ The driver's weight is set when the arrow is in the middle of the display window (153). The minimum or maximum weight setting is reached when you can feel a return stroke on the lever.

- After setting the weight, fold in the weight setting lever (151) completely.

*The driver's weight is now set.*

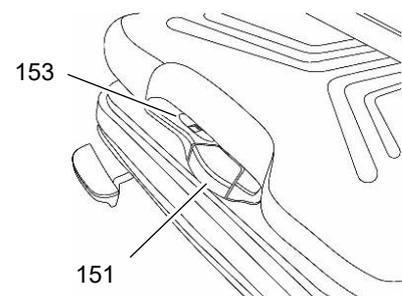
→ The seat is designed for an operator with a maximum body weight of 155 kg.

→ At least 40 mm of headroom must be maintained between the head and the roof structure when the seat is correctly adjusted.

#### **Driver's seat with pneumatic weight adjustment (MSG 75) (O)**

#### *Procedure*

- Pull the weight adjustment lever (151) up to set the seat to a higher weight.
- Push the weight adjustment lever (151) 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 (153).*

## Adjusting the backrest

### Procedure

- Sit on the driver's seat.
- Pull the lever (154) to adjust the backrest.
- Adjust the backrest tilt.
- Release the lever (154) again. The backrest is locked.

*The backrest is now set.*

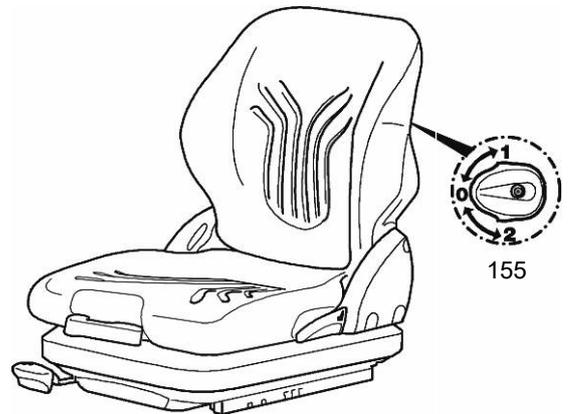


## Adjusting the lumbar support (○)

### Procedure

- Turn the hand wheel (155) to the required position.  
Position 0 = no warping in lumbar vertebrae area.  
Position 1 = increasing warping in upper lumbar vertebrae area.  
Position 2 = increasing warping in lower lumbar vertebrae area.

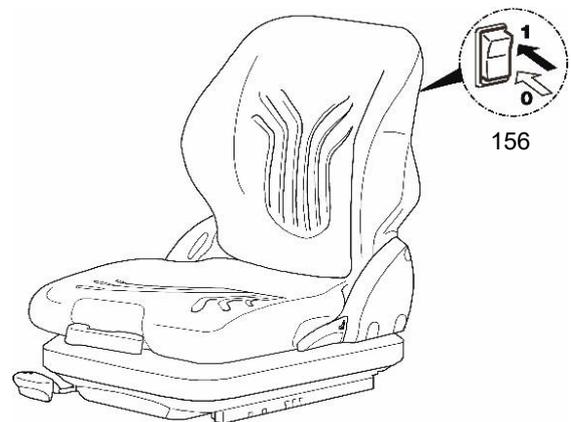
*The lumbar support is now set.*



## Switching the seat heating on and off (○)

### Procedure

- Press the seat heating switch (156).  
Switch setting 1 = Seat heating on.  
Switch setting 0 = Seat heating off.



## Adjusting the backrest extension (O)

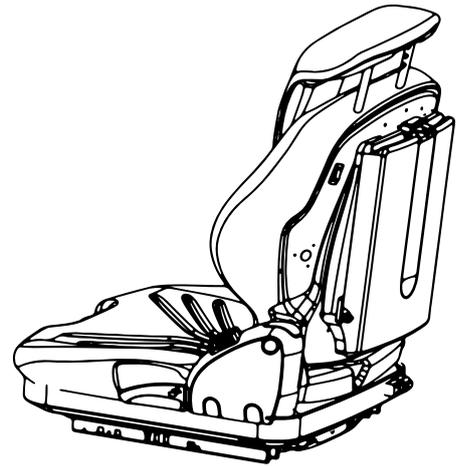
### ⚠ CAUTION!

#### Accident risk when adjusting the backrest during travel

- ▶ Do not adjust the backrest extension while travelling.

#### Procedure

- The backrest extension height can be adjusted by changing the detent.
- Pull the backrest up and lock it in place to extend the backrest.
- Push the backrest down and lock it in place to shorten the backrest.



## Adjusting the swivel seat (O)

### ⚠ CAUTION!

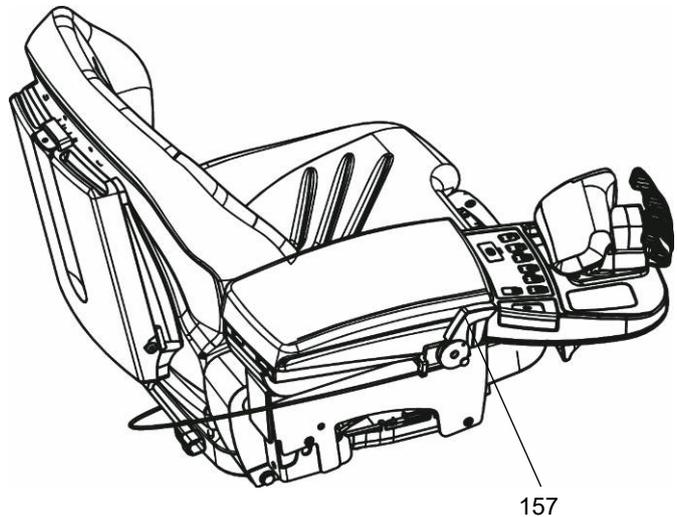
#### Accident risk when adjusting the swivel seat during travel

- ▶ Do not adjust the swivel seat while travelling.

#### Procedure

- Pull the locking lever (157) back while simultaneously turning the seat to the required position.
- Engage the lock.

The swivel seat is adjusted and locked in position.

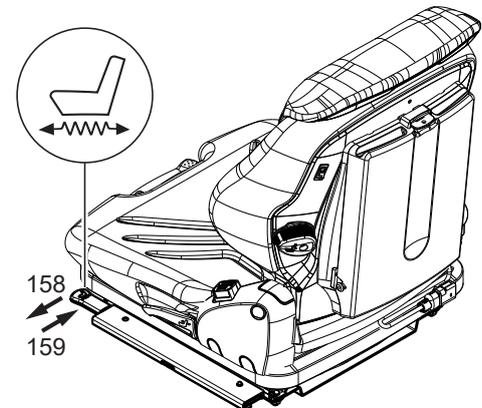


- ➔ Operate the truck only when the swivel seat is locked in position.

## Activating and deactivating the fore/aft suspension (O)

#### Procedure

- To activate the fore/aft suspension, pull the locking lever outwards in direction 158.
- To deactivate the fore/aft suspension, push the locking lever inwards in direction 159.



- ➔ At high speeds or on difficult terrain, the driver's seat is subjected to impact loads in the travel direction, which can be reduced by activating the fore/aft suspension.

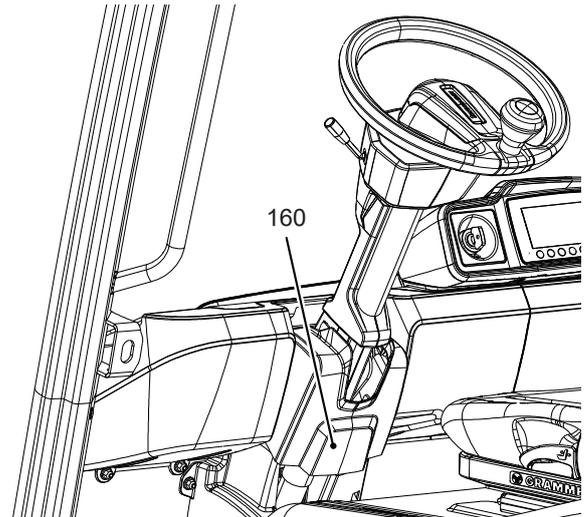
### 3.4.2 Adjusting the steering column

#### **Adjusting the steering column**

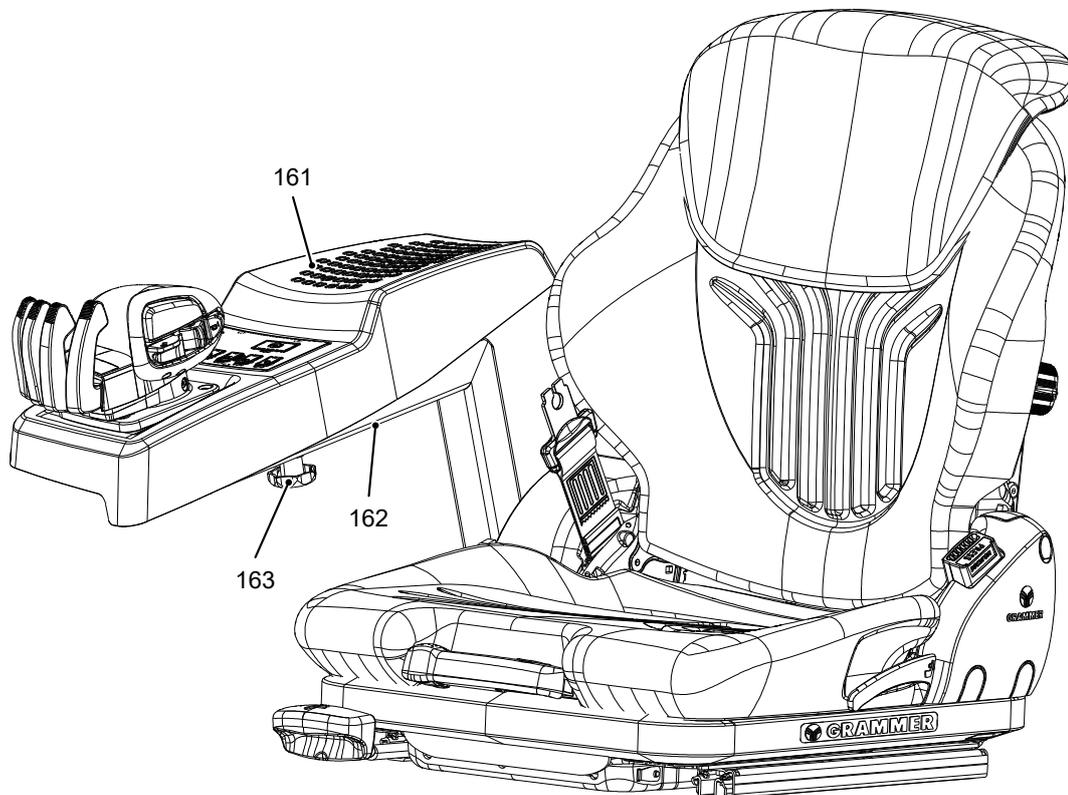
##### *Procedure*

- Release the steering column stop (160).
- Set the steering column to the required position (height and angle).
- Fix the steering column stop (160) in position.

*The steering column is now positioned.*



### 3.4.3 Adjusting the "Basic" Armrest



##### *Procedure*

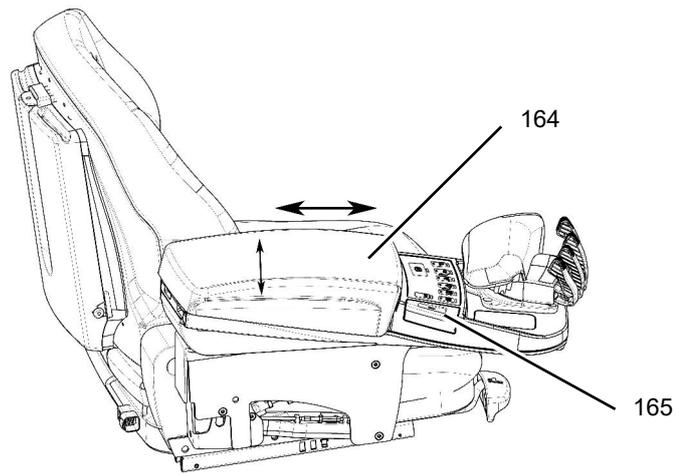
- Loosen the star knob screw (163) by about one turn.
- Slide the armrest (161) along the rail (162) to the desired position.

➔ The "Basic" armrest can be moved only along the rail (162).

- Hand-tighten the star knob screw (163).

*The armrest is now positioned.*

### 3.4.4 Adjusting the Multifunction Armrest

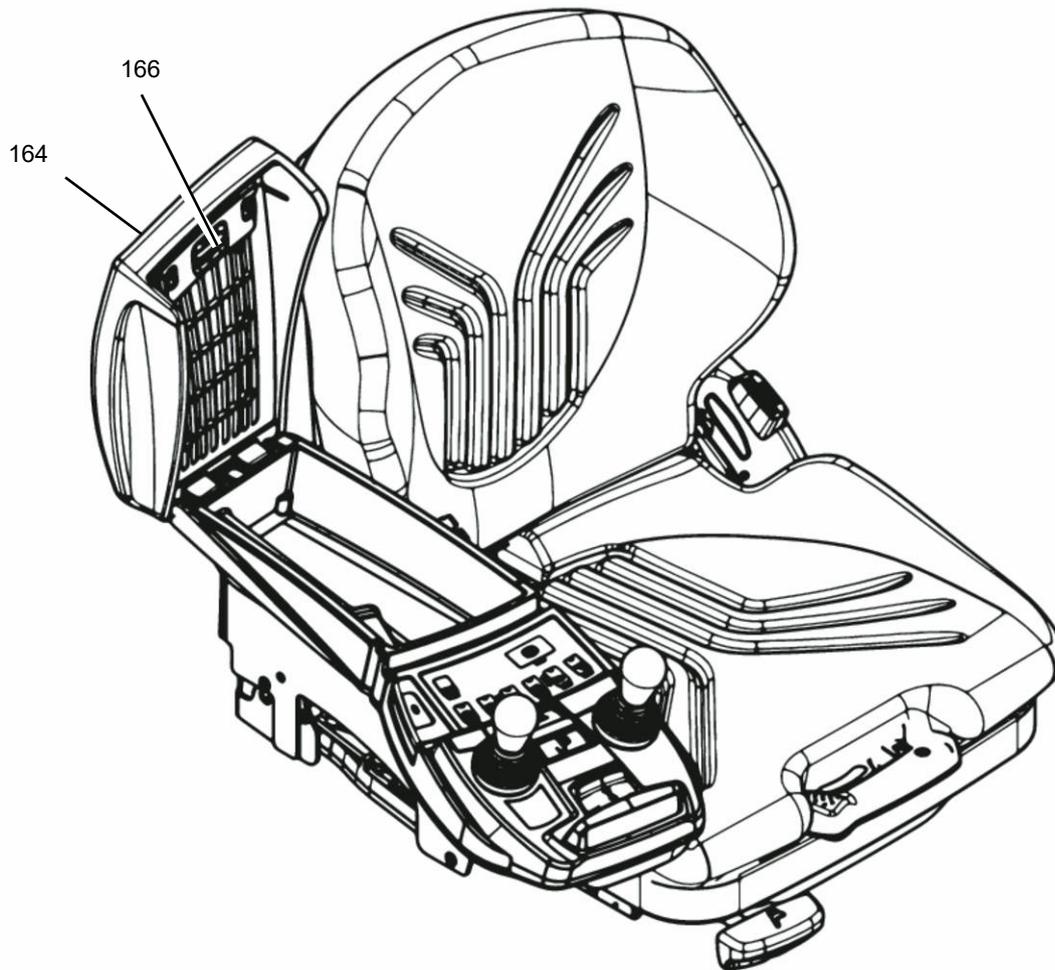


#### *Procedure*

- Press the lock (165) and hold it in this position.
- Move the armrest (164) vertically and horizontally.
- Release the lock (165) at the desired position.
- Push the armrest (164) slightly forward or back until it locks in position.

*The armrest is now positioned.*

### 3.4.5 Adjusting the armrest



#### ***Adjusting the armrest***

##### *Procedure*

- Fold up the armrest (164).
- Set the height adjuster (166) to the desired position (high/low).
- Fold the armrest (164) down.

### 3.5 Restraint systems

Approved restraint systems:

- Seat belt (see page 150)
- Cabin door (see page 230)
- Swivelling gate (see page 238)
- Summer door (see page 240)

At least one of these restraint systems is present and is monitored electrically. Further restraint systems with or without electrical monitoring may be present as options.

### 3.6 Seat Belt

#### **⚠ DANGER!**

##### **A faulty seat belt can cause injury**

Using a faulty seat belt can result in injury.

- ▶ Only operate the truck with the seat belt intact. A faulty seat belt should be replaced immediately.
- ▶ The truck must remain decommissioned until a functional seat belt has been fitted.

#### **⚠ 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.

#### **⚠ CAUTION!**

##### **Accident risk when opening the seat belt during travel**

If the seat belt is opened while driving, the truck automatically brakes to a maximum speed of 4 km/h.

- ▶ Do not open the seat belt while driving.



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

##### **Belt lock control system**

The truck is fitted with a belt lock control system. If the belt is not locked properly, the following may occur:

- The belt lock control symbol (see page 116) lights up in the display unit.
- The speed of the truck is restricted to 4 km/h.

## **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.*

## **What to do in hazardous situations**

If the truck is about to tip over, do not loosen the seat belt. The operator must not jump off the truck. The operator must lean his upper body over the steering wheel and hold on with both hands. Tilt your body in the opposite direction of the tipping.

## **Starting the industrial truck on steep slopes**

The automatic blocking system locks the belt in the retractor when the truck is positioned on a steep slope. This prevents the belt from being pulled out of the retractor.

→ Carefully drive the truck off the slope and then put on the belt.

## 4 Working with the truck

### 4.1 Safety regulations for travel mode

#### **⚠ WARNING!**

##### **Magnetic fields can cause accidents**

Electronic components can be affected or damaged by external magnetic fields. This can lead to malfunctions or accidents.

► Do not use or keep magnets or clamping magnets in the immediate vicinity of the controls.

---

##### **Travel routes 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.

The truck must only be operated in work areas with sufficient lighting to avoid danger to personnel and materials. Additional equipment is necessary to operate the truck in areas of insufficient lighting.

#### **⚠ DANGER!**

Do not exceed the permissible surface and point loading on the travel lanes.

At blind spots get a second person to assist.

The driver must ensure that the loading dock /dock leveller cannot be removed or come loose during loading/unloading.

---

#### **NOTICE**

Loads must not be deposited on travel or escape routes, in front of safety mechanisms or operating equipment that must be accessible at all times.

---

##### **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.

Do not use a mobile phone or walkie-talkie without a handsfree device while operating the truck.

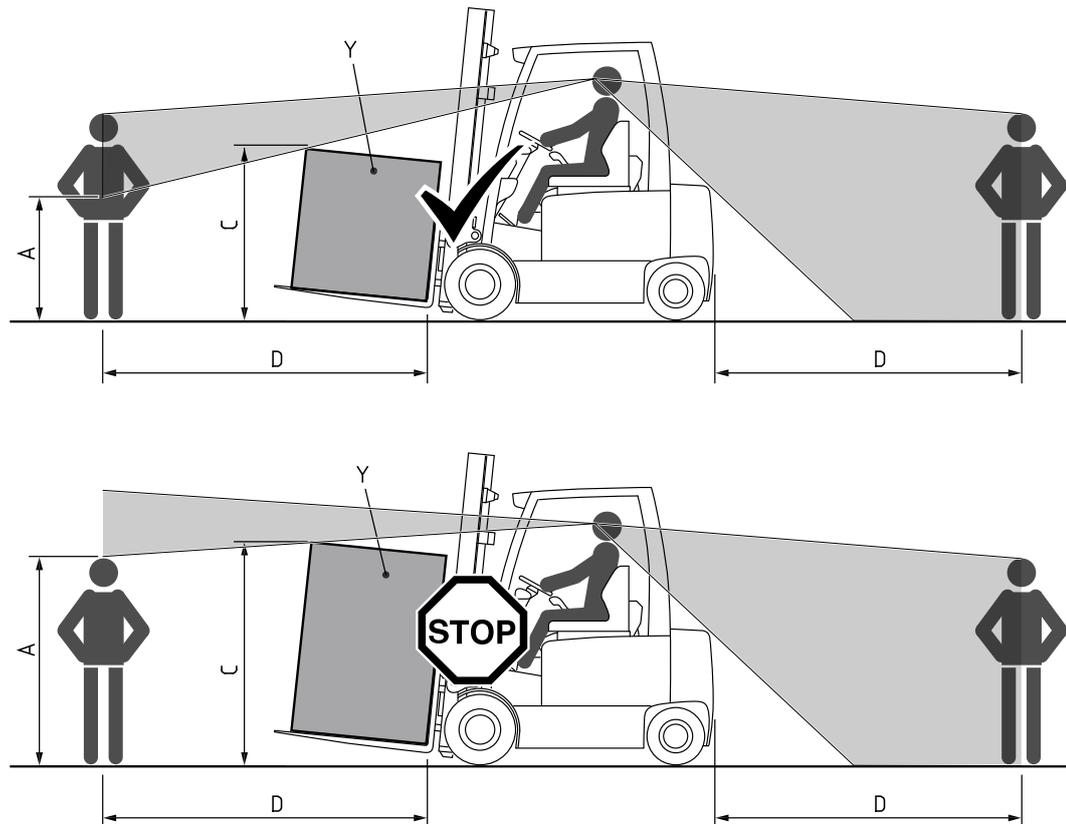
##### **What to do in hazardous situations**

If the truck is about to tip over, do not loosen the seat belt. The operator must not jump off the truck. The operator must lean his upper body over the steering wheel and hold on with both hands. Tilt your body in the opposite direction of the tipping.

##### **Travel visibility**

The operator must look in the direction of travel and must always have a clear view of the route ahead. If the truck is carrying loads that affect visibility, the truck must

travel against the load direction. If this is not possible, a second person must walk alongside the truck as a lookout to observe the travel route while maintaining eye contact with the operator. Proceed only at walking pace and with particular care. Stop the truck as soon as you lose eye contact.



- At a distance (D) of 4000 mm between the rear of the load (Y) and a person or obstacle, the non-visible area (A) must not be larger than 1085 mm. If the height (C) impairs visibility to the extent that A 1085 mm is exceeded, the truck must travel in the opposite direction to the load direction.

Depending on the operating conditions and application of the truck, the operating company or its representative is obligated to define a visible area which is appropriate to the prevailing hazard(s).

### Negotiating slopes and inclines

Negotiating slopes and inclines up to 15% 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 truck must always be driven with the load facing uphill. The industrial truck must not be turned, operated at an angle or parked on inclines and slopes. Inclines must only be negotiated at slow speed, with the driver ready to brake at any moment. Particular care is required when travelling near slopes and quay walls.

## **⚠ WARNING!**

### **Risk of accident due to the truck tipping over and the load slipping down**

Risk of accident due to the truck tipping over and the load slipping down when driving on a slope crosswise or diagonally or with the load not guided on the uphill side. There is a risk of crushing or impact for the operator and bystanders.

- ▶ Keep all persons out of the hazardous area during travel operations.
  - ▶ Instruct other people to move out of the hazardous area of the truck. Cease working with the truck immediately if people do not leave the hazardous area.
  - ▶ Travel at a reduced speed.
  - ▶ Do not drive across or at an angle when on a slope.
  - ▶ Drive up a slope with the load guided on the uphill side.
- 

## **⚠ WARNING!**

### **Danger of accidents due to regenerative braking fault**

Regenerative braking faults can result in extended stopping distances and accidents, particularly when travelling on inclines. Other persons can be injured in the truck's hazardous area.

- ▶ Keep all persons out of the hazardous area during travel operations.
  - ▶ Instruct other people to move out of the hazardous area of the truck. Stop using the truck immediately if people do not vacate the hazardous area.
  - ▶ The truck must travel carefully and not faster than crawl speed when the "Regenerative braking fault" warning notice appears on the display unit.
  - ▶ In emergencies, use the service brake via the brake pedal for braking.
- 

### **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 owner. 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.

### **Types of load to be carried**

The operator must make sure that the loads are in a satisfactory condition. Loads must always be positioned safely and carefully. Take appropriate countermeasures if there is a risk of the load or parts of the load tipping or falling down.

Prevent liquid loads from sloshing out. Drive slowly and take special care when transporting liquid loads. Avoid abrupt braking or acceleration.

Inflammable liquids (e.g. molten metal etc.) may only be transported with suitable auxiliary equipment. Contact the manufacturer's customer service department.



Safety instructions for the types of load to be carried with attachments – see page 174.

## **⚠ WARNING!**

### **Risk of injury from falling loads**

Incorrectly or inappropriately secured and applied loads can slip and fall during heavy braking or as a result of wind forces.

- ▶ Tilt the mast back when transporting loads.
  - ▶ Only transport loads that have been correctly secured and positioned. Take suitable additional precautions to prevent parts of the load from tipping or falling down.
  - ▶ Secure loads containing small items, e.g. by wrapping them in film.
  - ▶ During travel, you must only brake forcefully in an emergency.
  - ▶ If necessary, stop operation.
- 

## **⚠ WARNING!**

### **Accident risk when transporting liquid loads**

The following hazards can arise when transporting liquid loads:

- Liquids sloshing out.
  - A change in the load centre due to sudden lifting and travel movements and the load falling down as a result.
- ▶ Store liquid loads in sealed containers to prevent them from sloshing out.
- 

### **Work platforms**

## **⚠ WARNING!**

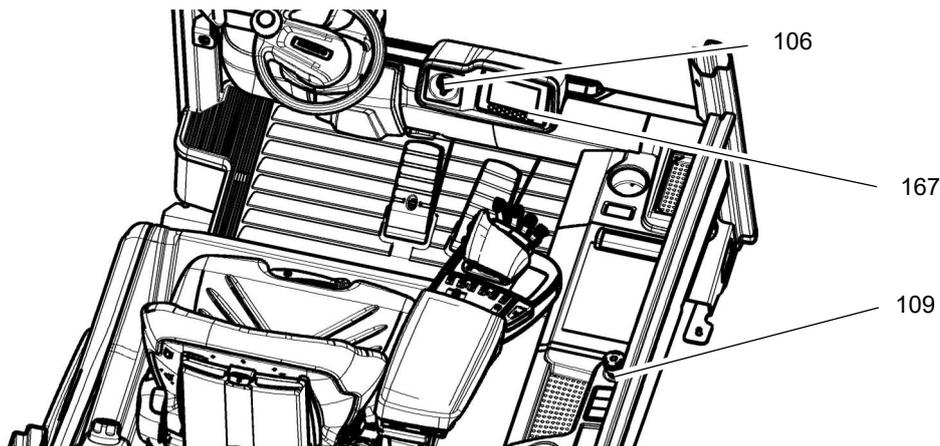
The use of working platforms is governed by national law. In some states the use of working platforms is prohibited on industrial trucks. Observe the applicable law. Working platforms can only be used in the country of application if the law permits it.

- ▶ Contact the national authorities before using a working platform.
- 

### **Towing trailers**

Only use the truck for towing lightweight trailers internally, see page 207.

## 4.2 Preparing the truck for operation



→ The truck may only be operated from the driver's seat.

### **Switching on the truck**

#### *Requirements*

– Checks and operations before starting daily work completed, see page 137.

#### *Procedure*

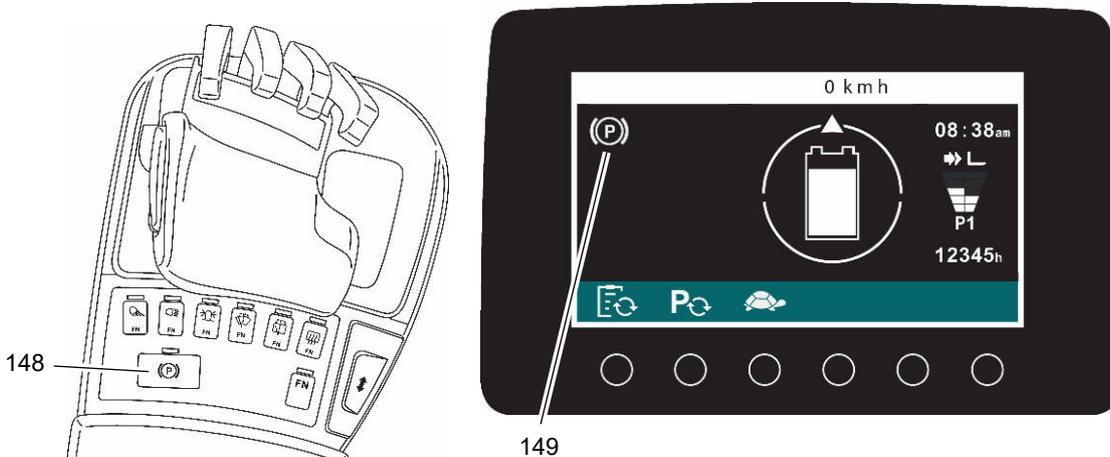
- Activate the lithium-ion battery – see page 157.
- Turn the rotary knob to unlock the emergency disconnect switch (109) – see page 159.
- Insert the key in the key switch (106) and turn it clockwise as far as it will go to the "I" position.

→ Keyless access systems (○) – see page 210.

→ The truck performs a self-test for several seconds (tests the control devices, motors and parking brake). During this time, no travel movements or hydraulic functions are possible. If controls for travel movements or hydraulic functions are actuated, an information message appears on the display unit.

- Test the brake pedal and parking brake (148 and 149 light up simultaneously).

*The truck is ready for use. The display unit shows the remaining battery capacity.*



### 4.3 Activating the lithium-ion battery (○)

A preset time after actuating the emergency disconnect switch and to protect against deep discharge and malfunctions, the lithium-ion battery deactivates and switches to energy-saving mode.

To activate the sufficiently charged lithium-ion battery back into normal operation, actuate the battery activation button on the control panel or actuate the battery activation button on the battery tray (depending on equipment).

An insufficiently charged, deactivated lithium-ion battery must be sufficiently charged before it can be activated and used for trouble-free operation of the industrial truck.

#### **Activating the lithium-ion battery**

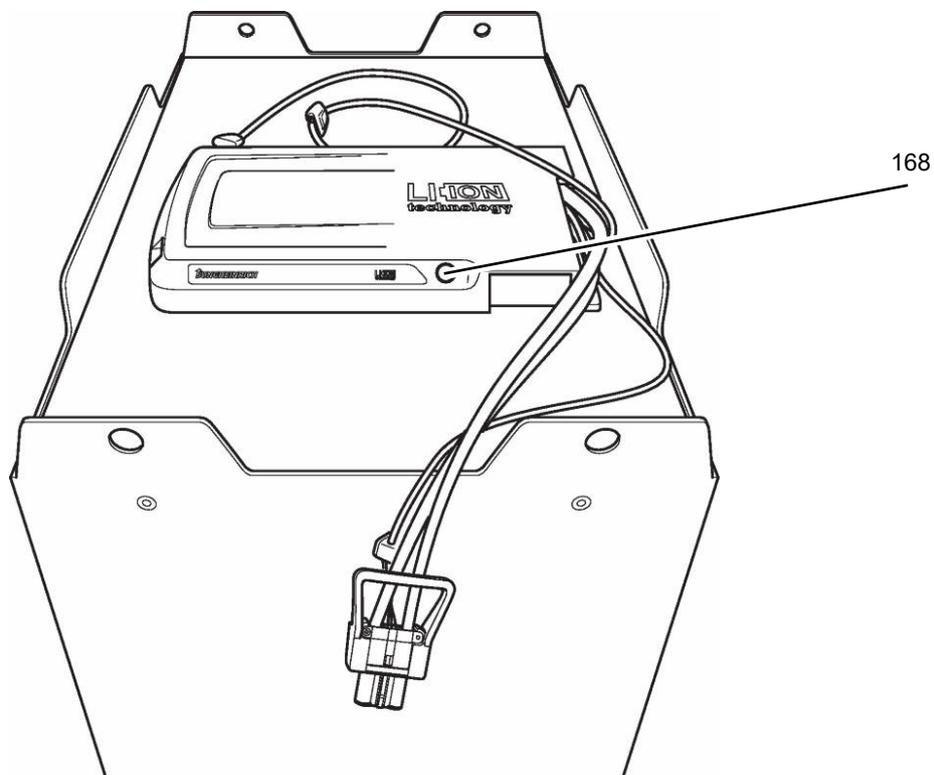
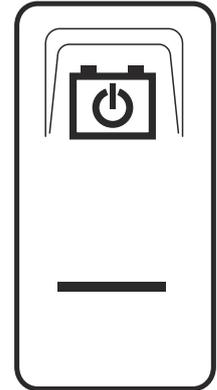
##### *Requirements*

- Key switch set to OFF.
- Key removed.
- Emergency disconnect switch actuated.

##### *Procedure*

- If present, hold down the battery activation button on the control panel for approx. 3 seconds.
- Otherwise, open the battery door as far as it will go, press the battery activation button (168) on the battery tray and close the battery door again.

*The lithium-ion battery is activated.*



## 4.4 Parking the truck securely

### **⚠ WARNING!**

#### **An unsecured truck can cause accidents**

Parking the truck on an incline, without the brakes applied or with a raised load / load handler 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.
- ▶ Always fully lower the mast and load handler.
- ▶ Tilt the mast forward.
- ▶ Always apply the parking brake button before parking the truck.
- ▶ Choose a place to park where no other people are at risk of injury from lowering forks.
- ▶ Do not park and abandon a truck on an incline.

#### ***Park the truck securely (with the parking brake button)***

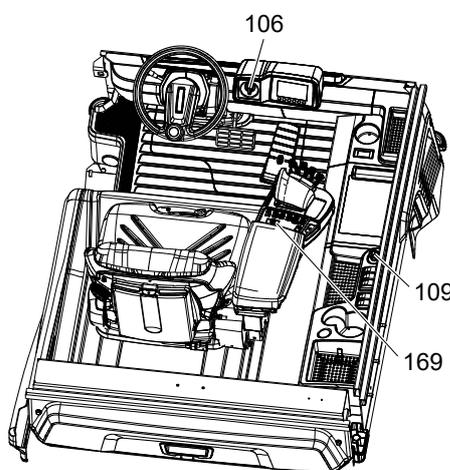
##### *Procedure*

- Lower the load handler.
- Tilt the mast forward.
- Press the parking brake button (169).
- Turn the key in the key switch (106) to the "0" position.

➔ Keyless access systems (○) – see page 210.

- Remove the key from the key switch (106). Prevent unauthorised use.
- Press the emergency disconnect switch (109) down.

*Truck is parked securely.*



## 4.5 Emergency Disconnect

### **⚠ CAUTION!**

#### **Applying maximum braking can result in accidents**

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 load handler. There is a higher risk of accidents and injury.

- ▶ Do not use the Emergency Disconnect switch as a service brake.
  - ▶ Use the Emergency Disconnect switch during travel only in emergencies.
- 

### **⚠ 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 operation of 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 defective truck and take out of service.
  - ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
- 

- A preset time after actuating the emergency disconnect switch, the lithium-ion battery deactivates and switches to energy-saving mode.  
To activate the sufficiently charged lithium-ion battery back into normal operation, actuate the battery activation button – see page 157.

#### ***Operating the emergency disconnect switch***

##### *Procedure*

- Press the emergency disconnect switch (109).

*All electrical travel, steering and hydraulic functions are cut out. The mechanical multi-plate brake engages and brakes the truck to a stop.*

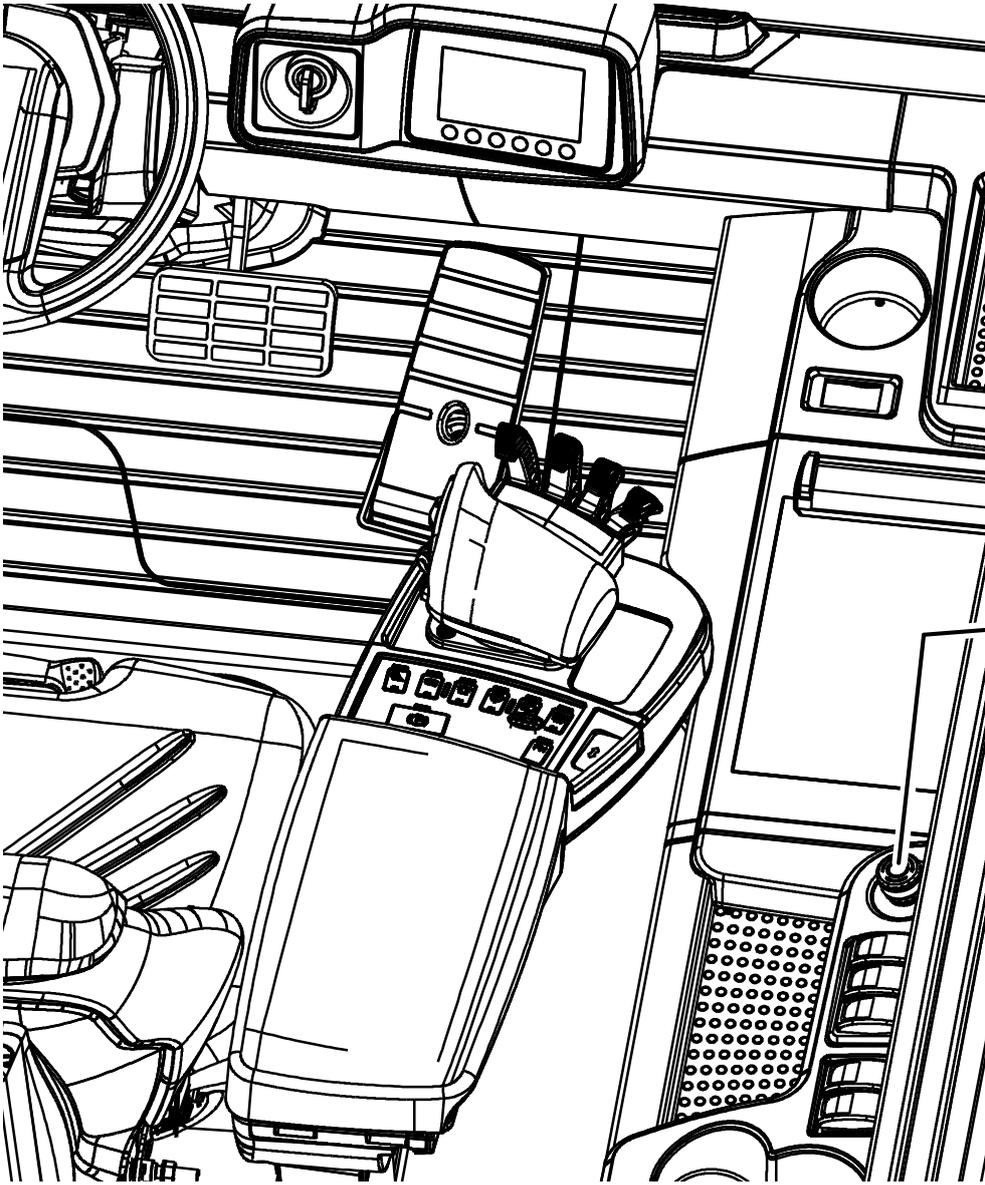
- When the emergency disconnect switch is operated, the power supplies are largely switched off.

#### ***Unlocking the emergency disconnect switch***

##### *Procedure*

- Pull the rotary knob or turn it clockwise until the emergency disconnect switch (109) is unlocked.

*All electrical functions are switched on, the industrial truck is ready for operation again.*



109

## 4.6 Travel

### **WARNING!**

#### **Risk of accident and personal injury due to incorrect travel and loss of operational stability**

Incorrect travel can lead to the truck tipping over and accidents, as well as personal injury.

A laden or unladen industrial truck can tip over if the operator does not decelerate to a safe speed before a bend. Tyre slip, side tilt or lifting of a wheel indicate that an industrial truck was traveling too fast on a bend.

Equipment and mast version can influence the centre of gravity and operational stability.

- ▶ Do not exceed permissible loads and load centre distances.
- ▶ Drive the truck around bends carefully and at an appropriate speed.
- ▶ Do not make any sudden or jerky steering movements.
- ▶ Avoid heavy braking or acceleration.
- ▶ Avoid cornering when stacking and retrieving.

### **WARNING!**

#### **Improper travel can result in accidents**

- ▶ Do not get up from the driver's seat during travel.
- ▶ Do not drive the truck unless you are wearing a seat belt and the panels and doors are properly locked.
- ▶ Do not lean out of the truck while travelling.
- ▶ Make sure that the travel area is clear.
- ▶ Adapt your travel speed to the route conditions in the work area and the load.
- ▶ Tilt the mast back and raise the fork carriage approx. 200 mm.
- ▶ Make sure you have sufficient visibility when reversing.

#### **Depiction of travel direction on the display unit**

The engaged travel direction and the direction of current travel are shown on the display unit, see page 114.

-  Only when equipped with display unit with 4-inch display

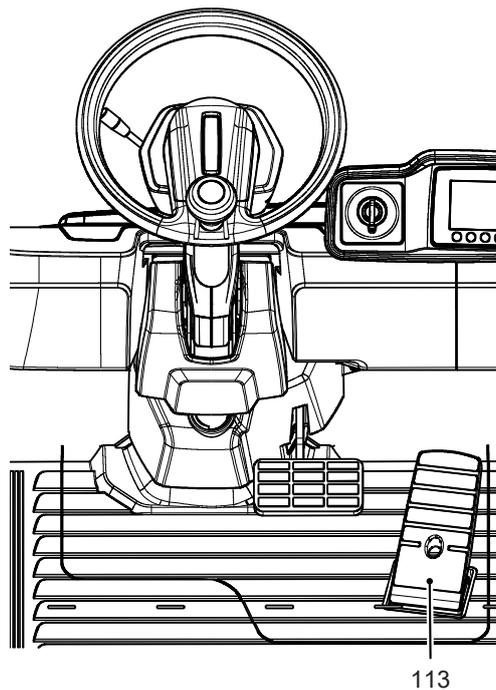
## 4.6.1 Single pedal

### Requirements

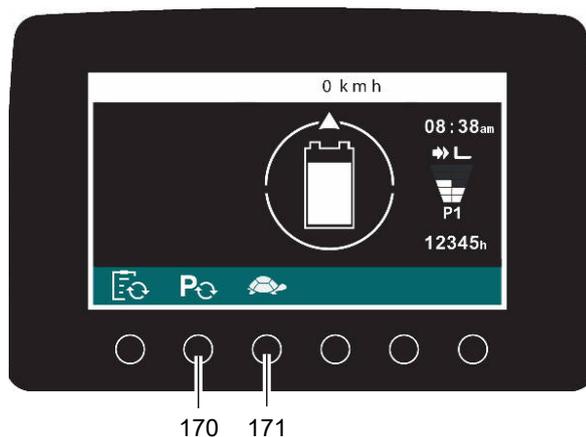
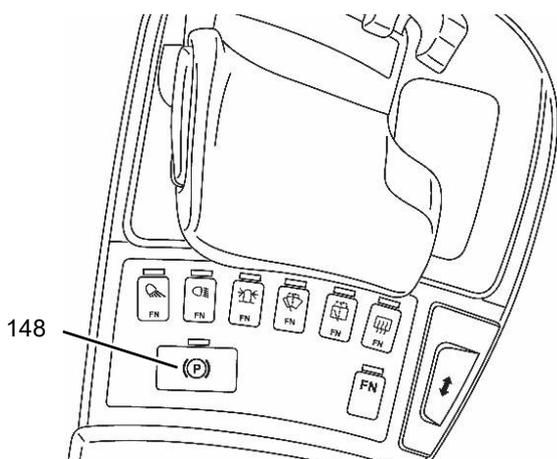
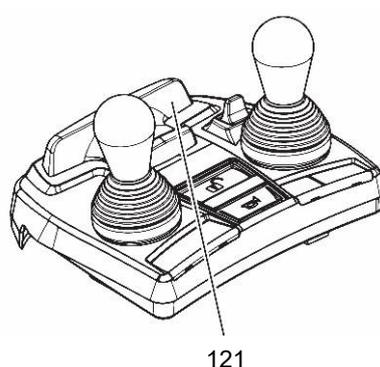
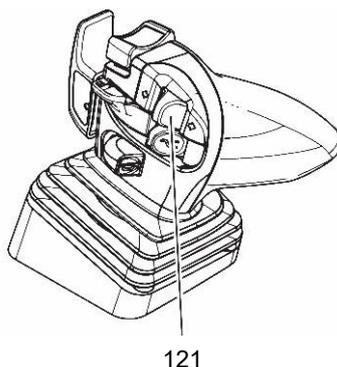
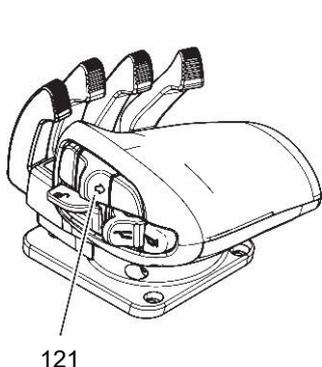
- Truck prepared for operation, see page 156.

### Procedure

- Release the parking brake, to do this press the parking brake button (148).
- Move the travel direction switch (121) from the neutral position into the desired travel direction.
- Select the travel speed if necessary; to do this, press the slow travel button (171) or the program selector (170).
- Raise the load handler approx. 200 mm.
- Tilt the mast back.
- Apply the accelerator pedal (113). The travel speed is governed by the accelerator pedal (113).



*The truck travels in the selected travel direction.*



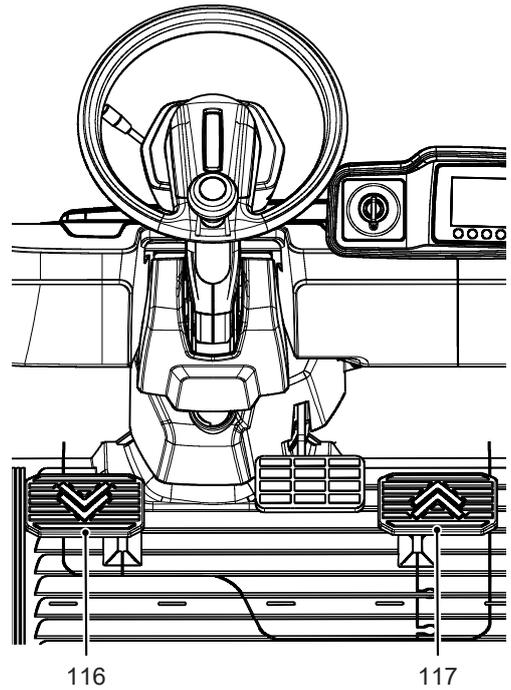
## 4.6.2 Twin pedal (○)

### Requirements

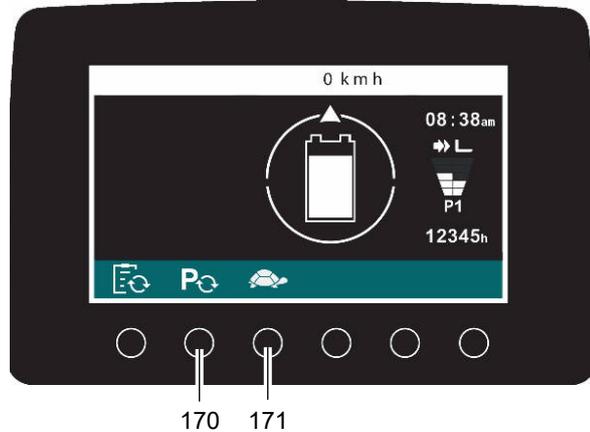
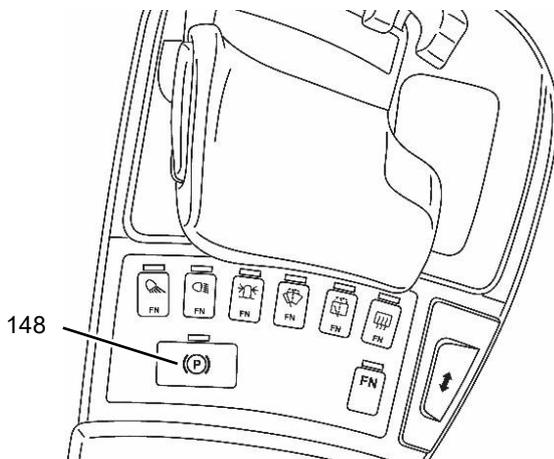
- Truck prepared for operation, see page 156

### Procedure

- For trucks with a twin pedal, the travel direction is selected via the accelerator pedals (117;116). When the driver leaves the truck, the truck is automatically set to "Neutral".
- Release the parking brake; to do this, actuate the parking brake button (148).
  - Raise the load handler approx. 200 mm.
  - Tilt the mast back.
  - Select the travel speed if necessary; to do this, press the slow travel button (171) or the program selector (170).
  - Apply the accelerator pedal (117) for forward travel. The travel speed is governed by the accelerator pedal (117).
  - Apply the accelerator pedal (116) for reverse travel. The travel speed is governed by the accelerator pedal (116).



*The truck travels in the travel direction selected.*



### 4.6.3 Changing the direction of travel

#### **⚠ CAUTION!**

#### **Danger when changing direction during travel**

Changing direction during travel can result in the truck travelling too quickly in the opposite direction if the operator does not take his foot of the accelerator pedal in time. Changing direction during travel causes the truck to decelerate sharply.

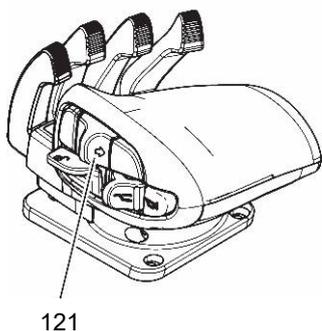
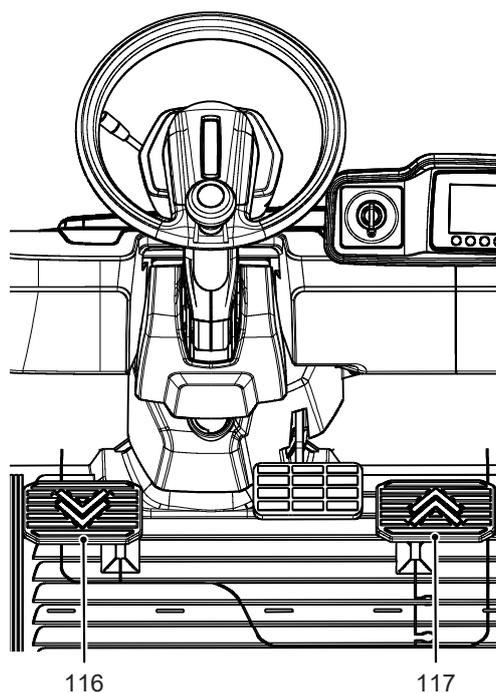
- ▶ When the truck starts to move in the opposite direction, only depress the accelerator pedal lightly or not at all.
- ▶ Do not make any abrupt steering movements.
- ▶ Look in the direction of travel.
- ▶ Have an adequate overview of the route to be travelled.

#### **Changing direction during travel**

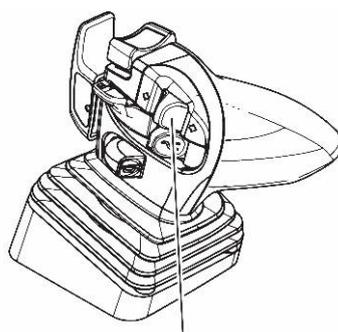
##### *Procedure*

- Set the travel-direction switch (121) to the opposite direction while travelling.
- For the twin pedal version, apply the accelerator pedal in the opposite direction to the travel direction (116 or 117).

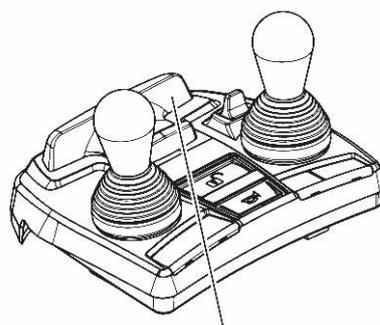
*The truck decelerates until it starts to travel in the opposite direction.*



121



121



121

## 4.7 Steering

### **⚠ WARNING!**

#### **Risk of accident and personal injury due to incorrect travel and loss of operational stability**

Incorrect travel can lead to the truck tipping over and accidents, as well as personal injury.

A laden or unladen industrial truck can tip over if the operator does not decelerate to a safe speed before a bend. Tyre slip, side tilt or lifting of a wheel indicate that an industrial truck was traveling too fast on a bend.

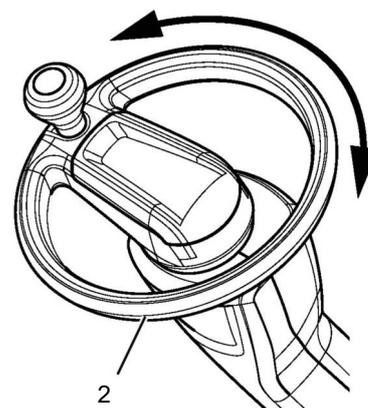
Equipment and mast version can influence the centre of gravity and operational stability.

- ▶ Do not exceed permissible loads and load centre distances.
- ▶ Drive the truck around bends carefully and at an appropriate speed.
- ▶ Do not make any sudden or jerky steering movements.
- ▶ Avoid heavy braking or acceleration.
- ▶ Avoid cornering when stacking and retrieving.

### **Steering**

#### *Procedure*

- ➔ Very little steering effort is required; you should therefore turn the steering wheel (2) sensitively.
- To negotiate a right-hand bend: Turn the steering wheel clockwise according to the required steering radius.
- To negotiate a left-hand bend: Turn the steering wheel anti-clockwise according to the required steering radius.



*The truck travels in the direction selected.*

### **Steer angle display on the display unit**

The current wheel position is shown on the display unit, see page 114.

- ➔ Only when equipped with display unit with 4-inch display

## 4.8 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.
  - ▶ In an emergency, operate the brake pedal with maximum force to initiate heavy braking.
- 

### **⚠ WARNING!**

#### **Danger of accidents due to regenerative braking fault**

Regenerative braking faults can result in extended stopping distances and accidents, particularly when travelling on inclines. Other persons can be injured in the truck's hazardous area.

- ▶ Keep all persons out of the hazardous area during travel operations.
  - ▶ Instruct other people to move out of the hazardous area of the truck. Stop using the truck immediately if people do not vacate the hazardous area.
  - ▶ The truck must travel carefully and not faster than crawl speed when the "Regenerative braking fault" warning notice appears on the display unit.
  - ▶ In emergencies, use the service brake via the brake pedal for braking.
- 

### **⚠ WARNING!**

#### **Risk of injury from falling loads**

Incorrectly or inappropriately secured and applied loads can slip and fall during heavy braking.

- ▶ Tilt the mast back when transporting loads.
  - ▶ Only carry loads that have been correctly secured and positioned. Take suitable additional precautions to prevent parts of the load from tipping or falling down.
  - ▶ Secure loads containing small items, e.g. by wrapping them in film.
  - ▶ During travel, you must only brake forcefully in an emergency.
- 

There are multiple ways of braking the truck:

- Braking in travel mode with the coasting brake (releasing the accelerator pedal)
- Braking in travel mode with the service brake (brake pedal)
- Activating the parking brake to park the truck securely
- Temporary braking via the automatic parking brake when stopped

After switch-on, an automatic test of the mechanical multi-plate brake takes place before travel release. If any event messages appear, contact the manufacturer's customer service department.

In the event of brake malfunctions, decommission the industrial truck and secure it with wedges to prevent it from rolling away unintentionally.

## 4.8.1 Braking with the coasting brake

### **⚠ WARNING!**

Immediately after the battery has been charged the brake power of the coasting brake may reduce of their own accord after long periods of application, e.g. ramp operation.

- ▶ The operator must instruct people to leave the hazardous area.
- ▶ The operator must perform test braking.

In travel mode, regenerative braking occurs when the accelerator pedal is released. Braking occurs in line with the operating program.

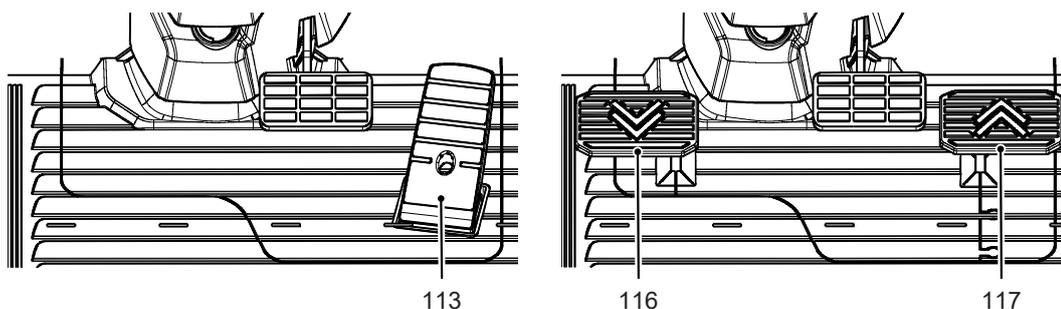
- ➔ If the truck reaches a standstill, the automatic parking brake is applied after a preset time.

### ***Braking with the coasting brake***

#### *Procedure*

- Take your foot off the applied accelerator pedal (113, 116, 117).

*The truck brakes.*



## 4.8.2 Braking with the Service Brake

When the brake pedal is actuated, the mechanical multi-plate brake is activated and regenerative braking also takes place.

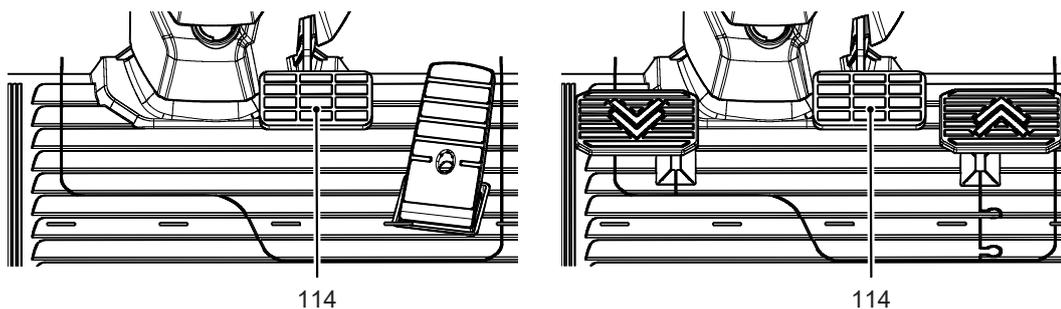
- If the truck reaches a standstill, the automatic parking brake is applied after a preset time.

### ***Braking the truck with the brake pedal***

#### *Procedure*

- Operate the brake pedal (114) according to the required level of braking.

*The truck decelerates depending on the brake pedal position.*



### 4.8.3 Parking brake

#### **DANGER!**

##### **Risk of accident**

On a clean floor surface, the parking brake will hold the truck with the permissible maximum load on inclines or slopes of up to 15 %.

Do not park and abandon the truck on an incline or slope.

Applying the parking brake during travel will cause the truck to brake to a halt in a controlled manner. This may cause the load to slide off the fork arms. There is a greater risk of accidents and injury.

- ▶ Do not drive on inclines or slopes of more than 15 %.
  - ▶ Always park the truck on a level surface.
  - ▶ Do not use the parking brake instead of the service brake.
- 

##### **Parking brake**

When the parking brake is activated, the status lamp above the parking brake button (148) and the red symbol for the parking brake (149) light up. Travel is disabled. The stationary truck is secured against rolling away and is in a secure position. If the accelerator pedal is actuated, the parking brake remains activated and the truck does not accelerate.

- The parking brake activates when you switch on the truck.
- Applying the parking brake during travel will cause the truck to brake to a halt in a controlled manner.

##### ***Applying the parking brake***

###### *Procedure*

- Press the parking brake button (148).

- The status lamp above the parking brake button (148) lights up and the red symbol for the parking brake (149) is displayed.
- Travel is disabled.

*Parking brake is activated.*

##### ***Deactivating the parking brake***

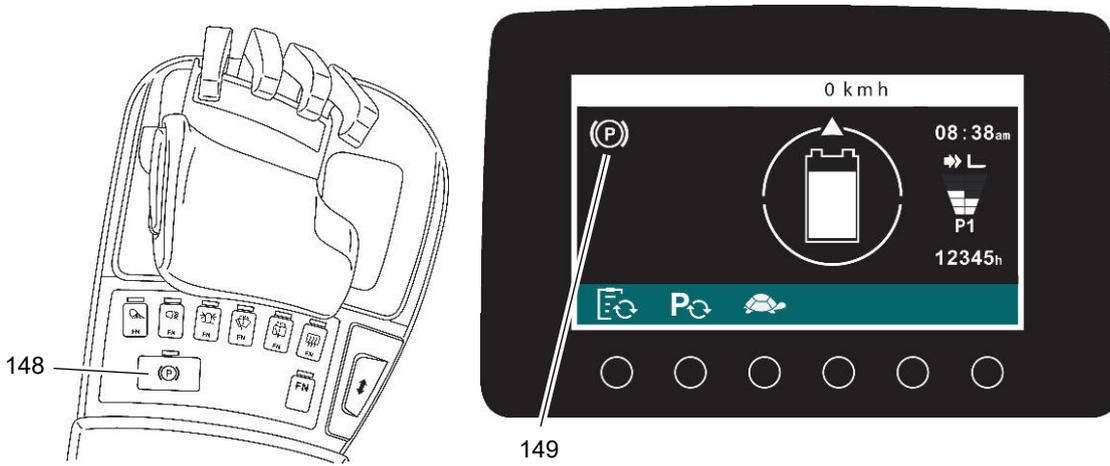
###### *Requirements*

- Parking brake activated.

###### *Procedure*

- Press the parking brake button (148).
- The status lamp above the parking brake button (148) and the red symbol for the parking brake (149) go out.
- Travel is enabled.

*Parking brake is deactivated.*



#### 4.8.4 Automatic parking brake

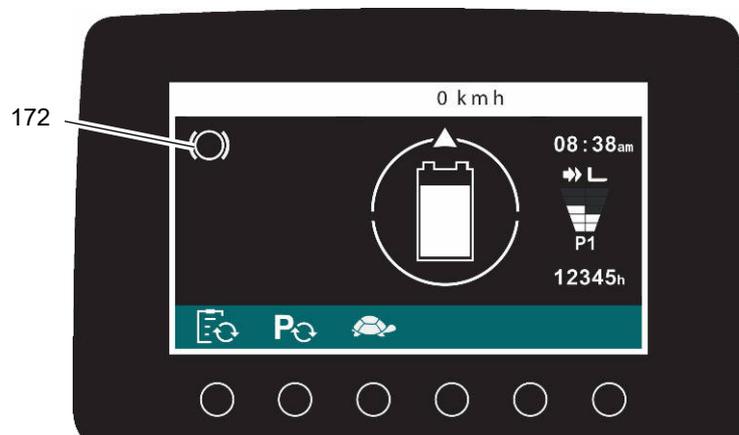
The automatic parking brake is a comfort function. The truck is prevented from rolling away but not parked securely.

The automatic parking brake is automatically activated a preset time (0 to 60 sec) after the truck stops. The factory setting is 30 sec.

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

When the automatic parking brake is activated, the green symbol for the automatic parking brake (172) lights up.

Applying the accelerator pedal releases the automatic parking brake. The green symbol for the automatic parking brake (172) goes out and the truck accelerates.



## 4.9 Adjusting the forks

### **⚠ WARNING!**

#### **Trapping hazard**

There is a trapping hazard when you perform this operation.

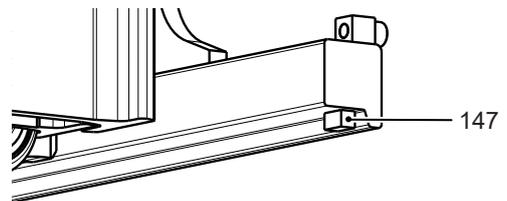
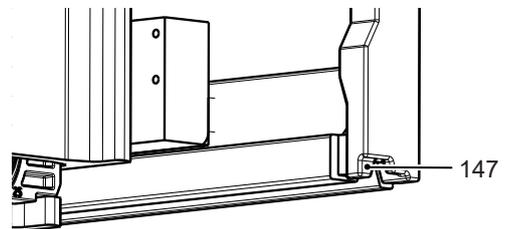
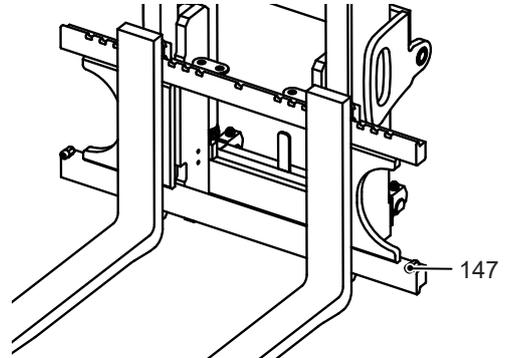
- ▶ Wear work gloves and safety shoes.

### **⚠ WARNING!**

#### **Unsecured and incorrectly adjusted forks can cause accidents**

Make sure that the fork retaining mechanisms (147) are fitted before adjusting the forks. Depending on the fork carriage, the fork-retaining mechanism (147) will be either via retaining bolts (85 Nm) or fixed stops.

- ▶ Adjust both forks so that they are equidistant from the outside edges of the fork carriage.
- ▶ Engage the locking pin in a groove to prevent the forks from moving accidentally.
- ▶ The load centre must lie centrally between the forks.



### **⚠ WARNING!**

#### **Risk of accidents when picking up long loads from the side**

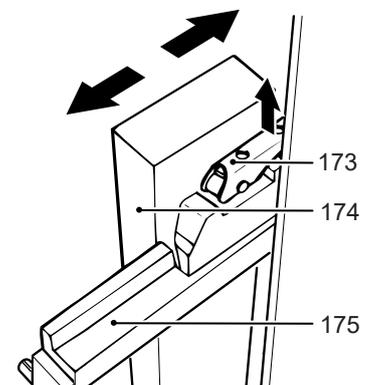
The inertia of the load changes the stability of the truck, which can cause loads to fall off the fork arms.

- ▶ Adapt the travel speed to the situation.
- ▶ Set the fork arms as far apart as possible.

#### **Adjusting the forks**

##### *Requirements*

- Park the truck securely, see page 158.



### *Procedure*

- Lift up the locking lever (173).
  - Push the forks (174) into the correct position on the fork carriage (175).
- ☞ To lift the load securely, the forks (174) must be spread as far apart as possible and positioned centrally with respect to the fork carriage. The load centre must lie centrally between the forks (174).
- Push the locking lever down (173) and move the forks until the locking pin engages in a slot.

*The forks are now adjusted.*

## 4.10 Replacing the forks

### **⚠ WARNING!**

#### **Risk of injury due to unsecured fork arms**

There is a risk of injury and trapping when replacing the fork arms.

- ▶ Wear work gloves and safety shoes.
- ▶ Ensure that the fork arms have sufficient capacity.
- ▶ Never pull the fork arms towards your body.
- ▶ Always push the fork arms away from your body.
- ▶ Secure heavy fork arms with lifting accessories and a crane before pushing them down from the fork carriage.
- ▶ After replacing the fork arms, fit the retaining bolts (147) and make sure that the bolts are seated correctly.
- ▶ Retaining bolt torque: 85 Nm.

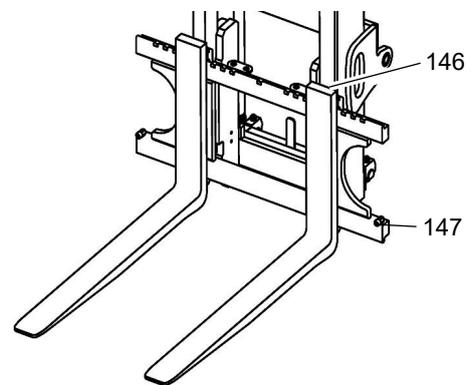
#### ***Replacing the forks (fork carriages with retaining bolts)***

##### *Requirements*

- Load handler lowered and fork tines not touching the ground.

##### *Procedure*

- Disassemble the retaining bolts (147).
- Loosen the fork stop (146).
- Carefully push the fork tines off the fork carriage.



*The fork tines are now dismantled from the fork carriage and can be replaced.*

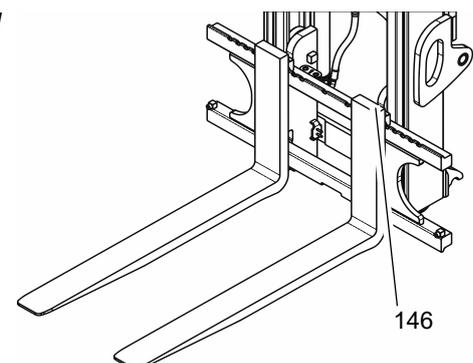
#### ***Replacing the forks (fork carriages with fixed stops)***

##### *Requirements*

- Load handler lowered and forks not touching the ground.

##### *Procedure*

- Loosen the fork stop (146).
- Carefully push the forks over the recess on the lower cross beam of the fork carriage.
- Raise the fork tips and lift them out of the top guide.



*The fork tines are now dismantled from the fork carriage and can be replaced.*

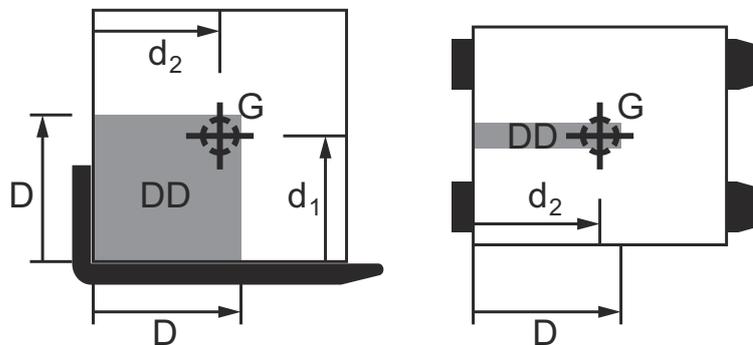
## 4.11 Lifting, transporting and depositing loads

### ⚠ WARNING!

#### Risk of accident when the load centre is outside the load centre distance

If the centre of gravity  $G$  of a raised load lies outside the load centre distance  $D$  specified for the load handler in the horizontal or vertical planes, under unfavourable conditions the raised load and also the truck can tip over while working.

- ▶ Observe load centre distances and capacities of the load handler, see page 55.
- ▶ Pick up the load so that its centre of gravity lies between the load arms of the load handler.
- ▶ Arrange and pick up the load so that the load centre lies within the load centre distance of the load handler ( $d_1 \leq D$  and  $d_2 \leq D$ , see area  $DD$  in the illustration).
- ▶ Do not pick up a load with a load centre outside the load centre distance of the load handler ( $d_1 > D$  and/or  $d_2 > D$ ), as this load case has not been checked on a truck tested according to the test guideline.



For loads with an even weight distribution, the load centre distance lies in the geometric centre of the volume.

For rectangular loads with an even weight distribution over the entire volume the load centre distance is in the middle, i.e. half the length, half the height and half the width of the load.

### ⚠ WARNING!

#### Unsecured and incorrectly positioned loads can cause accidents

Before lifting a load, the operator must make sure that it has been correctly palletised and does not exceed the truck's capacity.

- ▶ Instruct other people to move out of the hazardous area of the truck. Stop working with the truck if people do not leave the hazardous area.
- ▶ Only carry loads that have been correctly secured and positioned. Use suitable precautions to prevent parts of the load from tipping or falling down.
- ▶ Do not transport loads other than on the authorised load handler.
- ▶ Damaged loads must not be transported.
- ▶ If the stacked load obscures forward visibility, then you must reverse the truck.
- ▶ Do not exceed the maximum loads specified on the capacity plate.
- ▶ Check the fork spread before lifting the load and adjust if necessary.
- ▶ Insert the forks as far as possible underneath the load.
- ▶ You may only tilt the mast forward when the load handler is raised >300 mm beyond the vertical position before or above the load/rack.

## **⚠ WARNING!**

### **Risk of collision and damage to the mast due to lifting sequence errors**

In the case of masts with free lift, lifting sequence errors can occur at low ambient temperatures or with cold hydraulic oil, in combination with high lift speeds and when lifting without an attachment or without a load. Lifting sequence errors can also occur due to mechanical blockage of the mast.

A lift sequence error occurs when the mast lift is unintentionally extended on a mast with free lift: The height of the truck then exceeds  $h_1$  (height of mast retracted) before the load handler is raised by  $h_2$  (free lift), see page 37. Extending the mast or moving the truck with a lift sequence error can lead to collisions between the mast and parts of the building, installations, etc.

- ▶ Adjust your travel speed and load handling according to the visibility conditions.
- ▶ Carry out several lifting operations with load to warm up the hydraulic oil of the mast after the truck has been started up and cooled down. Watch out for potential collisions caused by lifting sequence errors when lifting the load handler and moving the truck.
- ▶ If lifting sequence errors occur due to mechanical blockage of the mast or with heated hydraulic oil, low lift speeds or when lifting with an attachment or load, park the truck in a secured position and do not operate. Contact the customer service department.

## **⚠ WARNING!**

### **Danger of accidents when storing and retrieving loads on slopes and inclines**

The storage and retrieval of loads on slopes and inclines is prohibited.

- ▶ Always store or retrieve loads on a horizontal surface.
- ▶ A slope of +/- 2% (e.g.: for surface drainage) is permissible in an outdoor area.

## **NOTICE**

Loads must not be deposited on travel or escape routes, in front of safety mechanisms or operating equipment that must be accessible at all times.

### ***Lifting loads***

#### ***Requirements***

- Load correctly palletised.
- Fork spread for the pallet checked and adjusted if necessary.
- Load weight matches the truck's capacity.
- Forks evenly loaded for heavy loads.

#### ***Procedure***

- Drive the truck carefully up to the pallet.
- Set the mast vertical.
- Slowly insert the forks into the pallet until the fork shank touches the pallet.
- Raise the load handler.
- Reverse carefully and slowly until the load is outside the storage area. Make sure you have enough clear space to reverse into.

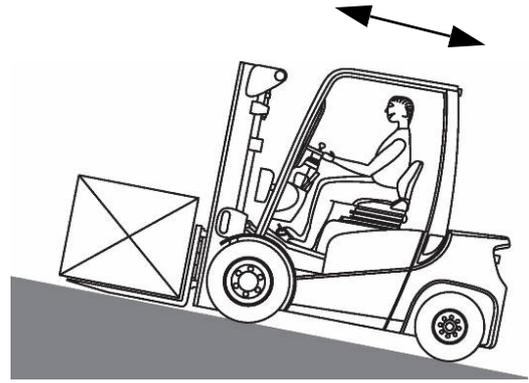
## ***Transporting loads***

### ***Requirements***

- Load raised correctly.
- Load handler lowered for transport (approx. 200 mm above the ground).
- Mast tilted back fully.

### ***Procedure***

- On slopes and inclines always carry the load facing uphill, never approach at an angle or turn.
- Accelerate and decelerate with care.
- Adapt your travel speed to the conditions of the route and the load you are transporting.
- Watch out for other traffic at crossings and passageways.
- Always travel with a lookout at blind spots.



## ***Depositing loads***

### *Requirements*

- Storage location suitable for storing the load.

### *Procedure*

- Set the mast vertical.
  - Drive the truck carefully up to the storage location.
  - Carefully lower the load handler so that the forks are clear of the load.
- ☞ Avoid depositing the load to prevent damage to the load and the load handler.
- Lowers the load handler.
  - Carefully remove the forks from the pallet.

*The load is deposited.*

## 4.12 Operating the lift mechanism and integrated attachments

### **⚠ WARNING!**

#### **Operating the lifting device and integrated attachments can be hazardous**

Other people can be injured in the truck's hazardous area.

The hazardous area is defined as the area in which people are at risk from the truck movement, the load handler, attachments etc. This also includes areas which can be reached by falling loads or lowering operating equipment.

Apart from the operator (in the normal operating position) there should be no other people in the truck's hazardous area.

- ▶ Instruct other people to move out of the hazardous area of the truck. Stop working with the truck if people do not leave the hazardous area.
  - ▶ If people do not leave the hazardous area despite the warning, prevent the truck from being used by unauthorised people.
  - ▶ Only carry loads that have been correctly secured and positioned. Use suitable precautions to prevent parts of the load from tipping or falling down.
  - ▶ Do not exceed the maximum loads specified on the capacity plate.
  - ▶ Do not stand underneath a raised load handler.
  - ▶ Do not stand on the load handler.
  - ▶ Do not lift other people on the load handler.
  - ▶ Do not reach through the mast.
  - ▶ The controls should only be operated from the driver's seat, and never suddenly.
  - ▶ The operator must be trained to handle the lift mechanism and the attachments.
- 

### **⚠ WARNING!**

#### **An offset load centre can result in accidents**

The capacity of the truck is reduced when using side shifts that are more than 100 mm outside the truck centre.

- ▶ Observe the capacity plate with the reduced capacity.
-

## 4.12.1 Operating the lift mechanism with soloPILOT

### **Lifting and lowering**

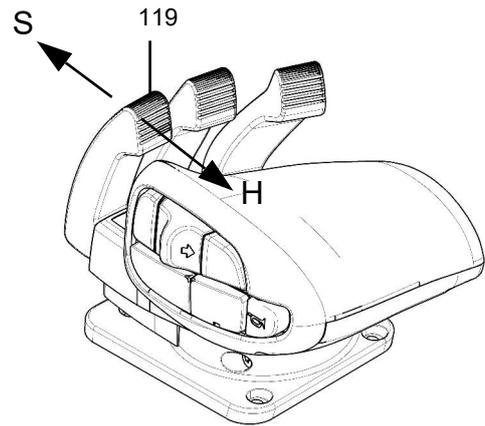
#### **Requirements**

- Truck prepared for operation, see page 156.

#### **Procedure**

- Pull the lever (119) in direction H to raise the load.
- Push the lever (119) in direction S to lower the load.

*The load is now raised or lowered.*



- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

### **Tilting the mast forward/backward**

#### **⚠ CAUTION!**

#### **Trapping hazard from inclined mast**

- ▶ Make sure no part of your body is between the mast and driver's cab when tilting the mast back.

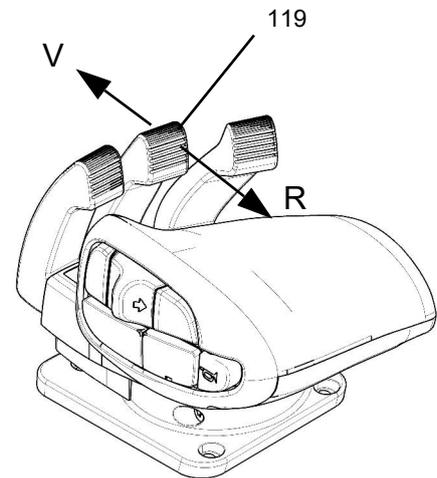
#### **Requirements**

- Truck prepared for operation, see page 156.

#### **Procedure**

- Pull the lever (119) in direction R to tilt the mast back.
- Push the lever (119) in direction V to tilt the mast forward.

*The mast is now tilted back or forward.*



- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

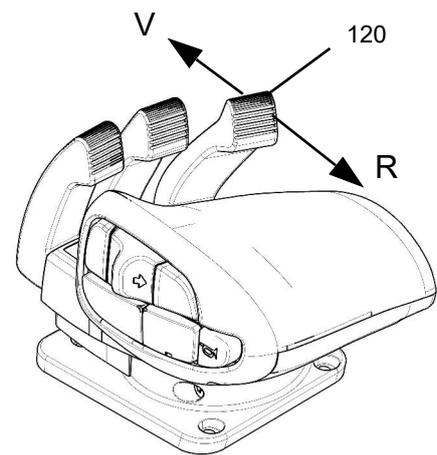
### ***Positioning the integrated sideshifter (option)***

#### ***Requirements***

- Truck prepared for operation, see page 156.

#### ***Procedure***

- Pull the lever (120) in direction R to move the load handler to the right (from the driver's viewpoint).
- Push the lever (120) in direction V to move the load handler to the left (from the driver's viewpoint).



*The sideshifter is now positioned.*

- ➔ When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

### **Positioning the forks with an integrated fork positioner (option)**

#### **⚠ CAUTION!**

Do not use the fork positioner to clamp loads.

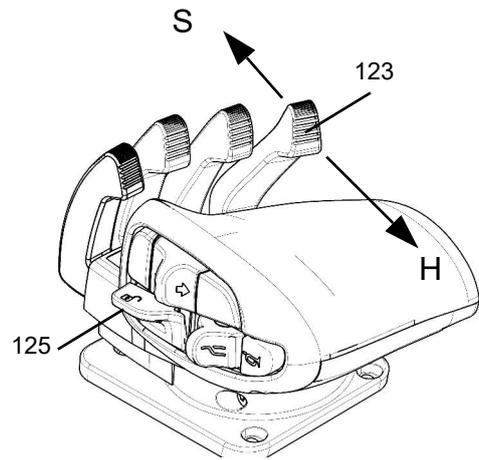
#### **Requirements**

- Truck prepared for operation, see page 156.

#### **Procedure**

- Press the acknowledgement key (125) and then within 2 seconds pull the lever (123) in direction H to bring the forks together.
- Press the acknowledgement key (125) and then within 2 seconds push the lever (123) in direction S to move the forks apart.

*The forks are now positioned.*



### **Synchronising the forks on an integrated fork positioner (optional equipment)**

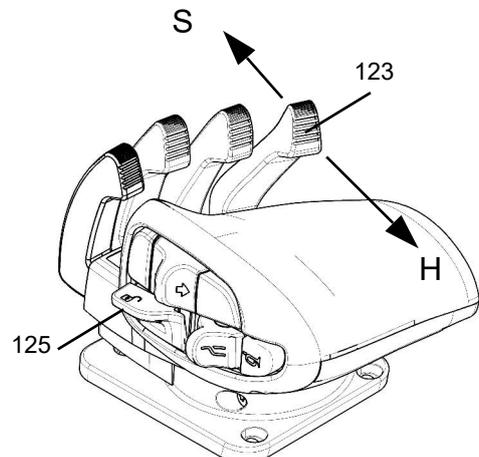
#### **Requirements**

- Truck prepared for operation, see page 156.
- The fork tines are no longer aligned.

#### **Procedure**

- Press the acknowledgement key (125) and then within 2 seconds push the lever (123) in direction S to move the forks apart as far as the stop.
- Press the acknowledgement key (125) and then within 2 seconds push the lever (123) in direction H to move the forks together up to the stop.

*The fork tines are now synchronised.*



When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

## 4.12.2 Operating the lift mechanism with multiPILOT

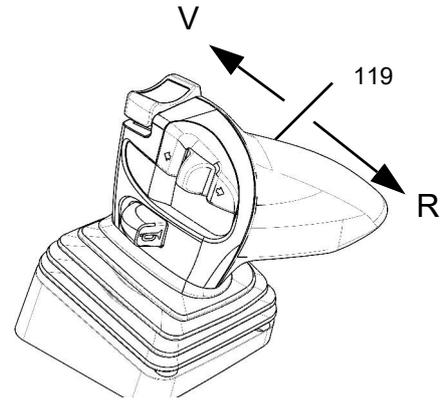
### **Lifting and lowering**

#### **Requirements**

- Truck prepared for operation, see page 156.

#### **Procedure**

- Pull the Multi-Pilot (119) in direction R to raise the load.
- Push the Multi Pilot (119) in direction V to lower the load.



*The load is now raised or lowered.*

- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

### **Tilting the mast forward/backward**

#### **⚠ CAUTION!**

#### **Trapping hazard from inclined mast**

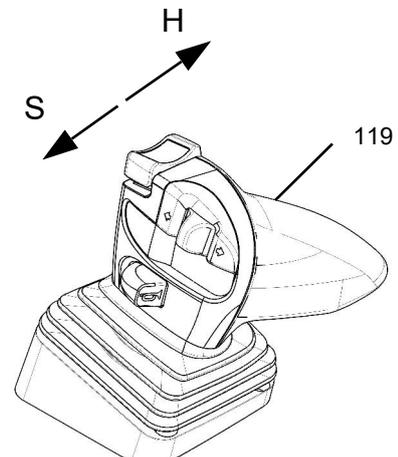
- ▶ Make sure no part of your body is between the mast and driver's cab when tilting the mast back.

#### **Requirements**

- Truck prepared for operation, see page 156.

#### **Procedure**

- Push the Multi-Pilot (119) in direction H to tilt the mast forward.
- Push the Multi-Pilot (119) in direction S to tilt the mast back.



*The mast is now tilted back or forward.*

- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

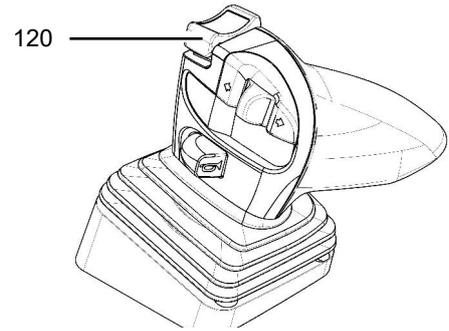
### ***Positioning the integrated sideshift (option)***

#### ***Requirements***

- Truck prepared for operation, see page 156.

#### ***Procedure***

- Press the button (120) to the left to move the load handler to the left (from the driver's viewpoint).
- Press the button (120) to the right to move the load handler to the right (from the driver's viewpoint).



*The sideshifter is now positioned.*



When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

### **Positioning the fork arms with an integrated fork positioner (optional equipment)**

#### **⚠ CAUTION!**

Do not use the fork positioner to clamp loads.

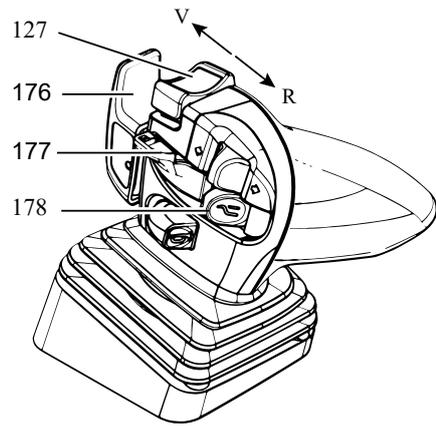
#### *Requirements*

- Truck prepared for operation – see page 156.

#### *Procedure*

- Press the acknowledgement key (177) and then within 2 seconds push the fork positioner lever (176) in direction V to move the fork arms apart.
- Press the acknowledgement key (177) and then within 2 seconds pull the fork positioner lever (176) in direction R to bring the fork arms together.

*The fork arms are now positioned.*



### **Synchronising the fork arms on an integrated fork positioner (optional equipment)**

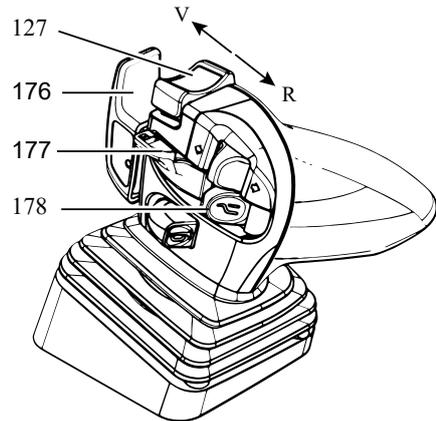
#### *Requirements*

- Truck prepared for operation – see page 156.
- The fork arms are no longer synchronised.

#### *Procedure*

- Press the acknowledgement key (177) and then within 2 seconds push the fork positioner lever (176) in direction V to move the fork arms apart as far as the stop.
- Press the acknowledgement key (177) and then within 2 seconds push the fork positioner lever (176) in direction R to move the fork arms together up to the stop.

*The fork arms are now synchronised.*



When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

### 4.12.3 Operating the lift mechanism with duoPILOT

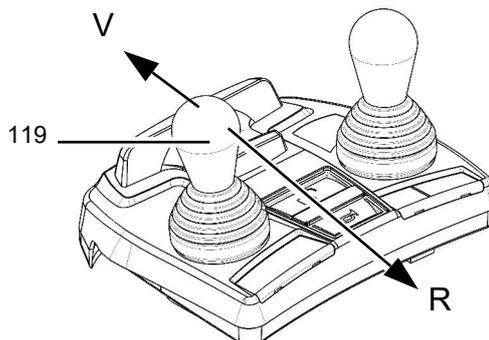
#### Lifting and lowering

##### Requirements

- Truck prepared for operation, see page 156.

##### Procedure

- Pull the lever (119) in direction R to raise the load.
- Push the lever (119) in direction V to lower the load.



*The load is now raised or lowered.*

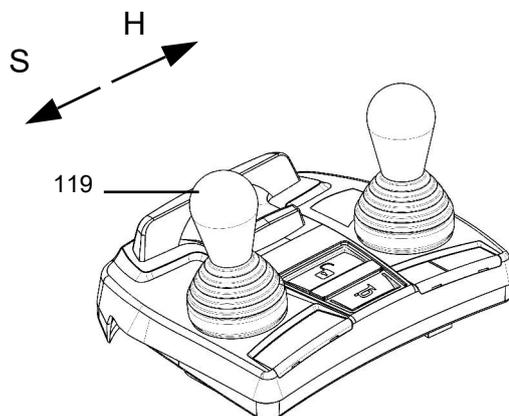
- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

#### Tilting the mast forward/backward

**⚠ CAUTION!**

##### Trapping hazard from inclined mast

- ▶ Make sure no part of your body is between the mast and driver's cab when tilting the mast back.



##### Requirements

- Truck prepared for operation, see page 156.

##### Procedure

- Push the lever (119) in direction H to tilt the mast forward.
- Pull the lever (119) in direction S to tilt the mast back.

*The mast is now tilted back or forward.*

- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

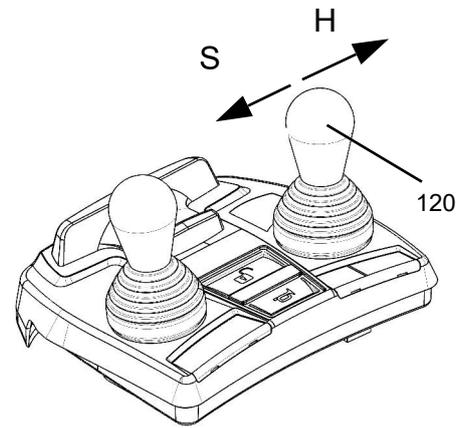
### ***Positioning the integrated sideshifter (option)***

#### ***Requirements***

- Truck prepared for operation, see page 156.

#### ***Procedure***

- Pull the lever (120) in direction S to move the load handler to the left (from the driver's viewpoint).
- Push the lever (120) in direction H to move the load handler to the right (from the driver's viewpoint).



*The sideshifter is now positioned.*

- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

### **Positioning the forks with an integrated fork positioner (option)**

#### **⚠ CAUTION!**

Do not use the fork positioner to clamp loads.

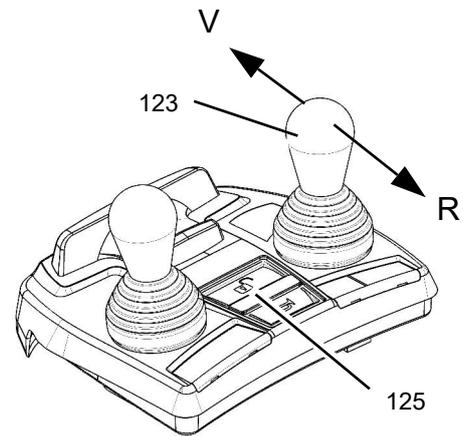
#### *Requirements*

- Truck prepared for operation, see page 156.

#### *Procedure*

- Press the acknowledgement key (125) and then within 2 seconds pull the lever (123) in direction R to bring the forks together.
- Press the acknowledgement key (125) and then within 2 seconds push the lever (123) in direction V to move the forks apart.

*The forks are now positioned.*



### **Synchronising the forks on an integrated fork positioner (optional equipment)**

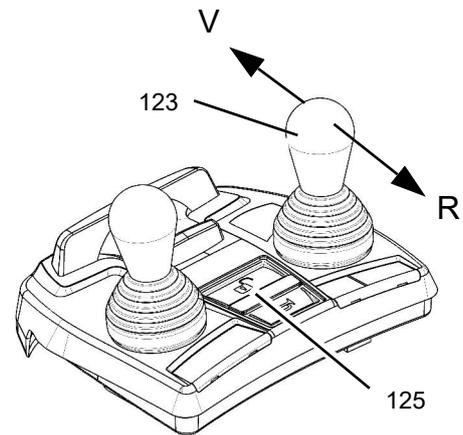
#### *Requirements*

- Truck prepared for operation, see page 156.
- The fork tines are no longer aligned.

#### *Procedure*

- Press the acknowledgement key (125) and then within 2 seconds push the lever (123) in direction R to move the forks together up to the stop.
- Press the acknowledgement key (125) and then within 2 seconds push the lever (123) in direction V to move the forks apart as far as the stop.

*The fork tines are now synchronised.*



When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

## 4.13 Safety instructions for operating additional attachments

### **⚠ DANGER!**

#### **Attaching exchangeable equipment can result in accidents**

Other people can be injured when attaching exchangeable equipment. Use only exchangeable equipment that has been deemed safe after a risk analysis carried out by the owner.

- ▶ Only use attachments that have been approved by the manufacturer of the truck.
  - ▶ Only use attachments that have been designed by the attachment manufacturer for use with the respective truck.
  - ▶ Only use attachments that are suitable for the operating pressure and oil flow available at the hydraulic port, see page 33.
  - ▶ Only use attachments that have been fitted for the purpose by the owner.
  - ▶ Make sure the operator has been instructed in the use of the attachment and that he uses it for its correct purpose.
  - ▶ Re-assess the residual capacity of the truck and, if it has been altered, attach an additional capacity plate to the truck.
  - ▶ Note the attachment manufacturer's operating instructions.
  - ▶ Use only attachments that do not restrict visibility in the travel direction.
- 

### **⚠ WARNING!**

#### **Risk of accident due to overload and failure of the attachment or the load falling or becoming damaged.**

When using attachments that are not suitable for the operating pressure and oil flow available, overload may give rise to damage and failure of the attachment, as well as the load falling or becoming damaged.

- ▶ Only use attachments that are suitable for the operating pressure and oil flow available at the hydraulic port, see page 33.
- 

### **⚠ CAUTION!**

#### **Risk of slipping and environmental damage due to leaked hydraulic oil**

When using attachments that are not suitable for the operating pressure and oil flow available, overload may give rise to leaks or broken lines with the potential for hydraulic oil leaks.

Risk of slipping due to leaked hydraulic oil. The risk is greater when combined with water.

- ▶ Only use attachments that are suitable for the operating pressure and oil flow available at the hydraulic port, see page 33.
- 

→ Optionally, trucks can be fitted with one or more auxiliary hydraulic functions to operate attachments. The auxiliary hydraulics are indicated with ZH1, ZH2 and ZH3. Auxiliary hydraulic functions for exchangeable equipment are fitted with replacement couplings on the fork carriage. To fit exchangeable equipment see page 200.

→ If visibility in the travel direction is impaired, the operating company must determine and apply suitable measures to ensure the safe operation of the truck. A lookout may have to be used or certain hazardous areas may have to be cordoned off. The truck can also be equipped with optional visual aids such as a camera system or mirrors. Travelling with visual aids requires plenty of practice at slow speed.

## Safety instructions for sideshifter and fork positioner attachments

### **⚠ WARNING!**

#### **Restricted visibility and reduced tilt resistance can cause accidents**

When using sideshifters and fork positioners, the change in centre of gravity can result in reduced lateral tilt resistance and accidents. Note that this affects visibility as well.

- ▶ Adapt the travel speeds to the visibility and load.
  - ▶ Make sure you have sufficient visibility when reversing.
- 

### **⚠ WARNING!**

#### **Risk of accidents due to falling loads**

If fork positioners that are not approved for clamping loads are used to clamp a load, the load may fall down unintentionally.

- ▶ Do not use clamp loads using fork positioners that are not approved for clamping loads.
- 

### **⚠ WARNING!**

#### **An offset load centre can result in accidents**

The capacity of the truck is reduced when using side shifts that are more than 100 mm outside the truck centre.

- ▶ Observe the capacity plate with the reduced capacity.
- 

## **Safety instructions for clamping attachments (bale clamps, barrel clamps, grabs, etc.)**

### **⚠ WARNING!**

#### **Risk of accidents due to falling loads**

Operating errors can occur and the load can fall accidentally.

- ▶ Clamping attachments may only be added to trucks which have a button to enable additional hydraulic functions.
  - ▶ Clamping attachments must only be operated on trucks with ZH1, ZH2, ZH3 or higher auxiliary hydraulics requiring acknowledgement.
  - ▶ When connecting the attachment, make sure that the hydraulic lines of the attachment are connected to the correct ports – see page 200.
  - ▶ Do not use clamping attachments for clamping purposes or in clamping operation while fork extensions are in use.
- 

- ➔ The highest auxiliary hydraulics after ZH2 must be released by the acknowledgement button.

### **NOTICE**

When retrofitting clamping attachments, the parameters for depressurisation of the auxiliary hydraulics must be disabled by the manufacturer's customer service department.

---

## Safety instructions for rotary attachments

### **⚠ WARNING!**

#### **A non-centred load centre of gravity can result in accidents**

When using rotary devices and non-centred loads, the centre of gravity can be displaced from the centre with a high risk of accidents.

- ▶ Adapt the travel speed to the load.
  - ▶ Lift the load from the centre.
- 

### **⚠ WARNING!**

#### **Risk of accidents due to falling loads**

As the rotation of the rotary device increases, the load acting on the forks changes from a vertical to a lateral force, until the load is only acting on one fork arm. If you overload the forks or use unsuitable forks, this can result in damage and the load may fall down accidentally.

- ▶ Do not use fork extensions to lengthen the forks on rotary devices.
  - ▶ Only use forks that are approved for use with the relevant rotary device.
  - ▶ Damaged forks must be marked accordingly and taken out of service.
- 

## Safety instructions for telescopic attachments

### **⚠ WARNING!**

#### **Accident risk due to increased tipover hazard and reduced residual capacity**

An increased risk of tipover exists with extended telescopic attachments since incorrectly carried loads can reduce the stability of the truck. When the residual capacity is reduced, a risk of serious material damage and personal injury due to falling loads exists in the vicinity of the truck.

- ▶ Do not exceed the maximum loads specified on the capacity charts.
  - ▶ Loads must only be transported when resting against the back of the fork arms. The load centre distance must be no more than half the fork length.
  - ▶ Do not transport loads solely on the front fork. Moving and transporting the load with the telescopic fork extended is not permitted if the load is located solely on the front fork.
  - ▶ Travelling without a load on the forks is only permitted with the forks retracted.
  - ▶ Reduce the travel speed according to the altered load centre.
- 

## Safety instructions for attachments when transporting suspended loads

### **⚠ WARNING!**

#### **Swinging loads and a reduced residual capacity can result in accidents.**

Transporting hanging loads can reduce the stability of the truck.

- ▶ Adapt the travel speed to the load, less than walking pace.
  - ▶ Secure swinging loads for example with lifting slings.
  - ▶ Reduce the residual capacity and have it certified by a expert.
  - ▶ If the truck is to be operated with hanging loads, proof of sufficient safety distance under local operating conditions must be obtained from a specialist assessor.
-

## Safety instructions for using loading buckets as attachments

### **⚠ WARNING!**

#### **Increased mast loading can cause accidents.**

- ▶ When carrying out the daily checks and operations before starting, see page 137, check in particular check the fork carriage, mast rails and mast rollers for damage.
- 

## Safety instructions for fork extensions

### **⚠ WARNING!**

#### **Unsecured and oversized fork extensions can cause accidents.**

- ▶ Only use fork extensions that are suitable and have been approved for the base forks of the truck. Observe the data on the data plates of the fork extensions and truck.
  - ▶ The basic fork length must be at least 60% of the length of the fork extension.
  - ▶ Push out the fork extensions fully and lock onto the basic fork arms.
  - ▶ Lay the load as close to the fork shanks as possible. The distance between the overall centre of gravity of the load and the fork shank must not exceed 50% of the length of the fork extension.
  - ▶ When carrying out checks and operations before daily commissioning, see page 137, check the fork extension lock.
  - ▶ Mark any fork extensions with an incomplete or faulty lock and take them out of service.
  - ▶ Do not use trucks with an incomplete or faulty fork extension lock. Replace the fork extension.
  - ▶ Only restore the fork extension to service when the fault has been rectified.
  - ▶ Use only fork extensions which are free of dirt and foreign bodies near the entry opening point. Clean the fork extensions as required.
- 

- ➔ The weight of the fork extensions reduces the residual capacity of the truck. When determining the residual capacity, the increased load distance must be taken into account, see the data plate and capacity plate of the fork extension.

### **⚠ WARNING!**

#### **Risk of accidents due to falling loads**

In the case of an incorrect load or uneven load distribution, the fork extensions may be damaged and the load can fall down accidentally.

- ▶ Do not use clamping attachments for clamping purposes or in clamping operation while fork extensions are in use.
  - ▶ Do not use fork extensions to lengthen the forks on rotary devices.
  - ▶ Damaged fork extensions must be marked accordingly and taken out of service.
-

## 4.14 Operating additional attachments with soloPILOT

### **⚠ WARNING!**

#### **Incorrect symbols can cause accidents**

Symbols on controls that do not depict the function of the attachments can cause accidents.

- ▶ Mark the controls with symbols that indicate their function.
- ▶ Specify the attachments' direction of movement in accordance with ISO 3691-1 so that they match the controls' direction of movement.

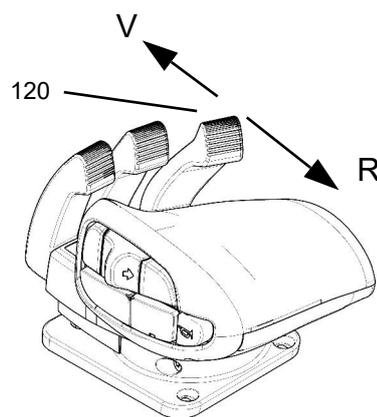
### 4.14.1 soloPILOT with control of ZH1 hydraulic port

- Depending on the attachments used the lever (120) is assigned the function of the attachment. Unused levers have no function. For connections see page 200.

#### *Procedure*

- Operating hydraulic port ZH1:  
Move the lever (120) in direction V or R.

*The attachment performs its operation.*



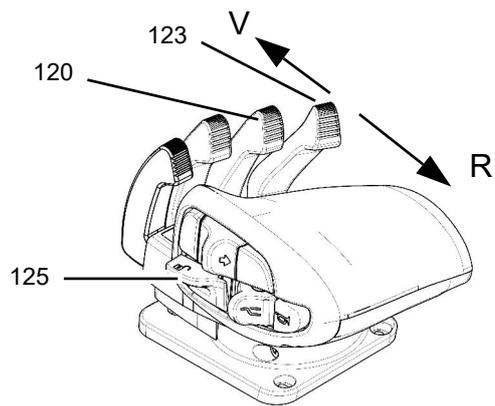
#### 4.14.2 soloPILOT with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used the lever / button (120, 123, 125) is assigned the function of the attachment. Unused levers have no function. For connections see page 200.

##### *Procedure*

- Operating hydraulic port ZH1:  
Move the lever (120) in direction V or R.
- Operating hydraulic port ZH2:  
Press the acknowledgement key (125) and then within 2 seconds move the lever (123) in direction V or R.

*The attachment performs its operation.*



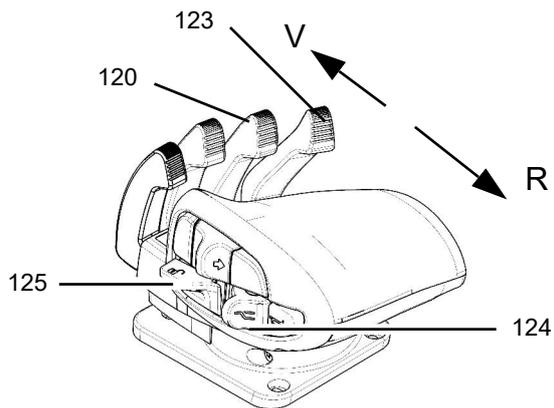
### 4.14.3 soloPILOT with control of ZH1, ZH2 and ZH3 hydraulic ports

→ Depending on the attachments used the levers / buttons (120, 123, 125, 124) are assigned the respective functions. Unused levers have no function. For connections see page 200.

#### *Procedure*

- Operating hydraulic port ZH1:  
Move the lever (120) in direction V or R.
- Operating hydraulic port ZH2:  
Move the lever (123) in direction V or R.
- Operating hydraulic port ZH3:  
Apply the toggle switch (124), press the acknowledgement key (125) and then within 2 seconds move the lever (123) in direction V or R.
- Now pull the toggle switch (124).

*The attachment performs its operation.*



## 4.15 Operating additional attachments with multiPILOT

### **⚠ WARNING!**

#### **Incorrect symbols can cause accidents**

Symbols on controls that do not depict the function of the attachments can cause accidents.

- ▶ Mark the controls with symbols that indicate their function.
  - ▶ Specify the attachments' direction of movement in accordance with ISO 3691-1 so that they match the controls' direction of movement.
- 

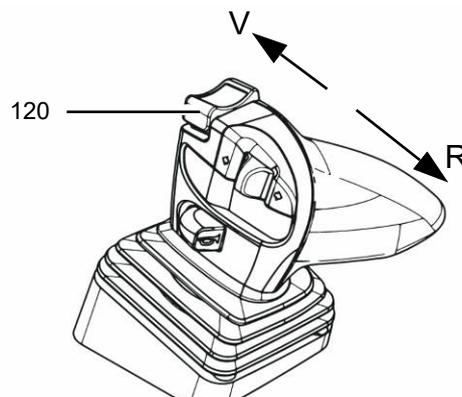
### 4.15.1 multiPILOT with control of ZH1 hydraulic port

- Depending on the attachments used, the (120) button is assigned the function of the attachment. Unused levers have no function. For connections see page 200.

#### *Procedure*

- Operating hydraulic port ZH1:  
Press the (120) button to the left or right.

*The attachment performs its operation.*



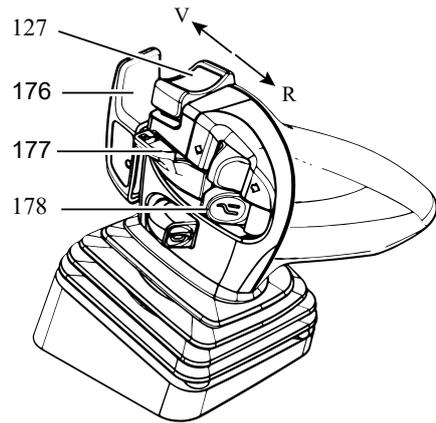
#### 4.15.2 multiPILOT with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used, the levers/buttons (127, 176, 177) are assigned the function of the attachment. Unused levers have no function. For ports, see page 200.

##### *Procedure*

- Operating hydraulic port ZH1:  
Press the button (127) to the left or right.
- Operating hydraulic port ZH2:  
Press the acknowledgement key (177) and then within 2 seconds push the lever (176) in direction V or pull it in direction R.

*The attachment performs its operation.*



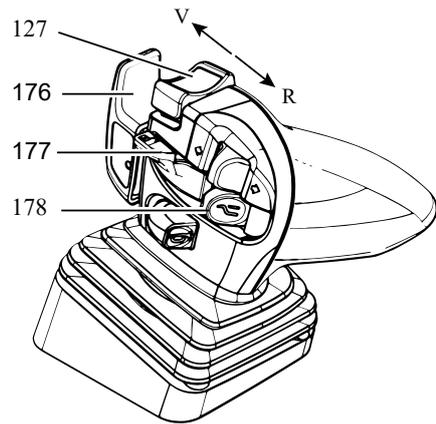
#### 4.15.3 multiPILOT with control of ZH1, ZH2 and ZH3 hydraulic ports

→ Depending on the attachments used, the levers/buttons (127, 176, 177, 178) are assigned the respective functions. Unused levers have no function. For ports, see page 200.

##### *Procedure*

- Operating hydraulic port ZH1:  
Press the button (127) to the left or right.
- Operating hydraulic port ZH2:  
Push the lever (176) in direction V or pull it in direction R.
- Operating hydraulic port ZH3:  
Push the toggle switch (178), press the acknowledgement key (177) and within 2 seconds move the lever (176) to the left or right.
- Now pull the toggle switch (178).

*The attachment performs its operation.*



## 4.16 Operating additional attachments with duoPILOT

### **⚠ WARNING!**

#### **Incorrect symbols can cause accidents**

Symbols on controls that do not depict the function of the attachments can cause accidents.

- ▶ Mark the controls with symbols that indicate their function.
- ▶ Specify the attachments' direction of movement in accordance with ISO 3691-1 so that they match the controls' direction of movement.

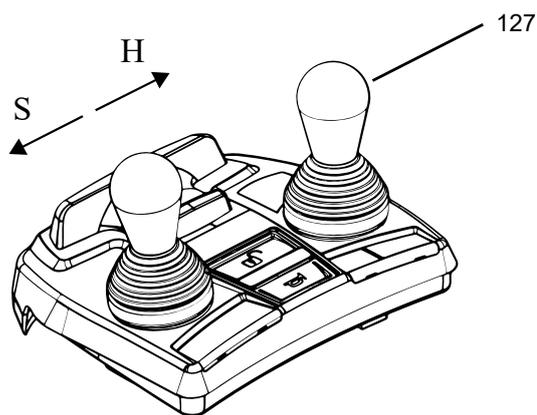
### 4.16.1 duoPILOT with control of ZH1 hydraulic port

- Depending on the attachments used, the lever (127) is assigned the function of the attachment. Unused levers have no function. For ports, see page 200.

#### *Procedure*

- Operating hydraulic port ZH1:  
Push the lever (127) in direction S or H.

*The attachment performs its operation.*



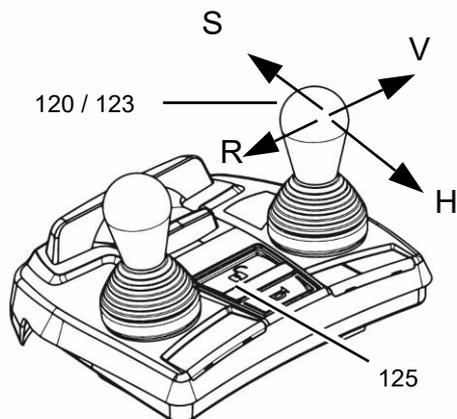
## 4.16.2 duoPILOT with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used the lever / button (120,123,125) is assigned the function of the attachment. Unused levers have no function. For connections see page 200.

### *Procedure*

- Operating hydraulic port ZH1:  
Push the lever (120) in direction V or R.
- Operating hydraulic port ZH2:  
Press the acknowledgement key (125) and then within 2 seconds pull the lever(123) in direction H or push it in direction S.

*The attachment performs its operation.*



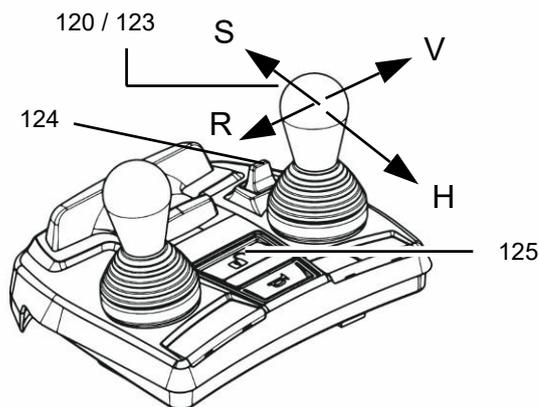
### 4.16.3 duoPILOT with control of ZH1, ZH2 and ZH3 hydraulic ports

→ Depending on the attachments used the levers / buttons (120,123,124,125) are assigned the respective functions. Unused levers have no function. For connections see page 200.

#### *Procedure*

- Operating hydraulic port ZH1:  
Push the lever (120) in direction V or R.
- Operating hydraulic port ZH2:  
Pull the lever (123) in direction H or push it in direction S.
- Operating hydraulic port ZH3:  
Flip the toggle switch (124) forward, press the acknowledgement key (125) and then within 2 seconds push the lever(123) in direction S or pull it in direction H.
- Now flip the toggle switch (124) back.

*The attachment performs its operation.*



## 4.17 Fitting additional attachments

### **⚠ WARNING!**

#### **Hot hydraulic oil can cause injury**

Hot hydraulic oil can cause serious injuries such as burns or scalds.

- ▶ Wait until the hydraulic oil has cooled down.
  - ▶ Do not drain or pump hot hydraulic oil out of the system.
  - ▶ In the case of injuries, seek medical assistance immediately.
  - ▶ Remove any spilled hydraulic oil immediately with an appropriate bonding agent.
- 

### **⚠ WARNING!**

#### **Incorrectly connected attachments can cause accidents.**

Attachments that are incorrectly hydraulically or mechanically connected can result in accidents. There is a risk of fingers or hands being crushed.

- ▶ Attachments must only be assembled and commissioned by trained, specialist personnel.
  - ▶ Observe the manufacturer's operating instructions.
  - ▶ Before starting, check the fasteners are positioned correctly and securely and make sure they are complete.
  - ▶ Before starting, make sure the attachment is working correctly.
- 

### **⚠ WARNING!**

#### **Hydraulic ports for clamping attachments**

- ▶ Clamping attachments may only be added to trucks which have a button to enable additional hydraulic functions.
  - ▶ On trucks with auxiliary hydraulics ZH2 the clamping function should only be attached to the coupling pair marked ZH2.
  - ▶ On trucks with auxiliary hydraulics ZH3 the clamping function should only be attached to the coupling pair marked ZH3.
- 

When retrofitting a clamping attachment for the first time, the manufacturer's customer service must be consulted to adjust the parameterisation of the industrial truck for proper function (pressure release for clamping attachments).

## ***Depressurising hydraulic plug-in couplings (2-inch display)***

### *Requirements*

- The operator is in the operating position.
- Parking brake activated.
- Travel direction switch in neutral.
- All controls in neutral.

### *Procedure*

- Press the button (180) for more than 5 seconds.
- Move the auxiliary hydraulics lever in both directions and hold it briefly, see page 104.
- For auxiliary hydraulic functions requiring acknowledgement, the acknowledgement button must also be actuated in order to depressurise, see page 104.

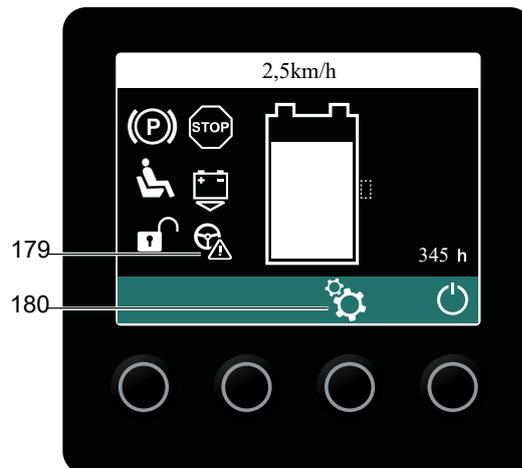
*Hydraulic hoses and plug-in couplings are depressurised.*

*The hydraulic steering assistance (179) is not available when the auxiliary hydraulics are depressurised.*



*Steering is possible by turning the steering wheel with increased effort.*

- Press the button (180) for more than 5 seconds to return to normal operating mode.



## Depressurise hydraulic plug-in couplings (4-inch display)

### Requirements

- The operator is in the operating position.
- Parking brake activated.
- Travel direction switch in neutral.
- All controls in neutral.

### Procedure

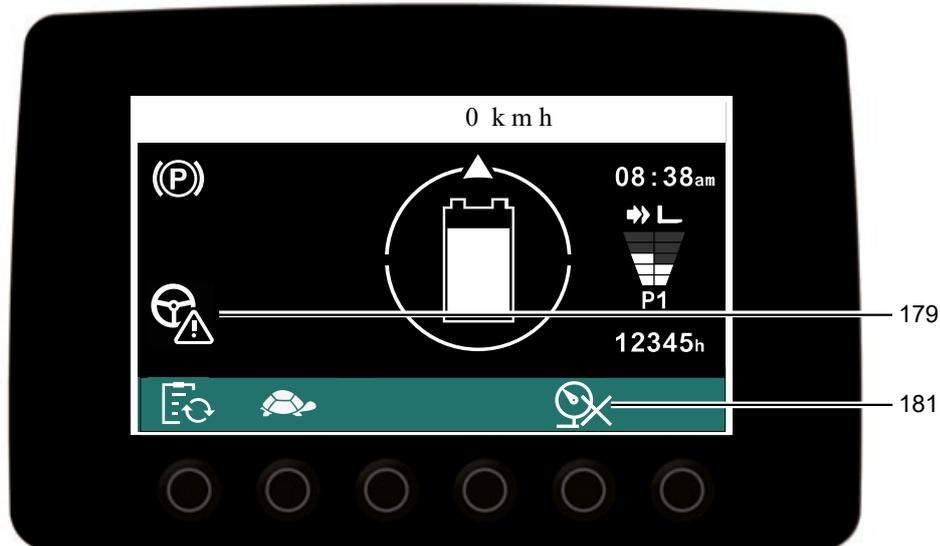
- Actuate the "depressurise auxiliary hydraulics" button (181) – see page 126. Warning triangle on the display lights up flashing yellow – see page 116.
- Move the auxiliary hydraulics lever in both directions and hold it briefly, see page 104.
- For auxiliary hydraulic functions requiring acknowledgement, the acknowledgement button must also be actuated in order to depressurise, see page 104.

*Hydraulic hoses and plug-in couplings are depressurised.*

*The hydraulic steering assistance (179) is not available when the auxiliary hydraulics are depressurised.*

→ *Steering is possible by turning the steering wheel with increased effort.*

- Actuate the "depressurise auxiliary hydraulics" button (181), see page 126, to return to normal operating mode.



Symbol	Meaning
	Depressurisation of auxiliary hydraulics: Depressurisation is initiated in combination with a lever movement.

## **⚠ WARNING!**

### **Unsecured hydraulic functions can cause accidents**

Failure to secure hydraulic functions for releasing functions on attachments that hold loads using force (e.g. paper clamps, load holder) can result in accidents.

- ▶ Hydraulic functions for releasing functions that hold loads using force must be secured such that they can be used only after actuation of the acknowledgement button.
  - ▶ Before starting, make sure the pilot is set up correctly.
- 

## **⚠ WARNING!**

### **Incorrectly labelled hydraulic functions can cause accidents**

Labels on the pilot that do not match the directions of movement and hydraulic functions on the attachment can result in accidents.

- ▶ Before starting, make sure the pilot is correctly labelled and adjust if necessary.
- 

### ***Connecting an attachment hydraulically***

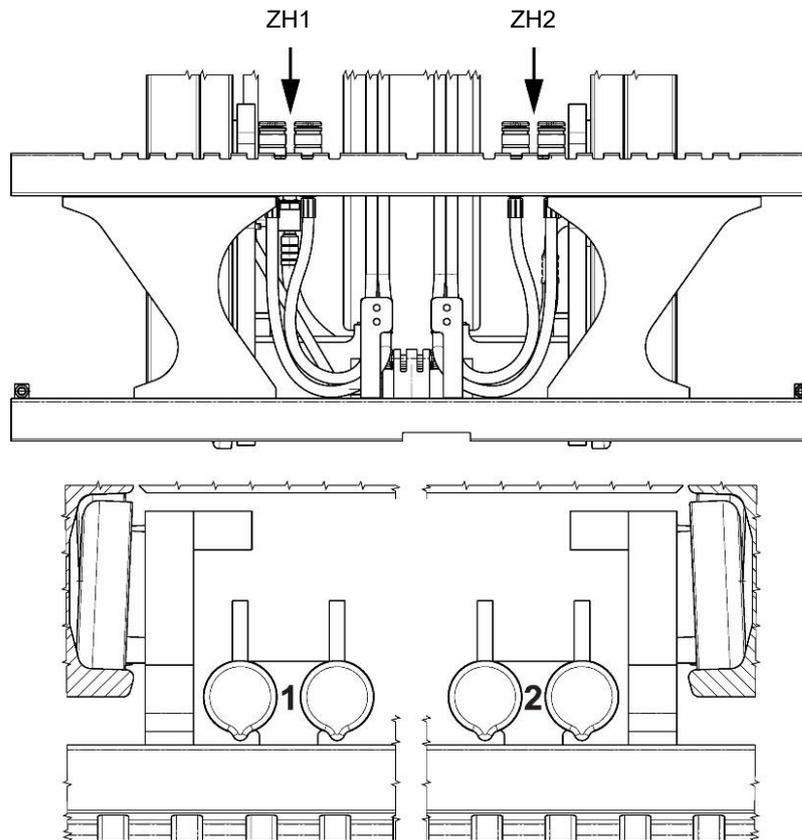
#### *Requirements*

- Non-pressurised hydraulic hoses and plug-in couplings.
- The adapters on the truck are marked "1" for ZH1, "2" for ZH2 and/or "3" for ZH3; see example diagram.
- Attachment directions of movement defined to match the actuation direction of the controls.

#### *Procedure*

- Connect the plug-in couplings and engage in position.
- Mark the controls with symbols that clearly indicate the function of the attachment.

*The attachment is now hydraulically connected.*



- Spilled hydraulic oil must be set using a suitable agent and disposed of in accordance with environmental regulations.  
 If hydraulic oil comes into contact with the skin, wash it off immediately with soap and water. If it comes into contact with the eyes rinse them immediately with flowing water and call for a doctor.
- The manufacturer's customer service department can correctly connect the attachment, adjust the controls and actuation directions on the pilot to the connections and directions of movement of the attachment, and label the pilot accordingly.

## 4.18 Assistance systems

The Access, Drive and Lift Control systems help the driver operate the truck with regard to safety regulations, see page 152 of the present operating instructions.

The assistance systems have no safety functions and do not disrupt the truck safety functions.

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

### 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.

#### 4.18.1 curveCONTROL

- Automatic speed reduction depending on the steer angle. curveCONTROL limits the travel speed and acceleration when cornering. This reduces the risk of oscillation or tipping over.

#### 4.18.2 accessCONTROL (○)

Unrestricted travel and operating release is granted only if the following steps have been carried out in the listed sequence:

1. The operator is seated.
2. The truck is switched on via the key switch (ISM ○ / transponder ○ / keypad ○).
3. The operator is wearing the seat belt.

- If the driver vacates the seat for a short while, the truck can be operated again when he returns (seat occupied) and puts the seat belt back on again.
- If travel is not released, depending on the malfunction either the seat switch or seat belt lock warning indicators light up. Items 1 to 3 must be performed again in the order listed.

Symbol	Meaning	Colour	Function
	Seat switch	Fixed yellow	Seat switch not actuated
		Flashing yellow	<ul style="list-style-type: none"> <li>– Seat switch not actuated, actuated function requires seated operator</li> <li>– Seated operator / activated seat switch implausible. Vacate the driver's seat.</li> <li>– Seat switch operated continuously for more than 6 hours. Vacate the driver's seat.</li> </ul>
		Flashing red	Error on seat switch
	Seat belt lock control system	Flashing yellow	<ul style="list-style-type: none"> <li>– Seat belt lock not locked, actuated function requires operator wearing seat belt</li> <li>– Operating position with locked seat belt lock implausible. Open the seat belt lock.</li> </ul>

#### 4.18.3 driveCONTROL (○)

This option restricts the travel speed of the truck as a function of the lift height. From a factory-set lift height the maximum travel speed is reduced to walking pace (approx.3 km/h) and the slow travel indicator (yellow symbol colour) is activated. When the forks fall below this height with the accelerator pedal applied, the truck accelerates at reduced levels to the speed prescribed by the accelerator pedal to prevent sudden acceleration when changing from slow travel to normal travel. Normal acceleration is only activated again when the speed prescribed by the accelerator pedal has been reached.

➔ In addition to the daily checks before starting, see page 137 the driver must carry out the following checks:

- Lift the empty load handler beyond the reference lift height and check if the slow travel indicator lights up.

#### 4.18.4 liftCONTROL (○)

This optional equipment includes driveCONTROL and also monitors and controls the tilt speed:

Tilt speed reduction as a function of the lift height (from approx. 1,5 m lift height).

- If the load handler is lowered below the limit height, the tilt speed increases up to the level specified by the control lever.

***In addition to the daily checks before starting, the operator must carry out the following checks:***

##### *Procedure*

- Lift the empty load handler beyond the reference lift height and check if the slow travel indicator lights up and the tilt speed is clearly reduced.
- Check the tilt angle display by tilting forward and back.

## 5 Towing trailers

### **⚠ DANGER!**

#### **Inappropriate speeds and excessive trailer loads can be dangerous**

If you do not adapt your speed and / or use an excessive trailer load, the truck can pull apart when cornering and braking.

- ▶ The truck should only be used occasionally to tow trailers.
  - ▶ The overall weight of the trailer should not exceed the capacity indicated on the capacity plate, see page 55. If a load is also transported on the load handler, the trailer load must be reduced by the same amount.
  - ▶ Do not exceed the maximum speed of 5 km/h km/h.
  - ▶ A truck must not be continually operated with trailers.
  - ▶ Do not use supporting loads.
  - ▶ Towing must only be performed on level, secure travel routes.
  - ▶ The owner must test trailer operation with the permissible tow load by means of a trial run under the applicable operating conditions on site.
- 

The national regulations for the use of unbraked trailers on trucks must be observed.

### **⚠ DANGER!**

#### **Danger from falling tiller**

If the tow pin on the tiller is removed, the tiller is no longer secured and there is a risk that the tiller will fall when the brakes are not applied.

- ▶ Hold the tiller while releasing the tow pin and place it securely in the inactive position.
- 

### **⚠ CAUTION!**

#### **Risk of trapping**

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.
  - ▶ Never reach into the open coupling.
  - ▶ The tiller must be horizontal; it may be tilted downwards by a maximum of 10° and never tilted upwards.
-

## ***Attaching the trailer***

### *Requirements*

- Truck and trailer are on a level surface.
- Trailer prevented from rolling away.

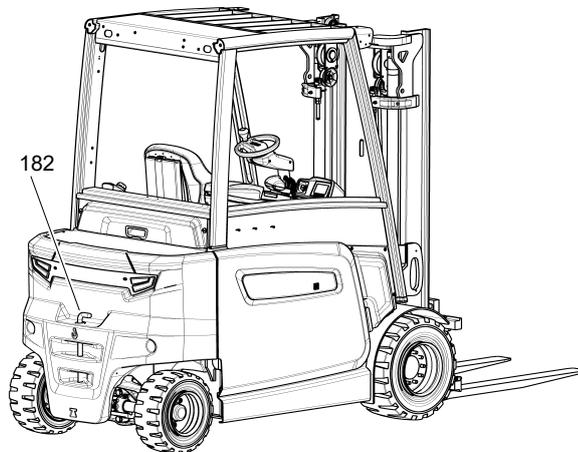
### *Procedure*

- Push the tow pin (182) down and turn it 90°.
- Pull up the tow pin (182) and insert the tiller of the trailer into the opening.

→ Reverse the truck for coupling until the tow pin of the coupling and the hole in the tiller are flush.

- Insert the tow pin (182), push it down, turn it 90 degrees and engage it.
- Remove the device preventing the trailer from rolling away.

*The trailer is now attached to the truck.*



→ To additionally ensure safe operation, the truck can be fitted with an electrical connection for trailers with lighting.

## ***Detaching the trailer***

### ***Requirements***

- Truck and trailer are on a level surface.
- Trailer prevented from rolling away.

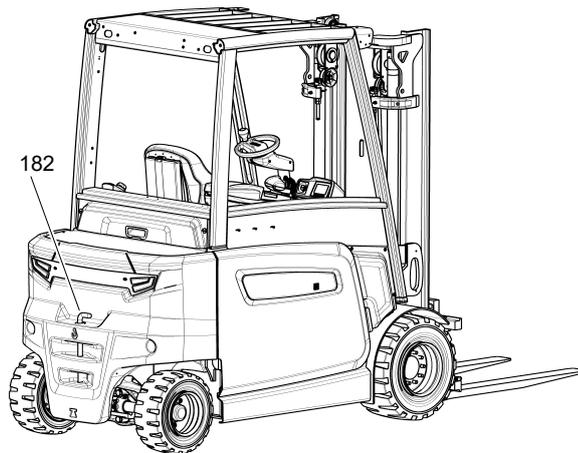
### ***Procedure***

- Push the tow pin (182) down and turn it 90°.
- Pull up the tow pin (182) until the tiller of the trailer hangs freely.

➔ To uncouple, drive the industrial truck forwards until the tiller of the trailer is free.

- Insert the tow pin, push it down, turn it 90 degrees and engage it.

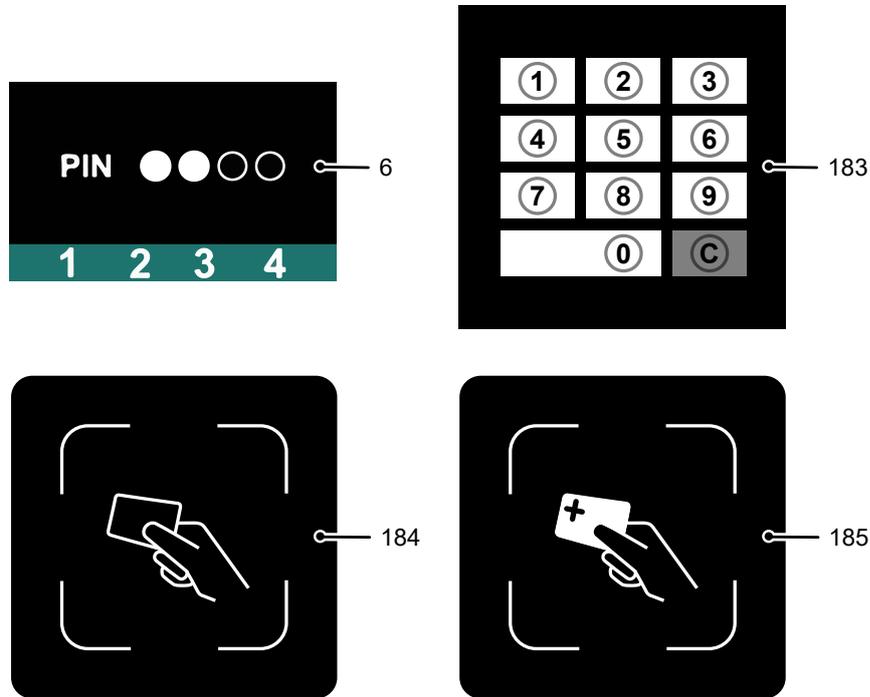
*The trailer is now detached from the industrial truck.*



## 6 Optional Equipment

### 6.1 Keyless Access System

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



Item	Description
6	Display unit (EasyAccess Softkey): – Description see page 113 – 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
183	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
184	Transponder reader ( EasyAccess Transponder): – Up to 100 transponders can be stored
185	Transponder reader Plus ( EasyAccess Transponder): – The transponder reader Plus supports additional transponder standards.

→ Operation of transponder reader Plus (185) corresponds to the operation of the standard transponder reader (184).

## 6.2 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 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.

## 6.3 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.

### 6.3.1 Activating the keypad

#### Procedure

- Release the emergency disconnect switch, see page 159.
- Enter the default code 1-2-3-4 using the keys below the display unit (6).

*The truck is switched on.*

- Press the key below the "Settings" symbol (186).
- Press the key below the "Change set-up code" symbol (187).
- Enter the set-up code 2-4-1-2 using the keypad (183).

*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 (188).

*The set-up code is deleted.*

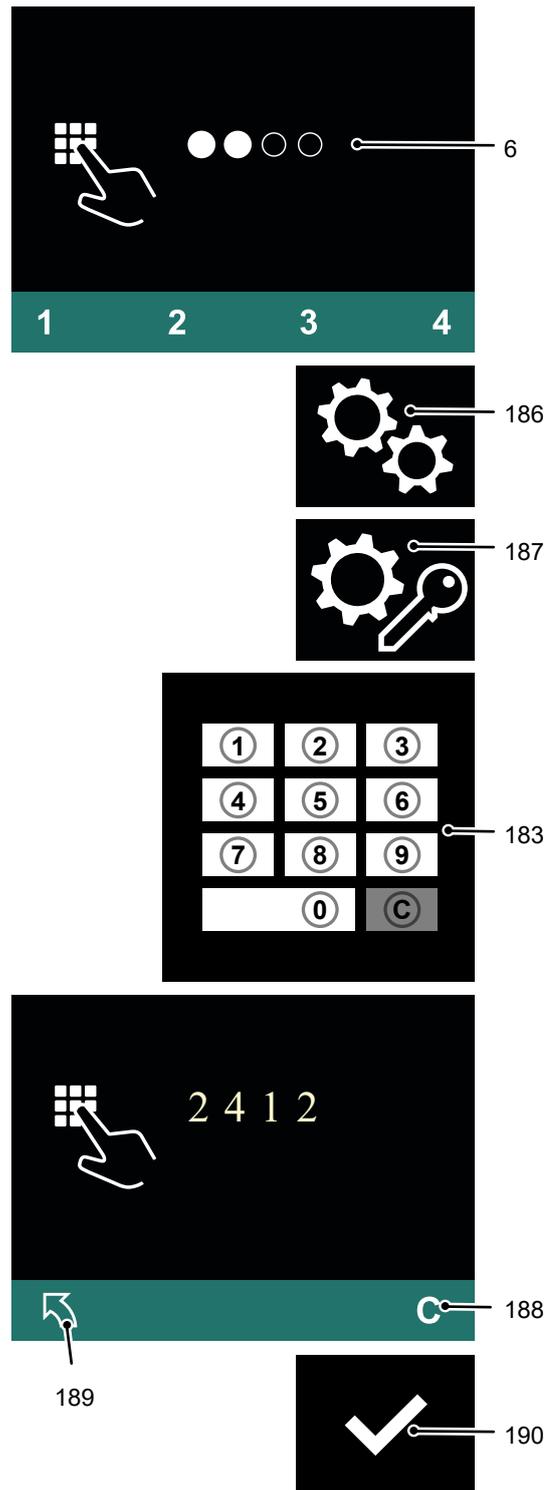
- Enter the new set-up code using the keypad (183).
- Press the key below the "Confirm" symbol (190).

*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 (188).

- To return to the main menu, press the key below the "Back" symbol (189).
- Delete the default code, see page 222.
- Create access codes, see page 221.

*The keypad is active.*



### 6.3.2 Activating the transponder reader

*Procedure*

- Release the emergency disconnect switch, see page 159.
- Enter the default code 1-2-3-4 using the keys below the display unit (6).

*The truck is switched on.*

- Press the key below the "Settings" symbol (186).
- Press the key below the "Change set-up code" symbol (187).
- Enter the set-up code 2-4-1-2 using the keys below the display unit (6).

*The set-up code entered is displayed.*

- Press the key below the "Delete" symbol (188).

*The set-up code is deleted.*

- Hold a transponder in front of the transponder reader (184).

*This transponder thus becomes the set-up transponder.*

- Press the key below the "Confirm" symbol (190).

*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 (188).*

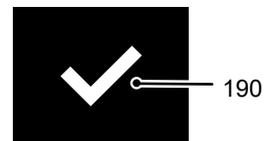
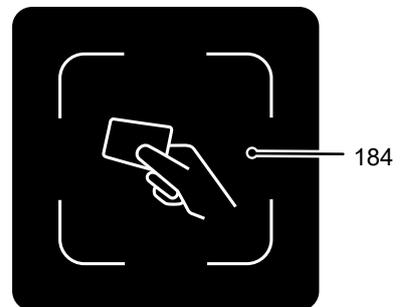
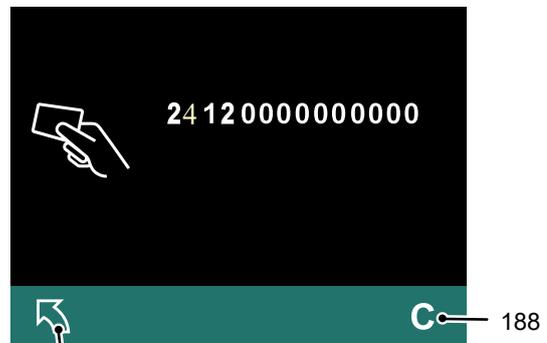
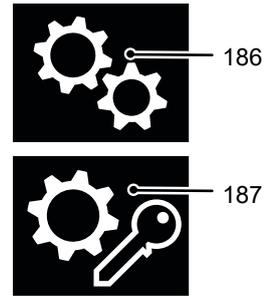
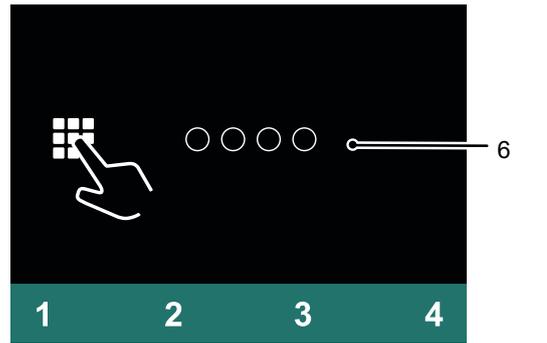
- To return to the main menu, press the key below the "Back" symbol (189).

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

Delete the default code, see page 227.

- Add new transponders, see page 226.

*The transponder reader is now active.*



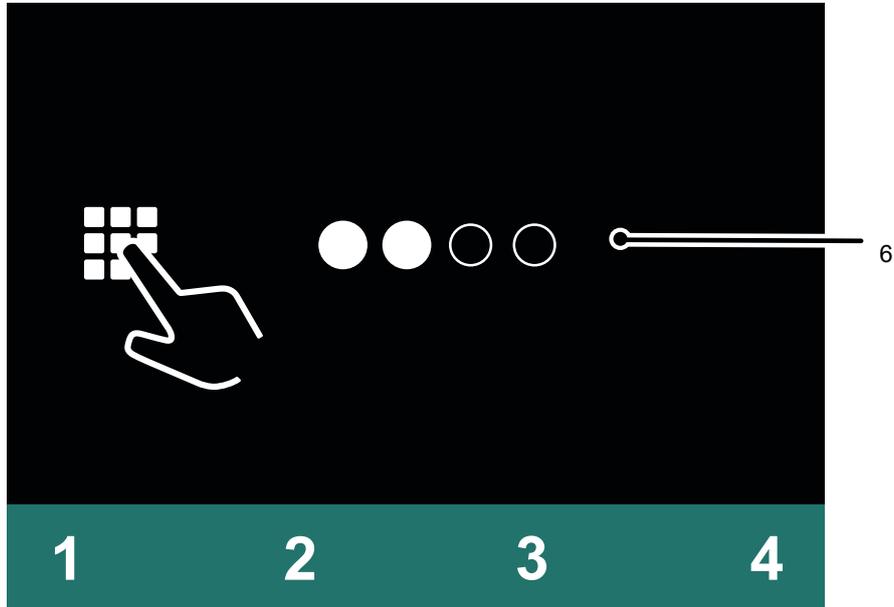
## 6.4 Keyless access system - display unit

### 6.4.1 Switching on the Truck with an Access Code

#### Procedure

- Release the emergency disconnect switch, see page 159.
- Enter the access code with the buttons below the display (6).

*The truck is switched on.*

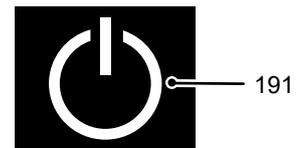


- The truck can only be switched on when the display unit (6) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

### 6.4.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (191) in the display unit.
- Press the Emergency Disconnect switch, see page 159.



*The truck is switched off.*

### 6.4.3 Changing the set-up code

#### Requirements

- The truck is switched on, see page 214.

#### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Change set-up code" symbol (187).
- Enter the set-up code using the keys below the display unit (6).

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

- Press the key below the "Delete" symbol (188).

*The set-up code is deleted.*

- Enter the new set-up code using the keys below the display unit (6).

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

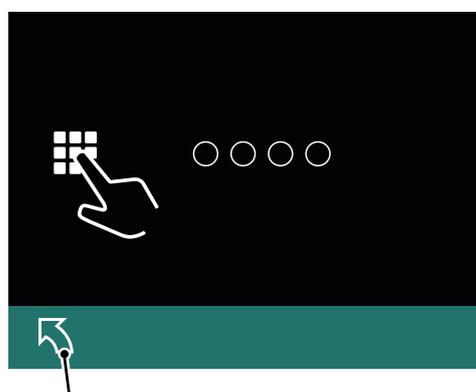
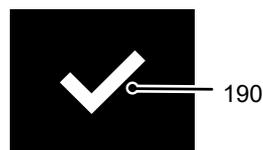
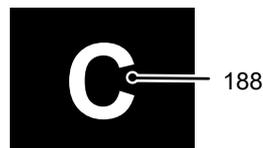
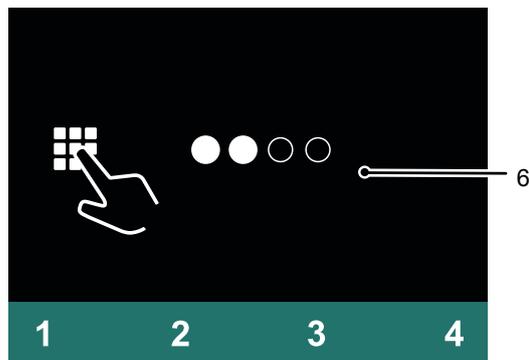
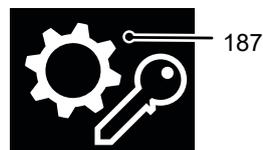
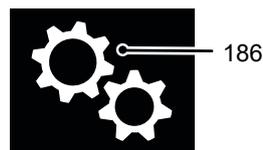
- Press the key below the "Confirm" symbol (190).

*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 (189).

*The set-up code has been changed.*



## 6.4.4 Adding a new access code

### Requirements

- The truck is switched on, see page 214.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Edit access code" symbol (192).

*The set-up code is requested.*

- Enter the set-up code using the keys below the display unit (6).

*All the access codes are displayed.*

- Press the key below the "Add" symbol (193).
- Enter the new access code using the keys below the display unit (6).

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

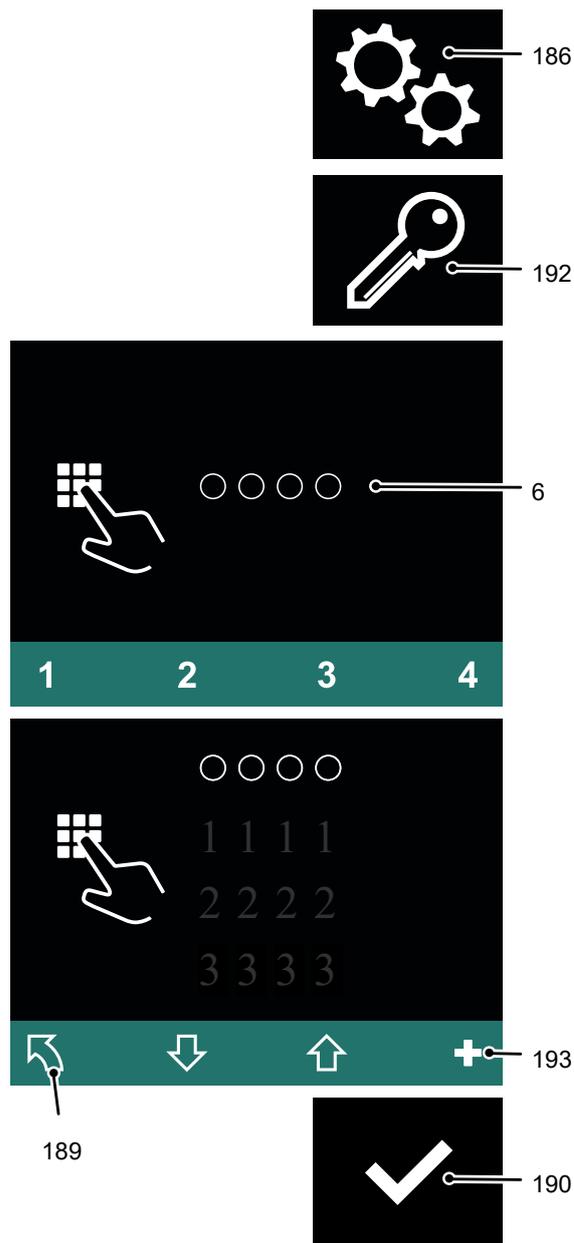
- Press the key below the "Confirm" symbol (190).

*The new access code is displayed.*

→ If the new access code has been entered incorrectly, delete it, see page 217, and add an access code again.

To return to the main menu, press the key below the "Back" symbol (189).

*A new access code has been added.*



## 6.4.5 Deleting an access code

### Requirements

- The truck is switched on, see page 214.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Edit access code" symbol (192).

*The set-up code is requested.*

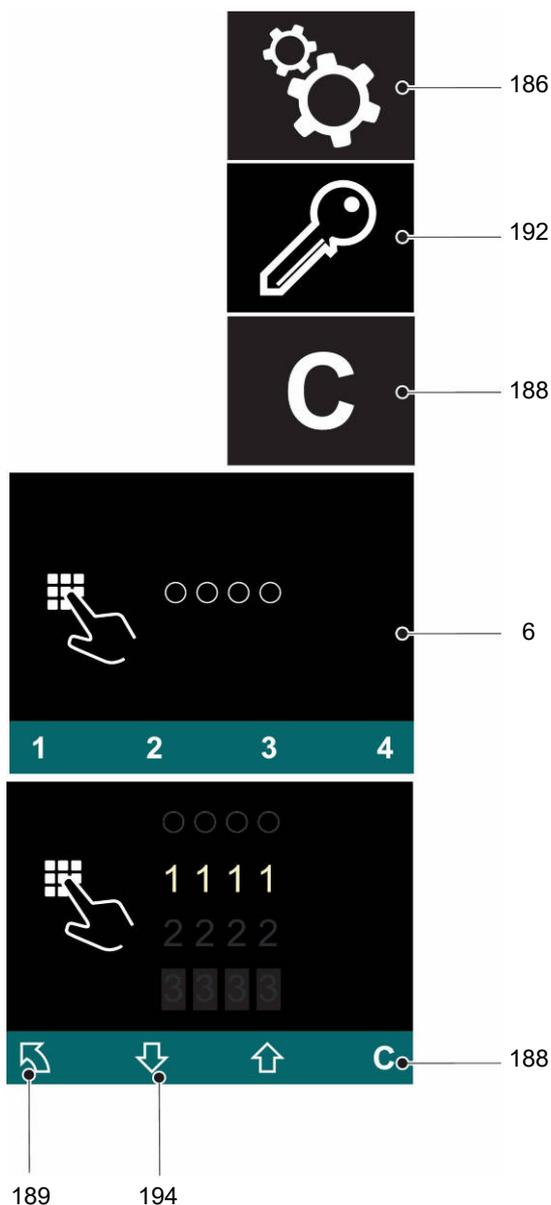
- Enter the set-up code using the keys below the display unit (6).

*All the access codes are displayed.*

- Select the access code to be deleted using the key below the "Down selection" symbol (194).
- Press the key below the "Delete" symbol (188).

*The access code has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (189).



## 6.4.6 Displaying the log-in history

The use of the last different access codes is displayed during the log-in process. The last log-in is displayed first.

- If multiple access codes are logged as being displayable simultaneously, the display area can be moved by scrolling forward or back.

### Requirements

- The truck is switched on, see page 214.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Log-in process" symbol (195).
- Enter the set-up code using the keys below the display unit (6).

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

- To scroll forward, press the button under the "Down selection" symbol (194) as many times as necessary.

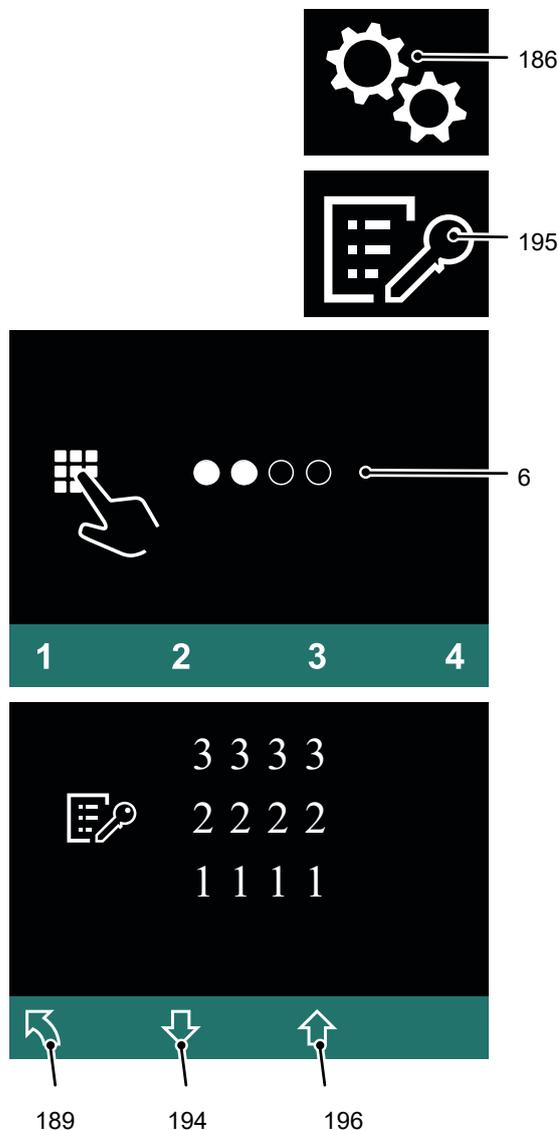
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (196) as many times as necessary.

*The display area moves: More recent log-ins are displayed.*

- To return to the main menu, press the key below the "Back" symbol (189).

*The log-in process is displayed.*



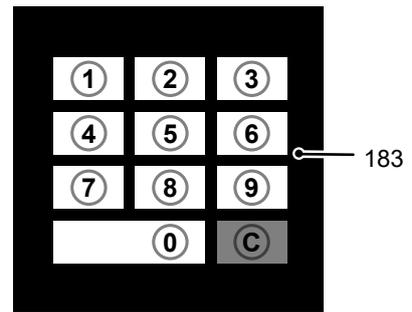
## 6.5 Keyless access system - keypad

### 6.5.1 Switching on the Truck with an Access Code

#### Procedure

- Release the emergency disconnect switch, see page 159.
- Enter the access code with the keypad (183).

*The truck is switched on.*



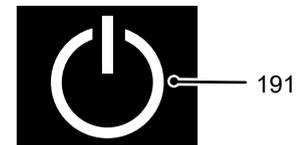
- The truck can only be switched on when the display unit (6) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

### 6.5.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (191) in the display unit.
- Press the Emergency Disconnect switch, see page 159.

*The truck is switched off.*



### 6.5.3 Changing the set-up code

#### Requirements

- The truck is switched on, see page 219.

#### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Change set-up code" symbol (187).
- Enter the set-up code using the keypad (183).

*The set-up code entered is shown in the display unit (6) as filled-in circles.*

- Press the key below the "Delete" symbol (188).

*The set-up code is deleted.*

- Enter the new set-up code using the keypad (183).

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

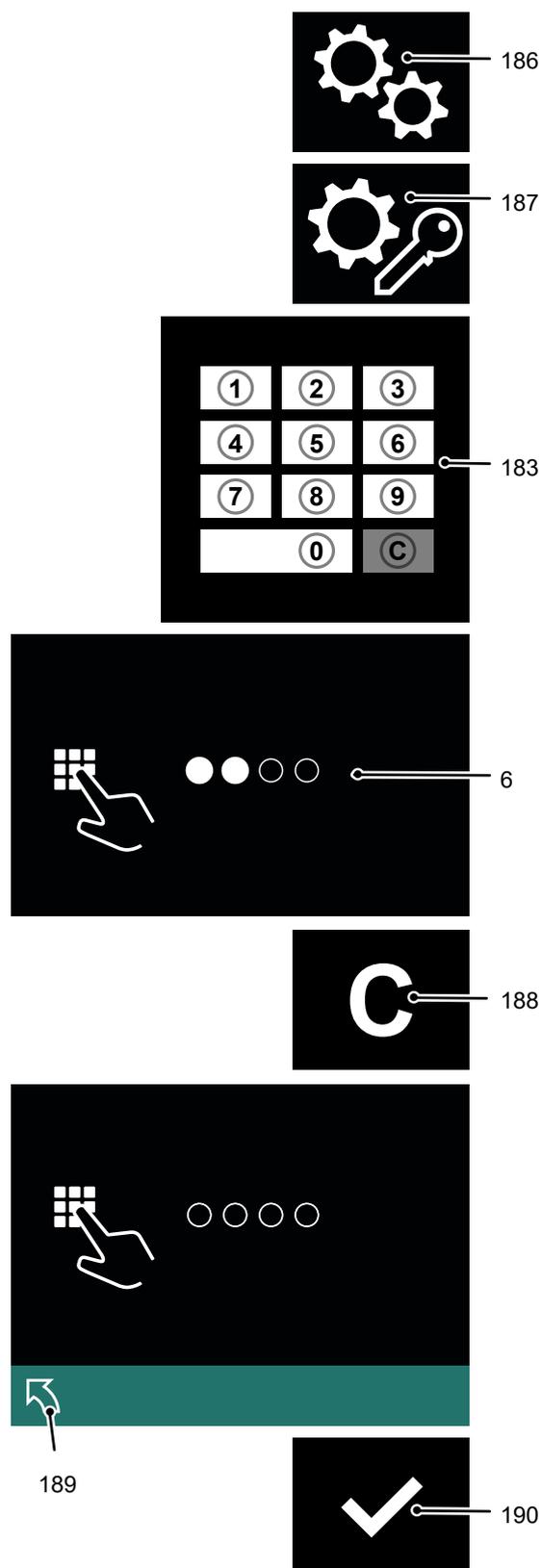
- Press the key below the "Confirm" symbol (190).

*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 (189).

*The set-up code has been changed.*



## 6.5.4 Adding a new access code

### Requirements

- The truck is switched on, see page 219.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Edit access code" symbol (192).

*The set-up code is requested.*

- Enter the set-up code using the keypad (183).

*All access codes are shown on the display unit (6).*

- Press the key below the "Add" symbol (193).
- Enter a new access code using the keypad (183).

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

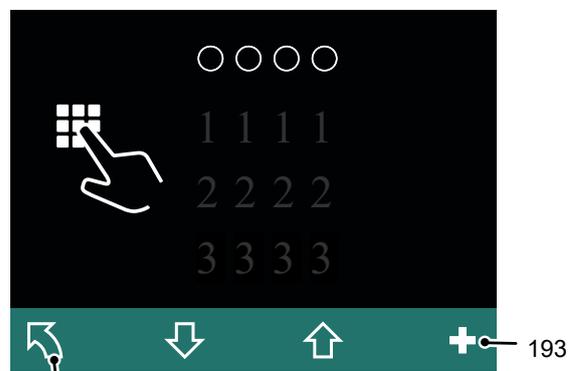
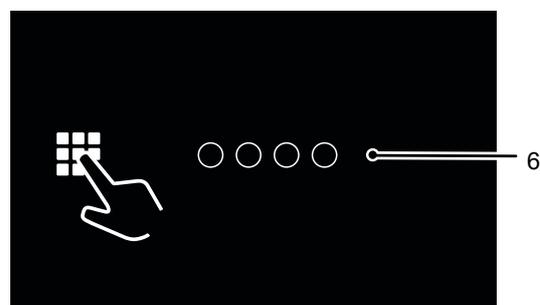
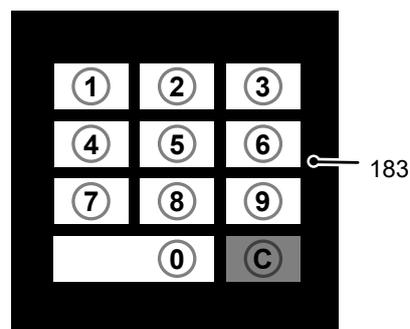
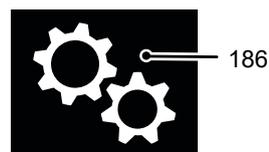
- Press the key below the "Confirm" symbol (190).

*The new access code is shown on the display unit (6).*

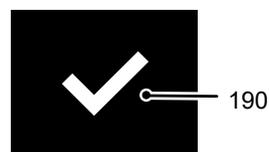
→ If the new access code has been entered incorrectly, delete it, see page 222, and enter the correct access code.

To return to the main menu, press the key below the "Back" symbol (189).

*A new access code has been added.*



189



## 6.5.5 Deleting an access code

### Requirements

- The truck is switched on, see page 219.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Edit access code" symbol (192).

*The set-up code is requested.*

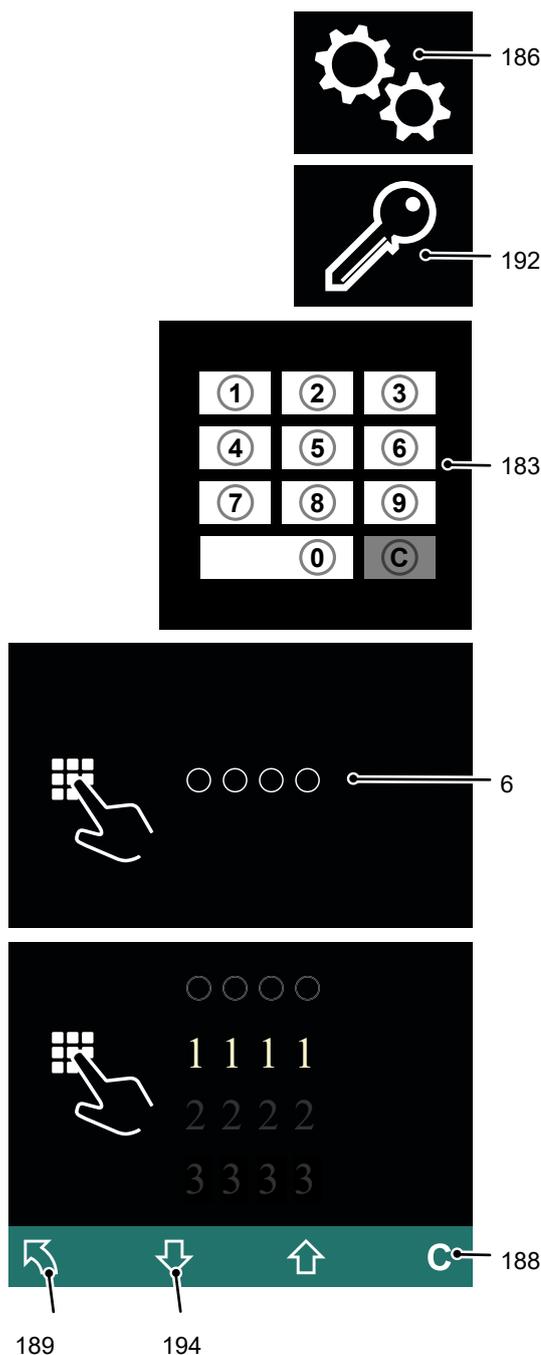
- Enter the set-up code using the keypad (183).

*All access codes are shown on the display unit (6).*

- Select the access code to be deleted using the key below the "Down selection" symbol (194).
- Press the key below the "Delete" symbol (188).

*The access code has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (189).



## 6.5.6 Displaying the log-in history

The use of the last different access codes is displayed during the log-in process. The last log-in is displayed first.

- If multiple access codes are logged as being displayable simultaneously, the display area can be moved by scrolling forward or back.

### Requirements

- The truck is switched on, see page 219.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Log-in process" symbol (195).
- Enter the set-up code using the keypad (183).

*The set-up code entered is shown in the display unit (6) as filled-in circles.*

- To scroll forward, press the button under the "Down selection" symbol (194) as many times as necessary.

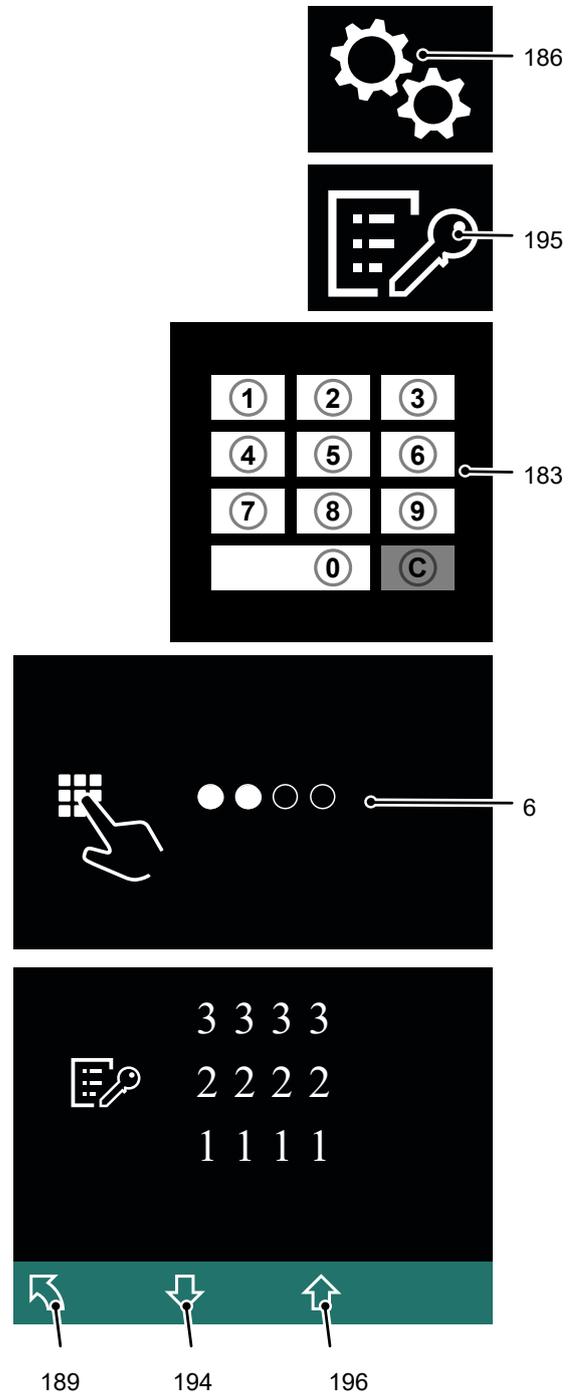
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (196) as many times as necessary.

*The display area moves: More recent log-ins are displayed.*

- To return to the main menu, press the key below the "Back" symbol (189).

*The log-in process is displayed.*



## 6.6 Keyless access system - transponder reader

### NOTICE

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

### 6.6.1 Switching on the truck with a transponder

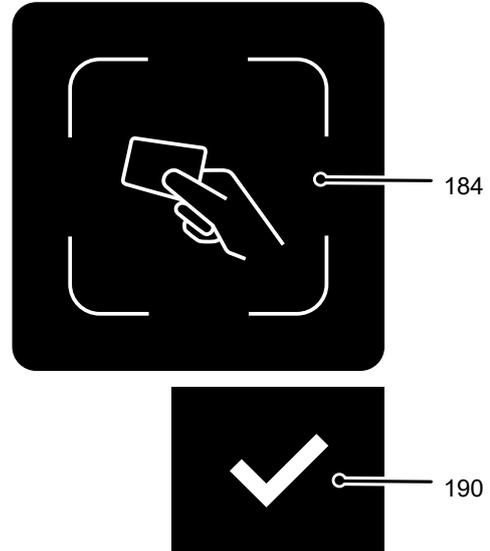
#### Procedure

- Release the Emergency Disconnect switch, see page 159.
- Hold the transponder in front of the transponder reader (184).

*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 (190).

*The truck is switched on.*



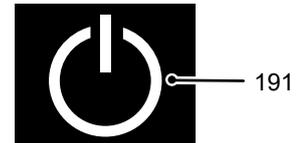
→ The truck can only be switched on when the display unit (6) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

### 6.6.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (191) in the display unit.
- Press the Emergency Disconnect switch, see page 159.

*The truck is switched off.*



### 6.6.3 Changing the set-up transponder

#### Requirements

- The truck is switched on, see page 224.

#### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Change set-up code" symbol (187).
- Place the set-up transponder on the transponder reader (184).

*The code of the set-up transponder is shown on the display unit (6).*

- Press the key below the "Delete" symbol (188).
- Place the new set-up transponder on the transponder reader (184).

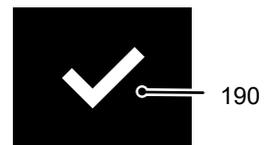
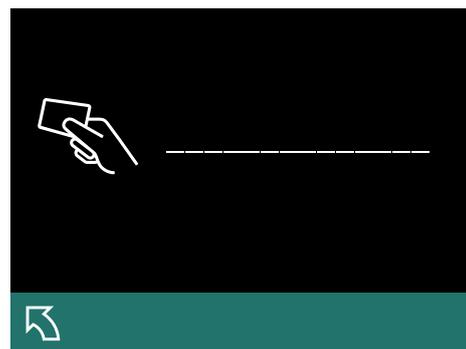
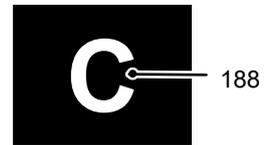
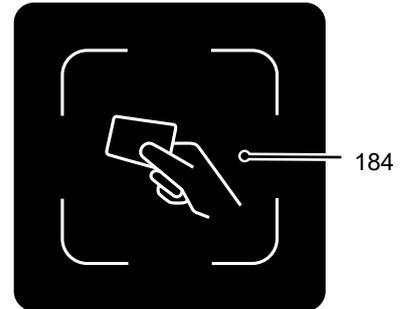
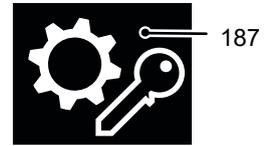
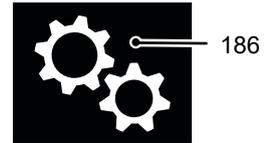
→ The new set-up transponder code must be different from existing transponder codes.

- Press the key below the "Confirm" symbol (190).  
*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 (188).

To return to the main menu, press the key below the "Back" symbol (189).

*The set-up transponder has been changed.*



189

## 6.6.4 Adding a new transponder

### Requirements

- The truck is switched on, see page 224.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Edit transponder" symbol (192).

*The set-up transponder is requested.*

- Place the set-up transponder on the transponder reader (184).

*All transponder codes are shown on the display unit (6).*

- Press the key below the "Add" symbol (193).
- Place the new transponder on the transponder reader (184).

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

- Press the key below the "Confirm" symbol (190).

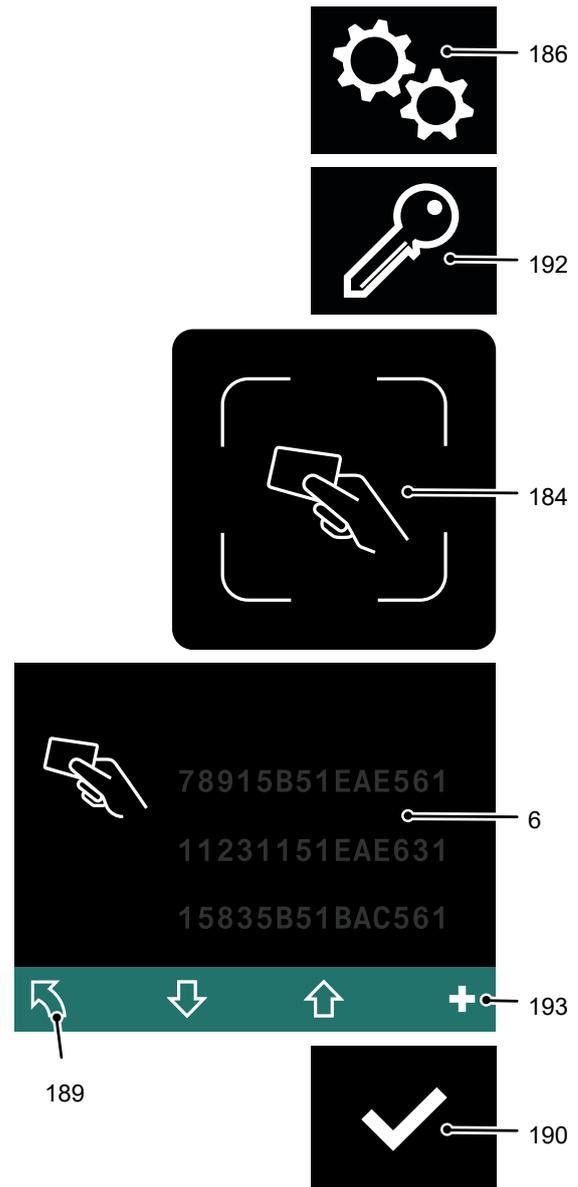
*The new transponder code is displayed.*

→ If the wrong transponder has been used, delete it, see page 227, and add a correct transponder.

To return to the main menu, press the key below the "Back" symbol (189).

*A new transponder has been added.*

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



## 6.6.5 Deleting a transponder

### Requirements

- The truck is switched on, see page 224.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Edit transponder" symbol (192).

*The set-up transponder is requested.*

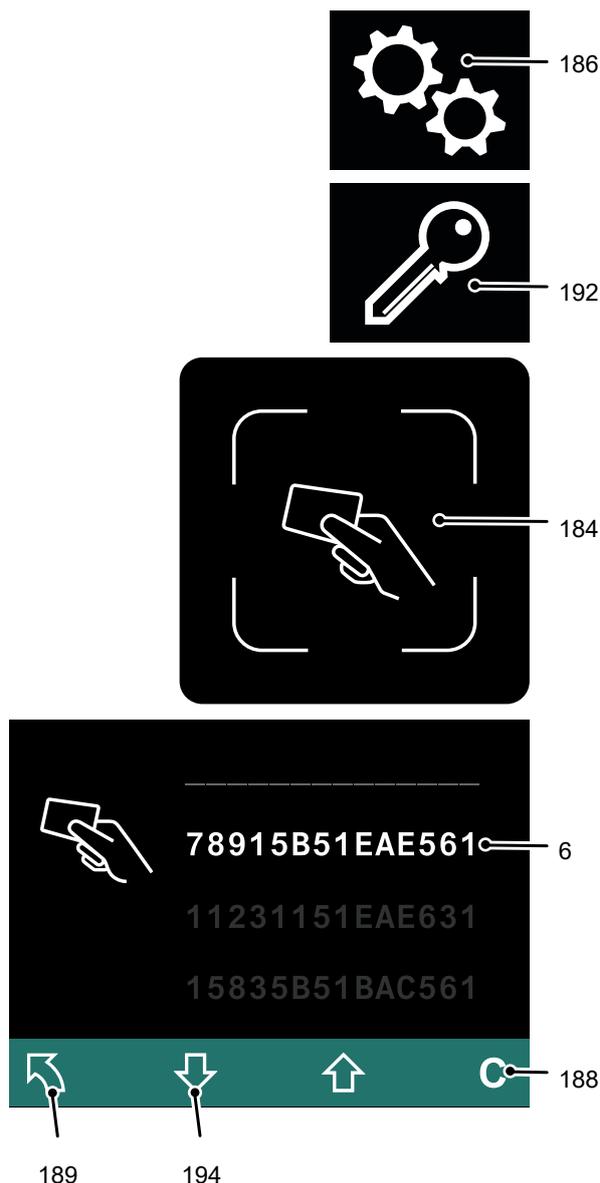
- Place the set-up transponder on the transponder reader (184).

*All transponder codes are shown on the display unit (6).*

- Select the transponder code to be deleted using the key below the "Down selection" symbol (194).
- Press the key below the "Delete" symbol (188).

*The transponder has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (189).



## 6.6.6 Displaying the log-in history

The use of the last different transponders is displayed during the log-in process. The last log-in is displayed first.

- If multiple transponders are logged as being displayable simultaneously, the display area can be moved by scrolling forward or back.

### Requirements

- The truck is switched on, see page 224.

### Procedure

- Press the key below the "Settings" symbol (186).
- Press the key below the "Log-in process" symbol (195).
- Place the set-up transponder on the transponder reader (184).
- To scroll forward, press the button under the "Down selection" symbol (194) as many times as necessary.

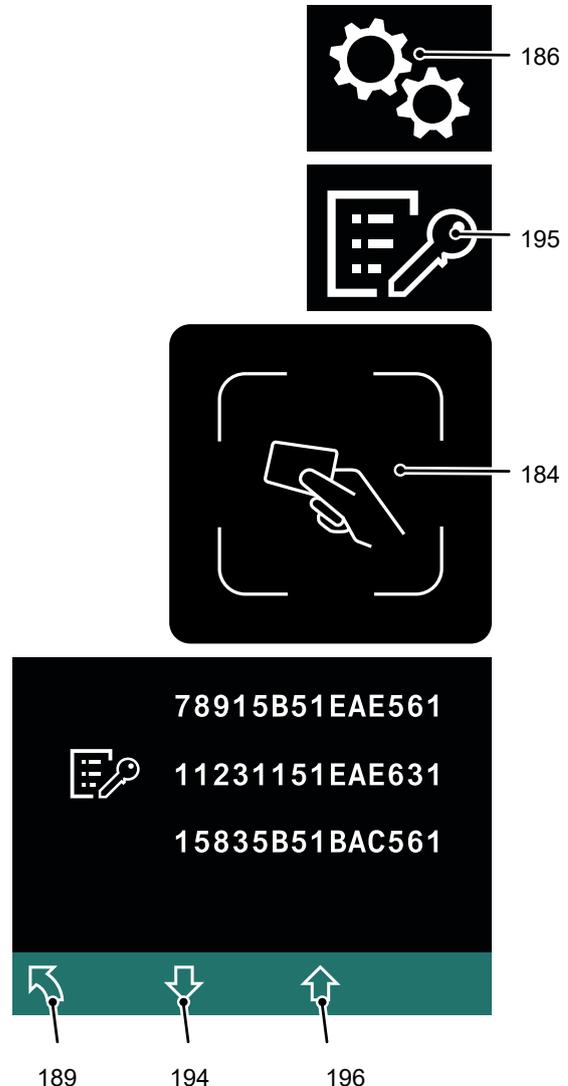
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (196) as many times as necessary.

*The display area moves: More recent log-ins are displayed.*

- To return to the main menu, press the key below the "Back" symbol (189).

*The log-in process is displayed.*



## 6.7 Tilt angle display

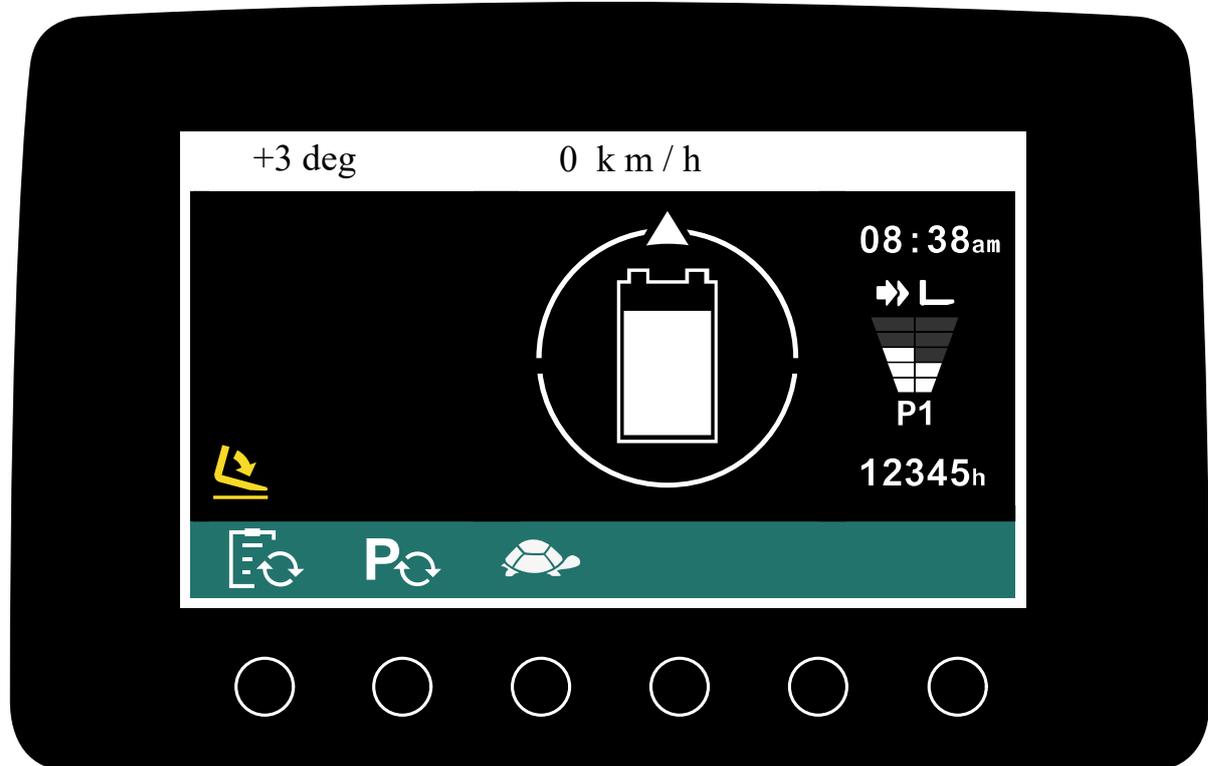
The tilt angle is shown in the information line and in the symbol field of the display unit.

- The mast tilt angle is determined relative to the truck (not relative to the axis of the earth).

### Tilt angle display on the display unit

Symbol	Meaning	Colour	Function
	Forks tilted back significantly	Yellow	Forks tilted back significantly, mast tilt $< -4^\circ$
	Forks tilted back slightly	Yellow	Forks tilted back slightly, mast tilt $-4^\circ$ to $-1^\circ$
	Fork tilt horizontal	Green	Forks horizontal, mast tilt $0^\circ$
	Forks tilted forward slightly	Yellow	Forks tilted forward slightly, mast tilt $+1^\circ$ to $+4^\circ$
	Forks tilted forward significantly	Yellow	Forks tilted forward significantly, mast tilt $> +4^\circ$

### Tilt angle display: Tilted forward slightly (+3°)



## 6.8 Steel cab

### **⚠ WARNING!**

#### **Risk of accidents due to fogged, icy mirrors and windows**

Windows (e.g. rear windscreen, front window) and mirrors may be fogged or iced up. This can lead to accidents and injuries.

▶ Always clean or de-ice the windows and mirrors before operation.

### **⚠ WARNING!**

#### **Open doors can result in accidents**

▶ Do not travel with an open door. When opening the door, make sure there is nobody in the door's swing range.

▶ Always close the door tightly and make sure it is locked.

▶ After closing the door, fasten the seat belt – see page 150.

### **⚠ CAUTION!**

#### **Risk of crushing from the cabin door**

You can trap hands or feet when the cabin door is opened and closed.

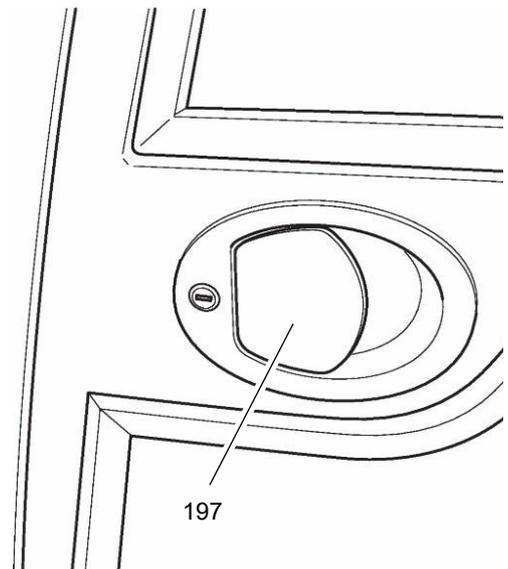
▶ Do not allow anything to come between the cabin frame/footwell and cabin door when opening and closing the cabin door.

The door can be opened by up to approx. 60°. If necessary, the gas strut of the door can be unhooked to open the door by up to approx. 180°.

#### ***Opening and closing the door***

##### *Procedure*

- To unlock the cab door, turn the key anti-clockwise.
- To lock the cab door, turn the key clockwise.
- To open the cab door, unlock the door and pull out the handle (197).
- To close the cab door, push the door back carefully until the lock audibly engages.



#### ***Opening and closing the door from inside the steel cab***

##### *Procedure*

- To open the cab door, operate the door opener on the inside of the door until the lock disengages and the door is slightly opened.
- To close the cab door, pull the door shut carefully until the lock audibly engages.



There is no facility for locking or unlocking the cab door in the inside.

## 6.8.1 Door Monitoring

### **⚠ CAUTION!**

#### **Accident risk when opening the cabin door during travel**

If the cabin door is opened while driving, the truck automatically brakes to a maximum speed of 4 km/h or comes to a standstill.

There is a risk of collision and injury when opening the cabin door while driving.

▶ Do not open the cabin door while driving.

---

### **⚠ CAUTION!**

#### **Risk of injury if the seat belt is not fastened**

The following must be observed for trucks with approved restraint systems:

- ▶ The seat belt also protects against injuries as a result of a rear-end collision.
  - ▶ In the case of trucks with multiple restraint systems, the use of the seat belt is not always mandatory. However, the manufacturer recommends the additional use of the seat belt, since the seat belt also prevents injuries caused by a rear-end collision for example.
- 

Trucks with cabin door monitoring may experience the following situations if the cabin door is not locked:

- The cabin door open symbol (see page 116) lights up in the display unit.
- The truck speed is limited to a maximum of 4 km/h or the travel cut-off is activated (○).
- An audible warning is emitted (○).

## 6.8.2 Split Door for the Steel Cabin

### **⚠ CAUTION!**

#### **Accident risk when opening the cabin door during travel**

If the cabin door is opened while driving, the truck automatically brakes to a maximum speed of 4 km/h or comes to a standstill.

There is a risk of collision and injury when opening the cabin door while driving.

▶ Do not open the cabin door while driving.

---

### **⚠ CAUTION!**

#### **Risk of crushing from the cabin door**

You can trap hands or feet when the cabin door is opened and closed.

- ▶ Do not allow anything to come between the cabin frame/footwell and cabin door when opening and closing the cabin door.
- 

### **⚠ CAUTION!**

#### **Risk of accident and collision when the front section of the split door is open**

The front section of the split door protrudes beyond the truck geometry when open.

- ▶ Observe the new truck geometry during travel and avoid collisions.
-

The front section of the door can be opened to approx. 180° and locked in the open position. The rear section of the door is fixed with screws and can be opened for maintenance work.

### **Opening the cabin door from the outside**

#### *Procedure*

- To unlock the cabin door, turn the key anti-clockwise.
- Unlock the cabin door and pull out the handle (200).
- Fold the cabin doors back until the front section (198) of the door audibly engages in the stop (201).

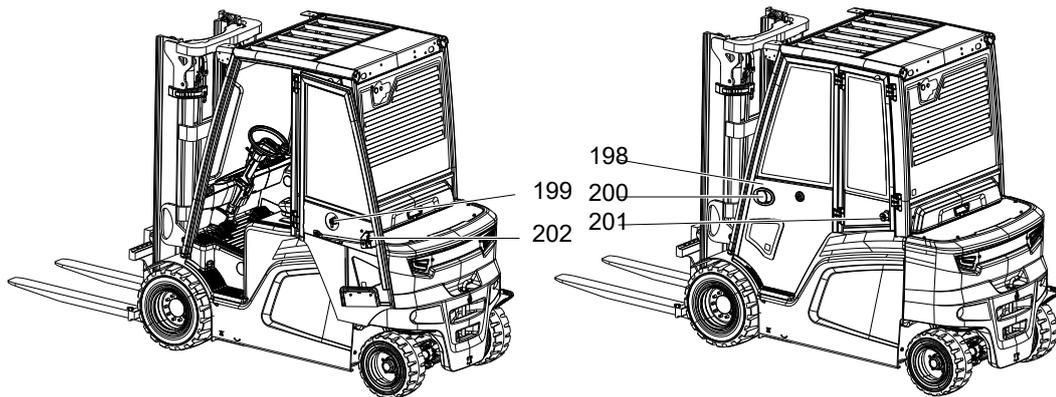
*The cabin door is open.*

### **Closing the cabin door from the outside**

#### *Procedure*

- To close the cabin door, actuate the turning mechanism (199) to release the stop (201) of the cabin door.
- Carefully push the cabin door into the lock until it audibly engages.
- To lock the cabin door, turn the key clockwise.

*The cabin door is closed.*



### **Opening the cabin door from the inside**

#### *Procedure*

- To open the cabin door, operate the door opener (202) on the inside of the door until the lock disengages and the door is slightly opened.

- ➔ If the cabin door is swivelled all the way back and locked in place, it can only be released from the outside using the turning mechanism (199).

*The cabin door is open.*

## ***Closing the cabin door from the inside***

### *Procedure*

- Before boarding, actuate the turning mechanism (199) and release the front section of the cabin door from the stop (201).
  - To close the cabin door, pull the door shut carefully until the lock audibly engages.
- When boarding the industrial truck, guide or hold the cabin door as it moves freely and is not cushioned by a gas strut.
- It is not possible to lock or unlock the inside of the cabin door.

*The cabin door is closed.*

## **6.8.3 Plastic Side Panels for the Steel Cabin**

### **⚠ CAUTION!**

#### **Risk of trapping due to zips on plastic side panels**

You can trap hands or fingers when the zips are opened and closed.

- ▶ When opening and closing the zips, there must be nothing between the zip halves.
- 

### **⚠ CAUTION!**

#### **Risk of cuts on the edges of the plastic side panels**

When opening and closing the zips, there is a risk of fingers and hands being cut by the edges of the plastic side panels.

- ▶ When opening and closing the zips, there must be nothing between the zip halves.
- 

### ***Opening and rolling up the plastic side panel – right-hand side***

#### *Procedure*

- Starting at the bottom right, open the zips (204). Only leave the top closed.
- Roll up the plastic side panel (205) and fasten with the press studs on the fixing straps (203).

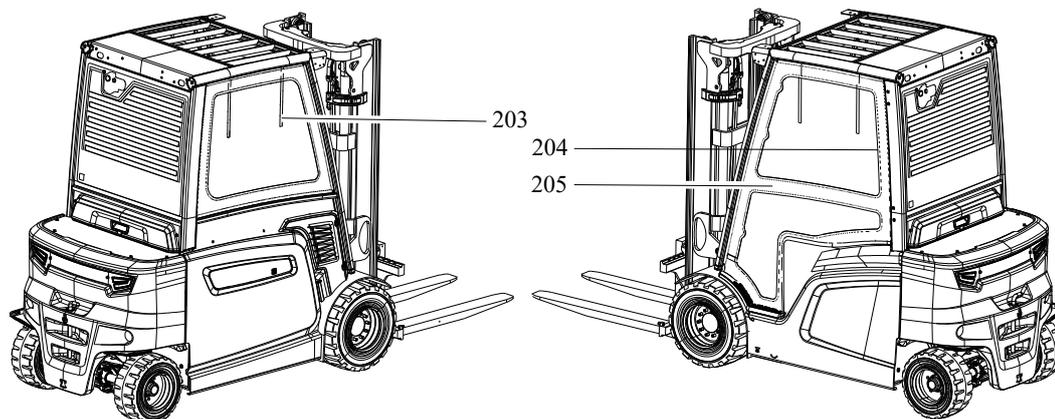
*The plastic side panel is rolled up.*

### ***Removing the plastic side panel – right-hand side***

#### *Procedure*

- Starting at the bottom right, fully open the zips (204) up to the top left corner.
- Unhook and remove the plastic side panel (205).

*The plastic side panel is now removed.*



### ***Attaching the plastic side panel – right-hand side***

#### *Procedure*

- Hang the plastic side panel (205) in the top left-hand corner.
- Fasten the zips (204) where necessary.

*The plastic side panel is installed.*

### ***Opening and rolling up the plastic side panel – left-hand side***

#### *Procedure*

- Open the zips (204). Only leave the top closed.
- Roll up the plastic side panel (205) and fasten with the press studs on the fixing straps (203).

*The plastic side panel is rolled up.*

### ***Removing the plastic side panel – left-hand side***

#### *Procedure*

- Fully open the zips (204) up to the top right corner.
- Unhook and remove the plastic side panel (205).

*The plastic side panel is now removed.*

### ***Folding the left-hand plastic side panel to the side***

#### *Procedure*

- Open the zips (204) completely at the front and only halfway at the top.
- Fold back the front plastic side panel (205) and attach to the B-pillar with magnets.

*The plastic side panel is folded to the side.*

## 6.9 Optional Cabin Interior Equipment

### **⚠ CAUTION!**

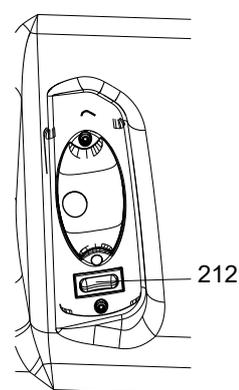
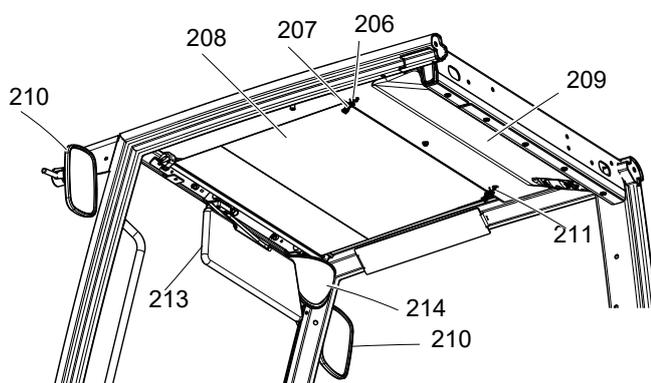
#### **Risk of injury if the sun blind is pulled together too quickly**

There is a risk of trapping your fingers when rolling up the sun blind.

► Carefully and slowly retract the sun blind when rolling it up.

#### **Possible cabin interior equipment:**

- Interior rear-view mirror (214)
- Exterior rear-view mirror (210)
- Sun visor (213)
- Sun blind (208) for the roof window
- Illuminated roof lining (209)



## **Unrolling the sun blind**

### *Procedure*

- To unroll the sun blind (208), use the tab (207) on the eyelets (206). Note: The tab is part of the eyelet and not a separate element.
- Carefully pull out the sun blind (208) and hook the eyelets (206) at the rear position on the hooks (211).

*The sun blind is now protecting against glare.*



To roll in, remove the eyelets (206) from the hooks (211) and carefully guide them back.

## **Adjusting the sun visor**

### *Procedure*

- Adjust the sun visor (213) manually by hand.

*The sun visor is now protecting against glare.*

## **Interior and exterior rear-view mirrors**

### *Procedure*

- Adjust the interior rear-view mirror (214) and exterior rear-view mirror (210) to suit the driver's ergonomics.
- Move the mirror into the desired position by hand.

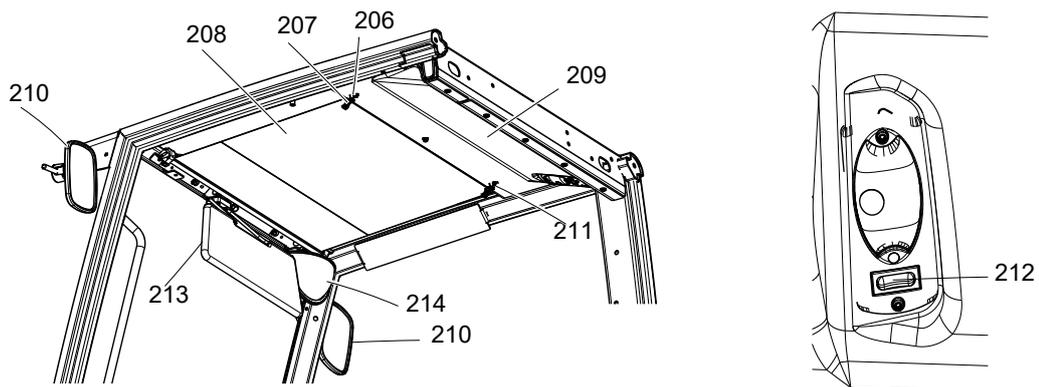
*The rear-view mirrors are now adjusted.*

## **Illuminated roof lining**

### *Procedure*

- Press the switch (212).

*The roof lining (209) lights up.*



## 6.10 Sliding windows

### **⚠ CAUTION!**

**An unlocked sliding window can cause accidents**

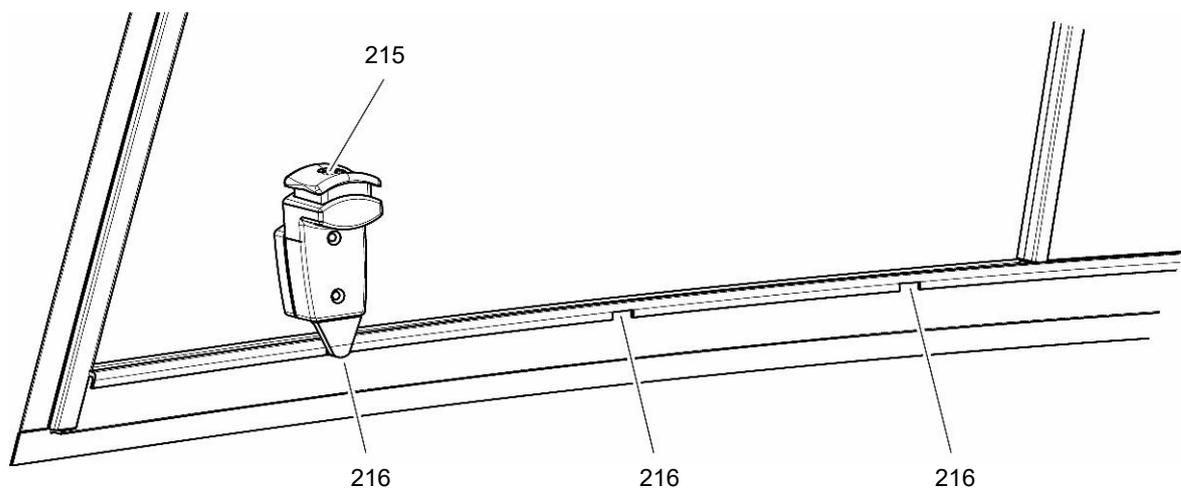
► The sliding windows must be locked at all times.

---

### ***Opening and closing windows***

#### *Procedure*

- Press the lock (215) down.
- Move the window forward or back.
- Engage the lock in the stop (216).



## 6.11 Gate

### **⚠ CAUTION!**

#### **Risk of accidents due to faulty swivelling gate**

- ▶ Never use the truck without a fully functional swivelling gate. Have the swivelling gate checked by authorised specialist personnel after an accident. Do not modify the swivelling gate.
  - ▶ Always close the swivelling gate fully and make sure it is locked in place.
  - ▶ After closing the swivelling gate, fasten the seat belt, see page 150.
- 

### **⚠ CAUTION!**

#### **Accident risk when opening the swivelling gate during travel**

If the swivelling gate is opened while driving, the truck automatically brakes to a maximum speed of 4 km/h or comes to a standstill.

There is a risk of collision and injury when opening the swivelling gate while driving.

- ▶ Do not open the swivelling gate while driving.
- 

### **⚠ CAUTION!**

#### **Risk of injury if the seat belt is not fastened**

The following must be observed for trucks with approved restraint systems:

- ▶ The seat belt also protects against injuries as a result of a rear-end collision.
  - ▶ In the case of trucks with multiple restraint systems, the use of the seat belt is not always mandatory. However, the manufacturer recommends the additional use of the seat belt, since the seat belt also prevents injuries caused by a rear-end collision for example.
- 

#### **What to do in hazardous situations**

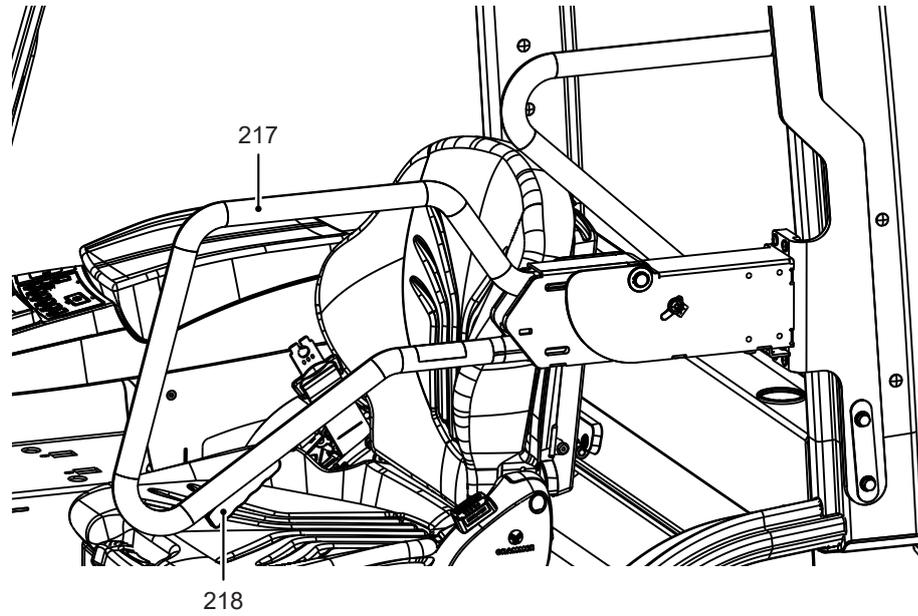
If the truck is about to tip over, do not loosen the seat belt. The operator must not jump off the truck. The operator must lean his upper body over the steering wheel and hold on with both hands. Tilt your body in the opposite direction of the tipping.

#### ***Folding gate operation***

##### *Procedure*

- To open the gate, (217) press the handle (218).  
*The gate automatically folds up and remains in this position.*
- To close the gate (217), press it down until it engages.

- ☞ The position of the gate is monitored. Travel is only enabled when the gate is closed.



Trucks with swivelling gate monitoring may experience the following situations if the swivelling gate is not locked:

- The "cabin door open" symbol lights up in the display unit.
- The truck speed is limited to a maximum of 4 km/h or the travel cut-off is activated.

## 6.12 Panel door

### **⚠ WARNING!**

#### **Open doors can result in accidents**

- ▶ Do not travel with an open door. When opening the door, make sure there is nobody in the door's swing range.
- ▶ Always close the door tightly and make sure it is locked.
- ▶ After closing the summer door, fasten the seat belt, see page 150.

### **⚠ CAUTION!**

#### **Accident risk when opening the summer door during travel**

If the summer door is opened while driving, the truck automatically brakes to a maximum speed of 4 km/h or comes to a standstill.

There is a risk of collision and injury when opening the summer door while driving.

- ▶ Do not open the summer door while driving.

### **⚠ CAUTION!**

#### **Risk of injury if the seat belt is not fastened**

The following must be observed for trucks with approved restraint systems:

- ▶ The seat belt also protects against injuries as a result of a rear-end collision.
- ▶ In the case of trucks with multiple restraint systems, the use of the seat belt is not always mandatory. However, the manufacturer recommends the additional use of the seat belt, since the seat belt also prevents injuries caused by a rear-end collision for example.

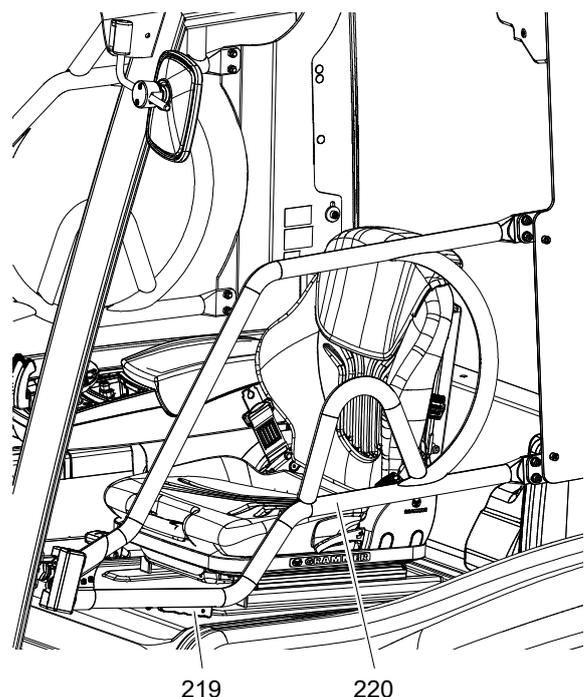
#### **What to do in hazardous situations**

If the truck is about to tip over, do not loosen the seat belt. The operator must not jump off the truck. The operator must lean his upper body over the steering wheel and hold on with both hands. Tilt your body in the opposite direction of the tipping.

#### **Summer door operation**

##### *Procedure*

- Pull the handle (219) towards the operator position, the door swings open.
- Pull the door (220) towards the operator until the lock engages; the door closes.



Trucks with summer door monitoring may experience the following situations if the summer door is not locked:

- The cabin door open symbol lights up in the display unit (see page 116).
- The truck speed is limited to a maximum of 4 km/h or the travel cut-off is activated.

## 6.13 Operator position extension

### **⚠ DANGER!**

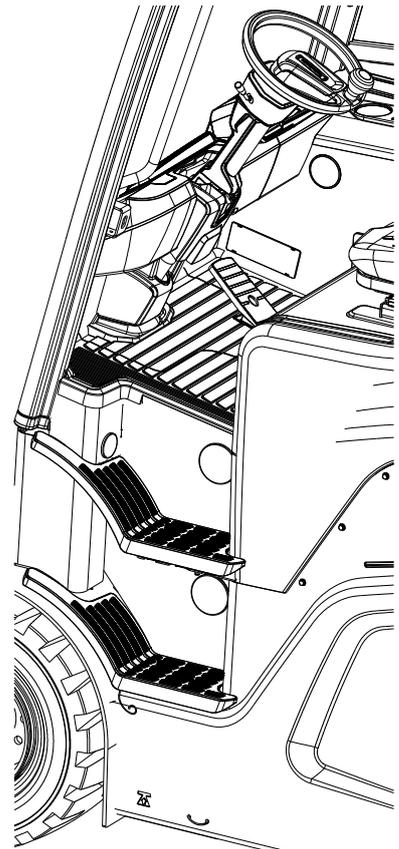
#### **Altering the tilt resistance can be dangerous**

The lateral tilt resistance reduces with a higher truck centre of gravity.

The height above the overhead guard ( $h_6$ ) increases by 150 mm / 300 mm, see page 37.

► Adapt the travel speed of the truck, in particular when cornering.

- For entry and exit see page 141.
- Note the increased height through operator position extension when using the emergency exit – see page 298.



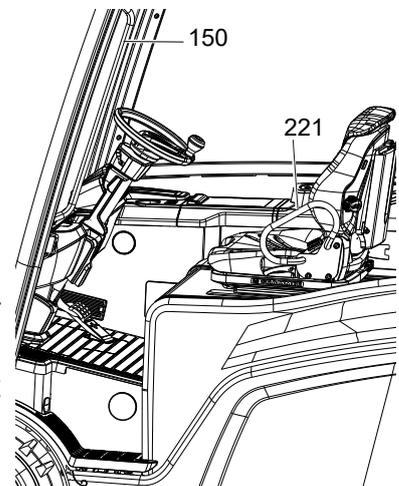
## 6.14 Entering or exiting with the hip restraint on the driver's seat

### *Requirements*

- Truck stationary.

### *Procedure*

- Open the cab door (if applicable) (○).
- To enter and exit, use the step and hold onto the handle (150) with one hand.
- Choose a third point of contact on the truck for support, e.g. hip restraint (○) (221), a floor plate as an additional step, the battery panel, the driver's seat or the B-pillar.
- Always face the truck when entering and exiting.



- Always use the entry aids provided to climb onto the truck.
- An additional step is provided for the driver position extension (○).

## 6.15 Heater, fan, air conditioning system

### 6.15.1 Heating

The heater and ventilation are operated via the control panel. The controls are illuminated.

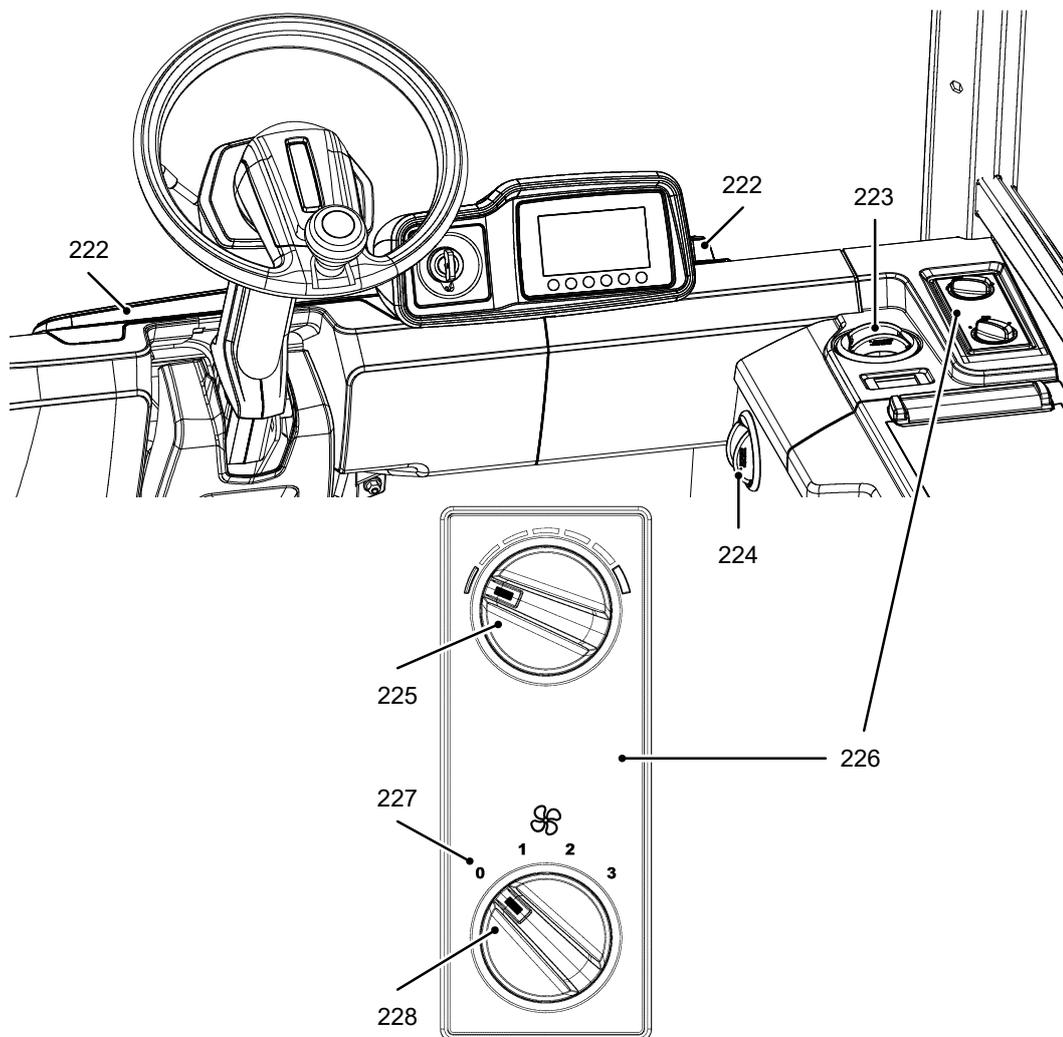
- Regular maintenance is required to ensure that the air-conditioning system functions correctly – see page 363.

At the latest, when only a reduced air flow with increased temperature comes out of the air flow jets, the air filter is used up and must be replaced immediately.

#### ***Operating the heater and ventilation***

##### *Procedure*

- Actuate the fan controller (228) to set the operating mode and ventilation: no operation mode (227) or manual mode with low to high ventilation.
  - Adjust the air flow jets (223, 224) to modify the air flow.
- Do not direct air flow jets towards persons.  
Do not cover the air flow jets with objects and do not use them to store objects.
  - Turn the temperature controller (225) clockwise to increase the required cabin temperature. Turn the temperature controller (225) anticlockwise to decrease the required cabin temperature.



Item	Description	Item	Description
222	Windscreen jets	226	Control panel
223	Body jet	227	Off position
224	Footwell jet	228	Fan controller
225	Temperature controller		

## 6.15.2 Air Conditioning and Heater

### **⚠ CAUTION!**

#### **Too great a temperature difference affects health**

- ▶ When operating the air-conditioning system, do not exceed a temperature difference of 6 °C in relation to the air outside.
  - ▶ Keep doors and windows closed when operating the air-conditioning system.
  - ▶ Do not direct air flow jets towards persons.
  - ▶ There must be no draught interference.
- 

The heating, ventilation and air conditioning are operated via the control panel. The controls and buttons are illuminated.

- ➔ Buttons that have been switched on can be switched off by actuating them again. Buttons that are switched on are brightly lit; buttons that are switched off are dimly lit.

In automatic mode, the ventilation, heating and air conditioning are regulated automatically in order to achieve the desired cabin temperature setting.

- ➔ The air conditioning system must be switched on at least once a month for approx. 10 minutes to recirculate the refrigerant.

When the air conditioning system is operating condensation water may be visible underneath the truck.

Regular servicing of the air conditioning system is required to ensure it can work at a consistently high level, see page 363.

At the latest, when only a reduced air flow with increased temperature comes out of the air flow jets, the air filter is used up and must be replaced immediately.

### ***Operating the heating, ventilation and air conditioning***

#### *Procedure*

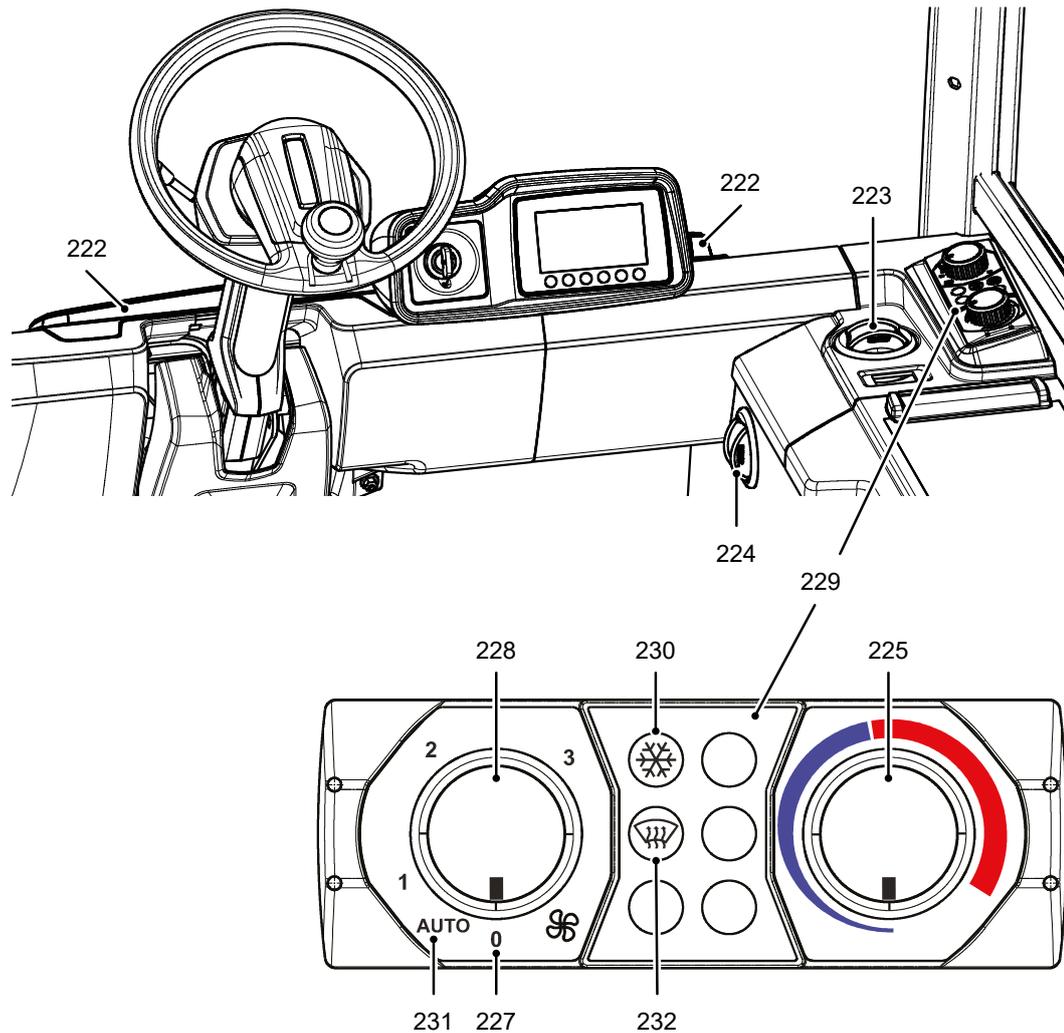
- Actuate the fan controller (228) to set the operating mode and ventilation: no operation mode (227), automatic mode (231) or manual mode with low to high ventilation.
- Adjust the air flow jets (223, 224) to modify the air flow.
- ➔ Do not direct air flow jets towards persons.  
Do not cover the air flow jets with objects and do not use them to store objects.
- Turn the temperature controller (225) clockwise to increase the required cabin temperature. Turn the temperature controller (225) anticlockwise to decrease the required cabin temperature.
- Switch on the cooling button (230) to manually activate the air conditioning for cooling and air dehumidifying.
- Switch on the de-icing button (232) to direct the air flow exclusively to the front window to blow clear.

## Using the air conditioning for temporary dehumidification in high air humidity and high temperatures

### Procedure

- Turn the fan controller (228) clockwise as far as the stop.
- Switch on the cooling button (230).
- Adjust the temperature controller (225) according to the outside temperature.
- Adjust the air flow jets (223, 224) to modify the air flow.
- Open the rear sliding window a fraction.

→ After temporary dehumidifying, reset the settings and close the rear sliding window.



Item	Description	Item	Description
222	Windscreen jets	228	Fan controller
223	Body jet	229	Control panel
224	Footwell jet	230	Cooling button
225	Temperature controller	231	Automatic mode
227	Off position	232	De-icing button

## 6.16 Switching off the operating hydraulics

All functions of the working hydraulics (lifting, tilting, ZH1, ZH2, ZH3) can be cut off via the display unit keypad or using the buttons on the armrest control panel.

### Button assignment

Symbol	Meaning
	Cut-off of all working hydraulics functions

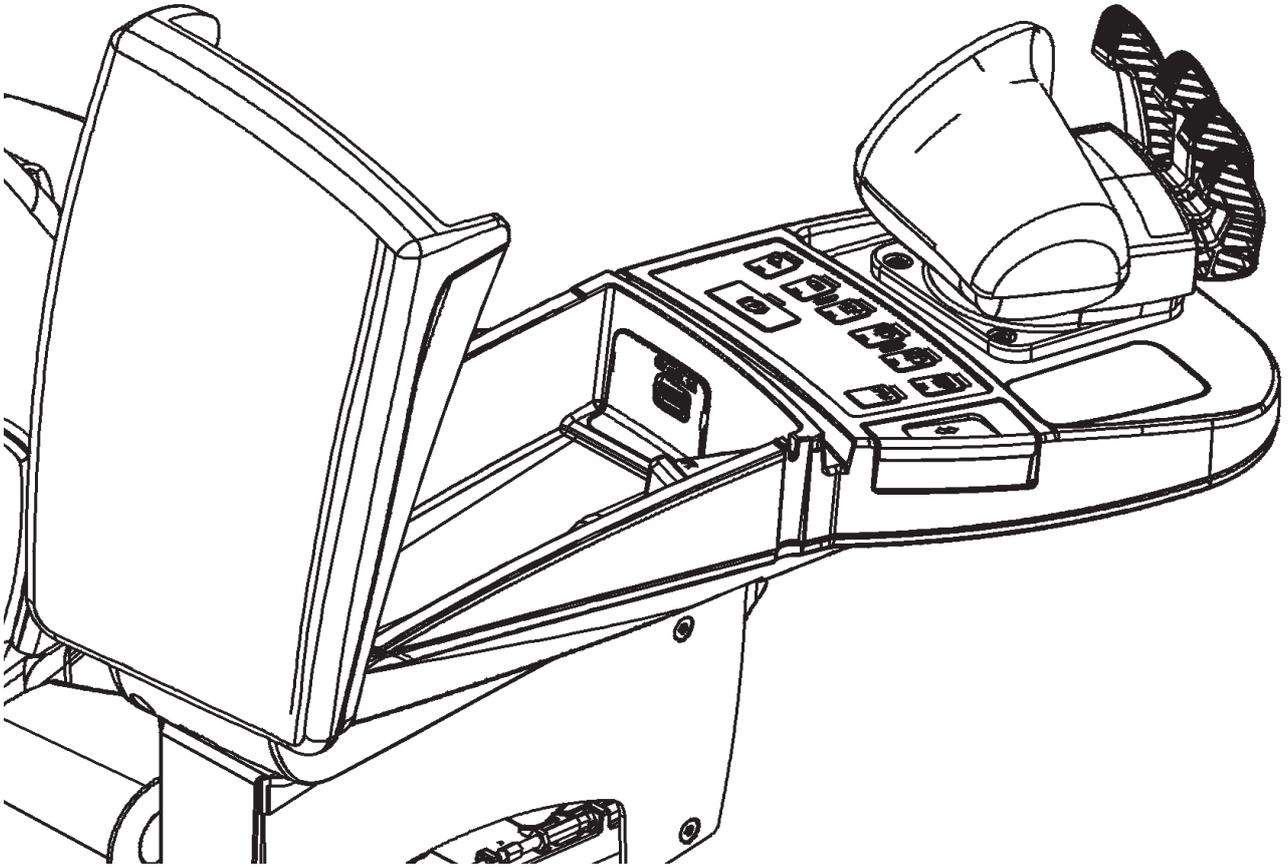
### Appearance on the display unit

Symbol	Meaning	Colour	Function
	Working hydraulics cut-off	Yellow	Cut-off activated

## 6.17 USB Charger Module in Armrest

The USB charger module is designed for charging electrical devices such as smart phones etc. and is located in the storage facility in the armrest.

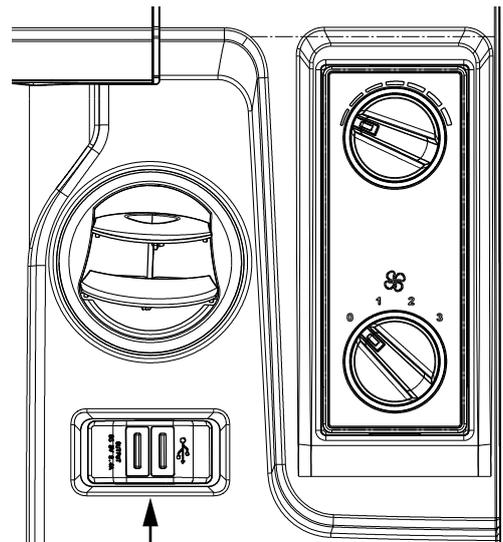
Connection data: 5 V, max. 1 A



## 6.18 USB Charger Module in Storage Facility

The USB charger module is designed for charging electrical devices such as smart phones and is located in the front-right storage facility.

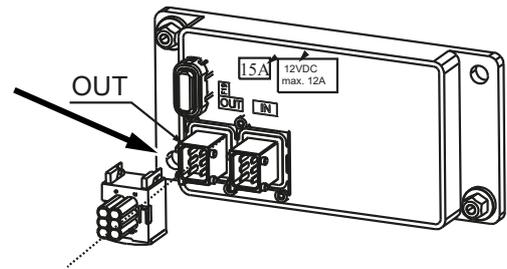
Connection data: 5 V, max. 2.4 A



## 6.19 Voltage Transformer

### Power supply in the rear under the service access

- Optional power supply
- 12 V / 150 W or 24 V / 150 W version

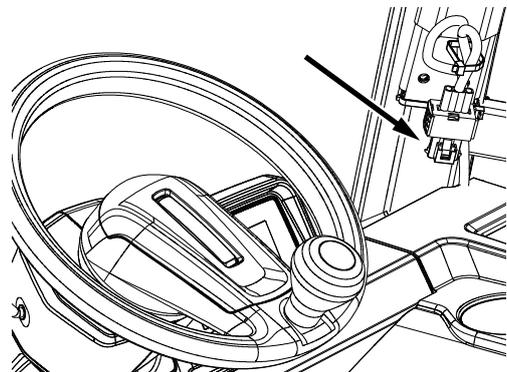


#### Connection assignment

Pin	12 V / 150 W version	24 V / 150 W version
4	12 V	24 V
5	0 V	0 V

### Power supply at the front right at the A-strut

- Optional power supply
- 12 V / 150 W or 24 V / 150 W version

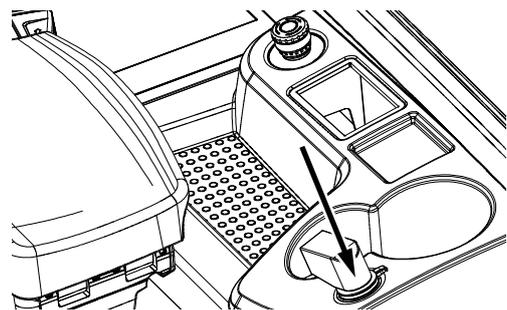


#### Connection assignment

Pin	12 V / 150 W version	24 V / 150 W version
1	12 V	24 V
2	0 V	0 V
3	GND	GND

### Power supply in the right-hand storage facility

- Optional power supply
- 12 V / 150 W or 24 V / 150 W version
- The two-pin socket is located to the right of the seat in the storage facility.



#### Connection assignment

Pin	12 V / 150 W version	24 V / 150 W version
1	12 V	24 V
2	0 V	0 V

## 6.20 Sound module

→ Only when equipped with display unit with 4-inch display

### ⚠ WARNING!

#### Warning of distraction and hearing damage if the volume is too high

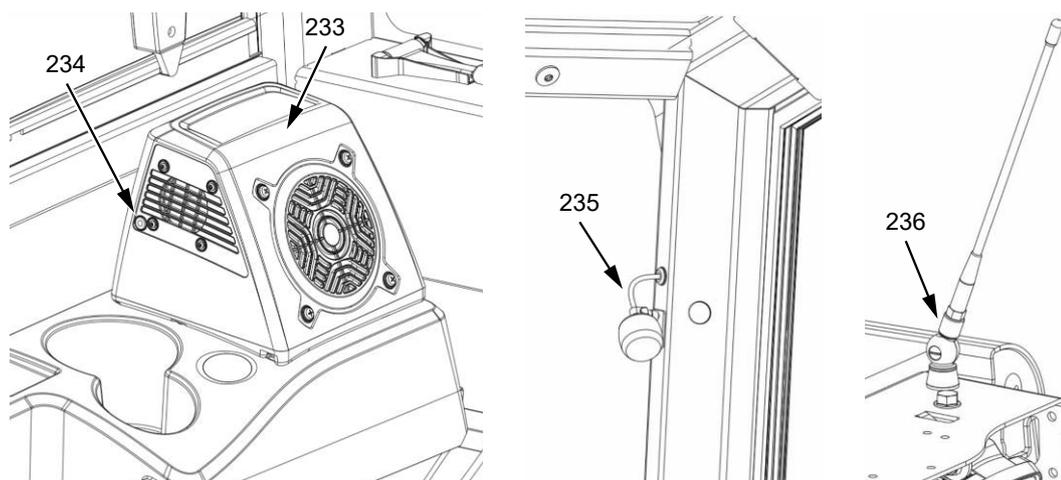
Operating the sound module during travel and excessive volume can lead to reduced attention and perception of dangers, as well as hearing damage to the operator.

- ▶ Operate the sound module only when the industrial truck is stationary, not when it is in use.
- ▶ Select the appropriate volume to be able to perceive dangers and warning signals.

Information from the "Sound module Premium" entertainment system (233) is shown in the text line of the display unit.

The audio signals and audio files of a digital end device (e.g. smartphone) can be transmitted via a Bluetooth® connection.

The analogue input "Aux In" (234) enables the playback of audio signals. The hands-free system (235) can be used with a digital device via a Bluetooth connection. The antenna module (236) provides radio reception (DAB +, FM).



The "media player" button function can be displayed on the display unit via the buttons of the armrest control panel, see page 112.

When pressed, the "Sound module Premium" is switched on.

→ Upon activation, the sound module is visible for 60 seconds as the "Jungheinrich sound module" Bluetooth device.

Symbol	Meaning
	Media player option menu Switching on "Sound module premium"

## 6.20.1 Bluetooth pairing

### **Set up a Bluetooth connection to a digital end device**

#### *Requirements*

- Digital end device with Bluetooth functionality within range
- Sound module activated

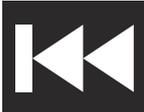
→ Upon activation, the sound module is visible for 60 seconds as the "Jungheinrich sound module" Bluetooth device.

- If the sound module is no longer visible as the "Jungheinrich sound module" Bluetooth device, select the "Bluetooth pairing" function via the options menu. After you have selected this option, the sound module is visible for 60 seconds as the "Jungheinrich sound module" Bluetooth device.
- Initiate the search for visible Bluetooth devices on the digital end device and select the "Jungheinrich sound module" entry to establish the connection.
- In order to play audio files, verify that the "Jungheinrich sound module" entry on the digital end device has the necessary authorisation. Adjust the authorisation if necessary.
- In order to use the hands-free system, verify that the "Jungheinrich sound module" entry on the digital end device has the necessary authorisation. Adjust the authorisation if necessary.

*Bluetooth connection has been set up.*

## 6.20.2 Sound module premium

### **Button assignment in media player options menu**

Symbol	Meaning
	Playback control of the audio source connected via Bluetooth® (where supported and available): Play the current audio file from the beginning, play the previous audio file, skip back to previous audio files
	"FM" radio: Station selection – select the previous available station
	"DAB": Select the previous station in the station list (press button for less than 2 seconds), start the automatic station scan (press button for more than 2 seconds)
	Playback control of the audio source connected via Bluetooth® (where supported and available): Play the next audio file, skip to next audio files
	"FM" radio: Station selection – select the next available station
	"DAB": Select the next station in the station list (press button for less than 2 seconds), start the automatic station scan (press button for more than 2 seconds)

Symbol	Meaning
	Reduce volume → Press and hold the button to mute.
	Increase volume
	Sound module settings menu
	Back: Returns to the previous menu.

### Button assignment in sound module settings menu

Symbol	Meaning
	Switch off the sound module
	Source selection: Switch between "FM" radio, "DAB" radio, an audio source connected via Bluetooth® ("Bluetooth", only when connected to digital end device) and an audio signal connected to the analogue input "Aux In"
<b>BASS</b>	Bass intensity setting: Gradual increase (0 (default), I, II, III) and decrease
<b>TREB</b>	Treble intensity setting: Gradual increase (0 (default), I, II, III) and decrease
	Hands-free system settings menu, with "Bluetooth pairing" function → The settings menu for the hands-free system can be accessed directly with a double-press of the FN button.
	Back: Returns to the previous menu.

## Button assignment in hands-free system options menu (○)

Symbol	Meaning
	Answer incoming phone call End current phone call
	Mute
	Reduce volume → When pressed, the volume is muted.
	Increase volume
	Bluetooth pairing – see page 250
	Back: Returns to the previous menu.

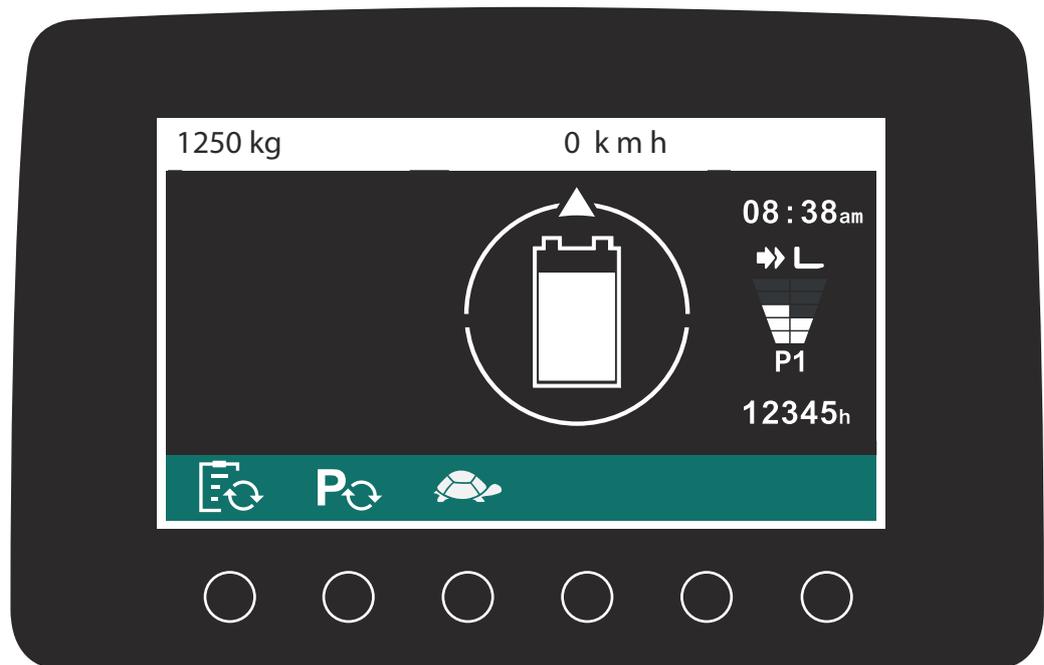
- The settings menu for the hands-free system can be accessed directly with a double-press of the FN button.
- As soon as a phone call is received on the connected phone, the current menu automatically switches to the hands-free options menu.

## 6.21 Load Weighing

→ Only when equipped with display unit with 4-inch display

The integrated load weighing system measures the weight continuously with a tolerance of 5 % of the rated capacity. For industrial trucks with load damping, the tolerance increases in the upper range of the capacity to 10 % of the rated capacity. The weighing system is not a substitute for calibrated scales.

The load is determined for every lifting and lowering process that lasts longer than 1 second. When the load weighing function is activated via the keypad on the display unit or via the buttons on the armrest control panel (see page 112) or after switching the information line accordingly, the result is shown in the information line of the display unit.



## 6.22 Load Weighing Plus

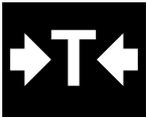
Load weighing plus expands the load weighing function with a controllable tare and total function in order to, for example, compensate for the weight of an attachment and to track the total weight when loading a lorry.

The display unit shows the current net individual weight and, after an "S", also shows the number and total weight of the individual weights saved.

Load weighing plus can be expanded via the individual weights option (○) in order to display and save individual weights.

Symbol	Meaning
	Information field toggle: Changes the information displayed in the information bar.
	Opens the load weighing menu

### Button allocation in load weighing plus option menu (○)

Symbol	Meaning
	Save the currently recorded individual weight as tare → Tare: Difference between the currently recorded gross individual weight and the net individual weight currently shown → Compensate for the weight of an attachment
	Total function: Add the currently shown net individual weight to the total weight, increase the number of weights recorded
	Total function: Subtract the currently shown net individual weight from the total weight, reduce the number of weights recorded → Reset the addition of a net individual weight
	Set zero point: Reset the total weight, the number of weights recorded and all saved net individual weights (○)
	Last weights: Individual weights submenu (○)
	Back: Returns to the previous menu.

## Button allocation in individual weights submenu (○)

Symbol	Meaning
	Reset the addition of the last net individual weight
	Last weights
	Back: Returns to the previous menu.

## 6.23 Removable load backrest

### **⚠ CAUTION!**

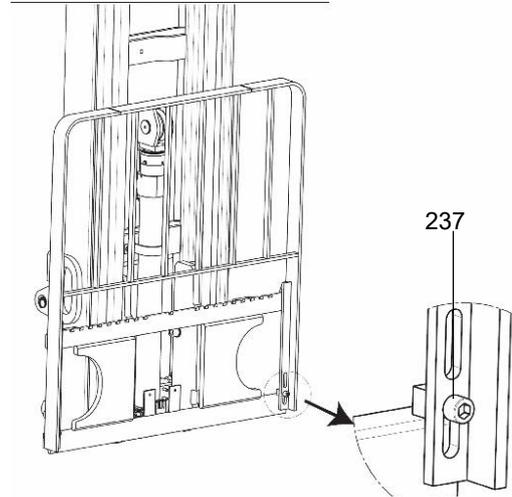
#### **Trapping hazard and heavy load backrest weight**

- ▶ Wear safety gloves and safety shoes when carrying out this operation.
- ▶ Two people are required to remove and attach the load backrest.

#### ***Load backrest disassembly***

##### *Procedure*

- Loosen the screws (237).
- Remove the load backrest from the fork carriage and put it down securely.
- Fit the fork retaining screws.



#### ***Load backrest assembly***

##### *Procedure*

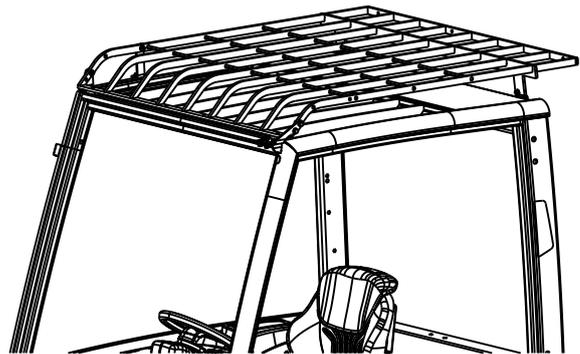
- Attach the load backrest to the top rail of the fork carriage.
- Fit the bolts and tighten them with a torque wrench.

→ Tightening torque = 85 Nm

## 6.24 Roof Protective Grille

The roof protective grille increases the protection of the overhead guard in the roof window area and protects the operator from falling loads.

→ Due to the roof safety grille, the height  $h_6$  (see page 37) is increased by approx. 150 mm.



## 6.25 Load damping

### **⚠ WARNING!**

#### **Risk of injury from energy-storing pressure vessels**

The hydraulic accumulator is a pressure vessel connected to the hydraulic line with a membrane and a compressed gas (nitrogen) under pre-charge pressure. Pressurised components and fluids can cause severe injury.

If the pressure in the hydraulic line increases, the pressure on the membrane also increases and the gas is further compressed. If the pressure in the hydraulic line falls, the energy created during the additional compression of the gas is released and the pressure in the hydraulic line rises again.

- ▶ Do not touch pressurised hydraulic lines.
- ▶ Report any defects immediately to your supervisor.
- ▶ Tag out the defective truck and take it out of service.
- ▶ Do not return the truck to service until the fault has been identified and rectified.
- ▶ Depressurise the hydraulic system before carrying out repair or maintenance work on the load damping components, see page 314.
- ▶ Repair and maintenance work on the hydraulic accumulator may only be carried out by a customer service department trained by the manufacturer:  
Do not change the gas or pre-filling pressure of the hydraulic accumulator. Do not open the hydraulic accumulator. Replace damaged or defective hydraulic accumulators.



### **⚠ WARNING!**

#### **Pressurised components and fluids can cause injury**

Pressurised components and fluids can cause severe injury.

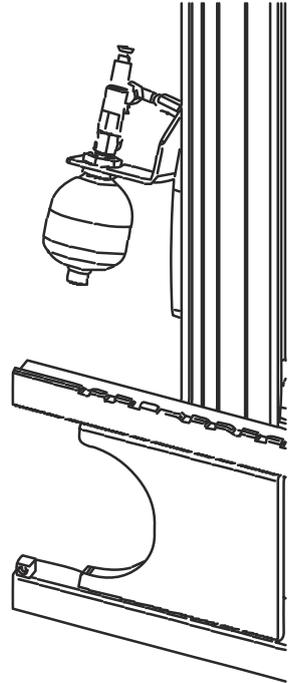
- ▶ Do not touch pressurised hydraulic lines.
- ▶ Report any defects immediately to your supervisor.
- ▶ Mark defective truck and take out of service.
- ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
- ▶ Remove any spilled hydraulic immediately with an appropriate bonding agent.
- ▶ The mixture of bonding agents and consumables must be disposed of in accordance with relevant regulations.
- ▶ Repair and maintenance work on pressure vessels and hydraulic lines must only be performed by the manufacturer's trained customer service department.

Load damping reduces the shocks and impacts acting on the load to be moved by means of a hydraulic accumulator. If pressure fluctuations occur in the hydraulic system e.g. due to potholes, they will be absorbed and minimised by the hydraulic accumulator. The lift mast damping consists of a hydraulic accumulator, a separate throttle valve, a measurement port and a hydraulic hose connecting this unit to the hydraulic system.

- For the hydraulic accumulator observe the regulations at the assembly site before commissioning and during operation.

### **Start up and commissioning**

Before starting up the truck you must check the hydraulic accumulator, the hose and the pressure relief valve for damage. If you discover any damage or faults remove the truck from service immediately.



## 6.26 Lift cut-off

- A lift cutout device can be factory fitted when working in areas of restricted height. This interrupts lifting.

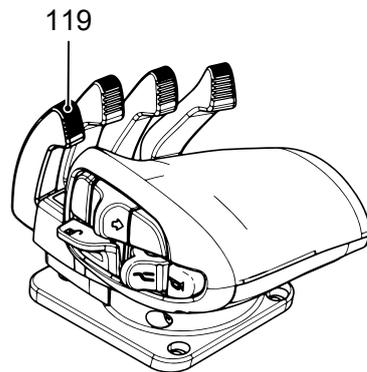
### To continue lifting:

#### Requirements

- Inspection and tasks before starting daily operations performed (see page 137).
- "Lift cutout" tested with function key (see page 126).

#### Procedure

- Press the lift cutout override button (see page 126).
- Pull the lever (119) to continue lifting beyond the lift cutout.



*Lift cutout is deactivated until the fork carriage is lowered below the height limit setting.*

### Button assignment

Symbol	Meaning
	Lift limit override: One-off override of the lift cut-off.

### Appearance on the display unit

Symbol	Meaning	Colour	Function
	Lift limit switch	Yellow	Lift cut-off initiated
		Green	Lift cut-off overridden

## 6.27 Sideshifter Centre Position

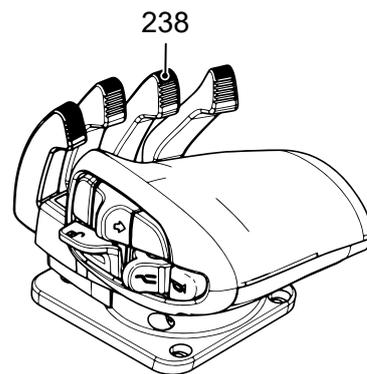
Automatic side shift centre position operation.

### Requirements

- Checks and operations before starting daily work completed, see page 137.
- "Automatic side shift centre position" function checked with the function key, see page 123.

### Procedure

- Press the side shift centre position button (see page 123) if the function is not permanently triggered after switching on (○) or through previous actuation (○).
- Pull or push the lever (238) until the side shift cuts out in the middle.



*The "Side shift centre position" function is deactivated after the fork carriage has stopped in the middle if it does not remain permanently triggered after switching on or actuation.*

### Button assignment

Symbol	Meaning
	Side shift centre position: Activates the side shift centre position function.

### Appearance on the display unit

Symbol	Meaning	Colour	Function
	Side shift centred	Yellow	Side shift not centred
		Green	Side shift centred

## 6.28 Fork Tilt Horizontal

→ Only when equipped with display unit with 4-inch display

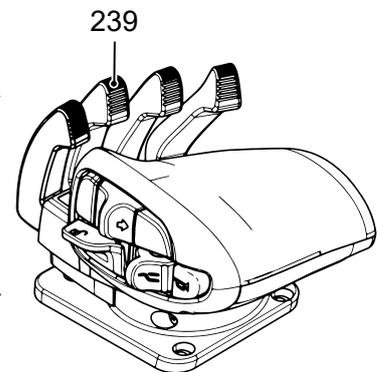
Alignment of the fork arms parallel to the travel path.

### Requirements

- Checks and operations before starting daily work completed, see page 137.
- "Fork tilt horizontal" function tested, see page 123.

### Procedure

- Press the fork tilt horizontal button (see page 116) if the function is not permanently triggered after switching on (○) or through previous actuation (○).
- Pull or push the lever (239) until fork tilt horizontal is reached.



*The "fork tilt horizontal" function is deactivated once the fork tilt horizontal position is reached if it does not remain permanently triggered after switching on or actuation.*

### Button assignment

Symbol	Meaning
	Mast tilt: Activates the fork tilt horizontal function.

### Appearance on the display unit

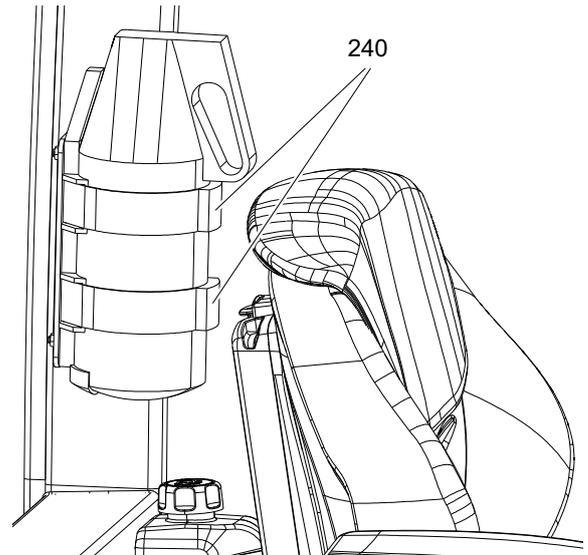
Symbol	Meaning	Colour	Function
	Fork tilt horizontal	Green	Forks horizontal, mast tilt 0°

## 6.29 Fire extinguisher

### *Procedure*

- Open the fasteners (240).
- Pull the fire extinguish out of its bracket.

➔ To operate, refer to the illustrations on the fire extinguisher.



## 6.30 Simple Manoeuvring Coupling with Pin

### **⚠ DANGER!**

#### **Danger of falling due to use of the trailer coupling as an attachment point**

Use of the trailer coupling as a lifting point for using a crane or jacking up is prohibited. There is a danger of falling.

- ▶ Do not use the trailer coupling as an attachment point.
- ▶ Do not use the trailer coupling to jack up the industrial truck.



### **⚠ CAUTION!**

#### **Incorrectly coupled trailers can cause accidents**

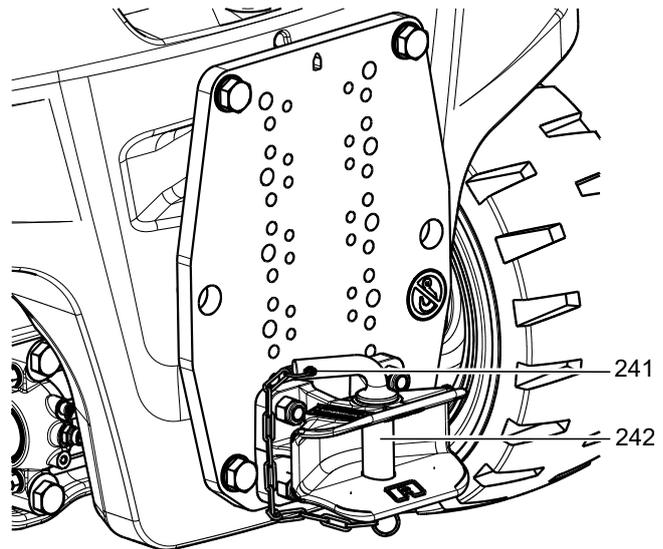
If the trailer coupling is incorrectly locked, the trailer can come loose during travel.

- ▶ Only use trailers with a tow eye.
- ▶ Make sure that the coupling is engaged securely before commencing travel.

#### **Operating the manoeuvring coupling – coupling the trailer**

##### *Procedure*

- Prevent the trailer from rolling away.
- Set the tow eye to the centre of the catcher.
- Unlock the tow pin (242) and pull it out of the coupling.
- Slowly reverse the industrial truck until the tow eye and the hole in the body are aligned.
- Insert the tow pin (242) and secure with the safety hook (241).



- The safety hook (241) of the chain must be in a vertical position after coupling.

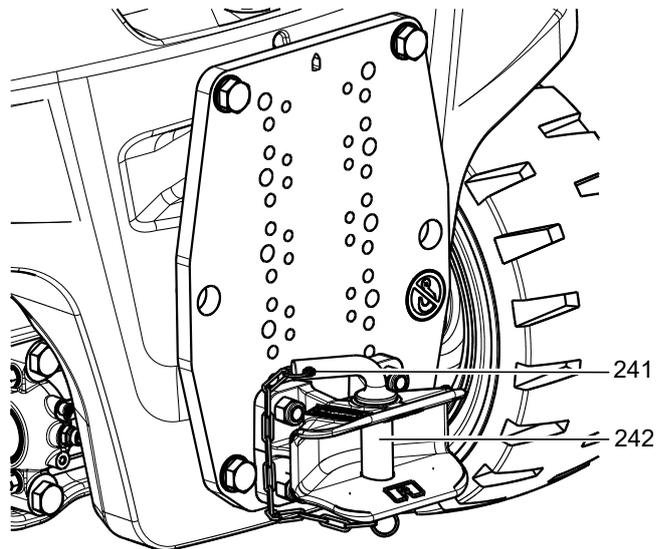
*The trailer has been coupled.*

**Operating the manoeuvring coupling – uncoupling the trailer**

**Procedure**

- Prevent the trailer from rolling away.
- Release and pull out the tow pin (242).
- Drive the truck forwards.

*The trailer has been uncoupled.*



## 6.31 Trailer Coupling with Hand Lever or Remote Control

→ Refer to the instructions for towing trailers, see page 207.

### **⚠ DANGER!**

#### **Danger of falling due to use of the trailer coupling as an attachment point**

Use of the trailer coupling as a lifting point for using a crane or jacking up is prohibited. There is a danger of falling.

- ▶ Do not use the trailer coupling as an attachment point.
- ▶ Do not use the trailer coupling to jack up the industrial truck.



### **⚠ CAUTION!**

#### **Incorrectly coupled trailers can cause accidents**

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

- ▶ Make sure that the coupling is engaged securely before commencing travel.
- ▶ The control pin (246) must be flush with the control sleeve (243).

#### ***Operating the trailer coupling (coupling the trailer)***

##### *Procedure*

- Prevent the trailer from rolling away.
- Adjust the pull rod of the trailer to the height of the coupling.
- Pull up the hand lever (244)/remote control (245) (○).

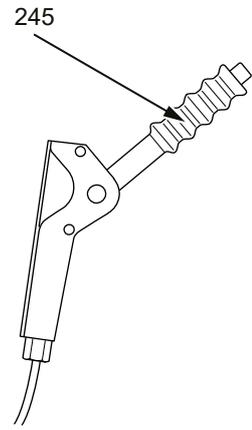
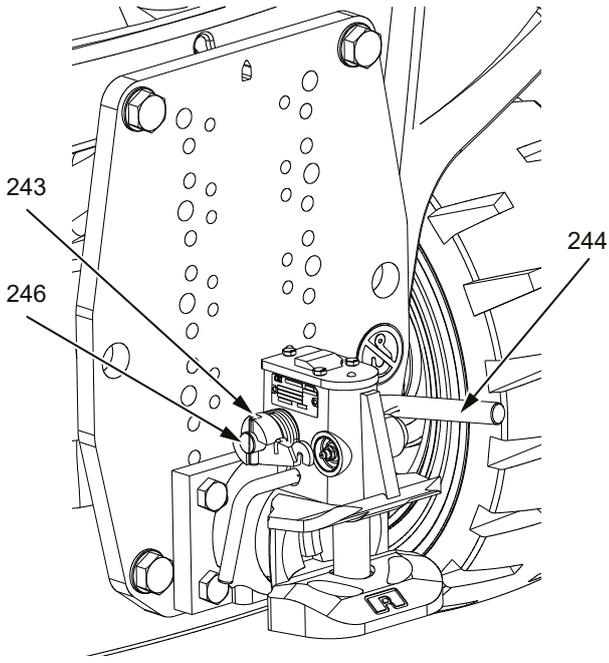
→ Depending on the truck version, the remote control (245) (○) is in the overhead guard area.

- Slowly reverse the truck until the coupling engages.
- Push down the hand lever (244)/remote control (245) (○).

#### ***Operating the trailer coupling (uncoupling the trailer)***

##### *Procedure*

- Prevent the trailer from rolling away.
- Pull up the hand lever (244)/remote control (245) (○).
- Drive the truck forward.
- Push down the hand lever (244)/remote control (245) (○).



## 6.32 Control layout “N”

### **⚠ WARNING!**

#### **Persons standing under or on a raised load handler are at risk of accidents**

Do not allow anyone to stand under or on a raised load handler.

- ▶ Do not stand on the load handler.
- ▶ Do not lift any persons on the load handler.
- ▶ Instruct other people to move out of the hazardous area of the truck.
- ▶ Do not stand underneath a raised and unsecured load handler.

- With control layout “N”, the lift and tilt functions are swapped compared with the standard operation. The Pilot must only be operated from the driver’s seat. The operator must be trained to handle the lift mechanism and the attachments.

### **NOTICE**

- ▶ The lift/lower and tilt speeds are determined by the inclination of the Pilot. Do not deposit the load handler suddenly to avoid damaging the load and the racking.

## **multiPILOT**

### **Lifting**

#### *Procedure*

- Push the Multipilot to the right (direction H) to raise the load.
- Push the Multipilot to the left (direction S) to lower the load.

### **Tilting**

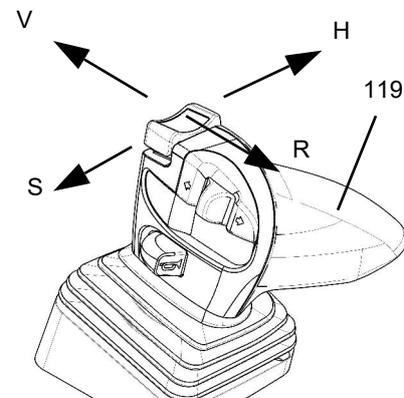
### **⚠ CAUTION!**

#### **Trapping hazard from inclined mast**

- ▶ When tilting the mast back, keep all parts of your body from between the mast and the front wall.

#### *Procedure*

- Push the Multipilot forward (direction V) to tilt the load forward.
- Pull the Multipilot back (direction R) to tilt the load back.



- When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

## **duoPILOT**

### **Lifting**

#### *Procedure*

- Push the Duo-Pilot lever (119) to the right (direction H) to raise the load.
- Push the Duo-Pilot lever (119) to the left (direction S) to lower the load.

## Tilting

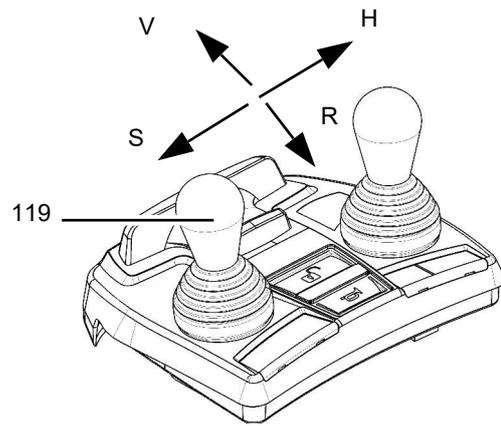
### **⚠ CAUTION!**

#### **Trapping hazard from inclined mast**

- ▶ When tilting the mast back, keep all parts of your body from between the mast and the front wall.

#### *Procedure*

- Push the Duo-Pilot lever (119) forward (direction V) to tilt the load forward.
- Pull the Duo-Pilot lever (119) back (direction R) to tilt the load back.



When the limit position for the operation has been reached (there will be a noise from the pressure relief valve) release the lever. The lever will revert automatically to neutral.

## 6.33 Operating the auxiliary hydraulics without pressing the acknowledgement key

### **WARNING!**

#### **Hydraulic ports for clamping attachments**

- ▶ Clamping attachments may only be added to trucks which have a button to enable additional hydraulic functions.
- 

### **WARNING!**

#### **Incorrect symbols can cause accidents**

Symbols on controls that do not depict the function of the attachments can cause accidents.

- ▶ Mark the controls with symbols that indicate their function.
  - ▶ Specify the attachments' direction of movement in accordance with ISO 3691-1 so that they match the controls' direction of movement.
-

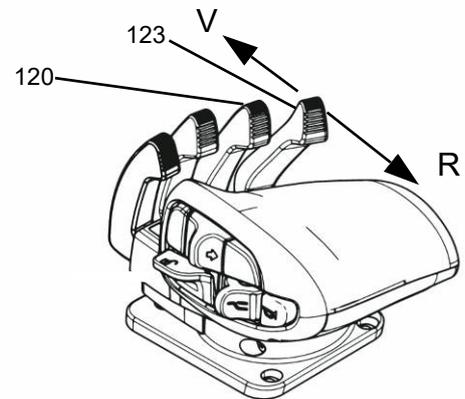
### 6.33.1 soloPILOT with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used the lever / button (120,123), is assigned the function of the attachment. Unused levers have no function. For connections see page 200.

#### Procedure

- Operating hydraulic port ZH1:  
Move the lever (120) in direction V or R.
- Operating hydraulic port ZH2:  
Move the lever (123) in direction V or R.

*The function of the attachment is performed.*



### 6.33.2 Positioning the forks with an integrated fork positioner (option)

#### **⚠ WARNING!**

#### **Clamping loads with the fork positioner can result in accidents**

Do not clamp loads with the fork positioner

▶ The fork positioner must not be used to clamp loads.

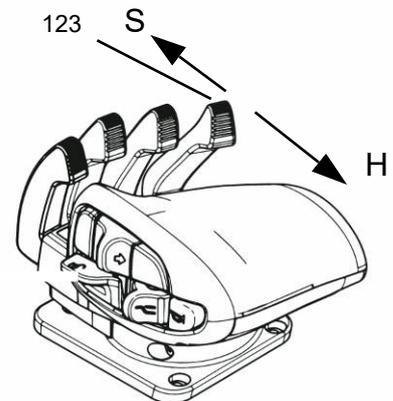
#### Requirements

- Truck prepared for operation see page 156.

#### Procedure

- Pull the lever (123) in direction H, the forks move together.
- Push the lever (123) in direction S, the forks move apart.

*The forks are now positioned.*



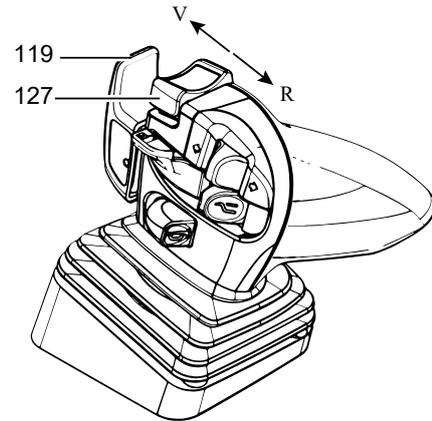
### 6.33.3 multiPILOT with control of ZH1 and ZH2 hydraulic ports

- Depending on the attachments used, the lever/button (119, 127) is assigned the function of the attachment. Unused levers have no function. For ports, see page 200.

#### Procedure

- Operating hydraulic port ZH1: Actuate the button (127) to the left or right.
- Operating hydraulic port ZH2: Push the lever (119) in direction V or pull it in direction R.

*The function of the attachment is performed.*



### 6.33.4 Positioning the forks with an integrated fork positioner (option)

#### **⚠ WARNING!**

#### **Clamping loads with the fork positioner can result in accidents**

Do not clamp loads with the fork positioner

- ▶ The fork positioner must not be used to clamp loads.

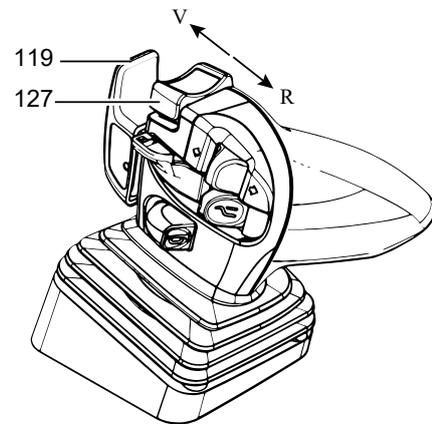
#### Requirements

- Truck prepared for operation – see page 156.

#### Procedure

- Pull the button (119) in direction R to move the forks apart.
- Push the button (119) in direction V to bring the forks together.

*The fork arms are now positioned.*



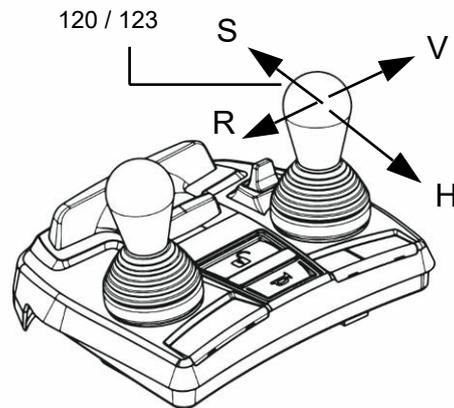
### 6.33.5 duoPILOT with control of ZH1 and ZH2 hydraulic ports

- Depending on the attachments used the lever / button (120,123), is assigned the function of the attachment. Unused levers have no function. For connections see page 200.

#### Procedure

- Operating hydraulic port ZH1:  
Push the lever (120) in direction V or R.
- Operating hydraulic port ZH2:  
Pull the lever (123) in direction H or push it in direction S.

*The function of the attachment is performed.*



### 6.33.6 Positioning the forks with an integrated fork positioner (option)

#### **⚠ WARNING!**

#### **Clamping loads with the fork positioner can result in accidents**

Do not clamp loads with the fork positioner

- ▶ The fork positioner must not be used to clamp loads.

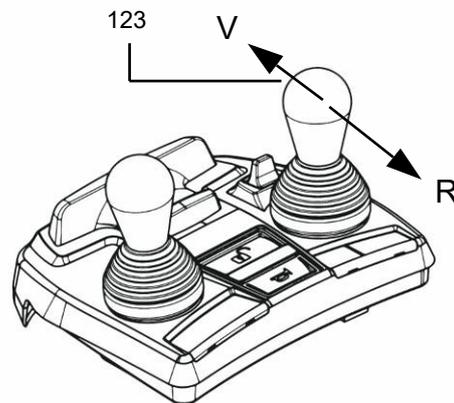
#### Requirements

- Truck prepared for operation see page 156.

#### Procedure

- Pull the lever (123) in direction R, the fork arms will move apart.
- Push the lever (123) in direction V, the fork arms move together.

*The fork arms are now positioned.*



## 6.34 Special control layout

### ⚠ WARNING!

#### Hydraulic ports for clamping attachments

- ▶ Clamping attachments may only be added to trucks which have a button to enable additional hydraulic functions.

### ⚠ WARNING!

#### Incorrect symbols can cause accidents

Symbols on controls that do not depict the function of the attachments can cause accidents.

- ▶ Mark the controls with symbols that indicate their function.
- ▶ Specify the attachments' direction of movement in accordance with ISO 3691-1 so that they match the controls' direction of movement.

The special control layout enables customer-specific adaptation of the operating functions on the truck.

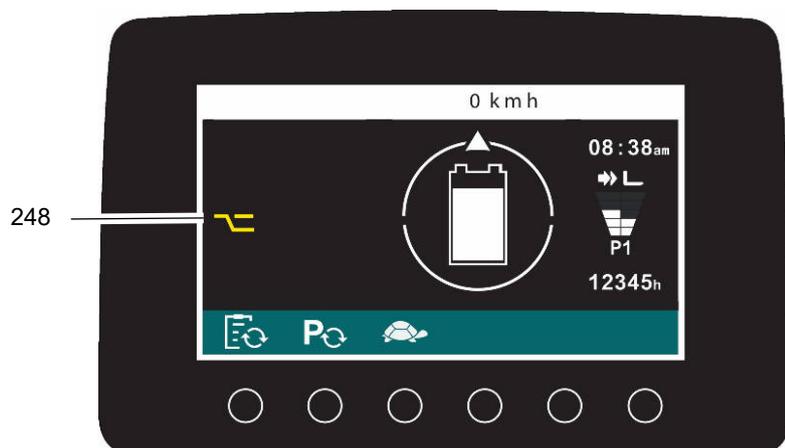
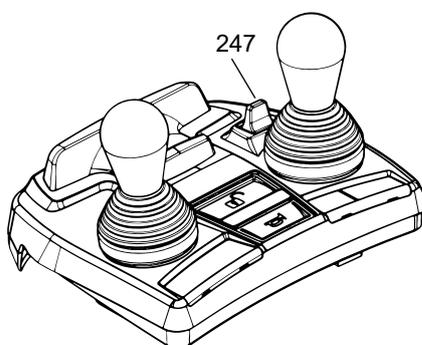
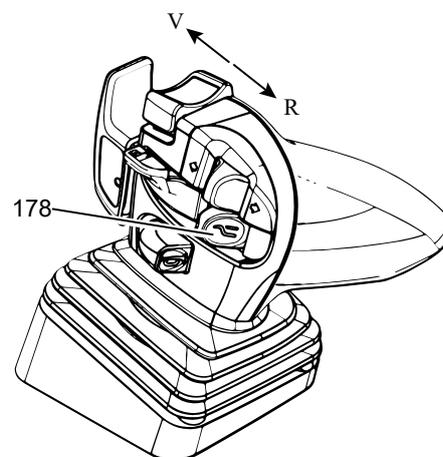
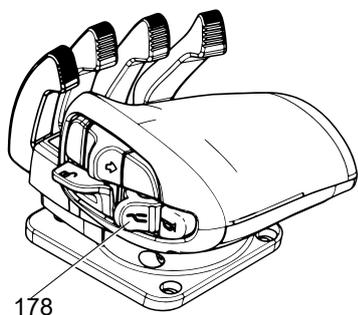
The sequence/assignment of the hydraulic functions available on the truck (lifting, lowering, tilting forwards and backwards, ZH1 - ZH4) may deviate where necessary (e.g. at the changeover level) from the standard assignment.

The respective hydraulic function is visible on the label for the control.

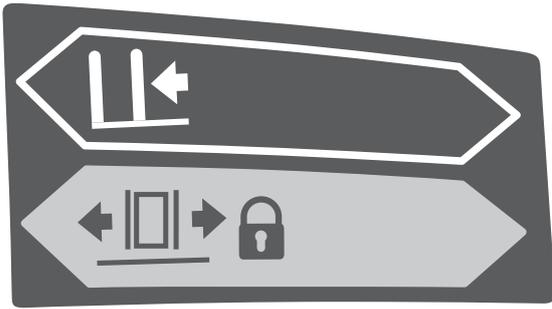


## Changeover level

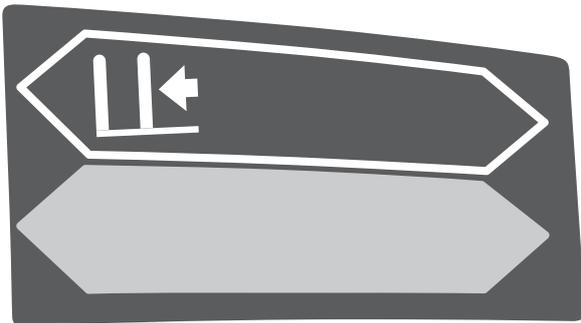
The changeover level is activated and deactivated via the button (178) on the control. The symbol for the active changeover level (248) is shown in yellow on the display.



If the operating functions at changeover level differ from the operating functions at basic level, these are indicated by grey labels with pictograms on the controls.



If the operating function is not assigned, this is indicated by a label with an empty field.



## Acknowledgement feature

Certain hydraulic functions (e.g. opening a load clamp) must be confirmed via the acknowledgement key (125) on the control.

The acknowledgement feature is activated by actuating the acknowledgement key (125) with the padlock symbol.

If a hydraulic function is set to require acknowledgement, the acknowledgement key (125) must be actuated regardless of the lever assignment at operating level.

### Procedure

- Press the acknowledgement key (125) and then actuate the control within 2 seconds.

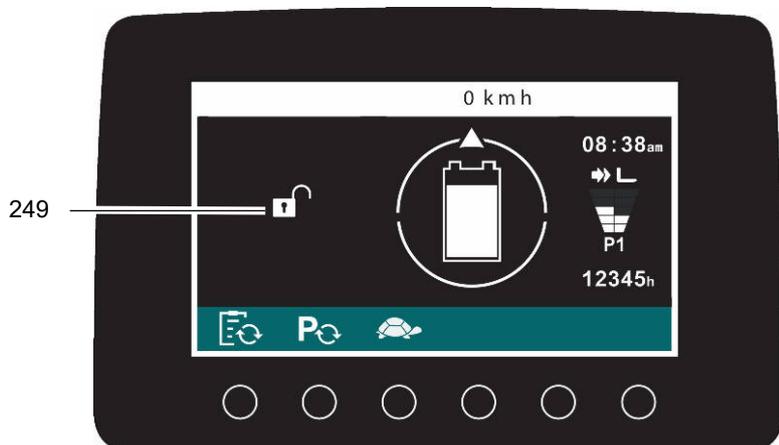
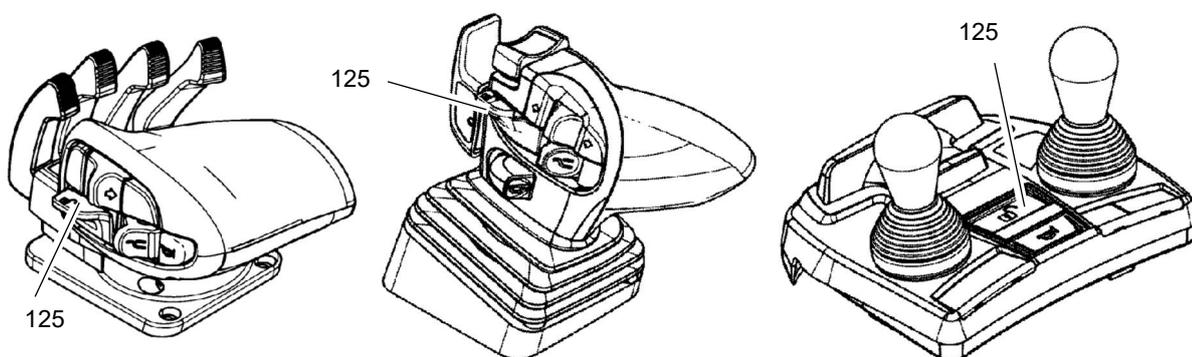
→ The active acknowledgement feature is shown on the display through the green padlock symbol (249).

*The hydraulic function requiring acknowledgement is performed.*

→ If the control is not actuated within 2 seconds, the green padlock symbol (249) goes out.

If the control remains in the home position for more than 2 seconds after the actuation of the hydraulic function, the green padlock symbol (249) goes out.

→ The manufacturer's customer service department must be contacted in order to assign hydraulic functions to the controls.



## 6.35 Warning Zone Light

### ⚠ CAUTION!

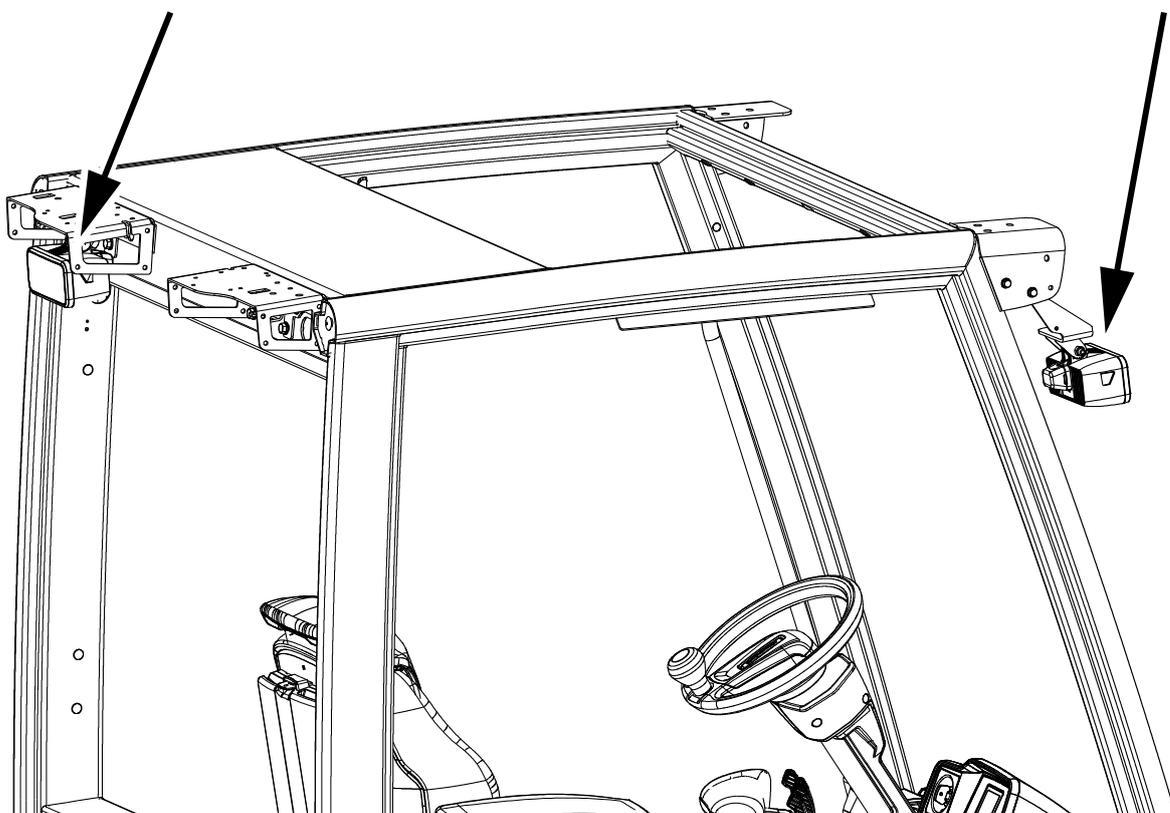
#### Risk of accident due to dazzling

Looking directly into the light beam of a warning zone light can dazzle and temporarily impair eyesight.

- ▶ Do not look directly into the light beam of a warning zone light.
- ▶ Do not alter the position and alignment of the warning zone light on the truck.
- ▶ Deactivate the warning zone light when travelling on public roads.

### 6.35.1 Floor-Spot

The Floor-Spot serves as an auxiliary device and, with the travel direction selected, projects a coloured dot on the floor at a distance of 5 m. When the truck travels forward, the coloured dot is in front of the truck. When reversing, it is behind the truck.



### 6.35.1.1 Additional information on Floor-Spot blue

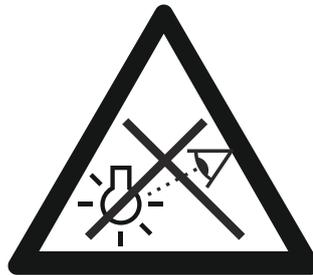
The activated Floor-Spot gives persons advance warning of the travel path of the forklift truck by projecting a blue dot onto the ground at a set distance.

#### **⚠ 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.

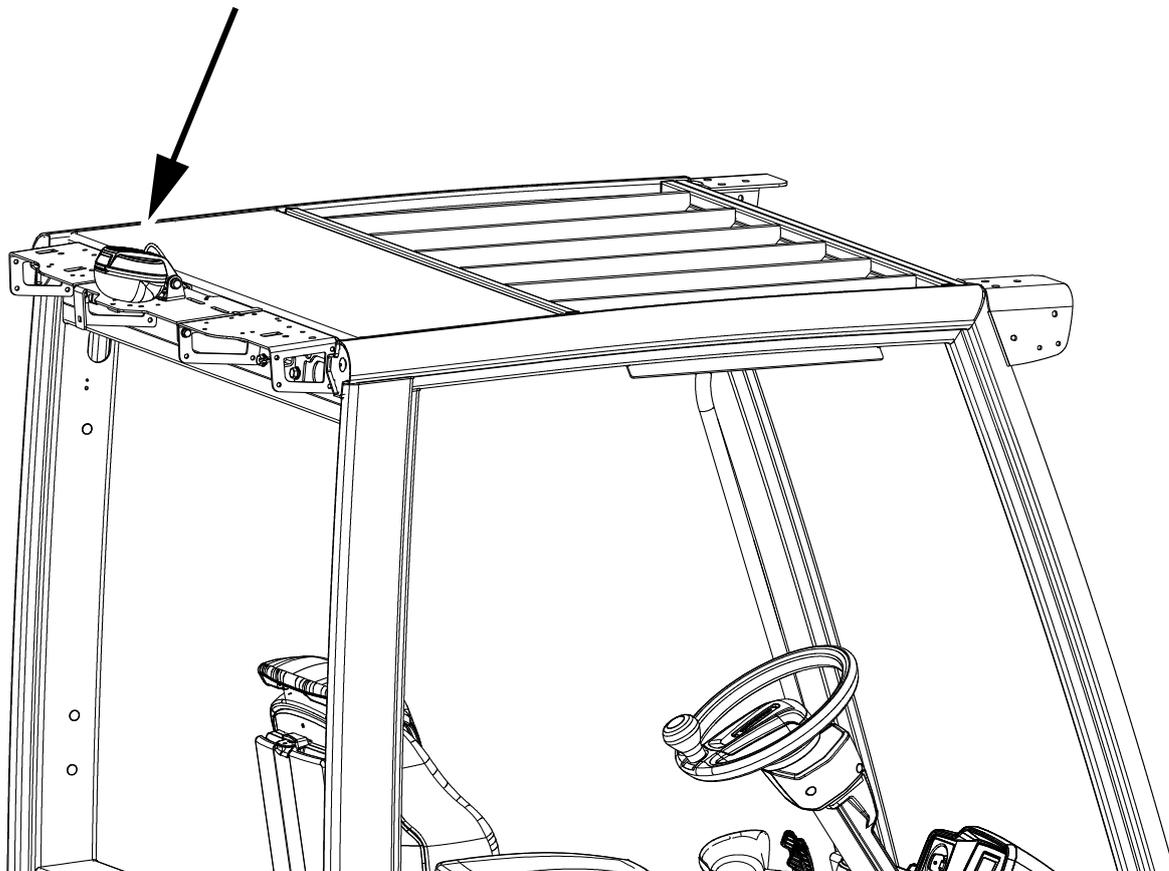
- ▶ Check that the warning notice: "Caution! Potentially dangerous optical radiation" is present and legible, and replace if necessary.
  - ▶ Do not look directly into the light beam of the Floor-Spot.
  - ▶ When performing maintenance and repairs, take the Floor-Spot out of service, e.g. by disconnecting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



- ➔ The warning notice "Caution! Potentially dangerous optical radiation" is attached to the side of the chassis or to the overhead guard. Small warning notices are attached to the side of the Floor-Spot.

### 6.35.2 Floor-Bow

The Floor-Bow serves as an auxiliary device and projects a coloured arc on the ground behind the truck when reverse travel (●) is selected or after pressing a button (○ – see page 123).



### 6.35.2.1 Additional information for the blue Floor-Bow

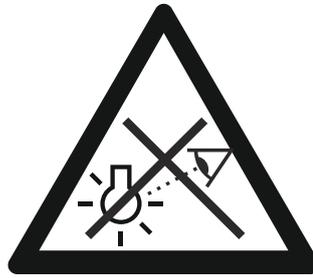
The activated Floor-Bow forewarns people of the truck's travel path by projecting a blue dot onto the floor at the set distance.

#### **⚠ CAUTION!**

##### **Risk of retinal damage due to blue light**

The Floor-Bow on the truck is classified in risk group 2 according to the standard IEC 62471: medium risk. Blue light can potentially damage the retina within a range of 400 nm to 780 nm.

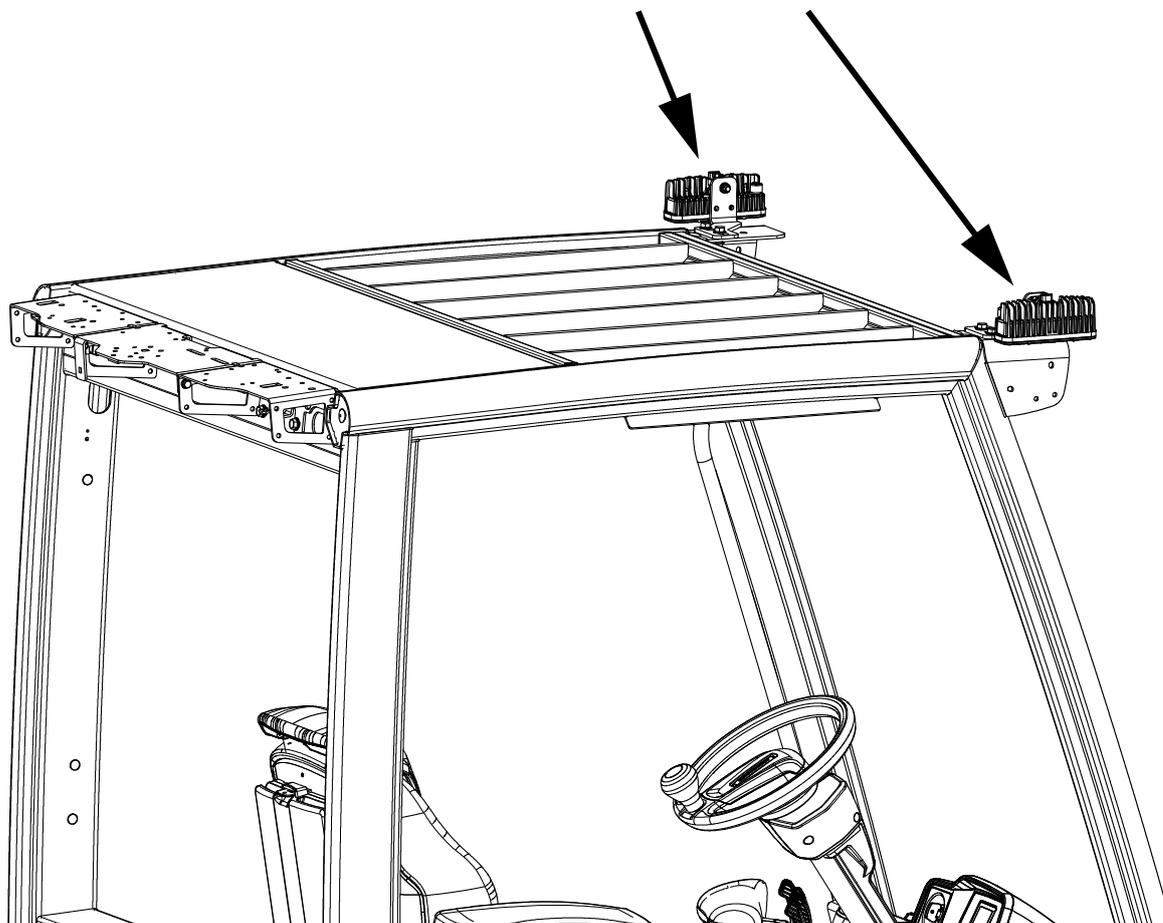
- ▶ Check that the warning notice: "Caution! Potentially dangerous optical radiation" is present and legible, and replace if necessary.
- ▶ Do not look directly into the light beam of the Floor-Bow.
- ▶ When performing maintenance and repair work, take the Floor-Bow out of service, e.g. by disconnecting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



- ➔ The warning notice "Caution! Potentially dangerous optical radiation" is attached to the side of the chassis or to the overhead guard. Small warning notices are stuck on the side of the Floor-Bow.

### 6.35.3 Floor-Stripes

The Floor-Stripes serve as auxiliary devices and project a coloured stripe on the ground on the left and right at a distance of 1 m from the truck when reverse travel (●) is selected or after pressing a button (○ – see page 123).



## 6.36 Optional Equipment for Road Traffic According to StVZO

### **⚠ WARNING!**

#### **Risk of accidents in public traffic areas**

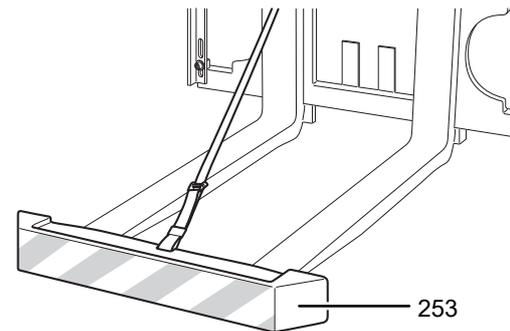
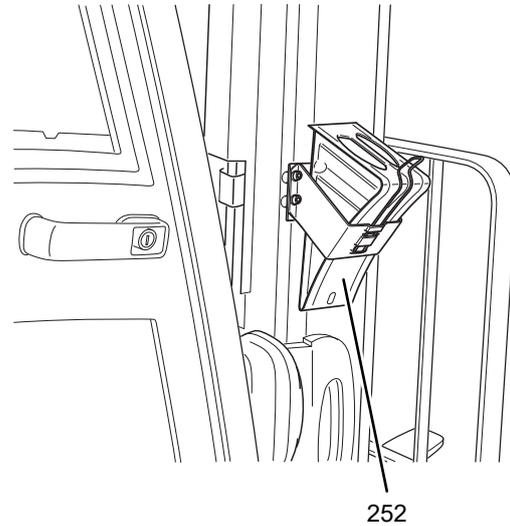
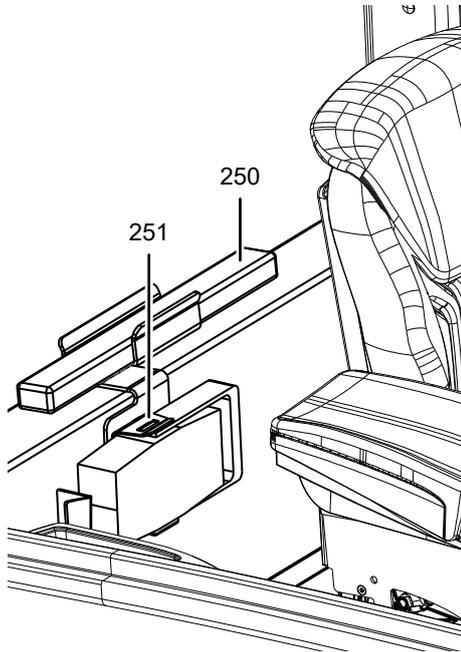
The use of public traffic areas and travel on public roads in particular requires utmost caution at all times as well as consideration and awareness for other traffic participants in order to avoid dangerous situations and accidents.

In public spaces (public roads, public traffic areas), all lighting systems (lights, reflectors) and other mandatory equipment must be fully functional and comply with national regulations.

- ▶ Only use lighting systems and other mandatory equipment that complies with national regulations.
  - ▶ Before entering public traffic areas, verify the correct condition of the lighting systems and other equipment.
  - ▶ Lighting equipment must be configured and used such that other road users are not dazzled.
  - ▶ Work lights and additional lighting equipment such as Floor-Spot, Floor-Bow, Floor-Stripes, beacon and strobe light must be switched off or deactivated before entering public traffic areas and must not be used in public traffic areas.
  - ▶ Do not make any unauthorised modifications to the function, position, alignment, colour or output of lighting equipment.
-

The following assemblies are available as optional equipment for road traffic:

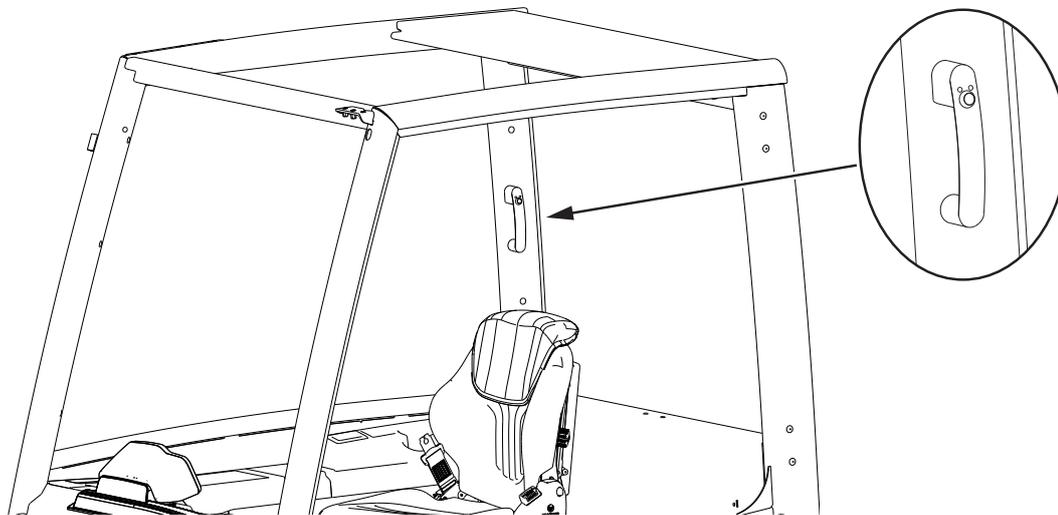
- Warning indicator (251)
- Warning triangle (250)
- Fork cover (253)
- Wheel chock (252)



## 6.37 Horn Button on Overhead Guard

When the horn button on the overhead guard is actuated, an acoustic signal is triggered.

- Use the horn button on the overhead guard only when reversing.



## 6.38 Options bracket

### **⚠ WARNING!**

#### **Risk of collision when using optional equipment on the options bracket**

Use of optional equipment installed on the options bracket during travel or hydraulic operations can lead to collisions with persons and objects.

- ▶ Do not use the optional equipment on the options bracket during travel or hydraulic operations.
  - ▶ Adapt the brackets for the optional equipment on the options bracket to the operator such that injury during normal operation is ruled out.
  - ▶ Adjust the operator's seat such that impact with the optional equipment on the options bracket during normal operation is ruled out.
- 

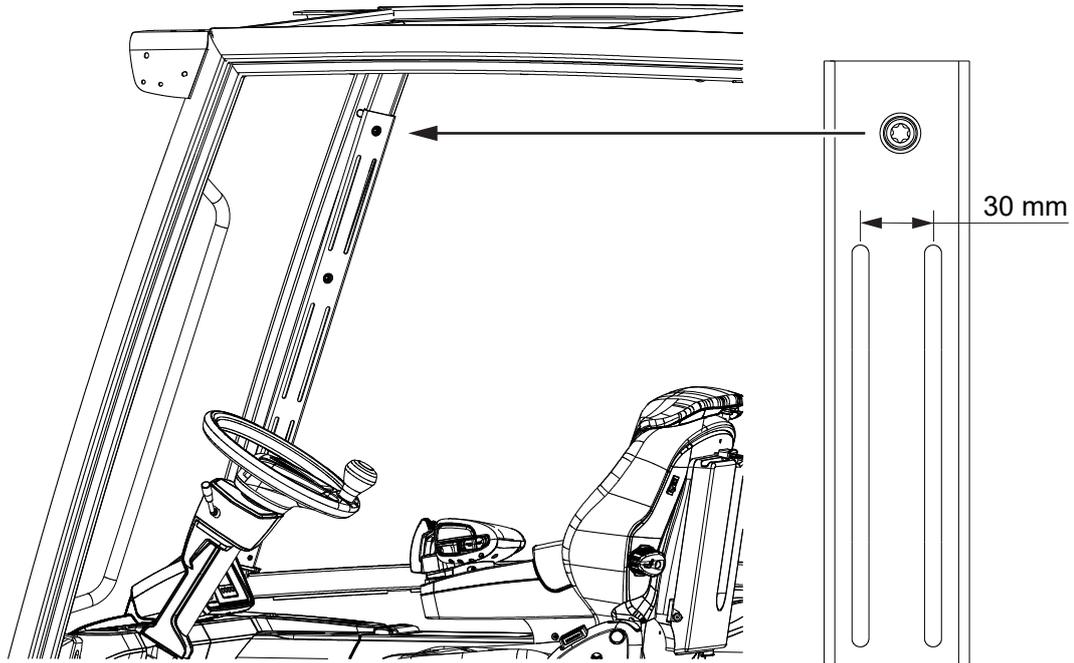
### **⚠ WARNING!**

#### **Risk of collision due to restricted visibility or distraction**

The optional equipment on the options bracket restricts the view of the operator. A restricted view or distraction can lead to collisions with persons and objects.

- ▶ Increased attention required during travel and hydraulic operations.
  - ▶ Ensure that the operating area and working area are clear.
  - ▶ Adjust your travel speed and load handling according to the visibility conditions.
  - ▶ Do not change the installation position of the optional equipment on the options bracket.
  - ▶ Check the secure fit of the optional equipment on the options bracket on a weekly basis.
-

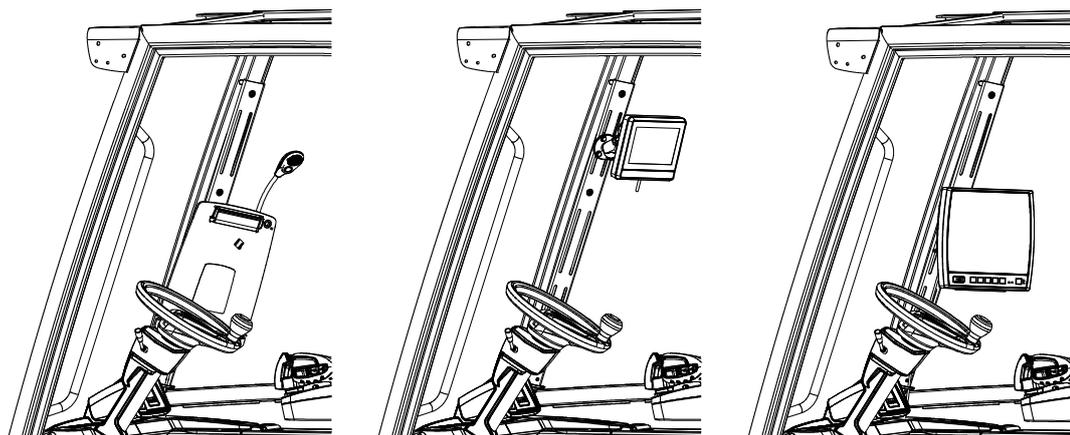
The options bracket for attaching suitable optional equipment is mounted on the right A-pillar and can support a weight of up to 5,3 kg with a maximum spacing of 180 mm. Optional equipment mounted on the options bracket must not extend beyond the truck contour.



Optional equipment that can be mounted on the options bracket:

- A4 writing pad, with options LED reading light
- Assistance display
- Fan
- Tilting terminal holder, e.g. for attaching the truck terminal
- Holder for barcode scanner

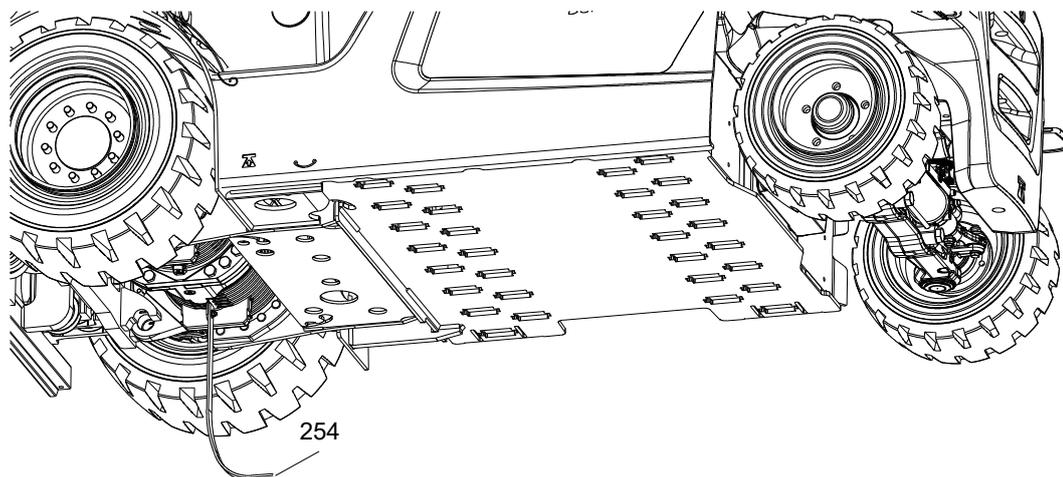
→ The options bracket, covers and optional equipment can be fitted by the manufacturer's customer service department.



## 6.39 Antistatic strap

The antistatic strap (254) depends on the tyres and ensures that the truck does not become statically charged. Before setting off, make sure that the antistatic strap (254) is undamaged and clean. When the truck is stationary, the contact surface of the antistatic strap (254) on the ground should be approx. 50 mm.

- The antistatic strap is required if the truck is equipped with non-marking tyres. If the truck is to be converted to non-marking tyres, the manufacturer's customer service department must be contacted and an antistatic strap retrofitted.



# 7 Troubleshooting

## 7.1 Troubleshooting

This chapter allows operators to identify and rectify simple faults or the results of incorrect operation themselves. When trying to locate a fault, proceed in the order shown in the remedy table.

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

Subsequent troubleshooting must only be performed by the manufacturer's customer service department. The manufacturer has a customer 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 on the display unit (if present)
- Error description
- Current location of truck.

### Information messages

Display	Meaning
0915	Battery door not closed for more than 0.5 secs when stationary.
1123.5	Parking-brake self-test failed
1145.1	Level of the compensation tank of the wet multi-disc brake critical
1901	Accelerator pedal applied during power up.
1904	No travel direction selected when accelerator pedal applied.
1908	Seat switch or seat belt lock or cabin door not closed. Industrial truck ready for operation, travel function actuated, operating position not properly assumed.
1909	Accelerator pedal pressed while parking brake applied.
1916	Travel cut-off actuated for more than 0.5 secs.
1917	Accelerator pedal and brake pedal pressed simultaneously.
1918	Accelerator pedal pressed and truck moving but cabin door detected as being open.
1922	"Test mechanical service brake" service function activated.
1952	Travel direction switch applied when truck switched on (or when seat switch closed).
2411.1	Reduction of hydraulic power to reduce heat input into the hydraulic oil.

<b>Display</b>	<b>Meaning</b>
2412.1	Limitation of hydraulic-pump speed to reduce heat input into the hydraulic oil.
2908	Seat switch or seat belt lock or cabin door not closed. Industrial truck ready for operation, hydraulic function actuated, operating position not properly assumed.
2951	Hydraulic function applied during power-up.
2953	multiPILOT/soloPILOT applied or button pressed, but conditions for function not met.

<b>Fault</b>	<b>Possible cause</b>	<b>Actions</b>
Truck does not start	– Battery connector not plugged in.	– Check battery connector and plug in if necessary.
	– Emergency disconnect switch pressed.	– Unlock the emergency disconnect switch.
	– Key switch set to O.	– Set the key switch to position I.
	– Battery charge too low.	– Check battery charge and charge if necessary.
	– On-board charger active/battery door opened.	– Finish charging/close battery door.
	– Faulty fuse.	– Check the fuses.
Load cannot be lifted	– Truck not operational.	– Carry out all actions listed under "Truck does not start".
	– Hydraulic oil level too low.	– Check the hydraulic oil level and top up, if necessary.
	– Battery discharge monitor has switched itself off.	– Charge the battery.
	– Faulty fuse.	– Check the fuses (○).
	– Excessive load.	– Note the maximum capacity, see page 53.
Fault display in the display unit	– Truck not operational.	– Press the EMERGENCY DISCONNECT switch or turn key switch to 0, after approx. 3 seconds try to perform the desired operation again.

#### **Additional information messages in the event of lithium-ion batteries (○)**

<b>Display</b>	<b>Meaning</b>
5342.1	Error: Battery discharged.
5343.1	Error: Battery voltage too low.
5345.1	Error: Battery voltage too high.
5347.1	Warning: Battery voltage too high or too low
5201.6	Hardware fault
5504.1	Truck ID missing. – Check battery connection cable.

## Troubleshooting

Fault	Possible cause	Actions
Truck does not start	– Battery connector not plugged in.	– Check battery connector and plug in if necessary.
	– Control line not connected to lithium-ion battery (○) or interface converter (○) of lithium-ion battery.	– Check control line and connect if necessary.
	– Lithium-ion battery (○) deactivated or in energy-saving operation	– Press activation button (○) on battery tray. – Charge the battery. – Version with interface converter (○) on the battery: Disconnect the control line from the battery connection at the top of the battery, or from the inside of the tray, and reconnect.
	– Emergency disconnect switch pressed.	– Unlock the emergency disconnect switch.
	– Key switch set to O.	– Set the key switch to position I.
	– Battery charge too low.	– Check battery charge and charge if necessary.
	– On-board charger active / battery door opened.	– Finish charging / close battery door.
	– Faulty fuse.	– Check the fuses.

<b>Fault</b>	<b>Possible cause</b>	<b>Actions</b>
Load cannot be lifted	– Truck not operational.	– Carry out all actions listed under "Truck does not start".
	– Hydraulic oil level too low.	– Check the hydraulic oil level and top up, if necessary.
	– Battery discharge monitor has switched itself off.	– Charge the battery.
	– Faulty fuse.	– Check the fuses (○).
	– Excessive load.	– Note the maximum capacity, see page 53.
Fault display in the display unit	– Truck not operational.	– Press the EMERGENCY DISCONNECT switch or turn key switch to 0, after approx. 3 seconds try to perform the desired operation again.

## 7.2 Moving a truck without its own drive system

### **⚠ WARNING!**

#### **Accident risk**

Other people can be injured if the truck is towed incorrectly.

- ▶ Only use vehicles to tow the truck which have sufficient tow and brake forces for the trailer load without its own braking system.
- ▶ Always use a pull rod to tow.
- ▶ Always tow the truck at walking pace.
- ▶ Do not park the truck with the parking brake released.
- ▶ One person must be seated in the recovery truck to steer it and one person must be seated on the towed truck.

### **⚠ WARNING!**

#### **Uncontrolled truck movement**

The truck can roll away if the spring pressure brake is released and if there is insufficient protection.

- ▶ Release the spring pressure brake to move the truck without power.
- ▶ Suitable measures must first be taken to prevent the truck from rolling away.

### **⚠ CAUTION!**

#### **A released spring-loaded brake can cause injury**

Do not operate the truck when the spring-loaded brake is released.

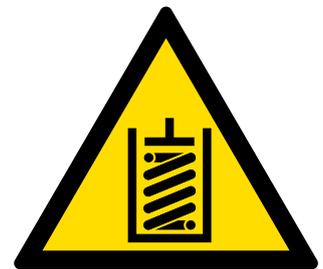
### **⚠ CAUTION!**

#### **Risk of injury from energy-saving spring system**

The mechanical multi-plate brakes in the brake units of the drive axle are actuated by energy-saving spring systems that are permanently under spring tension.

When a brake unit is disassembled, the energy stored as spring tension is released.

- ▶ Brake units may only be disassembled by trained personnel.
- ▶ Information on the safe disassembly of brake units is contained in the service documents.



## Towing the truck

### Requirements

- Truck parked securely.
- Actuate the emergency disconnect switch and switch off the key switch.
- Disconnect the battery connector.

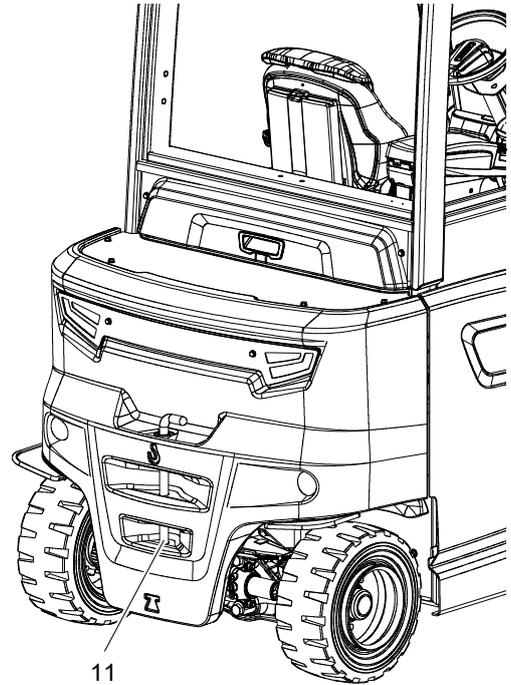
### Tools and Material Required

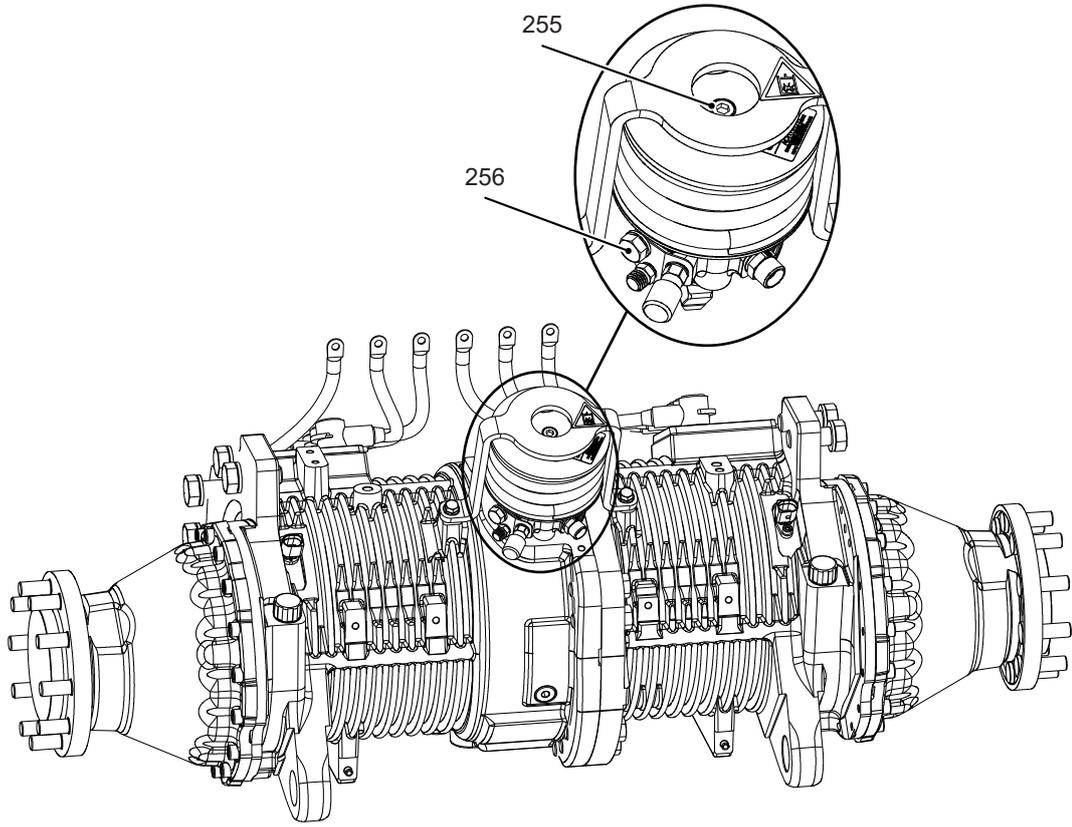
- Size 8 hexagon socket torque wrench
- Size 17 hex torque wrench
- Size 17 open-end spanner

### Procedure

- Attach the pull rod to the trailer coupling (11) of the industrial truck to be towed and to the towing vehicle.
- Release the parking brake on the drive system.
  - Remove the hexagon socket screw from (255).
  - Remove the hexagon head screw including washer from (256) and screw into (255).
  - Tighten the hexagon head screw with an open-end spanner until a clear resistance is built up and the parking brake is released.
  - Screw the hexagon socket screw into (256) and hand-tighten (max. 30 Nm).
  - *The parking brake is now released. The drive wheels are no longer blocked or braked.*
- Tow the truck to its destination.
- Apply the parking brake.
  - Remove the hexagon socket screw and hexagon head screw including washer.
  - Screw the hexagon head screw including the washer into (256) and tighten: Torque 10 Nm.
  - Screw the hexagon socket screw into (255) and tighten: Torque 10 Nm.
  - *The parking brake is activated. The drive wheels are blocked or braked again.*
- Undo the tow connection.

*The truck has now reached its destination.*





## 7.3 Emergency lowering

→ The load handler can be lowered manually if a fault occurs in the hydraulic controller.

### **⚠ WARNING!**

#### **Load handler emergency lowering**

- ▶ Instruct other people to move out of the hazardous area of the truck during emergency lowering.
- ▶ Never step or stand underneath a raised load handler.
- ▶ Only operate the emergency lowering valve when standing next to the truck.
- ▶ When the load handler is in the racking, emergency lowering is not permitted.
- ▶ 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.

#### ***Emergency lowering of the mast and load handler***

##### *Requirements*

- Load handler is not in the rack.
- Truck prevented from rolling away.
- Press the emergency disconnect switch and remove the key from the key switch.
- Disconnect the battery connector.

##### *Tools and Material Required*

- Size 4 hexagon socket torque wrench

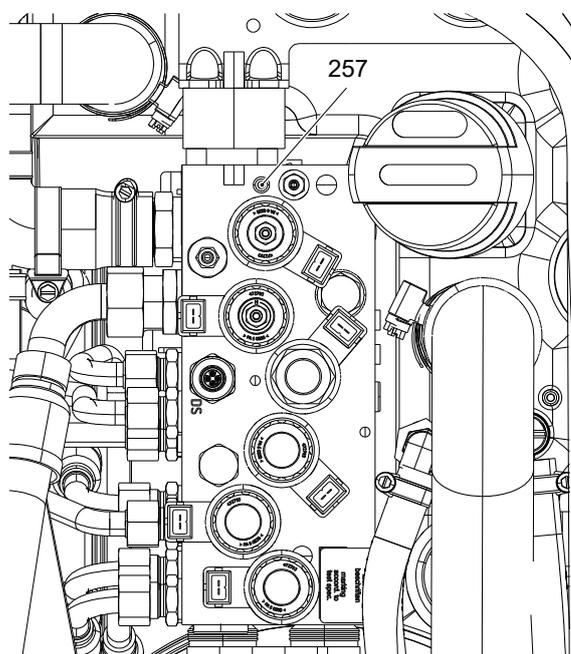
##### *Procedure*

- Remove the floor plate – see page 320.
- Carefully undo the threaded rod (257) on the valve block anti-clockwise (maximum 1.5 turns).
  - The mast and load handler start to lower slowly.

→ If necessary, the lowering speed can be reduced or the emergency lowering can be stopped by turning the threaded rod back in a clockwise direction.

- Once the load handler has been lowered, carefully screw the threaded rod back in with 2,5 Nm.
- Insert the floor plate – see page 320.

*The mast and load handler are lowered.*



## 7.4 Exiting the Driver's Cab via the Right-Hand Side Window or the Rear Windscreen (Emergency Exit)

### **⚠ CAUTION!**

#### **Risk of injury when striking the side window or the rear windscreen**

Striking the side window or the rear windscreen can result in facial injuries due to splinters of glass.

- ▶ Before striking the side window or the rear windscreen, turn your face away and close your eyes.
- 

### **⚠ CAUTION!**

#### **Risk of injury due to broken glass from the smashed window**

When leaving the driver's cab through the smashed window, the operator's body can be cut and injured by broken glass.

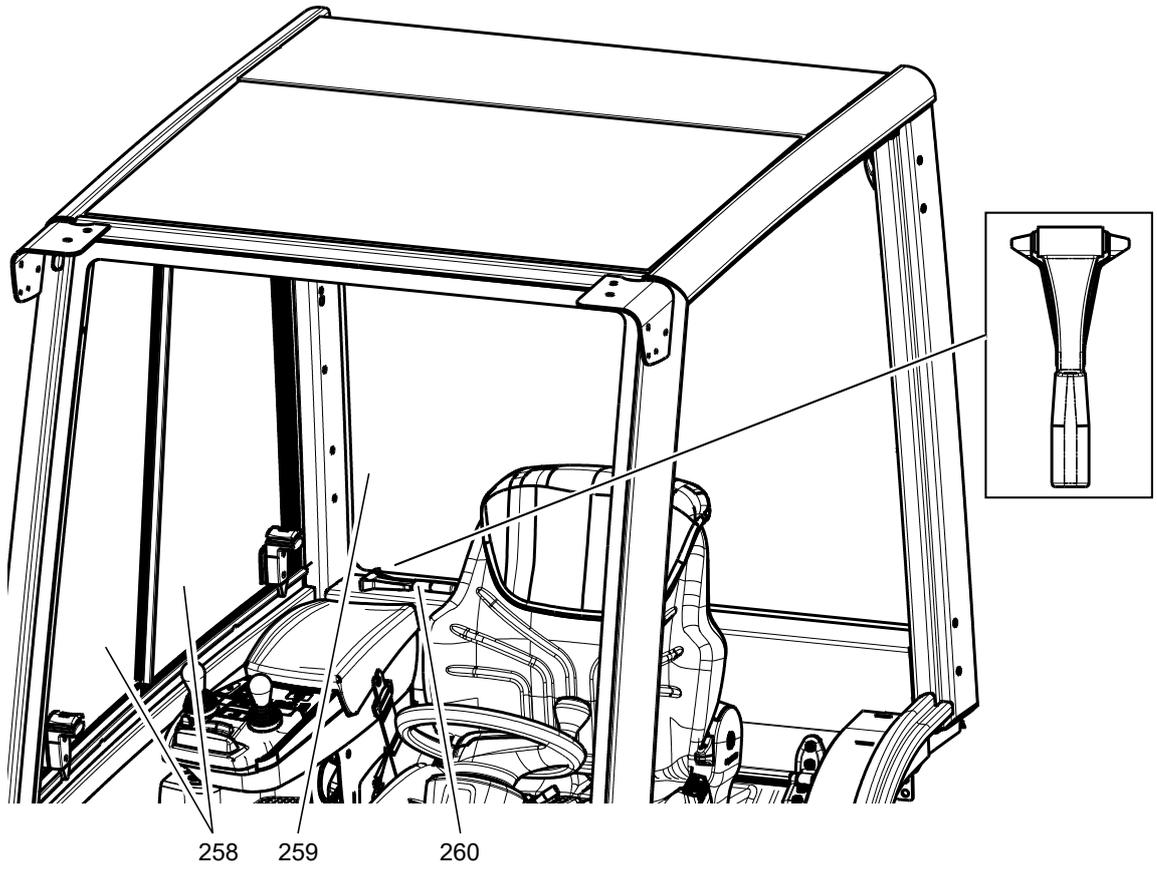
- ▶ Carefully remove the broken glass before leaving the driver's cab through the smashed window.
  - ▶ Use hand protection when removing the broken glass.
- 

#### *Requirements*

- It is not possible to exit the driver's cab through the cabin door.

#### *Procedure*

- Switch off the truck – see page 158.
- Press the emergency disconnect switch.
- Pull the emergency hammer (260) out of its support in the driver's cab.
- Strike the right-hand side window (258) or the rear windscreen (259) with the emergency hammer.
- Push out the broken glass from the smashed window towards the outside.
- When exiting, watch out for obstacles and for the risk of slipping due to wet surfaces or in cold temperatures.





# 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](http://www.jungheinrich.de/spare-parts-search)) by entering the serial number.

→ The serial number can be found on the data plate, see page 53.



## 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 363.

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 363.

### **WARNING!**

#### **Risk of accidents and component damage**

Any modification to the truck is prohibited.

- ▶ Safety equipment must not be modified.
- ▶ The operating speeds of the truck must not be changed.
- ▶ Laminating over the front window is prohibited.

---

**Exception:** Operating companies should only make changes or have changes made to powered industrial trucks if the 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. For safety reasons, only components which have been specially agreed by the manufacturer for this truck may be installed near the computer, control devices and wire guidance sensors (antennae). These components (computers, control devices, wire guidance sensors (antennae)) must therefore not be replaced by similar components from other trucks of the same series.

- 
-  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 359.

### 3 Maintenance Safety Regulations

#### **WARNING!**

##### **Danger from hot fluids and hot components**

Operating materials (hydraulic oil) as well as components of the hydraulic system and the drive train become very hot during operation. Hot components are freely accessible when the panels are open or the covers are removed. Direct contact with hot operating materials can cause scalds. Direct contact with hot components can cause burns.

- ▶ Do not touch hot surfaces.
  - ▶ When carrying out maintenance and repairs, wear suitable protective clothing (gloves etc.) to avoid getting scalded or burned.
- 

##### **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 314.

- Equipped with lithium-ion battery (○): read the manufacturer's operating instructions.

## 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 158.
  - ▶ Disconnect the battery connector.
  - ▶ Remove any rings, metal wristbands etc.
- 

### **⚠ WARNING!**

#### **Risk of electric shock due to slow voltage reduction**

In the case of a faulty discharge circuit, the controller can continue to carry a residual voltage up to 10 minutes after the power supply has been disconnected. A risk of electric shock therefore exists when working on or in the vicinity of the controller.

- ▶ To exclude the possibility of a faulty discharge circuit, read the error memory or query the controller status before commencing any work.
  - ▶ If the discharge circuit is faulty, wait at least 10 minutes for the residual voltage to be dissipated.
- 

### **⚠ WARNING!**

#### **Risk of injury due to residual voltage on the controller**

There is a risk of electric shock when working on or in the vicinity of the controller.

- ▶ After disconnecting the power supply, wait at least 10 minutes for the residual voltage to be dissipated.
- 

### **⚠ WARNING!**

#### **Danger from hot fluids and components**

Consumables (hydraulic oil, engine oil, coolant) and power train components (engine, manifold, exhaust system, turbo charger etc.) get very hot during operation. Direct contact with hot equipment can cause scalds. Direct contact with hot components can cause burns.

- ▶ When carrying out maintenance and repairs, wear suitable protective clothing (gloves etc.) to avoid getting scalded or burned.
- 

### **⚠ WARNING!**

#### **Risk of burns due to hot controller parts**

After switching off the truck, the temperature on the controller surface can be up to 85 °C. There is risk of burns when touching the controller.

- ▶ Wait for the controller to cool down before commencing work.
  - ▶ Wear protective gloves if necessary.
-

## 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 tyres that do not match the manufacturer's specifications can result in accidents.**

The quality of the tyres affects the operational stability and performance of the truck. Uneven wear reduces the operational stability of the truck and increases the stopping distance.

▶ When replacing tyres, make sure the truck is not skewed.

▶ Always replace tyres in pairs, i.e. left and right at the same time.

▶ For pneumatic tyres, only remove the steel ring when the tyre is depressurised.

---

- When replacing rims and tyres fitted at the factory, only use the manufacturer's original spare parts. Otherwise the manufacturer's specifications cannot be ensured. If you have any queries, contact the manufacturer's customer service department.
- During the wear test, the wear limit of the respective wheel must be observed.

## 3.4 Attachment Repairs and Inspection

### ⚠ WARNING!

#### **A faulty attachment can be hazardous**

Check the attachment daily for external signs of damage or defects. Faulty attachments can cause the load to fall.

▶ Report any defects immediately to your supervisor.

▶ Tag out and decommission a faulty lift truck.

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

---

- No welding work may be carried out without a permit from the manufacturer.

## 3.5 Lift Chains

### **⚠ WARNING!**

#### **Risk of accident from non-lubricated and incorrectly cleaned lift chains**

Lift chains are safety-critical parts. Lift chains must not show signs of serious contamination. Lift chains must always be clean and sufficiently lubricated.

- ▶ The lift chains are cleaned by wiping or brushing. Significant contamination can be softened by a paraffin derivative such as petroleum.
  - ▶ Do not clean lift chains with high-pressure steam jets or chemical cleaning agents.
  - ▶ Immediately after cleaning, dry the lift chain with compressed air and apply a chain spray.
  - ▶ Lift chains must be unloaded when lubricated; to do this, fully lower the load handler.
  - ▶ Lubricate a lift chain with particular care around the pulleys.
- 

- The intervals stated in the service checklist apply to normal duty use. More demanding conditions (dust, temperature) require more regular lubrication of the lift chains. The prescribed chain spray must be used in accordance with the instructions. Applying grease externally will not provide sufficient lubrication of the lift chains.

## 3.6 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.
-

## NOTICE

### Checking 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 once per year and replace if necessary.
- ▶ In the case of heavy-duty operation, the inspection intervals must be reduced accordingly.
- ▶ Under normal operating conditions, preventive 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.

## ⚠ WARNING!

### Hot hydraulic oil can cause injury

Hot hydraulic oil can cause serious injuries such as burns or scalds.

- ▶ Wait until the hydraulic oil has cooled down.
- ▶ Do not drain or pump hot hydraulic oil out of the system.
- ▶ In the case of injuries, seek medical assistance immediately.
- ▶ Remove any spilled hydraulic oil immediately with an appropriate bonding agent.

## 3.7 Air conditioning system

## ⚠ WARNING!

### Environmental and health hazards due to insufficient maintenance

The air conditioning coolant contains fluorinated greenhouse gases. Leaking coolant pollutes the environment; if there is a high concentration of air or oxygen, there is a risk of suffocation.

Contact with liquid coolant can cause cold burns or frostbite.

Condensate residues and heat in the blower box and on the evaporator increase the accumulation of bacteria, mould and microorganisms in the long term.

- ▶ Have the air conditioning system serviced regularly to prevent premature wear and tear and excessive loss of coolant.
- ▶ Maintenance tasks must only be performed by specialist personnel.
- ▶ If there is often increased condensation, have the air conditioning system disinfected as well as cleaned.

## NOTICE

### Premature wear and tear and damage to property due to insufficient maintenance

Oil in the refrigerant lubricates the air conditioning compressor and other moving parts and protects them from drying out. Depending on the system, around 10% to 15% of the refrigerant can escape from the air conditioning system through hoses, connections or seals.

- ▶ Have the air conditioning system serviced regularly to prevent premature wear and tear and to optimise the cooling performance.
- ▶ Maintenance tasks must only be performed by specialist personnel.

## 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.
- 

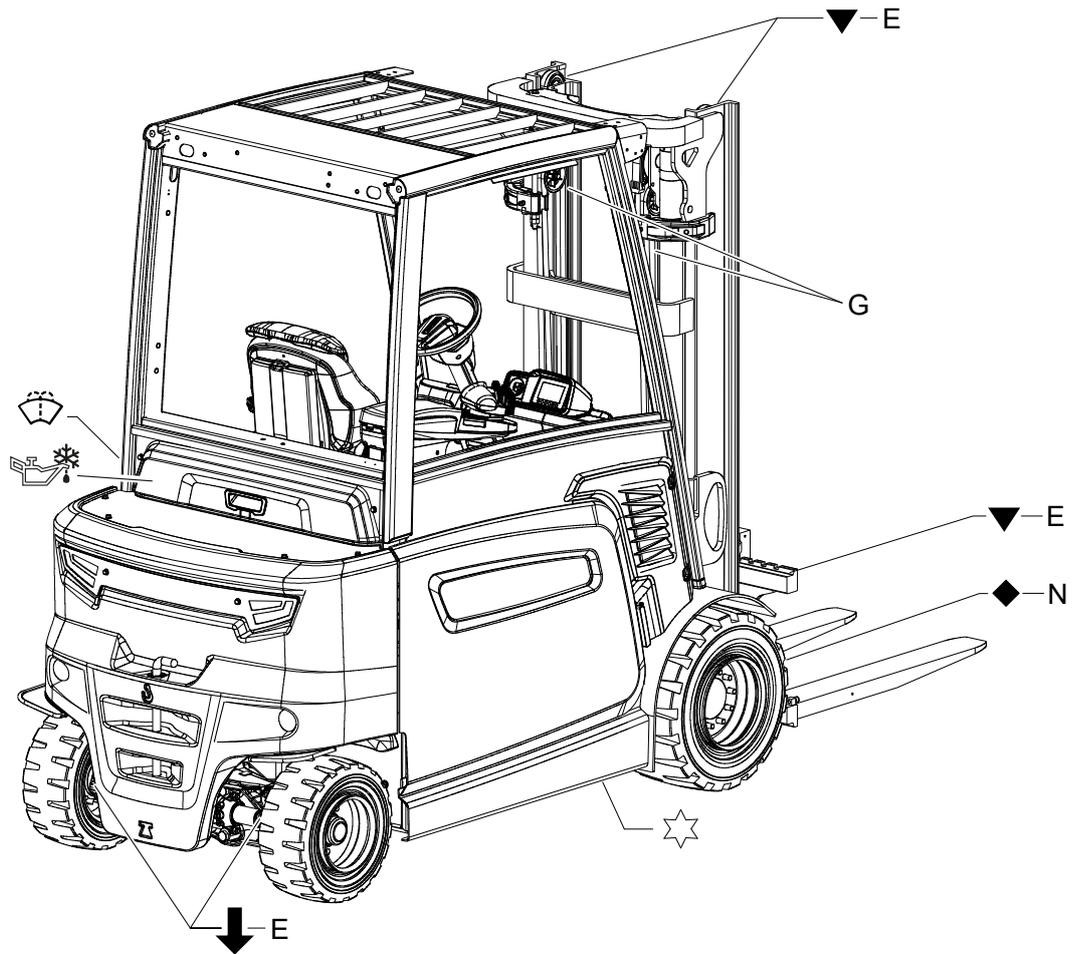
## **⚠ WARNING!**

### **Risk of injury from contact with hot operating media**

Contact with hot operating media can lead to serious injuries such as burns or scalds.

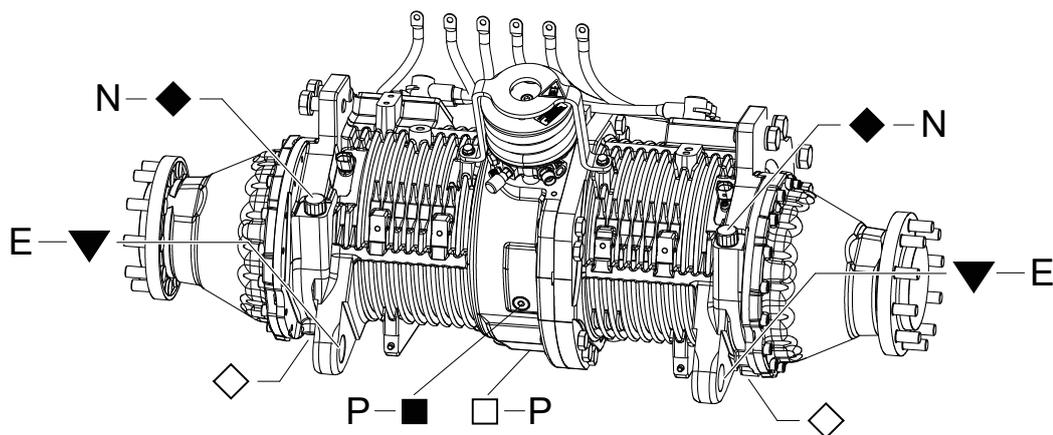
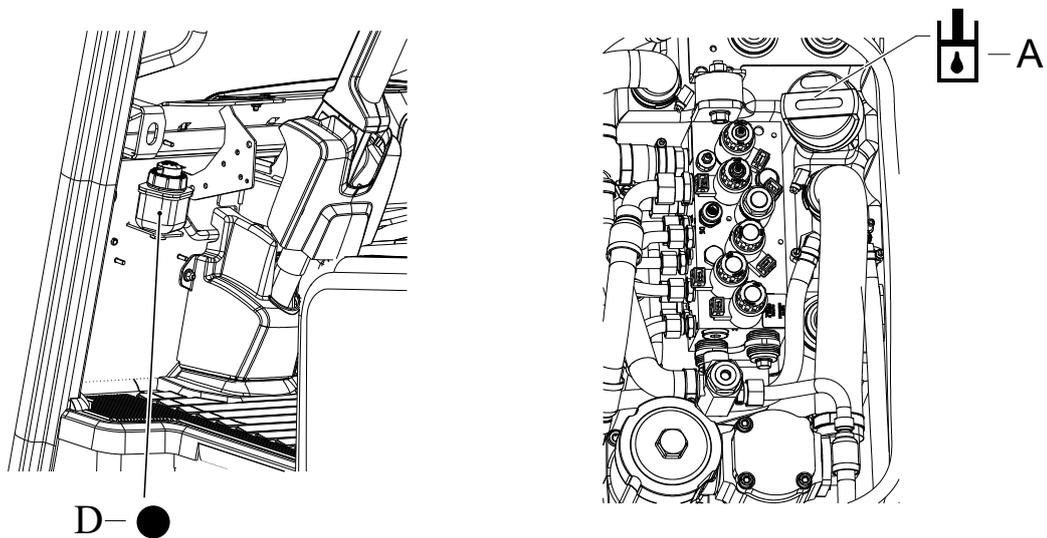
- ▶ Wait until the operating media has cooled down.
  - ▶ Avoid contact with hot operating media.
  - ▶ In the case of injuries, seek medical assistance immediately.
  - ▶ Remove any spilled hydraulic operating media immediately using an appropriate bonding agent.
-

## 4.2 Lubrication Schedule



▼	Contact surfaces	◆	Wheel hub transmission oil filler plug
↓	Grease nipple	◇	Wheel hub transmission oil drain plug
❄	Hydraulic oil filler plug	■	Check hole / oil filler hole in the drive axle brake
☆	Hydraulic oil drain plug	□	Drive axle brake oil drain plug
❄	Windscreen washer fluid filler plug (inside the cabin)	●	Brake system brake oil filler opening
		❄	Air conditioning operating fluid filling point (under the protective plate)

→ For industrial trucks with attachments, the operating instructions for the attachment must be observed.



▼	Contact surfaces	◆	Wheel hub transmission oil filler plug
↓	Grease nipple	◇	Wheel hub transmission oil drain plug
⊕	Hydraulic oil filler plug	■	Check hole / oil filler hole in the drive axle brake
☆	Hydraulic oil drain plug	□	Drive axle brake oil drain plug
	Windscreen washer fluid filler plug (inside the cabin)	●	Brake system brake oil filler opening
			Air conditioning operating fluid filling point (under the protective plate)

→ For industrial trucks with attachments, the operating instructions for the attachment must be observed.

### 4.3 Consumables

Code	Order no.	Delivered quantity	Filling quantity	Description	Used for
A	51132826	1 l	29 l	Jungheinrich hydraulic oil <sup>1</sup> HVLP 32	Hydraulic system
	51132827	5 l			
	51188578	20 l			
	51037497	5 l		Renolin 22 HLPD <sup>2</sup>	
	50429647	20 l			
	51887189	20 l		Plantosyn 46 HVI (BIO hydraulic oil)	
	51525383	5 l		HV 68 <sup>3</sup>	
D	51037497	5 l	0.1 l	Renolin 22 HLPD	Brake system brake oil for compensation tank
E	50354629	400 gr		Lubrication grease LX-PEP2	Contact surfaces of mast rollers, fork carriage and side shift; Steering axle, rear wheel bearings, lubricated mast bolts (○)
G	29201280	0.4 l		Chain spray	Chains
N	51525410	1 l	0.835 l each	Titan Supergear 80W-90	Wheel hub transmission on left and right drive wheel
P	51837578	20 l	1.4 l	Titan Sintofluid 75W 80	Drive-axle brake
	51224491	750 ml		Glass cleaner	Cleaning the roof window (○) (polycarbonate)
			1350 g ±30 g	Refrigerant R134a	Air conditioning system (○)
			100 ml <sup>4</sup>	Compressor oil POE 68	
<p><sup>1</sup>) Blue colouring, for indoor, outdoor or cold-store use (●)</p> <p><sup>2</sup>) Green colouring, for cold store application (○)</p> <p><sup>3</sup>) For hot country or tropical use (○)</p> <p><sup>4</sup>) Pre-filling</p>					

**⚠ WARNING!**

**Danger of contamination of the area of use by hydraulic oil from the hydraulic system**

Conversion of the hydraulic system from BIO hydraulic oil to another permissible hydraulic oil or vice versa or mixed operation is prohibited!

The use of hydraulic oil of another specification or viscosity as well as the mixing of additives is prohibited!

- ▶ Do not switch to from using BIO hydraulic oil to another hydraulic oil and vice versa.

**⚠ WARNING!**

**Risk of collision and damage to the mast due to different hydraulic oil in the hydraulic system**

If the parameterisation of the industrial truck has not been adjusted when the hydraulic system is changed to a different permissible hydraulic oil, depending on the temperature and viscosity, increased lowering speeds may occur and, in the case of masts with free lift, lift sequence errors may also occur (see page 174).

Conversion from BIO hydraulic oil to another permissible hydraulic oil or vice versa or mixed operation is prohibited!

The use of hydraulic oil of another specification or viscosity as well as the mixing of additives is prohibited!

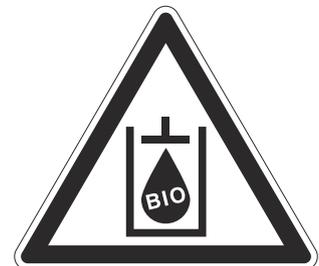
- ▶ When changing the hydraulic system to another permissible hydraulic oil with a different viscosity, the parameterisation of the industrial truck must be adjusted accordingly by the manufacturer's customer service department.

**⚠ CAUTION!**

**The use of unsuitable hydraulic oils can cause damage**

Trucks with bio hydraulic oil have a warning notice on the hydraulic reservoir: "Add hydraulic oil only".

- ▶ Use only BIO hydraulic oil.



**Grease guidelines**

Code	Saponification	Dew point °C	Worked penetration at 25°C	NLGI class	Operating temperature °C
E	Lithium	>250	265 – 295	2	-30 to +150

## 5 Maintenance and repairs

### 5.1 Preparing the truck for maintenance and repair work

#### **⚠ WARNING!**

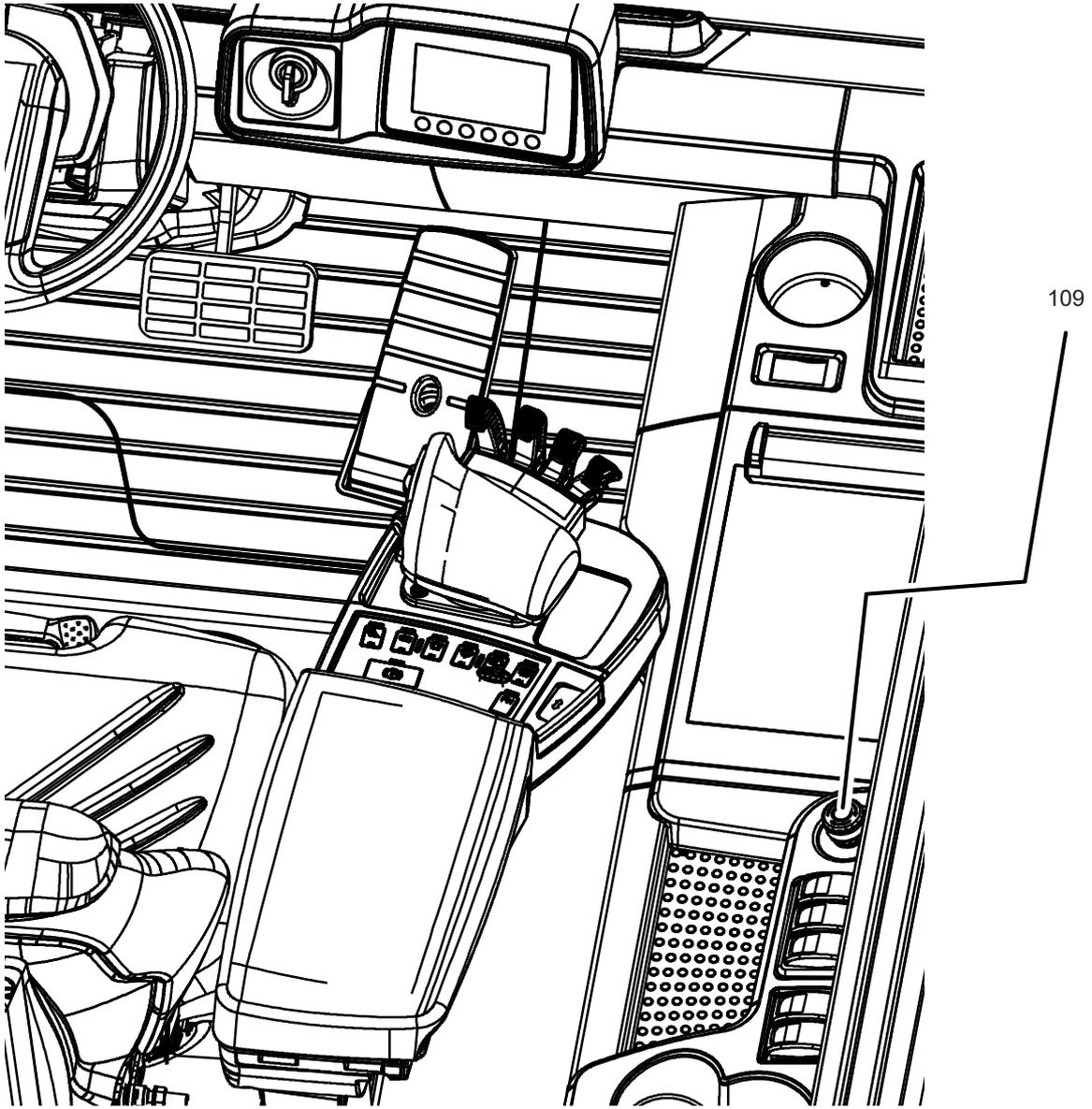
#### **Risk of accidents when working under the load handler, driver's cab and lift truck**

- ▶ When working under a raised load handler, driver's cab or a raised truck, secure them to prevent the truck from lowering, tipping or sliding away.
  - ▶ When raising the truck, follow the instructions, see page 61. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with wedges).
- 

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

#### *Procedure*

- Fully lower the load handler.
- Tilt the mast forward.
- Park the truck securely – see page 158.
- Activate the emergency disconnect switch (109).
- Disconnect the battery to prevent the truck from being switched on accidentally.



## 5.2 Checking the bonding adhesive on the roof window

### **⚠ WARNING!**

#### **Risk of injury from falling loads**

The glued-in roof window protects the operator from falling loads. The intact sealing joint on the top protects the adhesive bonding of the roof window from external influences.

If the roof window, adhesive bonding or sealing joint are damaged, the operator may no longer be protected against falling loads.

- ▶ Check the roof window, bonding adhesive and sealing joint.
  - ▶ In the event of damage, do not operate the truck until it is repaired.
- 

#### ***Checking the bonding adhesive on the roof window***

##### *Requirements*

- Truck prepared for maintenance and repair work (see page 314).
- Visually inspect the roof window and the bonding adhesive on the underside of the roof window for cracks and other damage.

##### *Tools and Material Required*

- Feeler gauge (approx. 0,1 mm)

##### *Procedure*

- Check the bonding adhesive on the underside of the roof window for strength:
  - The feeler gauge must not penetrate between the roof frame and roof window.
- Check the sealing joint on the top of the roof window for strength, cracks and damage:
  - The feeler gauge must not penetrate.
  - The surface must be firm, dry and not sticky and must not show any discolouration.

*The bonding adhesive on the roof window has been checked.*

If necessary, damage to the sealing joint must be properly repaired by a trained service technician. Repairing the bonding adhesive on the underside of the roof window is not permitted.

If damaged, the roof window must be replaced immediately by the manufacturer's customer service department. The truck must not be used until it is repaired.

## 5.3 Lifting and jacking up the truck safely

### **⚠ WARNING!**

#### **A truck tipover can cause accidents**

In order to raise the truck, use only suitable lifting gear at the points specially provided for this purpose.

- ▶ Note the weight of the truck on the data plate.
  - ▶ Always use a jack with a minimum capacity of 5000 kg.
  - ▶ Raise the unladen truck on a level surface.
  - ▶ When raising the truck, prevent it from slipping or tipping over through suitable means (wedges, wooden blocks) with a minimum capacity of 5000 kg.
  - ▶ Ensure that the truck is in a safe position and has a good centre of gravity.
- 

#### ***Raising and jacking up the truck securely***

##### *Requirements*

- Prepare the truck for maintenance and repair work (see page 314).

##### *Tools and Material Required*

- Jack with a minimum capacity of 5000 kg
- Wooden blocks with a minimum capacity of 5000 kg

##### *Procedure*

- Place the jack against an indicated contact point (32). Take care not to strike the battery door.

→ Jacking point – see page 48.

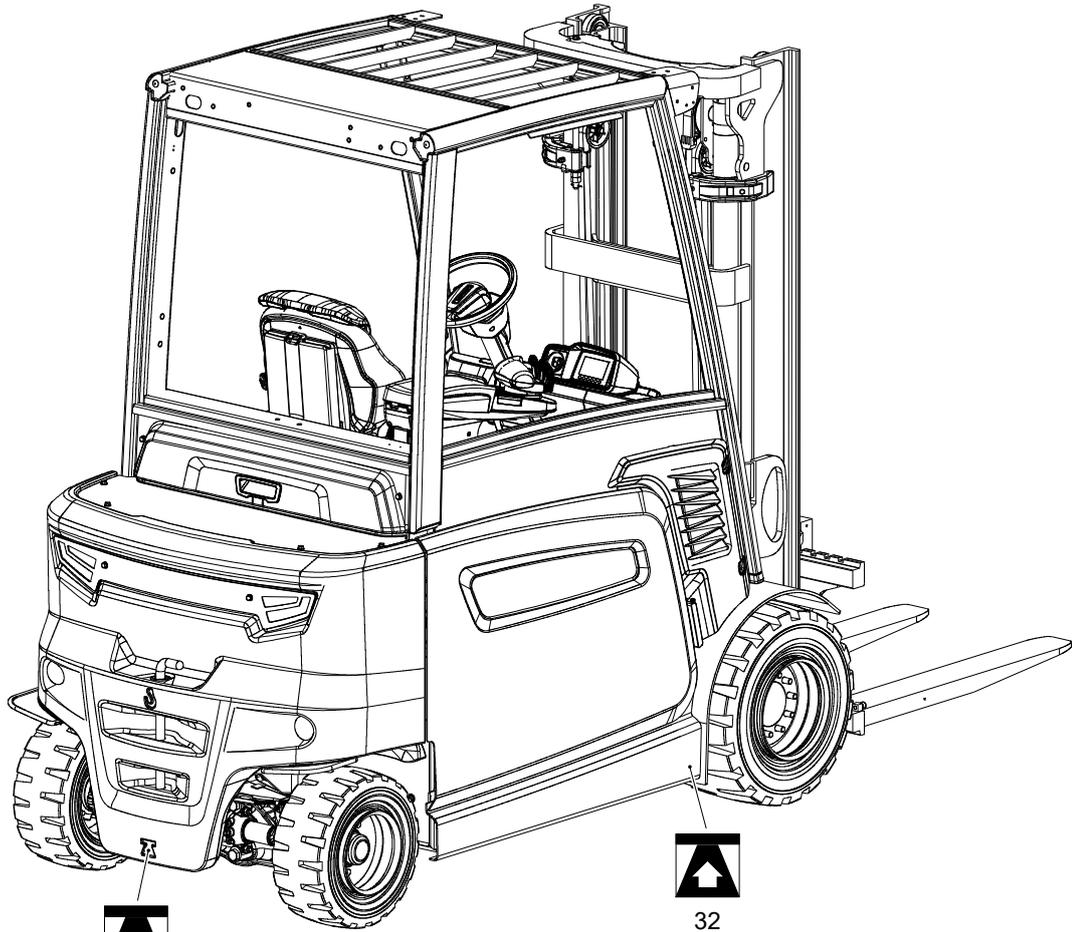
- Raise the truck.
- Support the truck with wooden blocks. Use only the designated areas (261) for support.

→ Supporting in other areas could permanently damage the structure of the industrial truck, especially in the area of the battery rollers.

- Set down the truck on wooden blocks.
- Remove the jack.

*The truck is now securely raised and jacked up.*

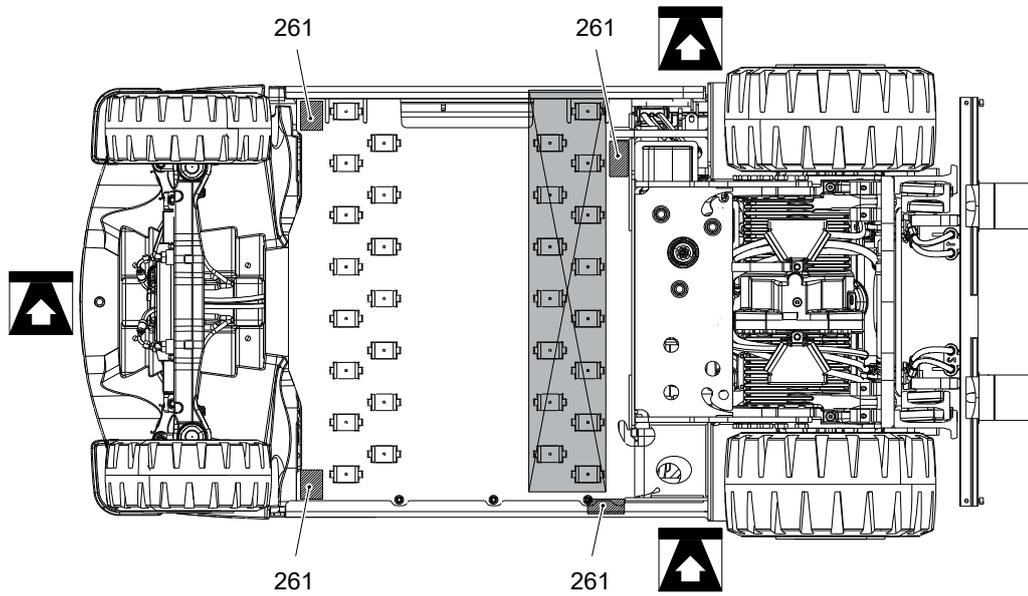
→ To lower the truck from the jacked-up position, follow the steps in reverse order.



32



32



261

261



261

261



## 5.4 Opening or closing the rear panel

### ***Opening the panel***

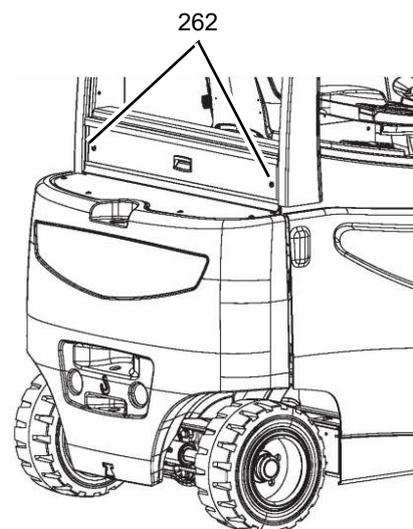
#### *Requirements*

- Prepare the truck for maintenance and repairs (see page 314).

#### *Procedure*

- Undo the two screws (262).
  - Pull the rear panel back and remove it.

*The rear panel is now open. The fuses and other electrical components can now be reached.*



- With the comfort charging option, the electrical connector of the sensor must be disconnected/reconnected.

### ***Closing the panel***

#### *Procedure*

- Place the rear panel flush with the contact surface.
  - Tighten the screws (262).

*The rear panel is now closed.*

## 5.5 Disassembling or assembling the floor plate

### **⚠ WARNING!**

#### **Danger from hot fluids and hot components**

Operating materials (hydraulic oil) as well as components of the hydraulic system and the drive train become very hot during operation. Hot components are freely accessible when the panels are open or the covers are removed. Direct contact with hot operating materials can cause scalds. Direct contact with hot components can cause burns.

- ▶ Do not touch hot surfaces.
- ▶ When carrying out maintenance and repairs, wear suitable protective clothing (gloves etc.) to avoid getting scalded or burned.

---

#### **Removing the floor plate**

##### *Requirements*

- Emergency disconnect switch pressed and key removed from the key switch.

##### *Procedure*

- Remove the floor mat from the floor plate (263).
- Undo and remove the fixing screws on the left and right edge of the floor plate.
- Lift up the floor plate and disconnect the plug connection (264).
- Remove the floor plate.

*The floor plate has been removed.*

#### **Inserting the floor plate**

##### *Requirements*

- Emergency disconnect switch pressed and key removed from the key switch.

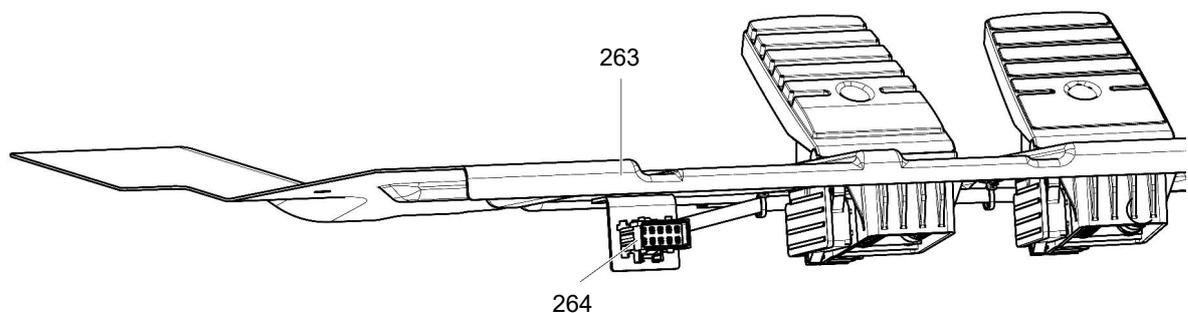
##### *Procedure*

- Connect the plug connection (264).
- Insert the floor plate (263).
- Insert and tighten the fixing screws on the left and right edge of the floor plate.

→ Tightening torque: 8 Nm

- Place the floor mate on the floor plate.

*Floor plate has been inserted.*



## 5.6 Replacing the wheels

### **⚠ WARNING!**

#### **A truck tipover can cause accidents**

In order to raise the truck, use only suitable lifting gear at the points specially provided for this purpose.

- ▶ Note the weight of the truck on the data plate.
  - ▶ Always use a jack with a minimum capacity of 5000 kg.
  - ▶ Raise the unladen truck on a level surface.
  - ▶ When raising the truck, prevent it from slipping or tipping over through suitable means (wedges, wooden blocks) with a minimum capacity of 5000 kg – see page 317.
  - ▶ Ensure that the truck is in a safe position and has a good centre of gravity.
- 

### **⚠ WARNING!**

#### **Falling wheels can cause injury**

- ▶ The wheels of the truck are very heavy. A single wheel can weigh up to 150 kg.
  - ▶ Always replace wheels with a suitable tool and protective equipment.
- 

### **⚠ WARNING!**

#### **The use of tyres that do not match the manufacturer's specifications can result in accidents.**

The quality of the tyres affects the operational stability and performance of the truck. Uneven wear reduces the operational stability of the truck and increases the stopping distance.

- ▶ When replacing tyres, make sure the truck is not skewed.
  - ▶ Always replace tyres in pairs, i.e. left and right at the same time.
  - ▶ For pneumatic tyres, only remove the steel ring when the tyre is depressurised.
- 

→ When replacing rims and tyres fitted at the factory, only use the manufacturer's original spare parts. Otherwise the manufacturer's specifications cannot be ensured. If you have any queries, contact the manufacturer's customer service department.

→ During the wear test, the wear limit of the respective wheel must be observed.

### **⚠ WARNING!**

#### **Risk of accident due to industrial truck tipping over through loss of wheels**

If the torques are not observed, the wheels may come loose/detach; this can cause the industrial truck to tip over.

- ▶ Always observe and adhere to the torques.
  - ▶ Wheels must only be changed by trained personnel.
-

## **Removing the wheels**

### **Requirements**

- Truck prepared for maintenance and repair work – see page 314.

### **Tools and Material Required**

- Jack with a minimum capacity of 5000 kg
- Wooden blocks with a minimum capacity of 5000 kg
- Mounting lever
- Torque wrench

### **Procedure**

- Place the jack against an indicated contact point. Take care not to strike the battery door.

→ Jacking point – see page 48.

- Raise and jack up the truck securely – see page 317. Use only the designated areas for support.

→ Supporting in other areas could permanently damage the structure of the industrial truck, especially in the area of the battery rollers.

- Undo the wheel attachment (265).
- Remove the wheel, using a suitable mounting lever if necessary.

*The wheel has now been removed.*

## **Fitting the wheels**

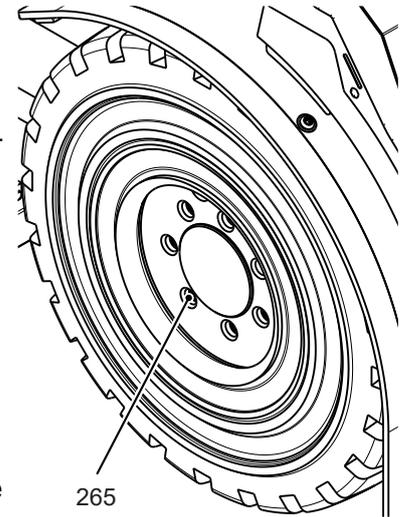
### **Procedure**

- Fit the wheel using a suitable mounting lever if necessary.
- Fit the wheel attachment.
- Lift the industrial truck securely, remove the wooden blocks and lower the industrial truck – see page 317.
- Torque the wheel attachment (265) crosswise with a torque wrench; for tightening torque, see page 44.

*The wheel has now been fitted.*

→ When using pneumatic tyres check the air pressure, for the air pressure see page 44

→ After every tyre change, check the height of the fork carriage and the fork arms and have them adjusted by the manufacturer's customer service department if necessary.



## 5.7 Checking the attachment of the wheels

### **⚠ WARNING!**

#### **Using different tyres can cause accidents**

The quality of the tyres affects the operational stability and performance of the truck.

- ▶ The diameter of the wheels must differ by no more than 15 mm.
- ▶ Always replace tyres in pairs, i.e. left and right at the same time. After replacing the tyres, check that the wheel bolts/nuts are secure after 10 operating hours.
- ▶ Always use tyres of the same make, model and profile.

#### **Checking the mounting of wheels**

##### *Requirements*

- Truck prepared for maintenance and repair work (see page 314).

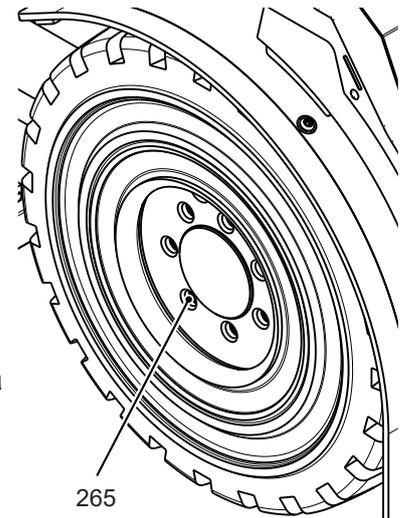
##### *Tools and Material Required*

- Torque wrench

##### *Procedure*

- Torque the wheel bolts/nuts (265) crosswise with a torque wrench – torques: see page 44.

*The mounting of wheels is now checked.*



- When using pneumatic tyres check the air pressure, for the air pressure see page 44

## 5.8 Hydraulic system

### **⚠ WARNING!**

#### **Danger from hot fluids and hot components**

Operating materials (hydraulic oil) as well as components of the hydraulic system and the drive train become very hot during operation. Hot components are freely accessible when the panels are open or the covers are removed. Direct contact with hot operating materials can cause scalds. Direct contact with hot components can cause burns.

- ▶ Do not touch hot surfaces.
  - ▶ When carrying out maintenance and repairs, wear suitable protective clothing (gloves etc.) to avoid getting scalded or burned.
- 

### **⚠ WARNING!**

#### **Hot hydraulic oil can cause injury**

Hot hydraulic oil can cause serious injuries such as burns or scalds.

- ▶ Wait until the hydraulic oil has cooled down.
  - ▶ Do not drain or pump hot hydraulic oil out of the system.
  - ▶ In the case of injuries, seek medical assistance immediately.
  - ▶ Remove any spilled hydraulic oil immediately with an appropriate bonding agent.
- 

### **⚠ CAUTION!**

The hydraulic oil is pressurised during operation and is a hazard to health and to the environment.

- ▶ Do not touch pressurised hydraulic lines.
  - ▶ Dispose of used oil in accordance with regulations. Store used oil safely until it can be disposed of in accordance with regulations.
  - ▶ Do not spill hydraulic oil.
  - ▶ Remove any spilled hydraulic oil immediately with an appropriate bonding agent.
  - ▶ The mixture of bonding agents and consumables must be disposed of in accordance with relevant regulations.
  - ▶ Observe national regulations when handling hydraulic oil.
  - ▶ Wear safety gloves when handling hydraulic oil.
  - ▶ Prevent hydraulic oil from coming into contact with hot components.
  - ▶ Do not smoke when handling hydraulic oil.
  - ▶ Avoid contact and digestion. If you swallow oil, do not induce vomiting, but rather 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 represent an environmental hazard

- ▶ Dispose of used operating materials and used parts in accordance with the applicable environmental protection regulations.
- ▶ Oil changes may only be performed by the manufacturer's customer service department.
- ▶ Note the safety regulations when handling these substances.

→ When carrying out maintenance and repair work in the engine compartment, the pedal plate/floor plate must be removed. To remove the plate, the connector to the accelerator and brake pedals must be disconnected

### 5.8.1 Checking the hydraulic oil level

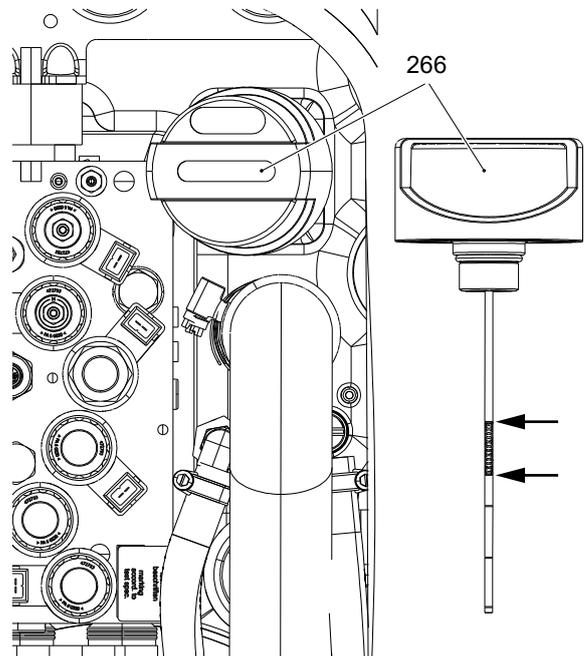
#### **Checking the hydraulic oil level and adding hydraulic oil**

##### Requirements

- Industrial truck parked on a level surface.
- Mast fully raised and lowered once.
- Truck prepared for maintenance and repair work (see page 314).
- Floor plate removed (see page 320).

##### Procedure

- Unscrew the ventilation/discharge filter (266), wipe the dipstick with a lint-free cloth and screw fully back into the filler opening.
- Unscrew the ventilation/discharge filter and check the oil level on the dipstick.



With cold oil: The oil level must be in the bottom half in the marked area (cross marking).

With hot oil: The oil level must be in the top half in the marked area (cross marking).

- If necessary, top up the hydraulic oil (see page 312) in small amounts and check again.
- Screw the ventilation/discharge filter fully back into the filler opening.

*The hydraulic oil level is now checked.*

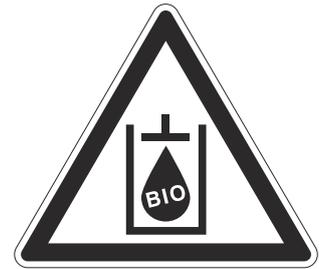
## 5.8.2 Replacing the hydraulic oil

### **⚠ CAUTION!**

#### **The use of unsuitable hydraulic oils can cause damage**

Trucks with bio hydraulic oil have a warning notice on the hydraulic reservoir: "Add hydraulic oil only".

► Use only BIO hydraulic oil.



#### *Requirements*

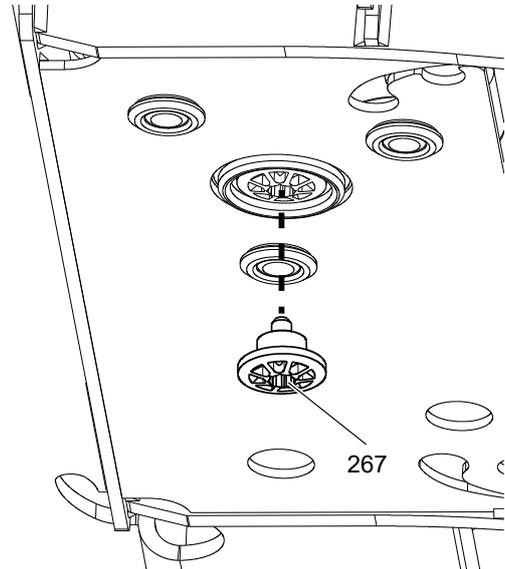
- Industrial truck parked on a level surface.
- Mast fully raised and lowered once.
- Truck prepared for maintenance and repair work (see page 314).

#### *Tools and Material Required*

- Ratchet with 1/2" square

#### *Procedure*

- Place an oil collection container of sufficient capacity (see page 312) underneath the oil drain plug (267).
- Undo the oil drain plug (267) until hydraulic oil flows out of the drain holes, and collect the hydraulic oil in the oil collection container.



- To drain the hydraulic oil, it is sufficient to undo the oil drain plug. The oil drain plug can be removed entirely, but this is not necessary.
- Once the hydraulic oil has been drained, screw the oil drain plug back in and tighten it.
- Torque: 6 Nm
- Unscrew the ventilation/discharge filter (266) and add new hydraulic oil – see page 312.
- Check the hydraulic oil level – see page 325.
- Perform a visual inspection to check for any oil leaks that need to be removed.

*The hydraulic oil has now been changed.*

## 5.8.3 Replacing the hydraulic oil filter

- Collect any spilled hydraulic oil. Dispose of the hydraulic oil and hydraulic oil filter and fuel in accordance with environmental regulations.

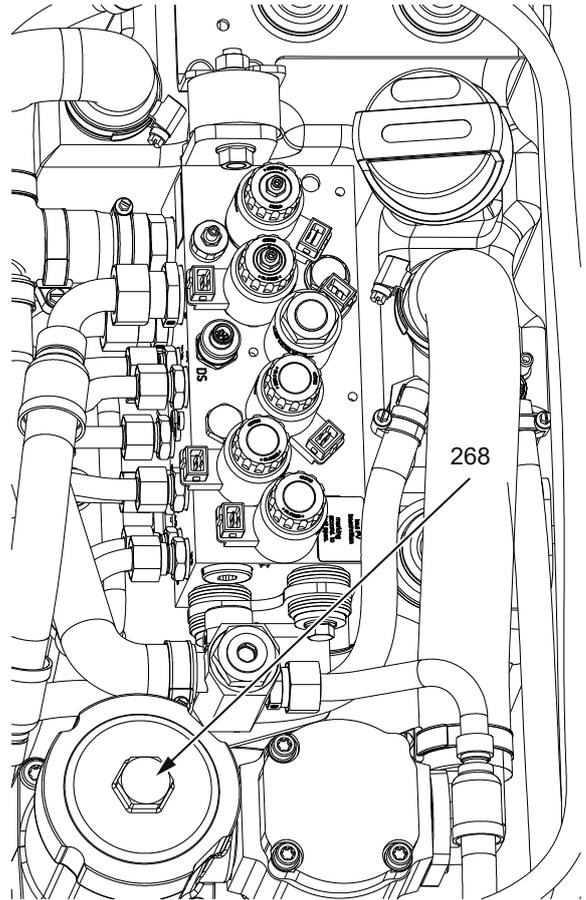
### Requirements

- Park the truck on a level surface.
- Truck prepared for maintenance and repair work (see page 314).
- Floor plate removed (see page 320).

### Procedure

- Place an oil collection container of sufficient capacity (see page 312) underneath to collect any drips that may escape.
- Undo and remove the sealing cap (268).
- Remove the filter element upwards.
- Insert a new filter element.
- Apply the sealing cap, screw it in as far as the stop and tighten it.

→ Torque: 10 Nm - 15 Nm



## 5.8.4 Replacing the ventilation and discharge filter

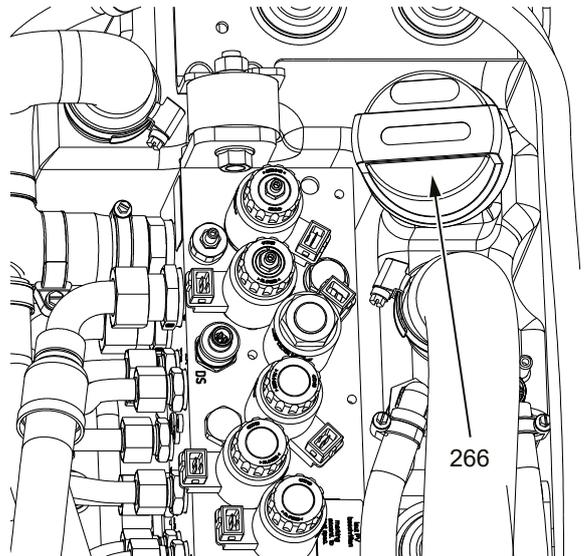
- Collect any spilled hydraulic oil. Dispose of the hydraulic oil and hydraulic oil filter and fuel in accordance with environmental regulations.

### Requirements

- Park the truck on a level surface.
- Truck prepared for maintenance and repair work (see page 314).
- Floor plate removed (see page 320).

### Procedure

- Unscrew the ventilation/discharge filter (266) with the oil dipstick.
- Screw in a new ventilation/discharge filter.



## 5.9 Checking the gear oil level

### ⚠ CAUTION!

#### Consumables and used parts represent an environmental hazard

- ▶ Dispose of used operating materials and used parts in accordance with the applicable environmental protection regulations.
- ▶ Oil changes may only be performed by the manufacturer's customer service department.
- ▶ Note the safety regulations when handling these substances.

### NOTICE

#### Damage to the transmission due to incorrect oil level

The oil functions as lubricant and coolant. A low oil level leads to transmission damage as a result of overheating.

- ▶ Always check the transmission oil level at operational temperature.
- ▶ Only use clean, fresh oil from clean containers to fill or top up the transmission. Damage will arise from contamination or water entering the transmission.

### 5.9.1 Checking the gear oil level

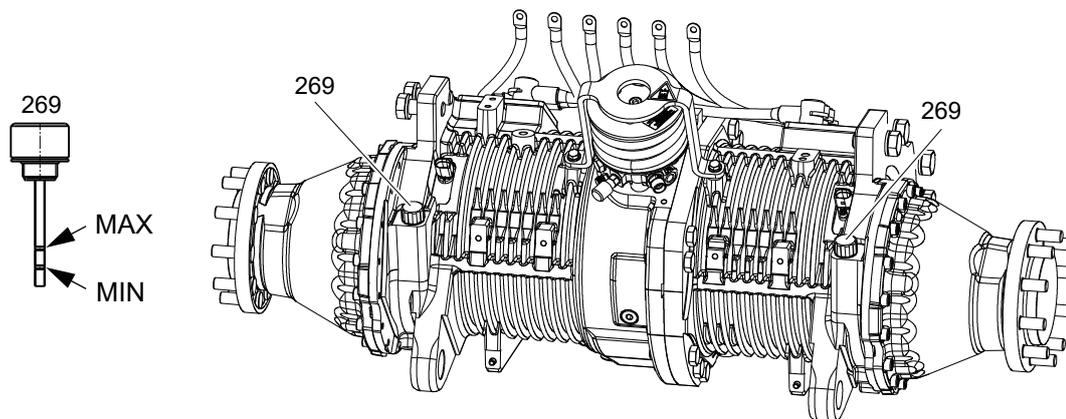
#### Requirements

- Truck parked securely on a level surface.

#### Procedure

- Unscrew the dipstick (269), wipe with a lint-free cloth and screw fully back into the filler opening.
- Unscrew the dipstick and check that the oil level is between the "MIN" and "MAX" marks.
- If the oil level is below the "MIN" mark on the dipstick, add transmission oil via the filler opening until the oil level has reached the "MAX" mark.
- Screw the dipstick fully back into the filler opening.

*The transmission oil level has now been checked.*



## 5.9.2 Replacing the gear oil

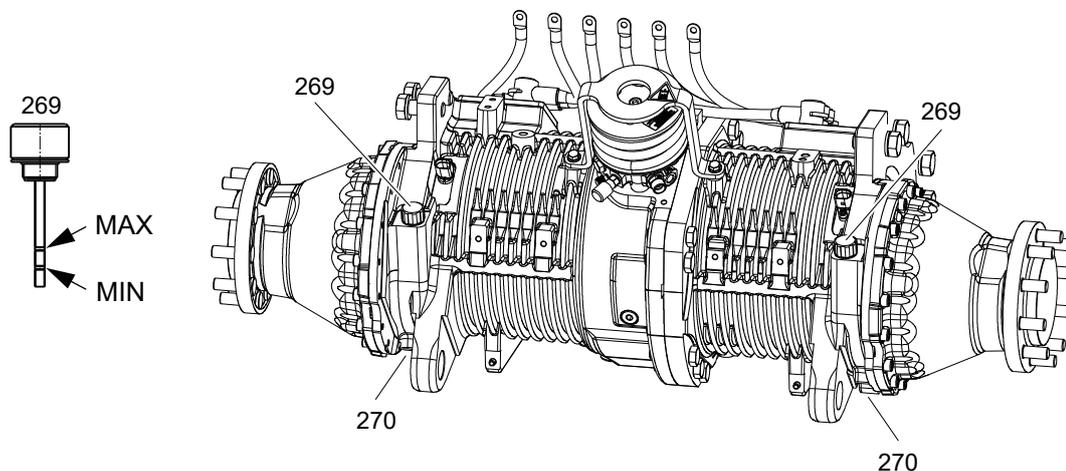
### Requirements

- Truck parked securely on a level surface.

### Procedure

- Place an oil collection container of sufficient capacity (see page 312) underneath the oil drain plug (270).
- Remove the oil drain plug (270) with sealing ring and collect the transmission oil in the oil collection container.
- Once the transmission oil has been drained, screw the oil drain plug with sealing ring back in and tighten.
  - Tightening torque: 20 - 30 Nm
- Unscrew the dipstick (269) and add new transmission oil, see page 312.
- Check the transmission oil level, see page 328.
- Perform a visual inspection to check for any oil leaks that need to be removed.

*The transmission oil has now been changed.*



## 5.10 Automatic Brake in the Axle

### ⚠ CAUTION!

#### Consumables and used parts represent an environmental hazard

- ▶ Dispose of used operating materials and used parts in accordance with the applicable environmental protection regulations.
- ▶ Oil changes may only be performed by the manufacturer's customer service department.
- ▶ Note the safety regulations when handling these substances.

### NOTICE

#### Damage to the brake due to incorrect oil level

The oil functions as lubricant and coolant. A low oil level leads to damage as a result of over temperature.

- ▶ Always check the brake oil level at operational temperature.
- ▶ Only use clean, fresh oil from clean containers to fill or top up the brake oil in the axle. Damage can occur if contamination or water enters the brake.

## 5.10.1 Checking the Brake Oil Level in the Axle

### *Requirements*

- Park the truck securely on a level surface –see page 158

### *Tools and Material Required*

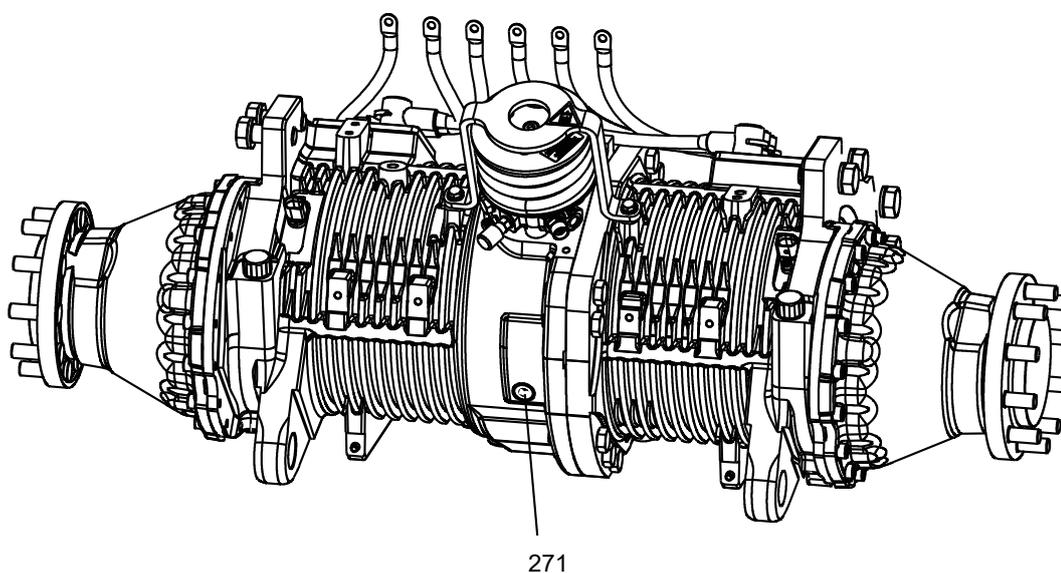
- Oil pan

### *Procedure*

- Place the oil pan under the axle.
- Unscrew the oil check plug (271).
- Check the brake oil level. Top up if necessary through the filler hole (271).

*The brake oil level has now been checked.*

- The oil level needs to reach the bottom mark of the oil check hole (271).



## 5.10.2 Changing the Brake Oil

### NOTICE

#### Warning of viscous brake oil

Brake oil can be viscous when the transmission is cold.

- Change the brake oil only at operational temperature and when the truck is in a horizontal position.

#### Requirements

- Park the truck securely on a level surface –see page 158

#### Tools and Material Required

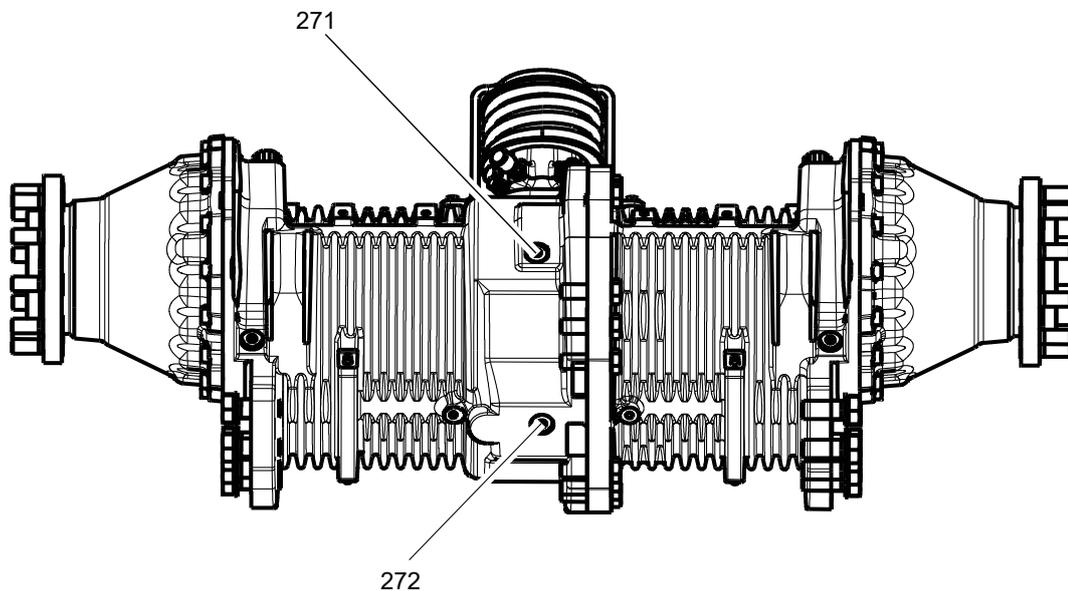
- Oil pan

#### Procedure

- Place an oil pan of sufficient capacity, see page 330, underneath the oil drain plug (272).
- Remove the oil drain plug (272) with sealing ring and collect the brake oil in the oil collection container.
- Once the brake oil has been drained, screw the oil drain plug (272) with sealing ring back in and tighten.
  - Torque: 20 - 30 Nm
- Unscrew the oil check plug (271) and fill with new brake oil – see page 330.
- Check the brake oil level – see page 330.

*The brake oil has been changed.*

Perform a visual inspection to check for any oil leaks that need to be removed.



## 5.11 Brake

### 5.11.1 Check the brake oil level

#### **⚠ WARNING!**

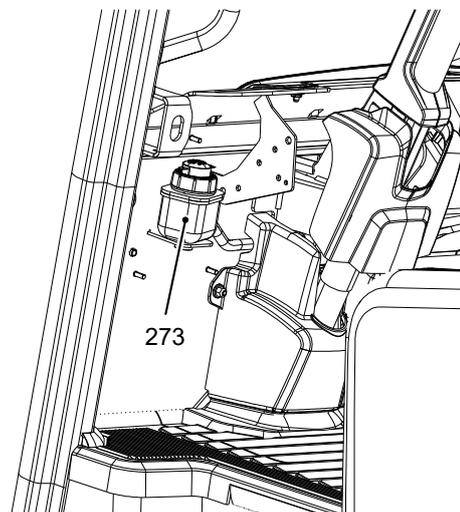
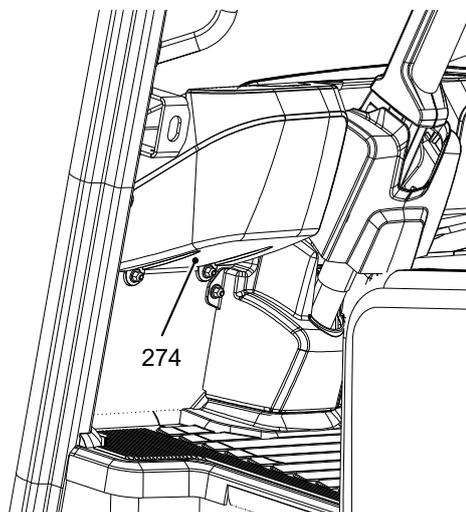
#### **Malfunctioning brake due to incorrect consumable**

Using brake fluid can cause the brake to fail.

► Only use authorised brake oil according to the consumables table, see page 312.

#### *Procedure*

- Loosen the nuts and remove the cover (274).
- Check the brake fluid level in the brake fluid reservoir (273).
- The level in the reservoir must be between the MIN and MAX markings.
- If necessary, open the lid of the reservoir and top up the brake fluid.
  - Volume: approx. 0,1 l
- After filling, close the lid of the reservoir again and refit the cover.



## 5.12 Heater and Air Conditioning

### **⚠ WARNING!**

#### **Danger from hot fluids and hot components**

Operating materials (hydraulic oil) as well as components of the hydraulic system and the drive train become very hot during operation. Hot components are freely accessible when the panels are open or the covers are removed. Direct contact with hot operating materials can cause scalds. Direct contact with hot components can cause burns.

- ▶ Do not touch hot surfaces.
- ▶ When carrying out maintenance and repairs, wear suitable protective clothing (gloves etc.) to avoid getting scalded or burned.

---

#### **Changing the breather filter**

##### *Requirements*

- Truck parked securely on a level surface – see page 158.

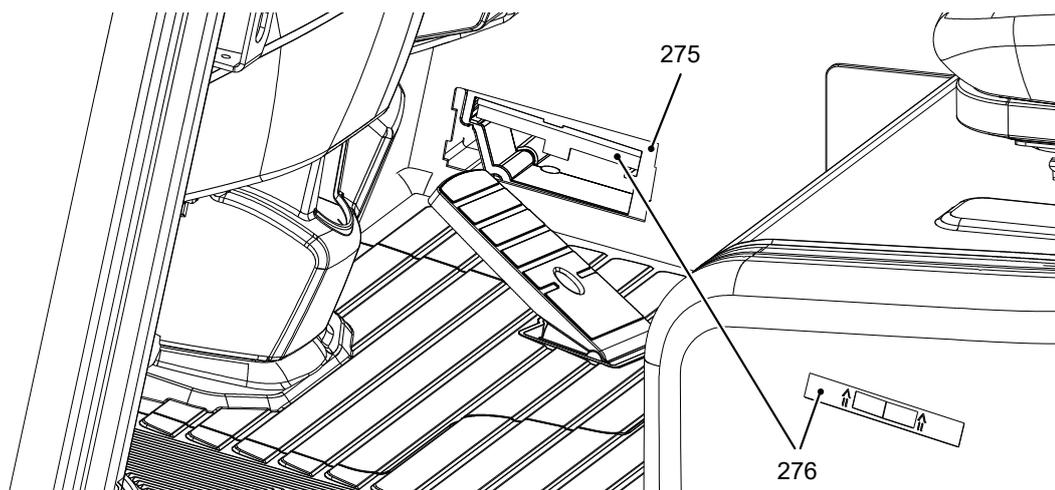
##### *Procedure*

- Remove the grille (275) in the footwell of the cabin.
- Pull the filter (276) out of the heating console by the handle.
- **Do not operate the heater without a functioning filter in place!**
- Replace the filter.
- Insert the grille (275) in the footwell of the cabin and fix it with snap locks.

*The filter cartridge has been changed.*

- Regular maintenance is required to ensure that the filter functions correctly – see page 363.

At the latest, when only a reduced air flow with increased temperature comes out of the air flow jets, the air filter is used up and must be replaced immediately.



## 5.13 Adding window washer system fluid

### Requirements

- Screw cap (277) of the container (278) is opened.

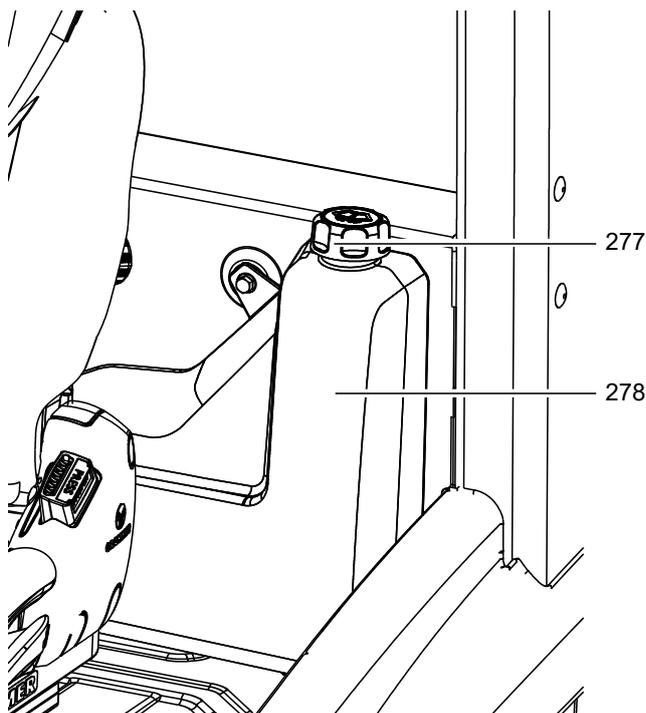
### Procedure

- Fill the container (278) with weather-dependent additives (max. 3,5 Liter).

→ Use a funnel or pouring aid to make filling easier.

- Wipe away excess fluid.
- Close the screw cap (277) of the container (278) again.

*The windscreen washing system has been topped up.*



## 5.14 Checking the electrical fuses

### **⚠ WARNING!**

#### **Risk of accidents due to electrical current**

Make sure the electrical system is voltage-free before starting work on it.

- ▶ Park the truck securely (see page 158).
  - ▶ Press the emergency disconnect switch.
  - ▶ Equipped with lithium-ion battery (○): Disconnect the truck-side control line from the connection on the battery tray or the interface converter (○) on the battery.
  - ▶ Disconnect the battery.
  - ▶ Remove any rings or metal bracelets etc. before working on electrical components.
- 

### **⚠ CAUTION!**

#### **The use of incorrect fuses can cause fire and damage components**

The use of incorrect fuses can damage the electrical system and result in fire. The safety and functionality of the truck cannot be ensured.

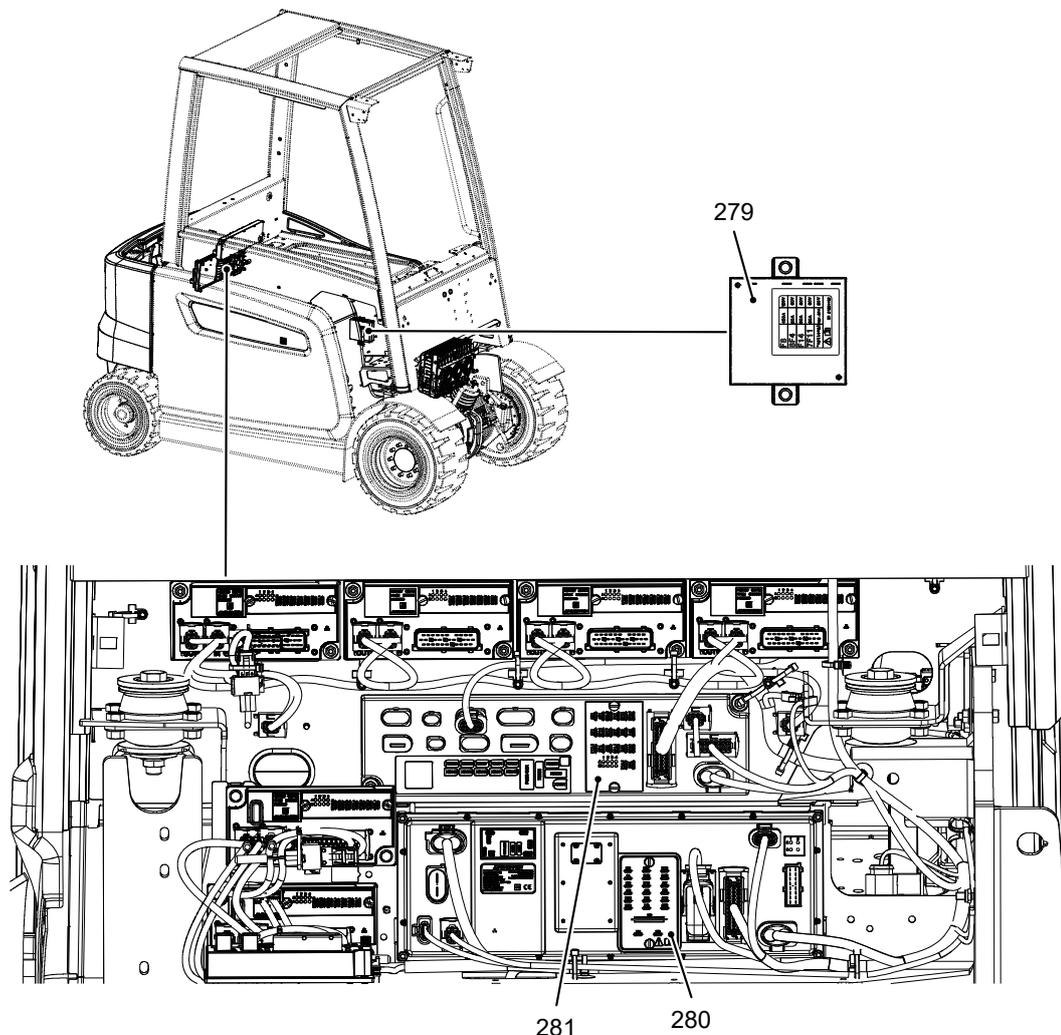
- ▶ Use only fuses with the prescribed rated current, see page 337.
- 

### **⚠ CAUTION!**

#### **Component damage due to dirt and water on the electrical control unit**

To avoid damage to the electrical control unit, remove dirt and water from the control-unit cover before opening the control unit.

- ▶ Clean the control-unit cover thoroughly before opening it.
-



## Checking electrical fuses

### Requirements

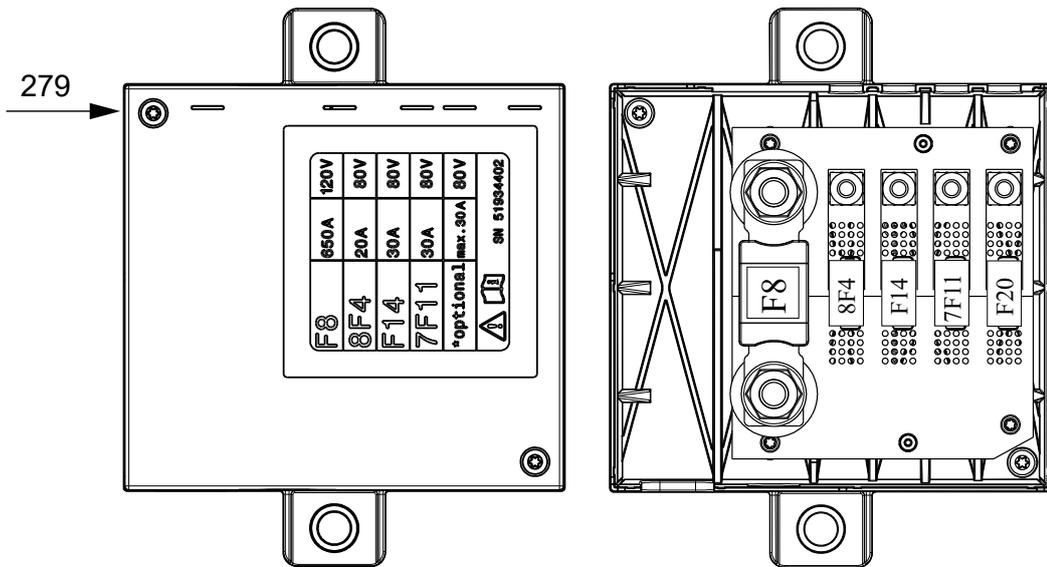
- Prepare the truck for maintenance and repair work (see page 314).

### Procedure

- Remove the rear cover by undoing the mounting screws – see page 319.
- Equipment with comfort charging socket (○): Disconnect connector XB334.
- Remove the cover in the foot well.
- Before opening, clean the caps (279, 280, 281) of the fuses and the area around the caps.
- Unscrew the caps (280, 281) at the rear.
- Unscrew the cap (279) in the footwell.
- Check condition and rating of the fuses in accordance with the table.
- Replace any damaged fuses in accordance with the tables.
- Close the caps again.
- Equipment with comfort charging socket (○): Reconnect connector XB334.
- Fit the rear cover and the cover in the footwell.

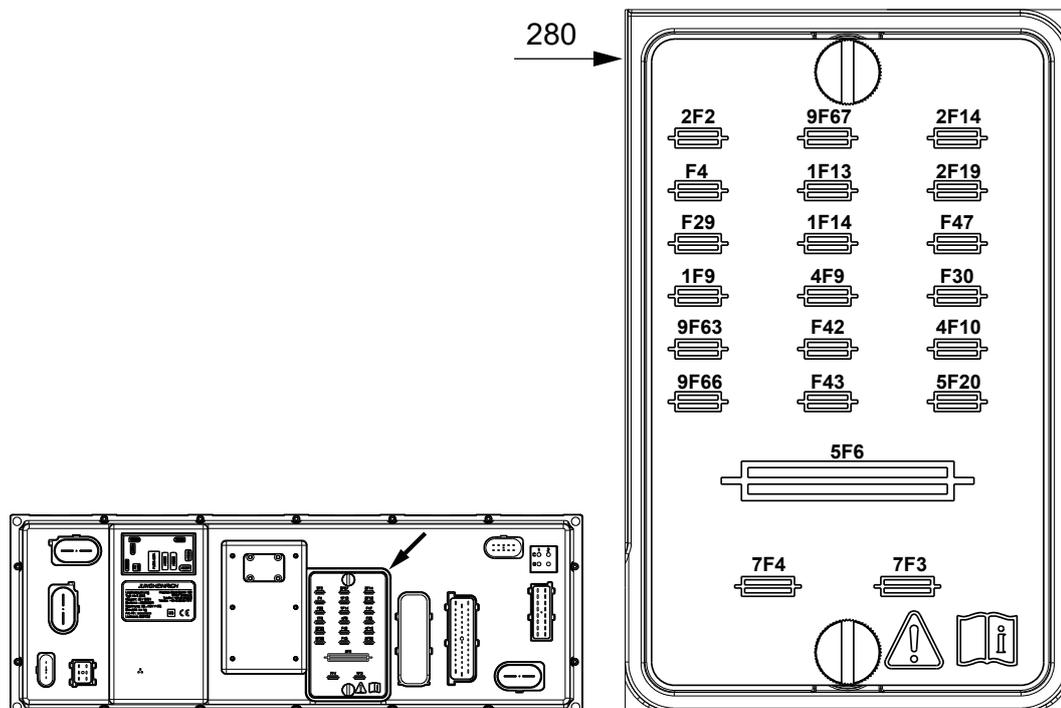
*The electrical fuses have now been checked.*

### 5.14.1 Fuse ratings



#### Main fuses

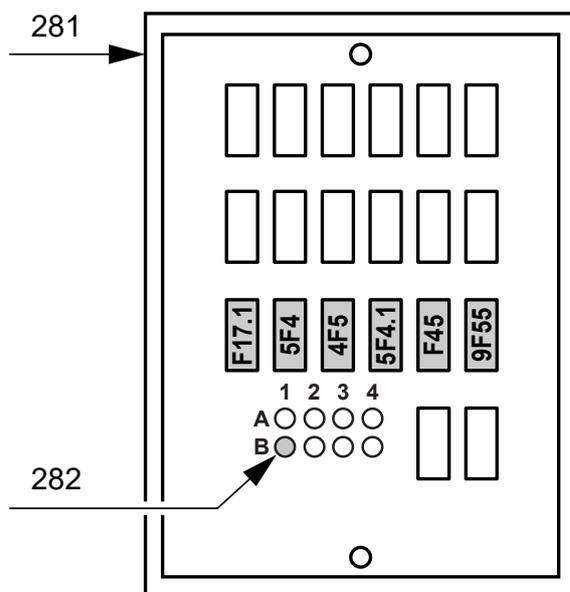
Designation	Type / rating	Electrical circuit
F8	SF56 Mega 120V / 650A	Main fuse
8F4	FKS 80V / 20A UL	SIO power supply
F14	FKS 80V / 30A UL	80 V heater supply
7F11	FKS 80V / 30A UL	80 V auxiliary-converter supply
F20	FKS 80V / 30A UL	Air-conditioning system
	FKS 80V / max. 30A UL	Option



### Control fuses for the drive section

Description	Type / rating	Electrical circuit
2F2	FK1 MINI, 32V/4A UL	Release valve Lift 2 valve
9F67	FK1 MINI, 32V/4A UL	Axle cooling fan
2F14	FK1 MINI, 32V/4A UL	ZH1/4 left/forwards valve ZH1/4 right/backwards valve ZH2/3 right/backwards valve ZH2/3 left/forwards valve ZH2 valve ZH3 valve
F4	FK1 MINI, 32V/4A UL	
1F13	FK1 MINI, 32V/4A UL	Brake valve Brake charge valve
2F19	FK1 MINI, 32V/4A UL	ZH1/4 right/backwards valve Release valve Lift valve Lower valve Tilt backwards valve Tilt forwards valve
F29	FK1 MINI, 32V/10A UL	Supply 24V standby for cabin module Supply 24V standby for fan battery
1F14	FK1 MINI, 32V/4A UL	Brake release valve Brake discharge valve
F47	FK1 MINI, 32V/4A UL	Load detection 1 sensor Load detection 2 sensor
1F9	FK1 MINI, 32V/4A UL	Traction controller 24V1 supply

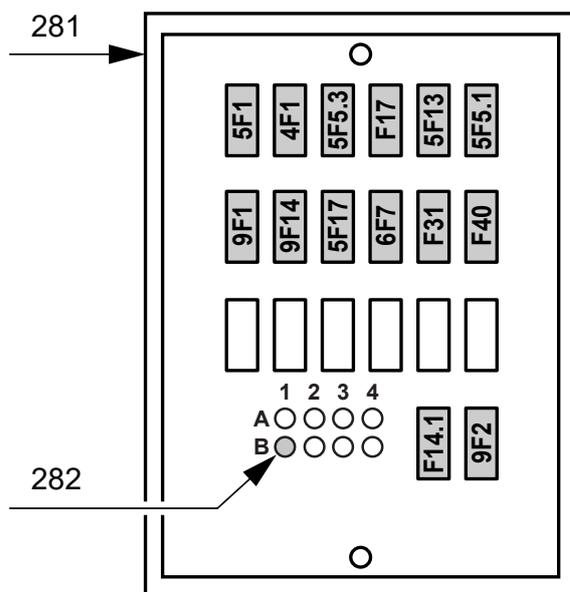
<b>Description</b>	<b>Type / rating</b>	<b>Electrical circuit</b>
4F9	FK1 MINI, 32V/4A UL	Steering actual value sensor Battery door and comfort charging flap sensor Parking brake sensor
F30	FK1 MINI, 32V/2A UL	Internal supply of the logic
9F63	FK1 MINI, 32V/7.5A UL	Oil-cooler fan
F42	FK1 MINI, 32V/20A UL	Control for options modules 24V supply
4F10	FK1 MINI, 32V/4A UL	Fan NxT-SIO
9F66	FK1 MINI, 32V/4A UL	Motor compartment cooling fan
F43	FK1 MINI, 32V/4A UL	Control for mast module / CUST 24V supply
5F20	FK1 MINI, 32V/4A UL	Control for mast module 24V supply
5F6	MIDI, 32V/50A UL	Control for cabin module 24V main supply
7F4	FK1 MINI, 32V/20A UL	24V supply of ext. DC/DC converter 2
7F3	FK1 MINI, 32V/20A UL	24V supply of ext. DC/DC converter 1



### Control fuses for the cabin section: Electrical circuit 0 (standby)

Description	Value (A) <sup>1</sup>	LED <sup>2</sup>	Consumer (24 V)
F17.1	4	2	Truck terminal
5F4	2	3	Light switch for search lighting, left parking light, left tail light
4F5	2	4	Front left and right indicators, rear left and right indicators
5F4.1	2	5	Right parking light, right tail light
F45	4	6	Options
9F55	4	7	Overhead guard, switches (indicators, warning indicators, StVZO parking light), cab door monitoring
<sup>1</sup> ) FK1 MINI 32 V / UL fuses <sup>2</sup> ) Blink code to LED 1B (282)			

→ Circuit 0 continues to supply consumers when the control unit is switched off.



### Control fuses for the cabin section: Electrical circuit 1

Designation	Rating (A) <sup>1</sup>	LED <sup>2</sup>	Consumer (24 V)
5F1	4	8	Front left and right work lights, rear left and right work lights
4F1	4	9	Horn, rear windscreen heater, options
5F5.3	2	10	Right dipped light, right brake light
F17	4	11	Third-party truck terminal
5F13	4	12	Reversing buzzer, warning indicator, front Floor-Spot, rear Floor-Spot or Floor-Bow, options
5F5.1	2	13	Left dipped light, left brake light
9F1	4	14	Front windscreen wiper
9F14	4	15	Rear windscreen wiper, DUO wash pump
5F17	2	16	Reading light, cabin fan, interior lighting
6F7	2	17	Voltage converter, internal supply for control logic
F31	4	18	Overhead guard: Options, horn button, horn button lighting, rear windscreen wiper, indicator lamp for lift cut-off override, cab door monitoring
F40	20	19	CUST interface
F14.1	7.5	20	Heating fan
9F2	7.5	21	Seat heating, compressor for pneumatic suspension

<sup>1</sup>) FK1 MINI 32 V / UL version fuses  
<sup>2</sup>) Blink code to LED 1B (282)



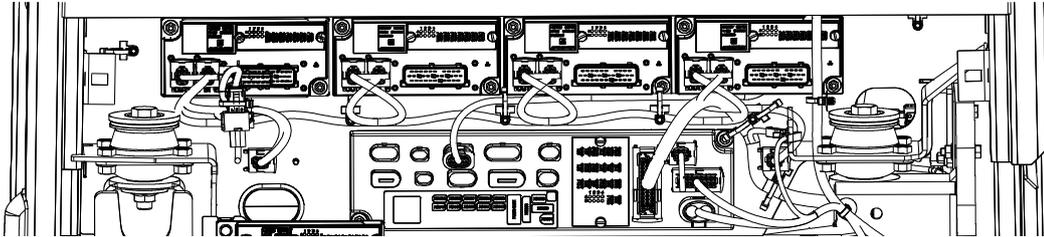
Circuit 1 only supplies consumers when the control unit is switched on.

### 5.14.1.1 Optional Equipment

Depending on the truck equipment, additional fused components may be connected in the cabin section near the control unit.

All fuses are of the following type: FK1 MINI 32 V / UL.

The status of each fuse circuit is indicated by an LED on the module. In the event of a defective fuse, the associated LED goes out.



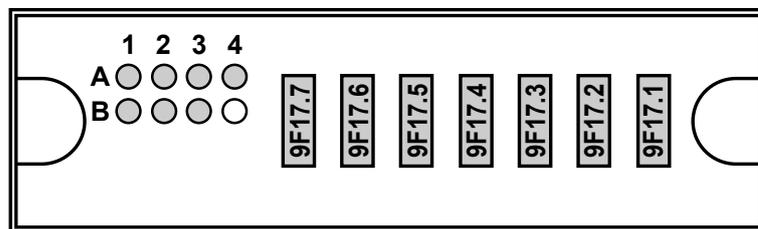
#### Auxiliary power supply module (9U27 NxT CES)

The component splits the incoming supply voltages of the 24 V on-board power supply into multiple, individually protected fuse circuits.

- Fuse circuit 7 is electrically isolated from the other circuits: The fuse can only be evaluated if the electrically isolated consumer is supplied with a 24 V supply voltage.

Description	Rating (A)	LED <sup>1</sup>	Consumer (24 V)
9F17.1	4	3 A	Fuse circuit 1
9F17.2	4	2 A	Fuse circuit 2
9F17.3	4	1 A	Fuse circuit 3
9F17.4	4	3B	Fuse circuit 4
9F17.5	4	2B	Fuse circuit 5
9F17.6	4	1B	Fuse circuit 6
9F17.7	4	4 A	Fuse circuit 7, electrically isolated

<sup>1)</sup> Assignment of status LED to the respective fuse circuit



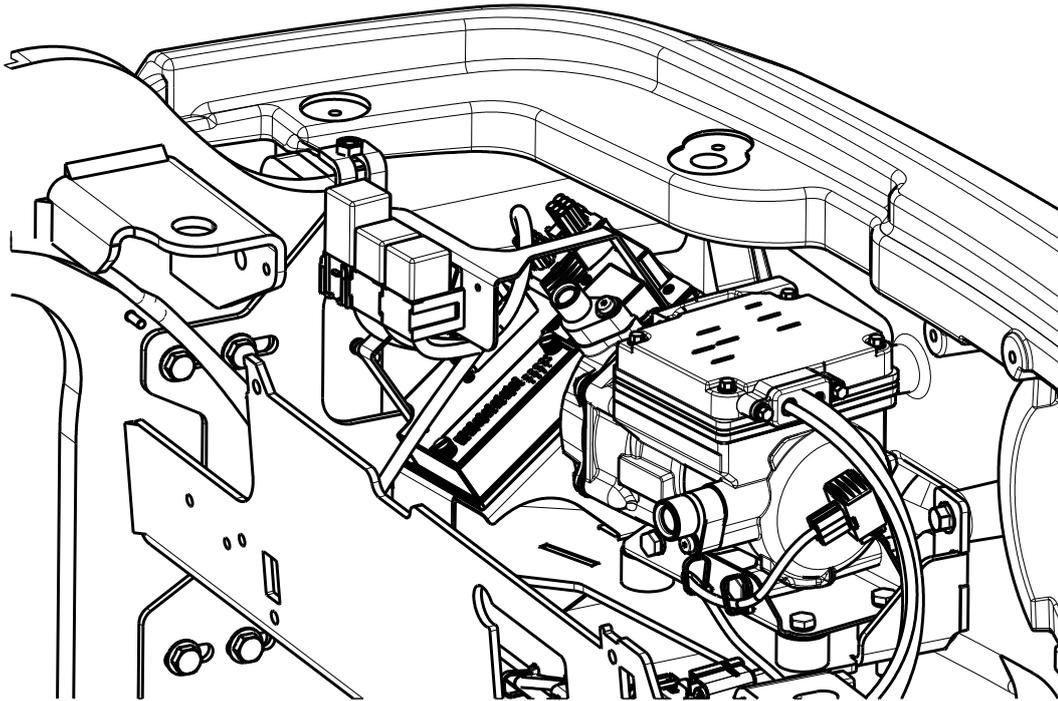
#### Auxiliary power supply module for air conditioning system (9U27 NxT CES)

A CES module is used for the power supply in the case of the optional air conditioning system. Deviating from the standard fuse configuration, the fuse ratings are modified as follows:

- Fuse circuit 7 is electrically isolated from the other circuits: The fuse can only be evaluated if the electrically isolated consumer is supplied with a 24 V supply voltage.

Description	Rating (A)	LED <sup>1</sup>	Consumer (24 V)
9F17.1	7.5	3 A	Fuse circuit 1 (condenser fan 9M11)
9F17.2	7.5	2 A	Fuse circuit 2 (condenser fan 9M12)
9F17.3	4	1 A	Fuse circuit 3 (relay control)
9F17.4	4	3B	Fuse circuit 4
9F17.5	4	2B	Fuse circuit 5
9F17.6	4	1B	Fuse circuit 6
9F17.7	4	4 A	Fuse circuit 7, electrically isolated

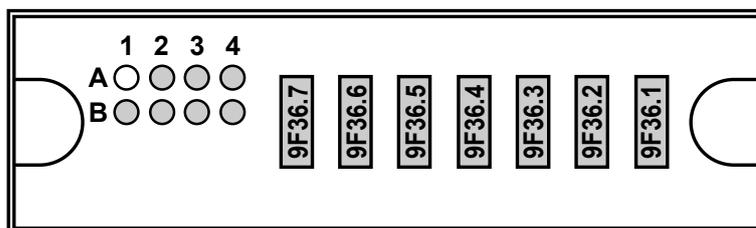
<sup>1)</sup> Assignment of status LED to the respective fuse circuit



### Auxiliary inputs and outputs module (9U26 NxT CIO)

Description	Rating (A)	LED <sup>1</sup>	Consumer (24 V)
9F36.1	4	4 A	Digital output 1
9F36.2	7.5	3 A	Digital output 2
9F36.3	4	2 A	Consumer 1, e. g. Floor-Stripes
9F36.4	4	4B	Consumer 2
9F36.5	4	3B	Consumer 3
9F36.6	4	2B	Consumer 4
9F36.7	4	1B	Current controller output 1/2

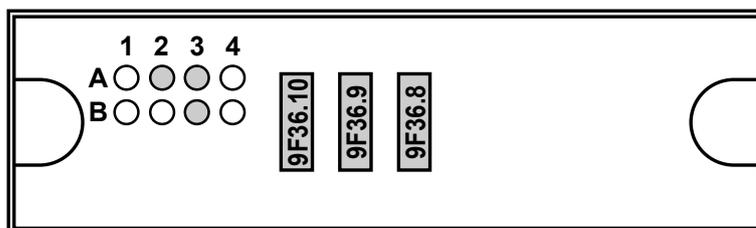
<sup>1)</sup> Assignment of status LED to the respective fuse circuit



### External operating components module (9U16 NxT SCI)

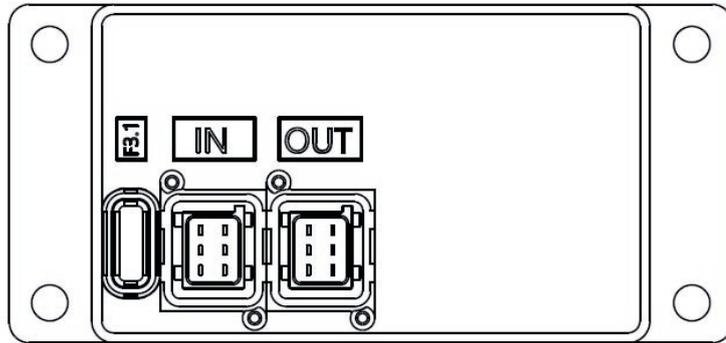
Description	Rating (A)	LED <sup>1</sup>	Consumer (24 V)
9F36.8	2	2 A	Internal supply
9F36.9	4	3B	Consumer 1, spare
9F36.10	4	3 A	Consumer 2, switching active

<sup>1)</sup> Assignment of status LED to the respective fuse circuit



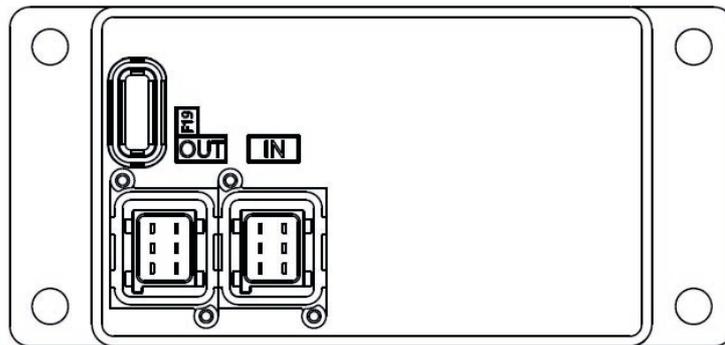
### Voltage converter 7U6 - 24V / 24V

Description	Rating (A)	LED	Consumer
F3.1	7.5 A	--	Option



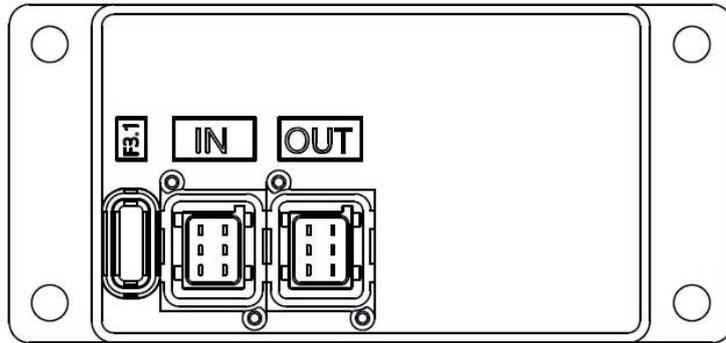
### Voltage converter 7U13 - 24V / 24V

Description	Rating (A)	LED	Consumer
F19	15 A	--	Option



## Control auxiliary converter U30 and U30.1 - 80V / 24V

Description	Rating (A)	LED	Consumer
F3.1	25 A	--	NxT SIO

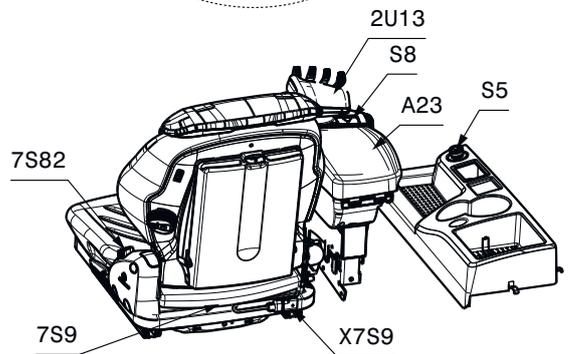
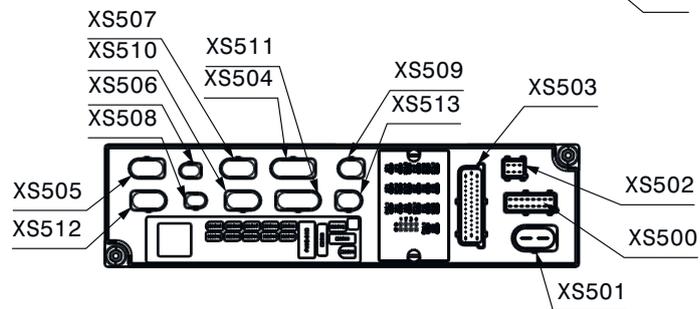
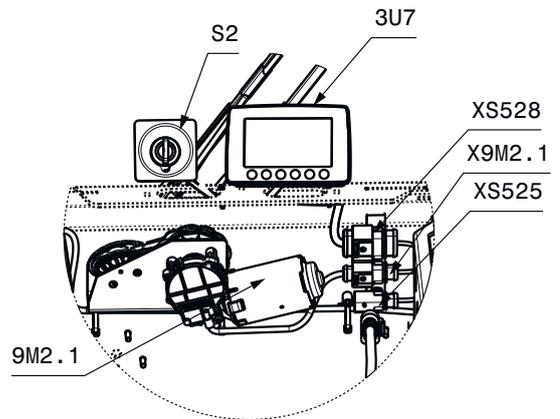
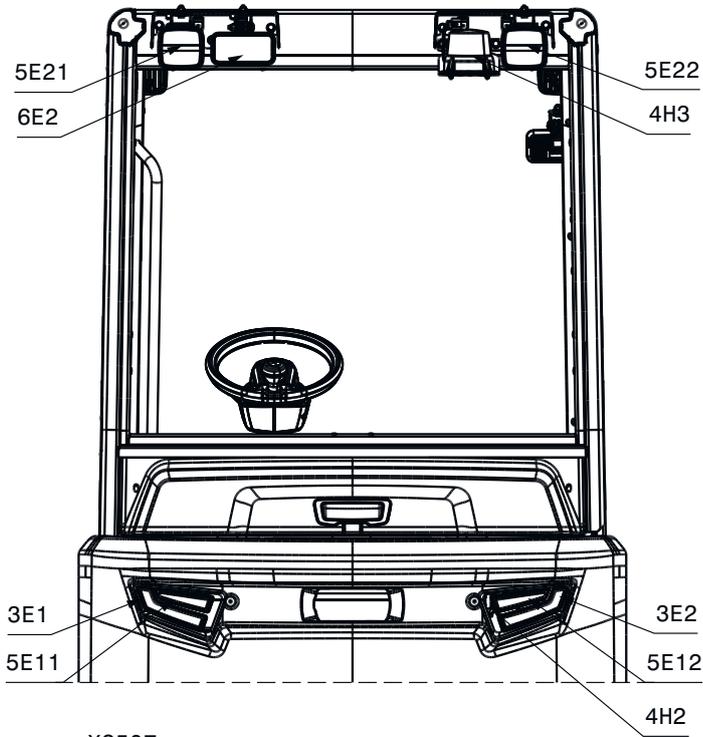
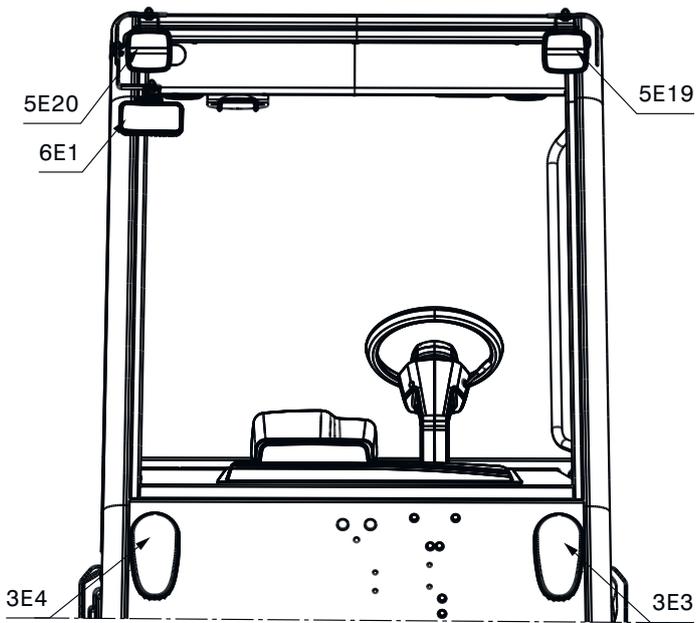


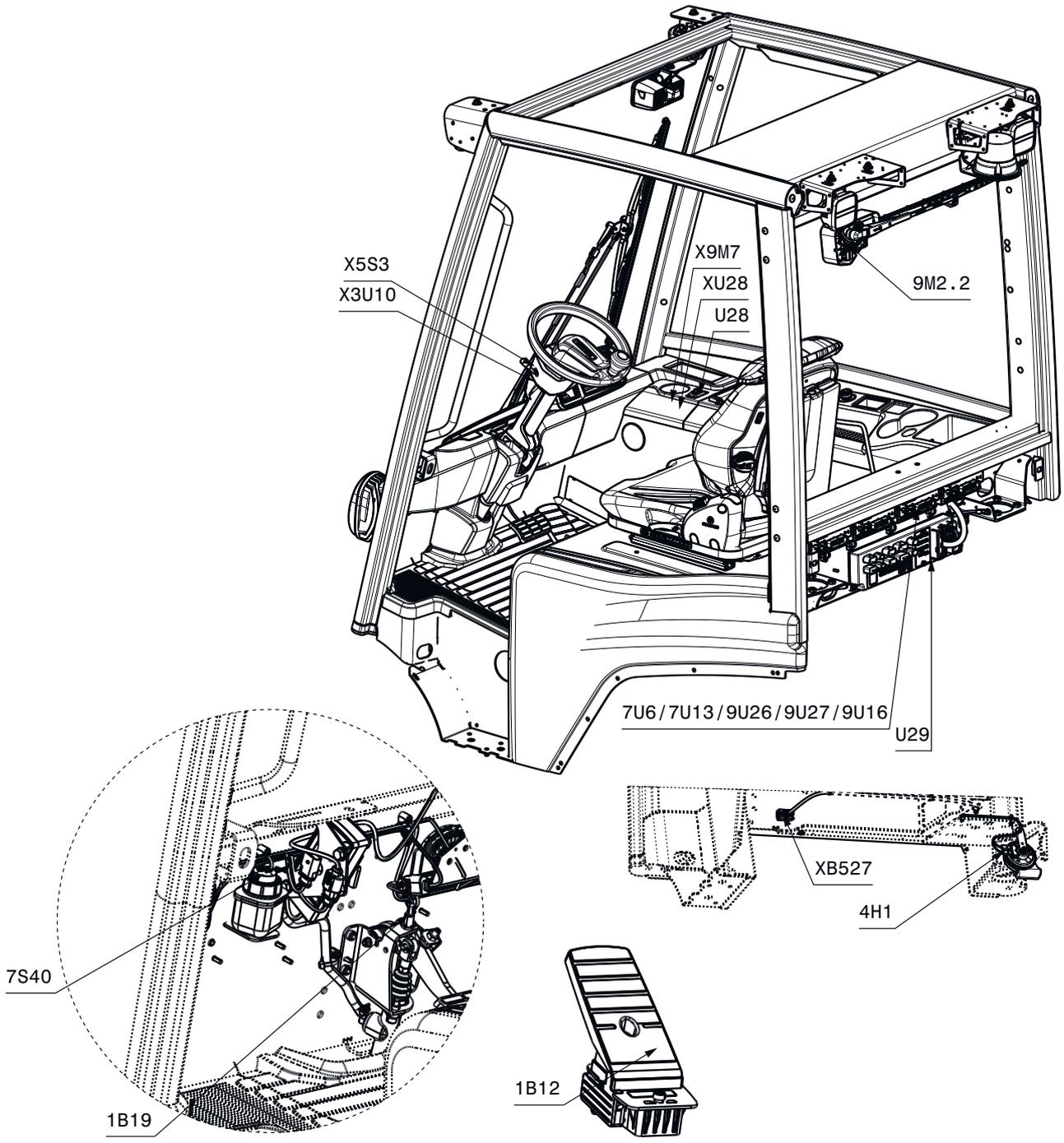
## 5.15 Connector overview

### 5.15.1 Operator position

Connection	Description
1B12	Accelerator pedal
1B19	Brake pedal sensor
2U13	multiPILOT
3E1	Left-hand combi tail light
3E2	Right-hand combi tail light
3E3	Left-hand combi light
3E4	Right-hand combi light
3U10	Steering setpoint device
3U7	Control unit display
4H1	Horn
4H2	Buzzer
4H3/4H3.1	Beacon / strobe light
5E11	Rear left indicator
5E12	Rear right indicator
5E19	Overhead guard front left work light
5E20	Overhead guard front right work light
5E21	Overhead guard rear left work light
5E22	Overhead guard rear right work light
6E1	Front Spot
6E2	Rear Spot
7S40	Brake fluid level sensor
7S82	Seat belt lock switch
7S9	Seat occupancy switch
7U13	DC/DC converter option 12V
7U6	DC/DC converter option 24V
9M2.1	Front windscreen wiper motor
9M2.2	Rear windscreen wiper motor
9U16	Central electrics
9U26	Cust interface I/O
A23	Multifunction armrest
S2	Key switch
S5	Emergency stop switch
S8	Membrane keypad
U28	Power supply module
U29	Cabin master
X3U10	Steering setpoint device connector

<b>Connection</b>	<b>Description</b>
X5S3	Indicator switch connector
X7S9	Interface, seat occupancy switch/seat belt lock switch/seat heating/compressor
X9M2.1	Rear wiper motor interface
X9M7	Fan heater connector
XB527	Interface, accelerator pedal/foot switch
XS500	Chassis on-board power supply interface
XS501	CCU power supply interface
XS502	CUST interface
XS503	Overhead guard on-board power supply interface
XS504	Front left/right combi light interface
XS505	Interface, rear right/left indicator, rear right/left combi light
XS506	Buzzer interface
XS507	Interface, rear Spot / rear right/left overhead guard work lights / beacon / strobe light
XS508	Front Spot interface
XS509	B-pillar horn interface
XS510	Interface, rear wiper motor/rear windscreen heater
XS511	Interface, reading lamp/interior lighting/lift cut-off override/cabin fan/cabin door monitoring
XS512	Interface, travel cut-off/slow travel
XS513	Truck terminal interface
XS525	Front right/left overhead guard work lights interface
XS528	Locking interface/display
XU28	Power supply module connector

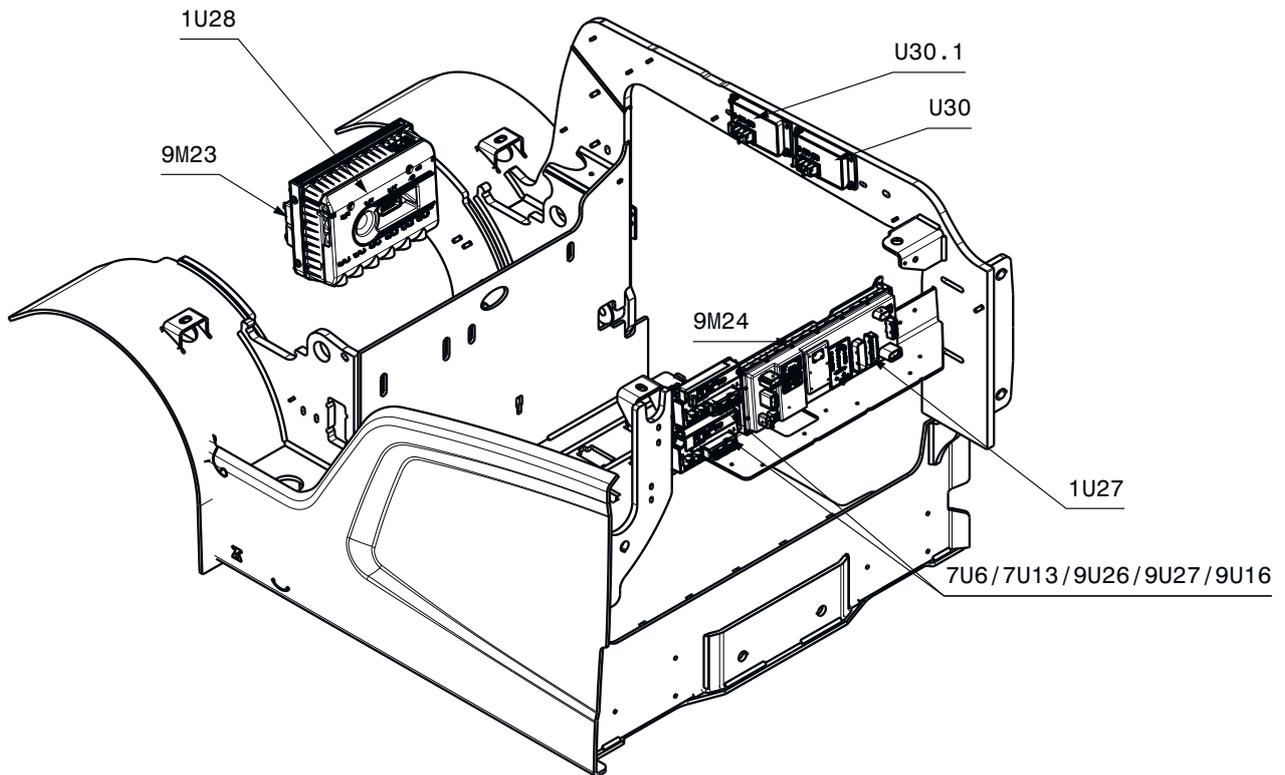
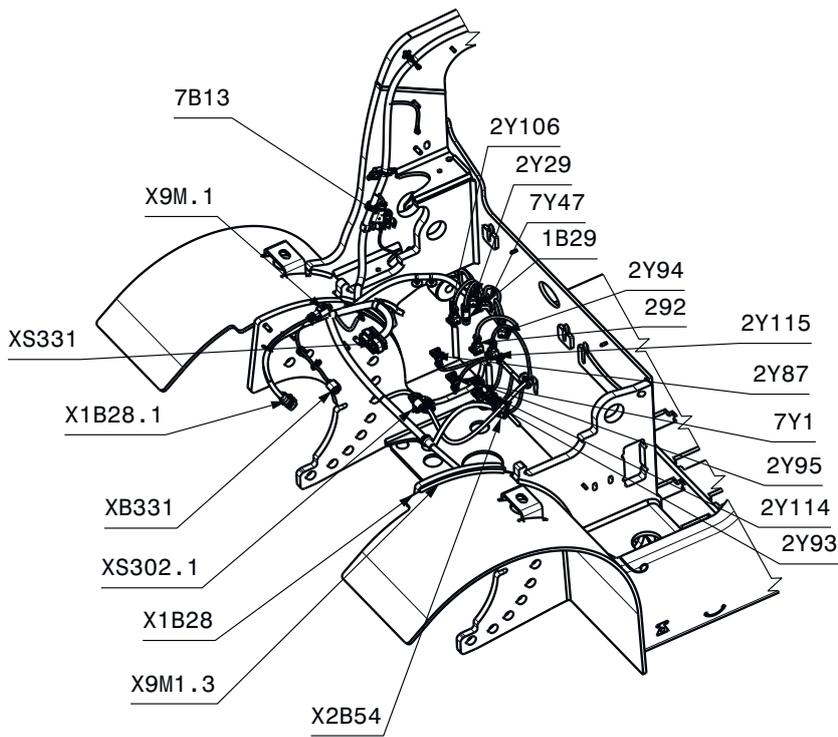


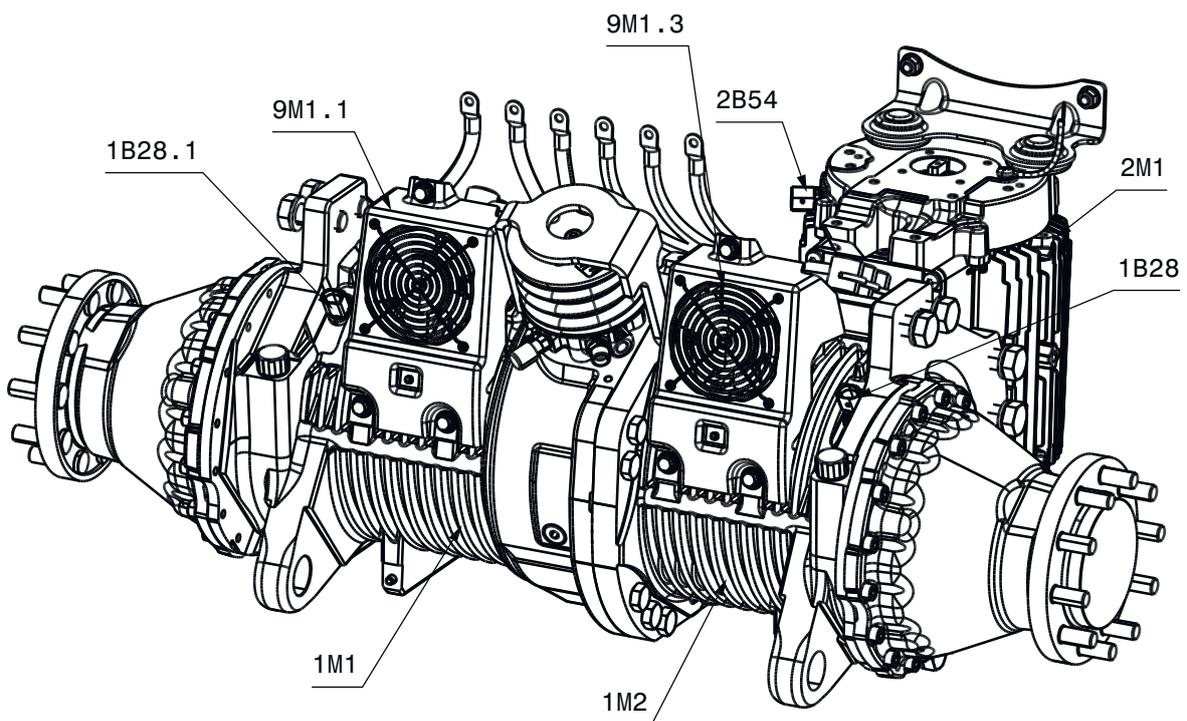
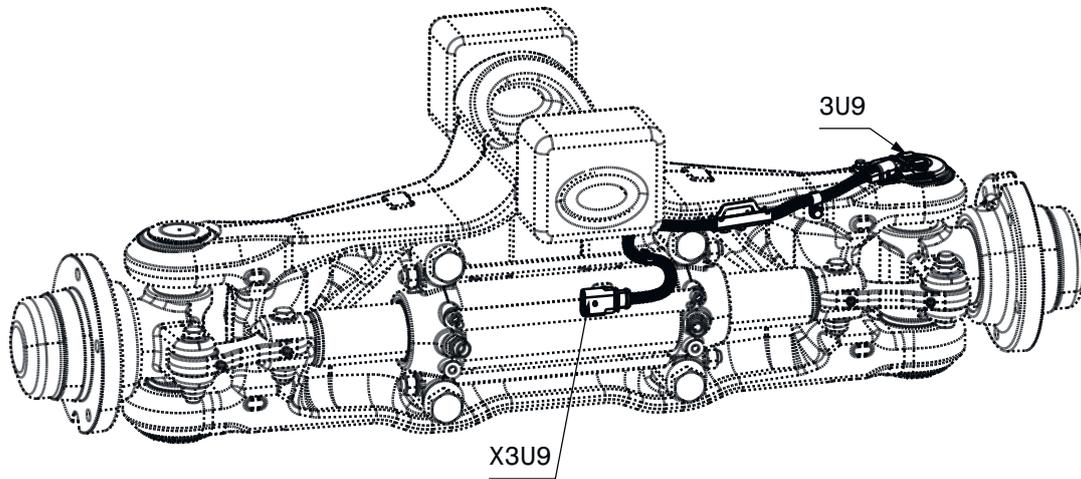
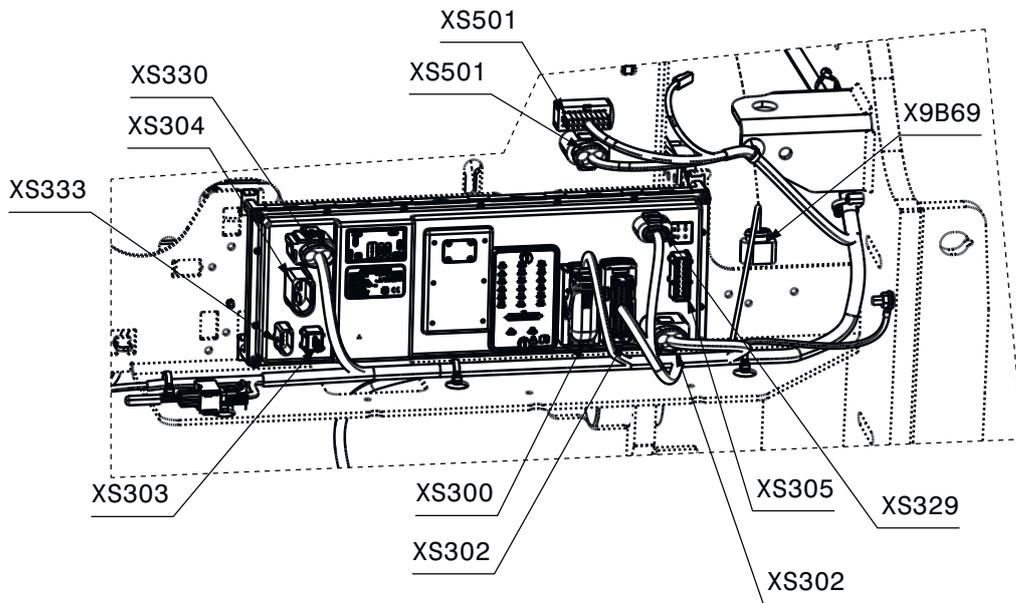


## 5.15.2 Drive section

Connection	Description
1B28	Right-hand drive motor combined sensor
1B28.1	Left-hand drive motor combined sensor
1B29	Pressure switch for parking brake
1M1	Right-hand drive motor
1M2	Left-hand drive motor
1U27	SIO control I/O chassis
1U28	TMC travel/lift control
2B54	Lift motor speed/temperature
2M1	Hydraulic motor
2Y106	Lift valve
2Y114	ZH2 forwards valve
2Y115	ZH2 backwards valve
2Y29	Lower valve
2Y87	Release valve
2Y92	ZH1 forwards valve
2Y93	ZH1 backwards valve
2Y94	Tilt forwards valve
2Y95	Tilt backwards valve
3U9	Steering actual value transmitter
7B13	Battery latch initiator
7U13	DC/DC converter option 12V
7Y1	Solenoid valve, brake / release
7Y47	Parking brake pressure-holding valve
9M1.1	Drive motor 1 fan
9M1.3	Drive motor 2 fan
9M23	Travel/lift control fan
9M24	I/O chassis control fan
9U16	Central electrics
9U26	Cust interface I/O
U30	Control auxiliary converter
U30.1	Control auxiliary converter
X1B28	Right-hand drive motor combined sensor interface
X1B28.1	Left-hand drive motor combined sensor interface
X2B54	Lift motor temp speed interface
X9B69	Shock sensor interface
X9M.1	Drive motor 1 fan interface
X9M1.3	Drive motor 2 fan interface

<b>Connection</b>	<b>Description</b>
XB331	TMC interface
XS300	Chassis on-board power supply interface
XS302	Chassis on-board power supply interface
XS302.1	Valve block interface
XS303	Additional converter IN interface
XS304	Cabin heating interface
XS305	Mast module interface
XS329	Overhead guard on-board power supply interface
XS330	SIO supply interface
XS331	Travel/lift control fan interface
XS333	Additional converter OUT interface





## 5.16 Cleaning

- 
- Cleaning tasks may only take place in the designated locations, which adhere to the stipulations of the country of use.
- 
- The cleaning interval must be adapted to the operating conditions of the truck. Before setting off, ensure that the field of view is clear!

### **⚠ CAUTION!**

#### **Risk of injury due to falling from the truck**

Do not climb on the truck, there is a risk of becoming stuck, slipping and falling. Use appropriate aids to reach higher points on the truck.

- ▶ Do not climb on the industrial truck.
  - ▶ Only use the designated step to climb onto the truck.
  - ▶ To reach higher or inaccessible locations, use appropriate aids, such as stepladders.
- 

### **⚠ CAUTION!**

#### **Risk of fire due to use of flammable cleaning agents**

Using flammable cleaning agents increases the risk of fire.

- ▶ Do not use any flammable cleaning agents when cleaning.
  - ▶ Disconnect the battery before starting cleaning work.
  - ▶ Before cleaning, take necessary safety measures to prevent spark formation (e.g. due to short circuits).
- 

### **NOTICE**

#### **Risk of component damage when cleaning the truck**

Cleaning with a high-pressure cleaner can result in malfunctions due to humidity.

- ▶ Cover all electronic system assemblies (controls, sensors, motors etc.) before cleaning the truck with a high-pressure cleaner.
  - ▶ Do not hold the jet of the high-pressure cleaner at marking points to avoid damaging them – see page 48.
  - ▶ Do not clean the truck with a steam jet.
- 

### **NOTICE**

#### **Risk of damage when cleaning the truck with a high-pressure cleaner**

Cleaning with a high-pressure cleaner can cause discolouration or other damage on coated or painted surfaces.

- ▶ Do not clean the truck with hot water or steam jets.
  - ▶ Do clean the truck using acidic or aggressive cleaning agents such as insect removers.
  - ▶ Do not clean the truck with insufficiently diluted cleaning agents.
  - ▶ Before using a cleaning agent, read the manufacturer's instructions. Test an inconspicuous or concealed part of the coated or painted truck surface for potential reactions to the cleaning agent.
  - ▶ Thoroughly rinse off any road salt before cleaning the truck.
  - ▶ The counterweight of the truck should ideally be cleaned using cold water and a clean, soft cotton cloth.
-

## ***Cleaning the truck***

### *Requirements*

- Truck prepared for maintenance and repair work (see page 314).

### *Tools and Material Required*

- Water-based solvents
- Clean sponges, rags, cotton cloths or paper towels

### *Procedure*

- Clean the surface of the truck with water-based solvents and water. Use clean sponges, rags, cotton cloths or paper towels for cleaning purposes.
- In particular, clean the following areas:
  - Windscreens
    - Observe the separate description for cleaning the roof window.
  - All walk-on areas
  - 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 359).

*The truck is now clean.*

## 5.16.1 Cleaning the roof window

### NOTICE

#### **Risk of damage to the roof window**

Dry cleaning, cleaning with paper towels or cleaning with dirty or large-fibre cleaning cloths can scratch the polycarbonate roof window. The static charge caused by dry cleaning can attract more dust to the roof window. The use of unsuitable cleaning agents can also damage the roof window.

External influences such as aggressive vapours, liquids or condensates can cause discolouration and damage the roof window.

- ▶ Only clean the roof window with a damp, soft cotton cloth.
- ▶ Use only glass cleaner with a low alcohol content or clean water without cleaning additives.
- ▶ Do not dry clean or pre-wipe the roof window.
- ▶ If necessary, rub the roof window dry using a clean, soft cotton cloth.
- ▶ Replace the roof window in the case of damage, scratched surfaces, poor visibility or discolouration.

---

#### ***Cleaning the roof window***

##### *Requirements*

- Prepare the truck for maintenance and repairs (see page 314).

##### *Tools and Material Required*

- Clean, soft cotton cloth
- Glass cleaner with a low alcohol content or clean water without cleaning additives

##### *Procedure*

- Damp-clean the roof window with a clean, soft cotton cloth. Do not re-wipe with a used cotton cloth.
- Use cleaning agents sparingly and always wipe them off completely. Avoid puddling on the top of the roof window, especially in the area of the sealing joint.
- If necessary, rub the roof window dry using a clean, soft cotton cloth.

*The roof window is clean.*

## 5.16.2 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 314.

##### *Tools and Material Required*

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

##### *Procedure*

- Expose the electrical system – see page 319.
- 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 319.
- Carry out all the tasks listed in the section "Recommissioning the truck after cleaning or maintenance work" – see page 361.

*The electrical-system assemblies are now clean.*

## 5.17 Restoring the truck to service after maintenance and repairs

### *Procedure*

- Thoroughly clean the truck, see page 355.
- Lubricate the truck according to the lubrication diagram, see page 310.
- Clean the battery, grease the terminals and connect the battery.
- Charge the battery, see page 94.
- Start up the truck, see page 137.

## 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 317.

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 355.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see page 325.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication diagram, see page 310.
- Charge the battery, see page 94.
- Disconnect and clean the battery.
- Clean the terminal screws, grease them with terminal grease and screw them into the connection thread to prevent short circuits.

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

→ Equipped with lithium-ion battery (○): read the manufacturer's operating 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 94.

## 6.3 Restoring the truck to service after decommissioning

### Procedure

- Thoroughly clean the truck – see page 355.
- Lubricate the forklift truck according to the lubrication schedule – see page 310.
- Equipment with lead-acid battery (●):  
Clean the battery, grease the battery terminal screws with terminal grease and connect the battery.
- Equipped with lithium-ion battery (○) without interface converter on the battery:  
Insert the truck-side control line into the connection on the battery trough.
- Equipped with lithium-ion battery (○) with interface converter on the battery:
  - Pull the battery forward.
  - Insert the control line into the battery connection at the top of the battery or the inside of the trough.
  - Slide the battery back in.
  - Connect the battery to the truck.
  - Close the battery connector lock: Tighten the bolted bar.
  - Insert the truck control line into the interface converter on the battery.
- Charge the battery – see page 94.
- Commission the forklift truck – see page 137.

## **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 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!**

### **Risk of accidents during repair and maintenance work**

Maintenance, service and repair work may only be carried out when the truck is de-energised.

- ▶ Park the truck securely (see page 158).
- ▶ Press the emergency disconnect switch.
- ▶ Equipped with lithium-ion battery (○): Disconnect the truck-side control line from the connection on the battery tray or the interface converter (○) on the battery.
- ▶ Disconnect the battery.
- ▶ Remove any rings or metal bracelets etc. before working on electrical components.

## **⚠ 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.

During the truck run-in period, after approx. 100 service hours, the operating company must check the wheel nuts/bolts and re-tighten if necessary.

The lithium-ion battery is a wear-free, maintenance-free and gassing-free (emission-free) sealed system.



No maintenance intervals are planned for this lithium-ion battery. For example, no refilling of liquids or other substances is necessary.

The lithium-ion battery is continually monitored by the battery management system.

# 1 Maintenance Contents EFG 425k-435 / S30

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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

<b>Brakes</b>
---------------

Test the brake.
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<b>Hydraulic operations</b>
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Lubricate the load chains.
----------------------------

Lubricate the contact surfaces of the mast.
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Correct the hydraulic-oil level.
----------------------------------

#### 1.1.1.2 Optional Equipment

##### Windscreen washing system

<b>Chassis/structure</b>
--------------------------

Correct the fill level of the windscreen washer reservoir.
--

##### Electrical heating

<b>Chassis/structure</b>
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Clean heater breather filter.
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##### Pneumatic tyres

<b>Travel</b>
---------------

Correct the tyre air pressure.
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##### Lead-acid battery, international

<b>Power supply</b>
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Correct the battery-acid level using demineralised water.
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##### Lead-acid battery

<b>Power supply</b>
---------------------

Correct the battery-acid level using demineralised water.
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### 1.1.2 Inspection contents

#### 1.1.2.1 Standard equipment

The following points must be checked:

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

<b>Power supply</b>
Compare the information (battery voltage, battery weight) on the battery data plate with the information on the truck data plate.
Check battery and battery components for damage
Battery latch and battery attachment for correct function and damage
Battery connector for secure fit, functionality and damage

<b>Travel</b>
Check wheels for wear and damage

<b>Chassis/structure</b>
Check labels for legibility, completeness and plausibility
Check doors or covers for damage
Test driver's seat restraint system and check for damage
Check the overhead guard and/or the driver's cab for secure attachment and damage
Overhead guard mounting / cabin mounting for secure seating and damage

<b>Hydraulic operations</b>
Check cylinders and piston rods are securely attached and check for damage
Hose guide for functionality and damage
Check contact surfaces of the mast for wear and damage
Test hydraulic system
Check fork arms or load handler for wear and damage

### 1.1.2.2 Optional Equipment

The following points must be checked:

#### **Windscreen washing system**

<b>Chassis/structure</b>
Check windscreen washer reservoir for leaks and damage

#### **Road traffic approval (StVZO)**

<b>Electrical system</b>
Test lighting and check for damage

## Work lights

<b>Electrical system</b>
--------------------------

Test lighting and check for damage
------------------------------------

## Electrical heating

<b>Chassis/structure</b>
--------------------------

Test the heater
-----------------

## Weather protection

<b>Chassis/structure</b>
--------------------------

Test doors and check for damage
---------------------------------

## Optional electrical equipment

<b>Electrical system</b>
--------------------------

Test optional electrical equipment and check for damage
---

## Optional equipment

<b>Chassis/structure</b>
--------------------------

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

## Strobe light/warning beacon

<b>Electrical system</b>
--------------------------

Test strobe light/warning beacon and check for damage
---

## Discharge strap

<b>Electrical system</b>
--------------------------

Check presence of electrostatic discharge strap or chain and check for damage
---

## Lead-acid battery, international

<b>Power supply</b>
---------------------

Check the battery cable connections for secure attachment
---

Check battery and battery components for damage
---

## Lead-acid battery

<b>Power supply</b>
---------------------

Check the battery cable connections for secure attachment
---

## 1.2 Customer Service

In accordance with the EFG 425k-435 / S30 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.

Correct the brake fluid level via the check hole in the brake housing.

#### Electrical system

Clean the fan.

Perform insulation inspection.

#### Travel

Correct the transmission oil level or grease filling of the transmission.

#### Hydraulic operations

Adjust the slide pieces.

Adjust the load chains.

Lubricate the load chains.

Lubricate the contact surfaces of the mast.

Test emergency lowering.

Correct the hydraulic-oil level.

Test and adjust the pressure relief valve.

Where two tilt cylinders with the same stroke are used, measure their relative adjustment.

#### 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.

### 1.2.1.2 Optional Equipment

#### Fork positioner

##### Hydraulic operations

Adjust the attachment.

Adjust the axial play of the front and rear rollers.

Clean and grease attachment bearings, guides and stops.

#### Clamping device

##### Hydraulic operations

Adjust the attachment.

Adjust the axial play of the front and rear rollers.

Clean and grease attachment bearings, guides and stops.

## Side shift

### Hydraulic operations

Adjust the axial play of the front and rear rollers.

Clean and grease attachment bearings, guides and stops.

Test the side shift adjustment.

## Telescopic forks

### Hydraulic operations

Adjust the attachment.

Clean and grease attachment bearings, guides and stops.

Adjust the pistons and piston rods.

## Windscreen washing system

### Chassis/structure

Correct the fill level of the windscreen washer reservoir.

## Radio data

### System components

Clean the scanner and terminal.

## Video system

### System components

Clean the camera.

Clean the display.

## Weigher sensors/switches

### Electrical system

Test the weigher.

## Pneumatic tyres

### Travel

Correct the tyre air pressure.

## Lead-acid battery, international

### Electrical system

Perform insulation inspection.

<b>Power supply</b>
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**

<b>Electrical system</b>
Perform insulation inspection.

<b>Power supply</b>
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**

<b>Electrical system</b>
Cables and motor for secure fit and damage
Warning and safety equipment in accordance with the operating instructions
Functionality of display and controls
Test microswitches and check for damage
Test emergency disconnect switch and check for damage
Test fan and check for damage
Check electrical wiring for damage (insulation damage, connections) and check whether the fuse ratings are correct

<b>Power supply</b>
Compare the information (battery voltage, battery weight) on the battery data plate with the information on the truck data plate.
Check battery and battery components for damage
Battery latch and battery attachment for correct function and damage
Battery connector for secure fit, functionality and damage

<b>Travel</b>
Transmission for noise and leaks
Check wheels for wear, damage and secure mounting
Check wheel bearings and mounting of wheels for wear and damage

<b>Chassis/structure</b>
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
Test seat belt monitoring and check for damage
Check doors or covers for damage
Check mast is securely attached
Check mast bearings for wear
Test trailer coupling stop or tow mechanism stop and check for damage
Check operator mat and steps are non-slip and free of damage
Test driver's seat restraint system and check for damage
Check the overhead guard and/or the driver's cab for secure attachment and damage
Overhead guard mounting / cabin mounting for secure seating and damage

<b>Hydraulic operations</b>
Check "Hydraulic" control elements for correct assignment
Test hydraulic controls and check their labels for legibility, completeness and plausibility
Check cylinders and piston rods are securely attached and check for damage
Hose guide for functionality and damage
Check lateral play of the mast sections and fork carriage
Check slide pieces and stops for wear and damage
Load chains and chain guides for wear and damage
Check load chain mounting elements and chain pins for wear and damage
Check mast rollers and their running surfaces for wear and damage
Check contact surfaces of the mast for wear and damage
Test hydraulic system
Check hydraulic connections, hoses and pipes are securely attached and check for leaks and damage
Check fork arms or load handler for wear and damage
Check piston rod screw depth and counter-fixing/clamping
Check tilt cylinders and mounting for leaks, wear and damage

<b>Steering</b>
Check hydraulic steering for leaks and damage
Check steering hoses and pipe lines for leaks and damage
Check the steer axle and stub axle for wear and damage
Check the mechanical parts of the steering column for wear and damage

## 1.2.2.2 Optional Equipment

### Electrolyte recirculation

<b>Power supply</b>
Hose connections and pump for correct function

### Aquamatic

<b>Power supply</b>
Aquamatic plug, hose connections and float for functionality and sealing
Flow indicator for functionality and sealing

### Battery refill system

<b>Power supply</b>
Refill system for functionality and leaks

### Boom

<b>Hydraulic operations</b>
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage

### Fork positioner

<b>Hydraulic operations</b>
Test attachment and check for damage
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage
Check sliding blocks for completeness, wear and damage
Check attachment bearings, guides and stops for wear and damage
Check hydraulic connections are securely attached and check for leaks
Fork positioner for functionality and damage
Check cylinder seals for leaks and damage
Check cylinder rods and their bushings for wear and damage

### Clamping device

<b>Hydraulic operations</b>
Test acknowledgement button
Test attachment and check for damage
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage
Check sliding blocks for completeness, wear and damage

<b>Hydraulic operations</b>
Check attachment bearings, guides and stops for wear and damage
Check hydraulic connections are securely attached and check for leaks
Check cylinder seals for leaks and damage
Check cylinder rods and their bushings for wear and damage

### Side shift

<b>Hydraulic operations</b>
Test attachment and check for damage
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage
Check sliding blocks for completeness, wear and damage
Check attachment bearings, guides and stops for wear and damage
Check hydraulic connections are securely attached and check for leaks
Side shift for functionality and damage
Check cylinder seals for leaks and damage
Check cylinder rods and their bushings for wear and damage

### Telescopic forks

<b>Hydraulic operations</b>
Test attachment and check for damage
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage
Check attachment bearings, guides and stops for wear and damage
Check hydraulic connections are securely attached and check for leaks
Check cylinder seals for leaks and damage
Check hydraulic connections, hoses and pipes are securely attached and check for leaks and damage
Check pistons and piston rods for wear and damage

### Crane hook

<b>Hydraulic operations</b>
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage

### Windscreen washing system

<b>Chassis/structure</b>
Check windscreen washer reservoir for leaks and damage
Test windscreen wipers and check for damage

## Trailer coupling

### Chassis/structure

Test trailer coupling stop or tow mechanism stop and check for damage

## Seat heating

### Electrical system

Check connections and cables are securely attached and check for insulation damage and other signs of damage

## Shock sensor/data recorder

### Electrical system

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

## 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

## Road traffic approval (StVZO)

### Electrical system

Test lighting and check for damage

## Video system

### System components

Check cables are securely attached and check for damage

Check camera is securely attached, test and check for damage

Check display is securely attached, test and check for damage

## Work lights

### Electrical system

Test lighting and check for damage

## Fire extinguisher

### Accessories

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

## Weigher sensors/switches

### Electrical system

Weigher for damage

## Access module

### Electrical system

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

## Electrical heating

### Chassis/structure

Test the heater

## Weather protection

### Chassis/structure

Test window heating and check for damage

Test doors and check for damage

## Optional electrical equipment

### Electrical system

Fuses for correct ratings

Test optional electrical equipment and check for damage

## 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

## Overhead guard cover

### Chassis/structure

Check overhead guard cover is present and securely attached and check for damage

## Audible warning devices

### Electrical system

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

## Discharge strap

### Electrical system

Check presence of electrostatic discharge strap or chain and check for damage

## Restraint system / HRS-E-DUO

### Electrical system

Check connections and cables are securely attached and check for insulation damage and other signs of damage

### Chassis / structure

The secure seating of the electrical connections and for damage.

Check restraint system is complete, test and check for damage

Test restraint sensor system and check for damage

## Restraint system / summer door

### Chassis/structure

Check restraint system is complete, test and check for 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

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Brake fluid for the brake system.	1000	12
Drive axle brake oil	2000	24
Hub gear oil	2000	24
Hydraulic system breather filter	2000	12
Hydraulic oil	2000	12
Hydraulic oil filter	2000	12
Replace hydraulic hoses.	12000	72

### 1.2.3.2 Optional Equipment

#### Cold store application

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Hydraulic oil	2000	12