

# EFG 112/213-320

08.22

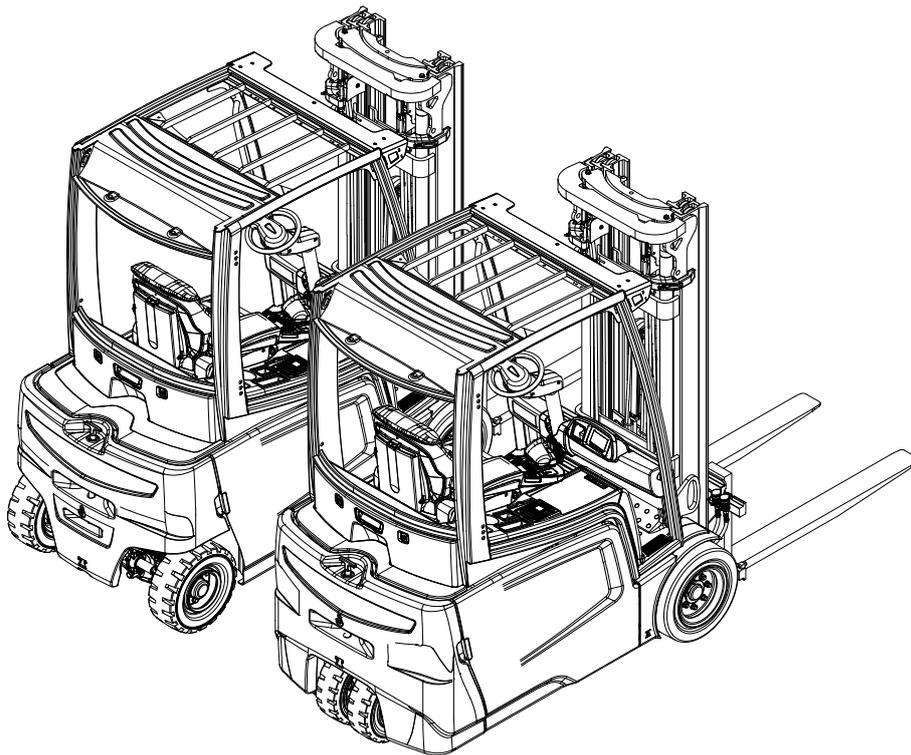
Operating instructions

en-GB

51982614

03.23

EFG 112  
EFG 213  
EFG 215  
EFG 216k  
EFG 216  
EFG 218k  
EFG 218  
EFG 220  
EFG 316k  
EFG 316  
EFG 318k  
EFG 318  
EFG 320





# Declaration of Conformity



## Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

<b>Description</b>  Industrial truck
--

Type	Option	Serial no.	Year of manufacture
EFG 112 EFG 213 EFG 215 EFG 216k EFG 216 EFG 218k EFG 218 EFG 220 EFG 316k EFG 316 EFG 318k EFG 318 EFG 320			

**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 112/213-320  
Serial number/type number

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

**UK representative:** Jungheinrich UK Ltd  
Sherbourne House  
Sherbourne Drive  
Tilbrook  
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**

\_\_\_\_\_, \_\_\_\_\_  
Place, date

\_\_\_\_\_  
<Name>  
Head of product line

\_\_\_\_\_  
<Name>  
Head of quality

# Foreword

## Notes on the operating instructions

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

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

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

## Safety notices and text mark-ups

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

### **⚠ DANGER!**

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

---

### **⚠ WARNING!**

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

---

### **⚠ CAUTION!**

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

---

### **NOTICE**

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

---

 Used before notices and explanations.

	Indicates standard equipment
	Indicates optional equipment

## **Copyright**

Copyright of these operating instructions remains with JUNGHEINRICH AG.

### **Jungheinrich Aktiengesellschaft**

Friedrich-Ebert-Damm 129  
22047 Hamburg - Germany

Tel: +49 (0) 40/6948-0

[www.jungheinrich.com](http://www.jungheinrich.com)

# Contents

<b>A</b>	<b>Correct Use and Application .....</b>	<b>13</b>
1	General.....	13
2	Correct application.....	13
3	Approved application conditions .....	15
3.1	Instructions for Trucks with Lithium-Ion Batteries.....	16
3.2	Indoor Application Combined with Outdoor Application or Cold Area Application.....	17
3.3	Outside and Cold Area Application (o).....	17
3.4	Ambient Conditions for Charging.....	19
4	Residual risk.....	20
5	Proprietor responsibilities.....	21
6	Adding attachments and/or optional equipment.....	21
7	Removal of components.....	21
<b>B</b>	<b>Truck Description.....</b>	<b>23</b>
1	Application.....	23
1.1	Truck models and rated capacity.....	23
2	Assemblies and Functional Description.....	24
2.1	Travel direction definition .....	24
2.2	Assembly Overview.....	25
2.3	Functional Description.....	26
3	Technical Specifications.....	28
3.1	Performance data .....	29
3.2	Dimensions .....	32
3.3	Weights.....	40
3.4	Mast versions.....	41
3.5	Tyre type.....	42
3.6	Engine Data.....	44
3.7	EN norms.....	45
3.8	Conditions of use.....	46
3.9	Electrical Requirements.....	46
3.10	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 .....	50
4.3	Truck capacity plate.....	51
4.4	Attachment capacity plate.....	53
5	Stability .....	54
5.1	Wind loads.....	55
<b>C</b>	<b>Transport and Commissioning.....</b>	<b>57</b>
1	Transport.....	57
2	Truck laden.....	57
2.1	Centre of gravity.....	57
2.2	Lifting the truck by crane.....	58
2.3	Loading the truck with a second truck.....	60
3	Securing the truck during transport.....	61

4	Using the Truck for the First Time .....	63
D	Battery - Servicing, Recharging, Replacement.....	65
1	General notes on handling batteries .....	65
1.1	Potential hazards.....	65
1.2	Touch voltage hazard.....	66
2	Safety Regulations for Handling Lead-Acid Batteries.....	67
3	Safety regulations for handling lithium-ion batteries.....	68
3.1	Fire Hazard .....	68
3.2	Particular hazard from combustion products .....	69
3.3	Special fire fighting protective equipment.....	69
3.4	Additional fire fighting instructions.....	69
3.5	Instructions for cooling an overheated, non physically damaged battery .....	69
4	Battery types.....	70
5	Battery dimensions .....	72
6	Exposing the battery .....	73
7	Removing or installing the battery.....	74
7.1	Removing or installing the battery using a pallet truck and "SnapFit" battery holder .....	75
7.2	Removing or installing the battery using a hand pallet truck and "SnapFit" battery holder.....	82
7.3	Removing or installing the battery using a pallet truck or hand pallet truck and no "SnapFit" battery holder.....	85
7.4	Removing or installing the battery using a fork shoe.....	86
7.5	Removing or installing the battery using a roller conveyor.....	88
7.6	Removing or installing the battery using a clip-in battery door.....	89
8	Charging the battery.....	90
8.1	Charging lead-acid batteries.....	90
8.2	Charging lithium-ion batteries (○).....	94
E	Operation .....	97
1	Safety Regulations for the Operation of Forklift Trucks.....	97
2	Displays and Controls.....	100
2.1	Controls .....	100
2.2	Pilots .....	102
2.3	Function symbols for the Pilots.....	103
2.4	Control panel with display unit.....	106
2.5	Button allocation of the display.....	108
2.6	Symbols in the display.....	110
2.7	Setting the time .....	113
2.8	Battery discharge indicator.....	114
2.9	Battery discharge monitor.....	114
2.10	Residual time display.....	115
2.11	Operating Programs .....	115
2.12	Hourmeter.....	116
2.13	Armrest Control Panel Switch .....	116
2.14	Side compartment control panel switch (○).....	118
3	Preparing the Truck for Operation.....	119
3.1	Checks and Operations to Be Performed Before Starting Daily Work.....	119
3.2	Entering or exiting.....	122
3.3	Trucks with reduced headroom (○).....	122

3.4	Setting up the operator position .....	123
3.5	Restraint systems.....	130
3.6	Seat Belt.....	131
4	Working with the truck.....	133
4.1	Safety regulations for travel mode.....	133
4.2	Activating the lithium-ion battery (○).....	137
4.3	Preparing the truck for operation.....	139
4.4	Parking the truck securely.....	140
4.5	Emergency Disconnect.....	141
4.6	Travel.....	143
4.7	Steering.....	148
4.8	Brakes.....	149
4.9	Adjusting the forks.....	155
4.10	Replacing the forks.....	157
4.11	Lifting, transporting and depositing loads.....	158
4.12	Operating the lift mechanism and integrated attachments.....	162
4.13	Safety instructions for operating additional attachments.....	172
4.14	Operating additional attachments with soloPILOT.....	177
4.15	Operating additional attachments with multiPILOT.....	180
4.16	Operating additional attachments with duoPILOT.....	182
4.17	Fitting additional attachments.....	185
5	Towing trailers.....	190
6	Optional Equipment.....	192
6.1	Keyless Access System.....	192
6.2	General Information about the Use of Keyless Access Systems.....	193
6.3	Commissioning the keypad and the transponder reader.....	193
6.4	Keyless access system - display unit.....	196
6.5	Keyless access system - keypad.....	201
6.6	Keyless access system - transponder reader.....	206
6.7	Voltage Transformer.....	211
6.8	Assistance systems.....	216
6.9	Steel cab.....	218
6.10	Sliding windows.....	220
6.11	Gate.....	221
6.12	Automatic / mechanical folding gate.....	224
6.13	Panel door.....	226
6.14	Operator position extension.....	227
6.15	Entering or exiting with the hip restraint on the driver's seat.....	228
6.16	Switching the Seat Heating On and Off.....	228
6.17	Auxiliary Functions on the Armrest.....	229
6.18	Switching off the operating hydraulics.....	231
6.19	Load Weighing.....	232
6.20	Load Weighing Plus.....	232
6.21	tiltCONTROL.....	234
6.22	Tilt angle display.....	235
6.23	Heating.....	238
6.24	Removable load backrest.....	240
6.25	Load damping.....	241
6.26	Overriding the lift cut-off.....	243
6.27	Sideshifter Centre Position.....	244
6.28	Fork Tilt Horizontal.....	245
6.29	Fire extinguisher.....	246
6.30	Rockinger coupling with hand lever or remote control.....	247

6.31	Camera system.....	248
6.32	Control layout "N".....	249
6.33	Operating the auxiliary hydraulics without pressing the acknowledgement key.....	251
6.34	Special control layout.....	255
6.35	Floor-Spot (○).....	259
6.36	Floor-Bow.....	261
6.37	Additional equipment for road traffic.....	263
6.38	Horn Button on Overhead Guard.....	265
6.39	Truck Terminal.....	266
6.40	Antistatic strap.....	272
7	Troubleshooting.....	273
7.1	Troubleshooting.....	273
7.2	Moving a truck without its own drive system.....	276
7.3	Emergency lowering.....	281
7.4	Leaving the driver's cab through the right side window or the rear windscreen.....	284
<b>F</b>	<b>Truck maintenance.....</b>	<b>285</b>
1	Spare Parts.....	285
2	Operational Safety and Environmental Protection.....	286
3	Maintenance Safety Regulations.....	287
3.1	Working on the electrical system.....	287
3.2	Consumables and used parts.....	288
3.3	Wheels.....	288
3.4	Attachment Repairs and Inspection.....	288
3.5	Lift Chains.....	289
3.6	Hydraulic system.....	290
4	Lubricants and Lubrication Schedule.....	291
4.1	Handling consumables safely.....	291
4.2	Lubrication Schedule.....	293
4.3	Consumables.....	294
5	Maintenance and repairs.....	296
5.1	Preparing the truck for maintenance and repair work.....	296
5.2	Lifting and jacking up the truck safely.....	297
5.3	Opening or closing the rear panel.....	299
5.4	Checking the attachment of the wheels.....	300
5.5	Replacing the wheels.....	301
5.6	Hydraulic system.....	303
5.7	Checking the gear oil level.....	309
5.8	Heating.....	310
5.9	Adding window washer system fluid.....	310
5.10	Checking the electrical fuses.....	311
5.11	Cleaning.....	322
5.12	Working on the electrical system.....	326
5.13	Restoring the truck to service after maintenance and repairs.....	326
6	Decommissioning the Industrial Truck.....	327
6.1	Prior to decommissioning.....	327
6.2	During decommissioning.....	327
6.3	Restoring the truck to service after decommissioning.....	328
7	Safety tests to be performed at intervals and after unusual incidents.....	329
8	Final de-commissioning, disposal.....	329
9	Human vibration measurement.....	329

G	Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement.....	331
1	Maintenance Contents EFG 112-220.....	331
1.1	Owner.....	332
1.2	Customer Service.....	336
2	Maintenance Contents EFG 316-320.....	347
2.1	Owner.....	347
2.2	Customer Service.....	350



# A Correct Use and Application

## 1 General

The truck must be used, operated and serviced in accordance with the present instructions. All other types of use are beyond its scope of application and may result in damage to personnel, the industrial truck or property.

## 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 158.

---

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 lowered loads that are not secured against slipping and falling.
- Picking up and using attachments and optional equipment approved by the manufacturer; this may require additional approval from local authorities or an expert opinion.
- Travel 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.
- 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 (neither on the load handler nor in the operator area) and lifting persons without attachments or optional equipment approved for this purpose. <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.

- ▶ 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.
  - ▶ 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 17 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 110

### 3.2 Indoor Application Combined with Outdoor Application or Cold Area Application

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

- Use in cold stores (below  $-10^{\circ}\text{C}$ ) is only possible with special cold-store equipment – see page 17.

Operating and ambient conditions	
Permissible temperature range	$-10^{\circ}\text{C}$ to $+40^{\circ}\text{C}$
Temperature range for secure parking	$-10^{\circ}\text{C}$ to $+40^{\circ}\text{C}$
Maximum air humidity	95% non-condensing

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

### 3.3 Outside and Cold Area Application (o)

#### NOTICE

##### Cold-store trucks

- ▶ Trucks intended for cold store application are equipped with hydraulic oil suitable for cold-store applications.
- ▶ If a truck with cold-store oil is used outside the cold store, the lowering speeds may increase.

#### 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  $-20^{\circ}\text{C}$  to  $-5^{\circ}\text{C}$ .
- ▶ If the battery charge is low, avoid using the truck in temperatures from  $-5^{\circ}\text{C}$  to  $+5^{\circ}\text{C}$  where possible.
- ▶ Charge the battery – see page 90

In addition to the permissible operating conditions in industrial and commercial environments, the truck remains primarily in cold stores. The truck should only leave the cold store briefly to hand over a load.

- In cold store areas below  $-10^{\circ}\text{C}$ , the truck must be operated permanently.
- Short-term use in a deep-freeze store is possible. The truck is cooled to  $-20^{\circ}\text{C}$ , works for max. 5 min. at max.  $-28^{\circ}\text{C}$  and then goes back into the cold store with max.  $-20^{\circ}\text{C}$  and stays there for at least 10 minutes. Another period of use at max.  $-28^{\circ}\text{C}$  is then possible in accordance with the described procedure.

<b>Operating and ambient conditions</b>	
Permissible temperature range	-20°C to +40°C
Permissible temperature range for short-term use (5 min.)	-28°C to -20°C
Temperature range for secure parking	-10°C to +40°C
Maximum air humidity	95% non-condensing

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

### 3.4 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.

---

## 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 112/213-320 is a three- or four-wheel electric sit-down counterbalanced 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 and can be derived from the type designation.

#### EFG 213

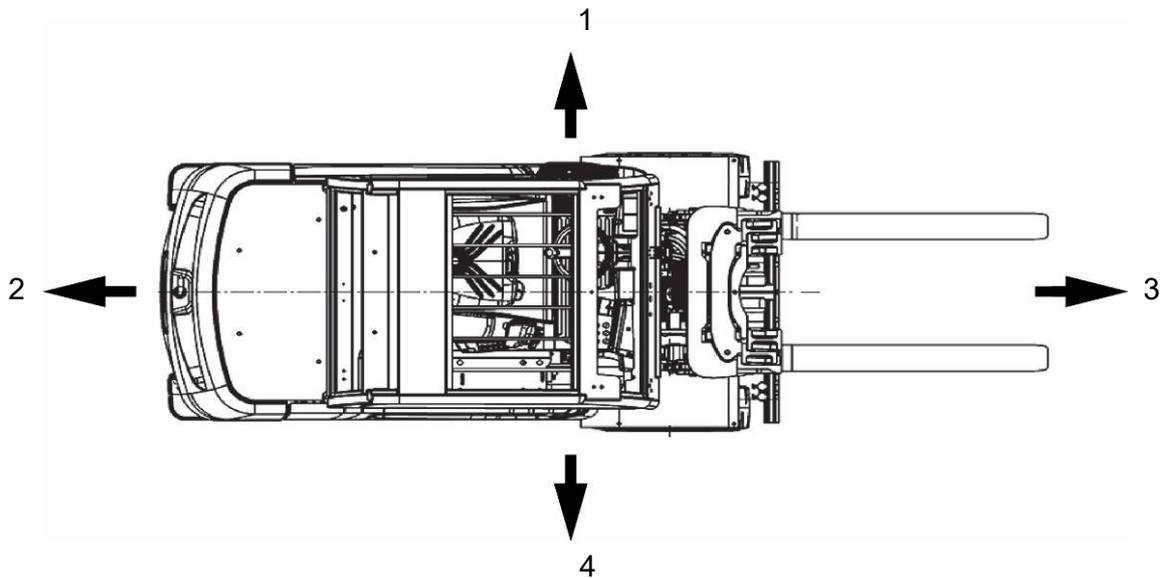
EFG	Type designation
2	Series
13	Rated capacity x 100 kg

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

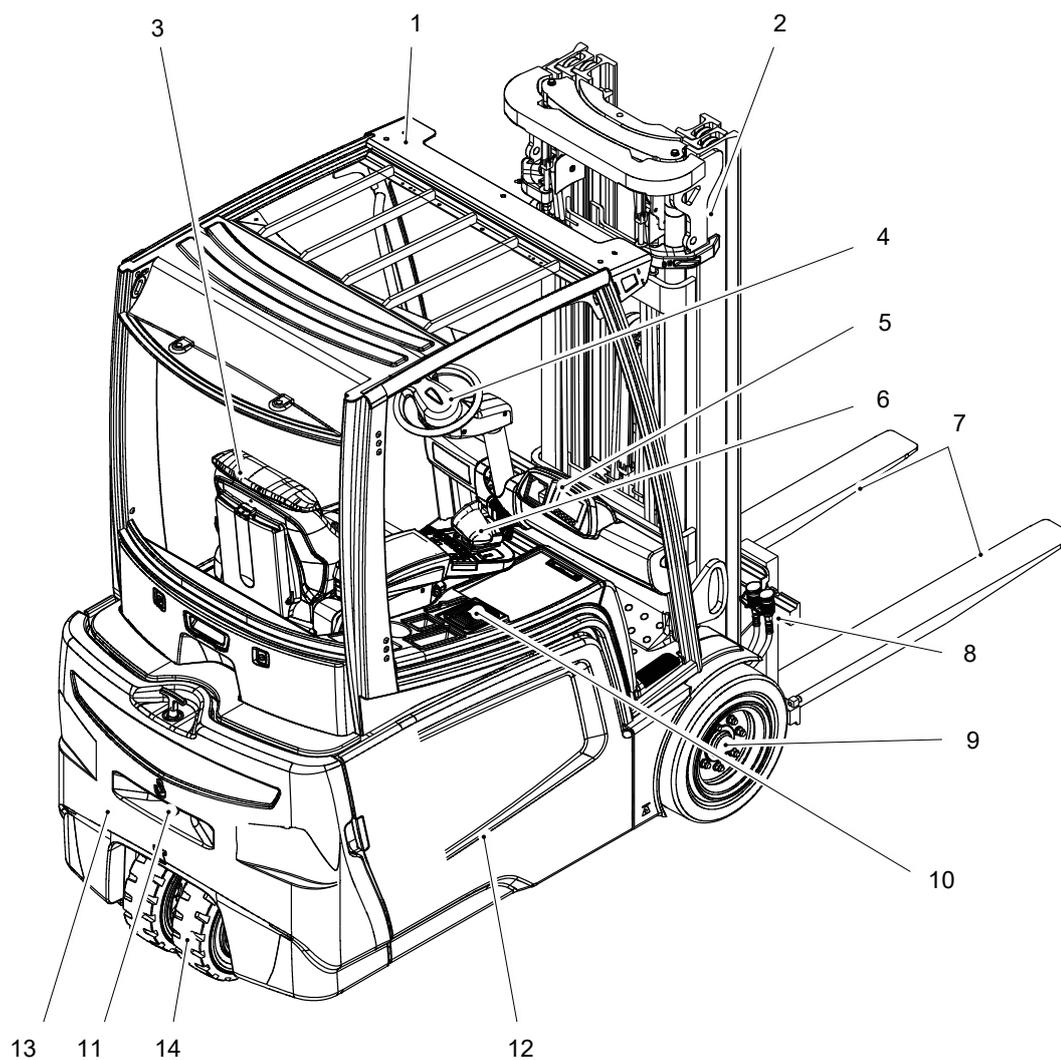
The following determinations have been made for travel direction specification:



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

## 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.

### Steering

The electric steering offers a high level of efficiency and ergonomics. The height and tilt angle of the steering column are adjustable and can be set to suit all operators. The low cross-section means the operator has maximum legroom at all times. The steering is particularly smooth, offering a high level of efficiency. As a result the overall energy consumption is reduced significantly. The steer angle is shown in the display.

### Wheels

There is a choice of super elastic or fully rubber tyres as well as optional pneumatic tyres.

### Drive and brake system

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 service brake is a maintenance-free disk brake. The truck also brakes regeneratively via the drive motors. The energy recovered in the process is fed back to the battery.

The parking brake operates both automatically and manually.

## **Emergency Stop safety feature**

If the system recognises a fault in the steering, an emergency stop is automatically introduced. The truck brakes to a halt, the travel direction does not change. An event message is shown in the control and display unit. The truck performs a self-test whenever it is switched on. Travel is only enabled again when the truck is operational and the parking brake (= emergency stop) released.

## **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

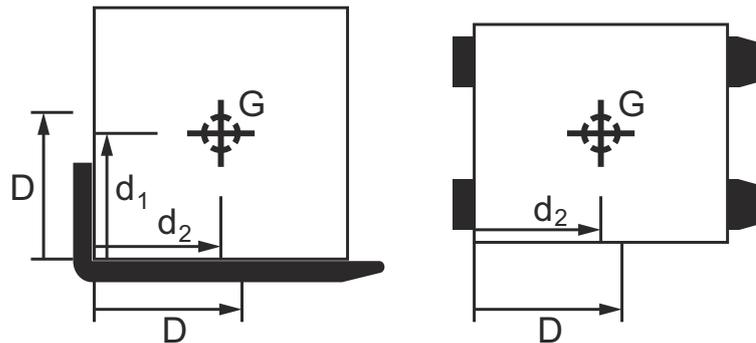
All technical details refer to standard trucks with mast 300 ZT.

All values marked with \*) may vary depending on the type of equipment used (e.g. mast, cabin, tyres etc.).

- The technical specifications comply with the German "Industrial Truck Data Sheet" Guidelines.

Technical modifications and additions reserved.

#### Load centre distance



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 158.

### 3.1 Performance data

#### EFG 112

	Description	EFG 112	
Q	Rated capacity (where C = 500 mm) <sup>1)</sup>	1200	kg
C	Load centre distance	500	mm
	Travel speed	12	km/h
	Lift speed with/without load	0.30/0.48	m/s
	Lowering speed with/without load	0.55	m/s
	Gradeability (30 min) with/without load	7.5/11.0	%
	Max. gradeability <sup>2)</sup> (5 min) with/without load	25.0/28.0	%
	Acceleration (15 m) with/without load	6.1/5.7	s
	Max. operating pressure	230	bar
	Oil flow for attachments	27	l/min

<sup>1)</sup> for vertical mast 300 ZT.

<sup>2)</sup> The values shown represent the maximum gradeability to overcome short differences in height and surface unevenness (surface edges). The truck must not operate on inclines of more than 15%.

## EFG 213-220

	Designation	EFG					
		213	215	216k 216	218k 218	220	
Q	Rated capacity (where C = 500 mm) <sup>1)</sup>	1300	1500	1600	1800	2000	kg
C	Load centre distance	500	500	500	500	500	mm
	Travel speed	16	16	16	16	16	km/h
	Lift speed with/without load	0.51/0.74	0.51/0.74	0.51/0.74	0.46/0.74	0.45/0.63	m/s
	Lowering speed with/without load	0.55	0.55	0.55	0.55	0.55	m/s
	Gradeability (30 min) with/without load	7.6/12.5	7.3/12.3	7.3/12.3 7.0/11.5	6.2/10.7 5.9/10.5	5.7/10.4	%
	Max. gradeability <sup>2)</sup> (5 min) with/without load	28.0/31.0	27.0/28.0	27.0/31.0 27.0/33.0	25.0/29.0 25.0/31.0	24.0/30.0	%
	Acceleration (15 m) with/without load	5.5/5.1	5.6/5.2	5.7/5.2	5.8/5.3	5.9/5.3	s
	Max. operating pressure	230	230	230	230	230	bar
	Oil flow for attachments ZH1	27	27	27	27	27	l/min
	Oil flow for attachments ZH2	30	30	30	30	30	l/min

<sup>1)</sup> for vertical mast 300 ZT.

<sup>2)</sup> The values shown represent the maximum gradeability to overcome short differences in height and surface unevenness (surface edges). The truck must not operate on inclines of more than 15%.

## EFG 316-320

	Designation	EFG					
		316k	316	318k	318	320	
Q	Rated capacity (where C = 500 mm) <sup>1)</sup>	1600	1600	1800	1800	2000	kg
C	Load centre distance	500	500	500	500	500	mm
	Travel speed*	17	17	17	17	17	km/h
	Lift speed with/ without load	0.51/0.74	0.51/0.74	0.46/0.74	0.46/0.74	0.45/0.63	m/s
	Lowering speed with/without load	0.55	0.55	0.55	0.55	0.55	m/s
	Gradeability (30 min) with/ without load	7.3/12.3	7.0/11.5	6.2/10.7	5.9/10.5	5.7/10.4	%
	Max. gradeability 2)(5 min) with/ without load	27.0/30.0	27.0/33.0	25.0/29.0	25.0/32.0	24.0/31.0	%
	Acceleration (15 m) with/ without load	5.7/5.2	5.7/5.2	5.8/5.2	5.8/5.2	5.9/5.5	s
	Max. operating pressure	230	230	230	230	230	bar
	Oil flow for attachments ZH1	27	27	27	27	27	l/min
	Oil flow for attachments ZH2	30	30	30	30	30	l/min

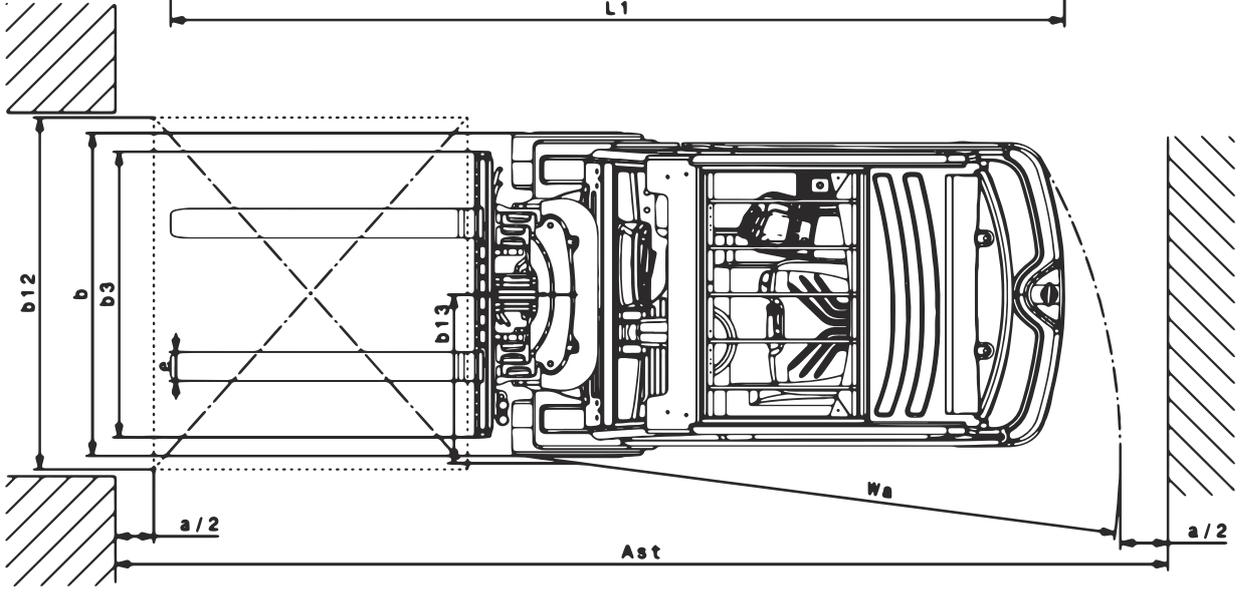
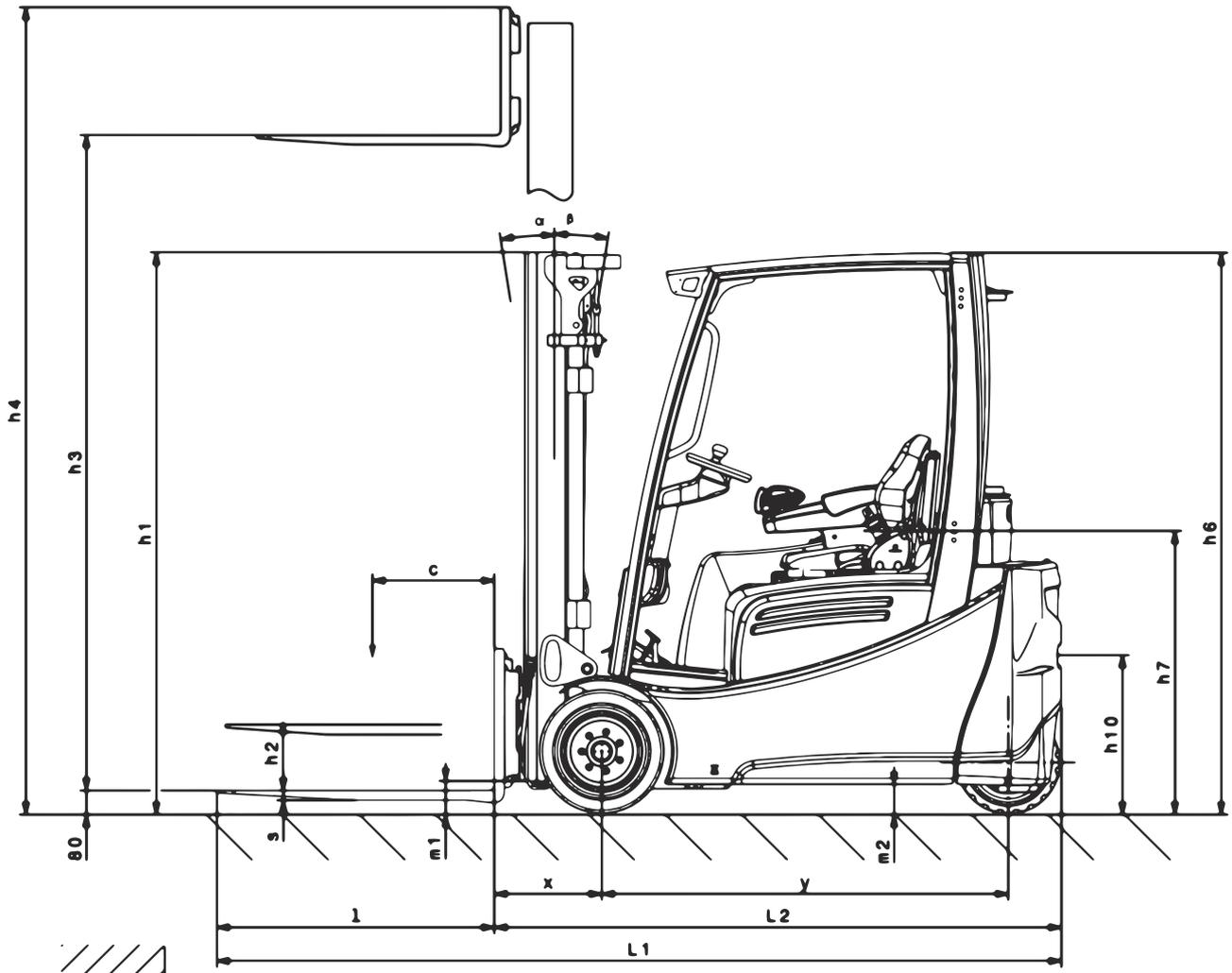
<sup>1)</sup> for vertical mast 300 ZT.

<sup>2)</sup> The values shown represent the maximum gradeability to overcome short differences in height and surface unevenness (surface edges). The truck must not operate on inclines of more than 15%.

## 3.2 Dimensions

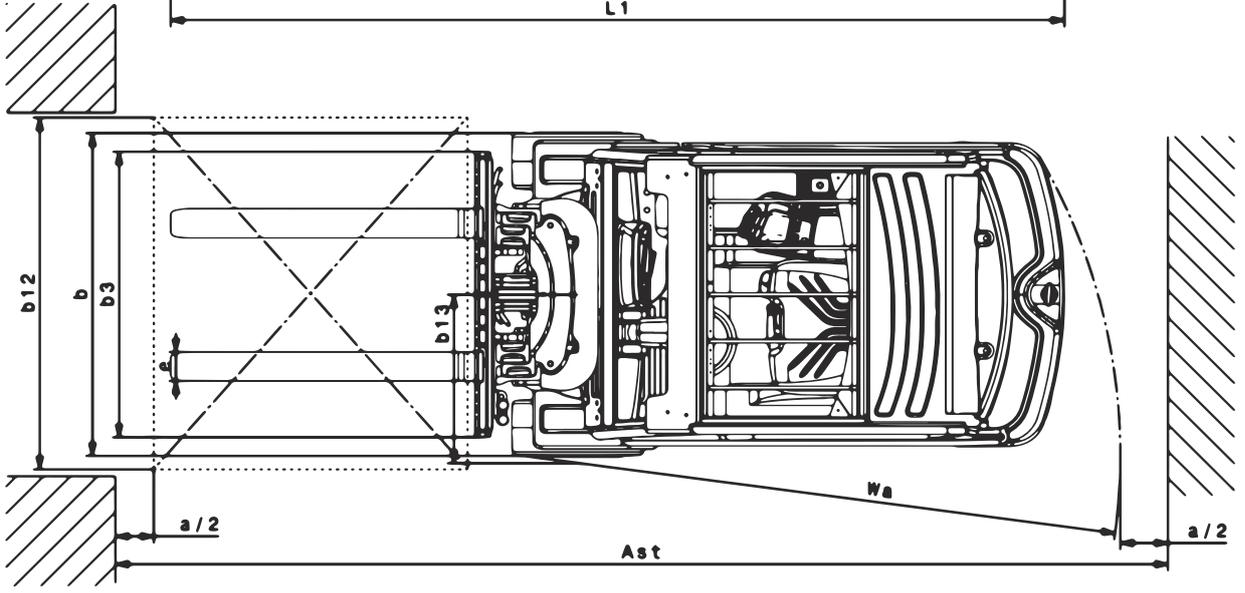
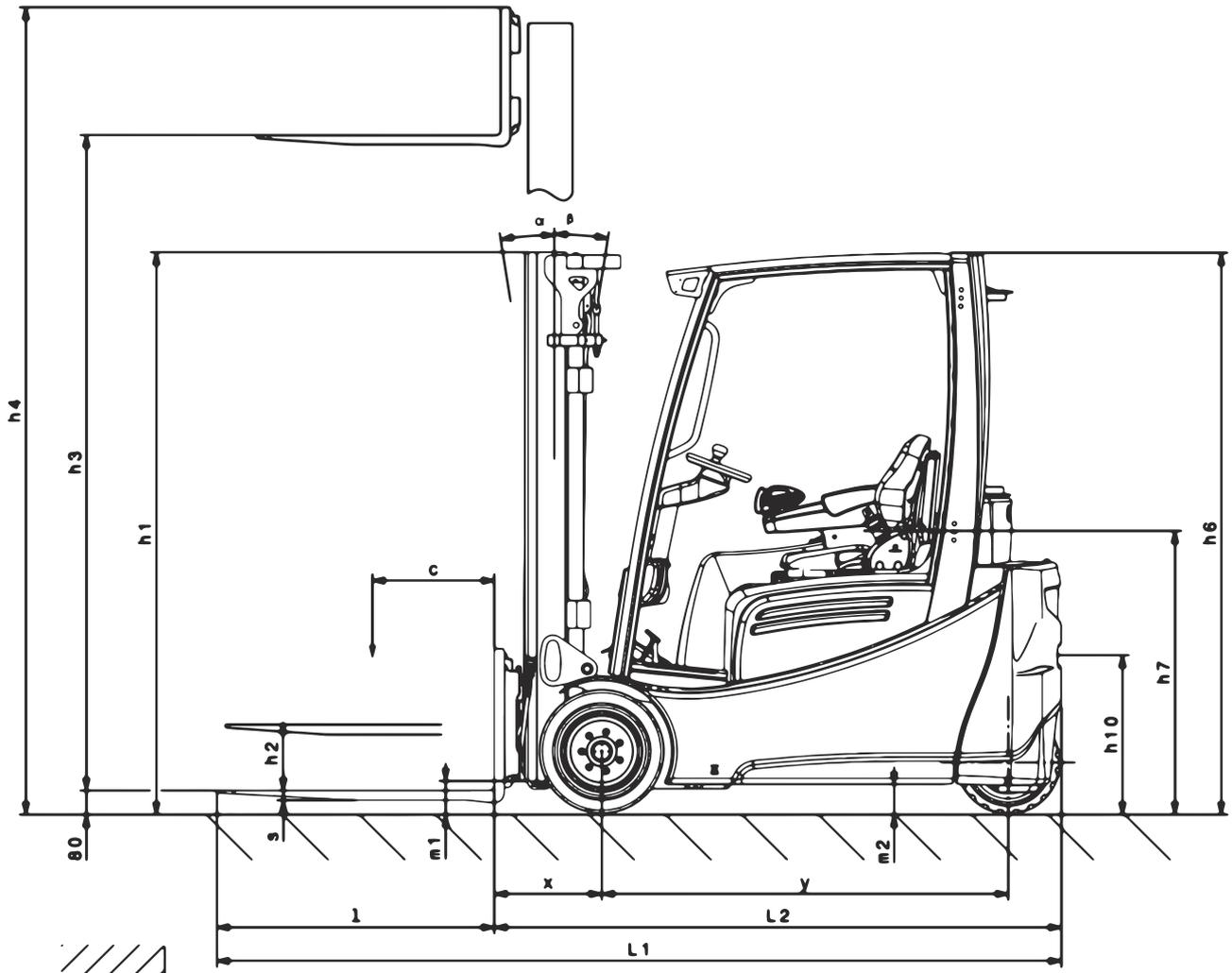
### EFG 112

	Description	EFG 112	
a/2	Safety clearance	100	mm
h <sub>1</sub>	Mast height retracted	2060	mm
h <sub>2</sub>	Free lift	150	mm
h <sub>3</sub>	Lift	3000	mm
h <sub>4</sub>	Mast height extended	3590	mm
h <sub>6</sub>	Height of overhead guard	2040	mm
h <sub>7</sub>	Seat height	920	mm
h <sub>10</sub>	Coupling height	560	mm
α	Mast tilt, fwd.	7	°
β	Mast tilt, back	6	°
L <sub>1</sub>	Length including forks	2933	mm
			mm
L <sub>2</sub>	Length to fork shank	1783	mm



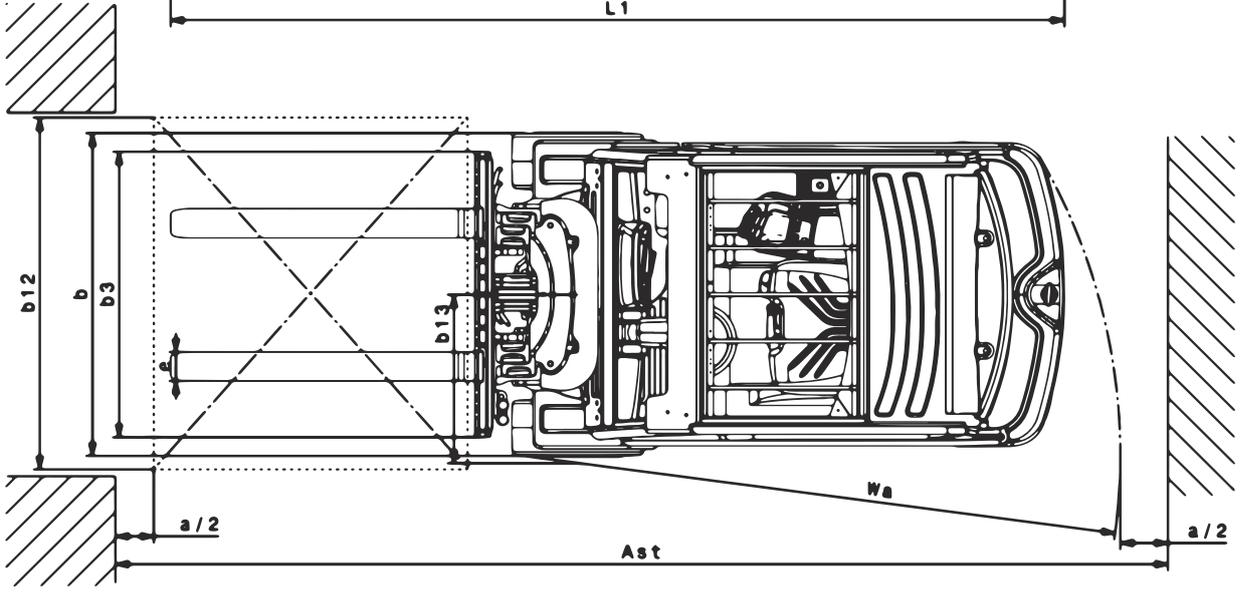
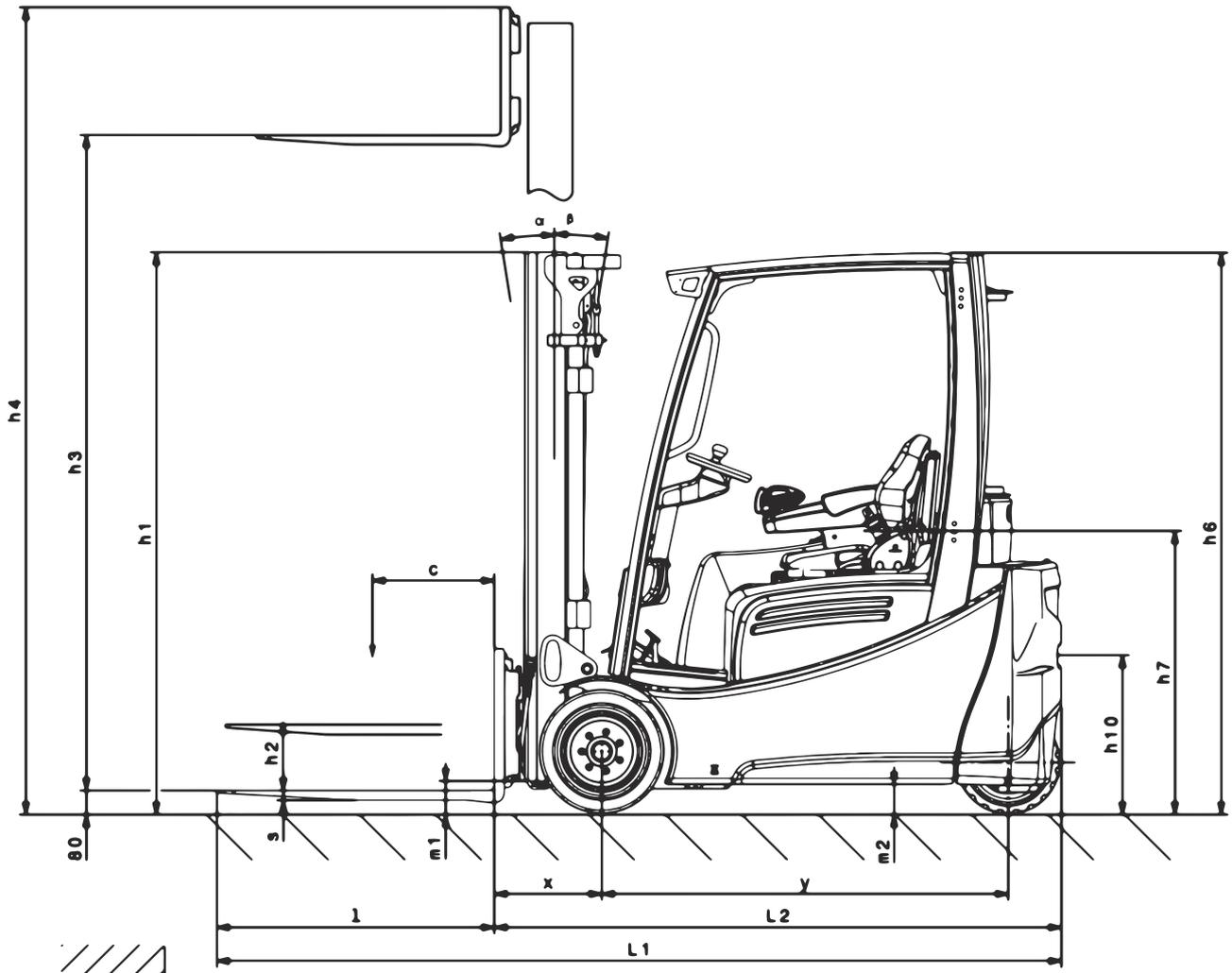
## EFG 213-220

	Description	EFG					
		213	215	216k	218k	220	
				216	218		
a/2	Safety clearance	100	100	100	100	100	mm
h <sub>1</sub>	Mast height retracted	2060	2060	2060	2067	2067	mm
h <sub>2</sub>	Free lift	150	150	150	150	150	mm
h <sub>3</sub>	Lift	3000	3000	3000	3000	3000	mm
h <sub>4</sub>	Mast height extended	3590	3590	3590	3612	3612	mm
h <sub>6</sub>	Height of overhead guard	2040	2040	2040	2040	2040	mm
h <sub>7</sub>	Seat height	920	920	920	920	920	mm
h <sub>10</sub>	Coupling height	560	560	560	560	560	mm
α	Mast tilt, fwd.	7	7	7	7	7	°
β	Mast tilt, back	6	6	6	6	6	°
L <sub>1</sub>	Length including forks	2933	2933	3041	3061	3169	mm
				3149	3169		
L <sub>2</sub>	Length to fork shank	1783	1783	1891	1911	2019	mm
				1999	2019		



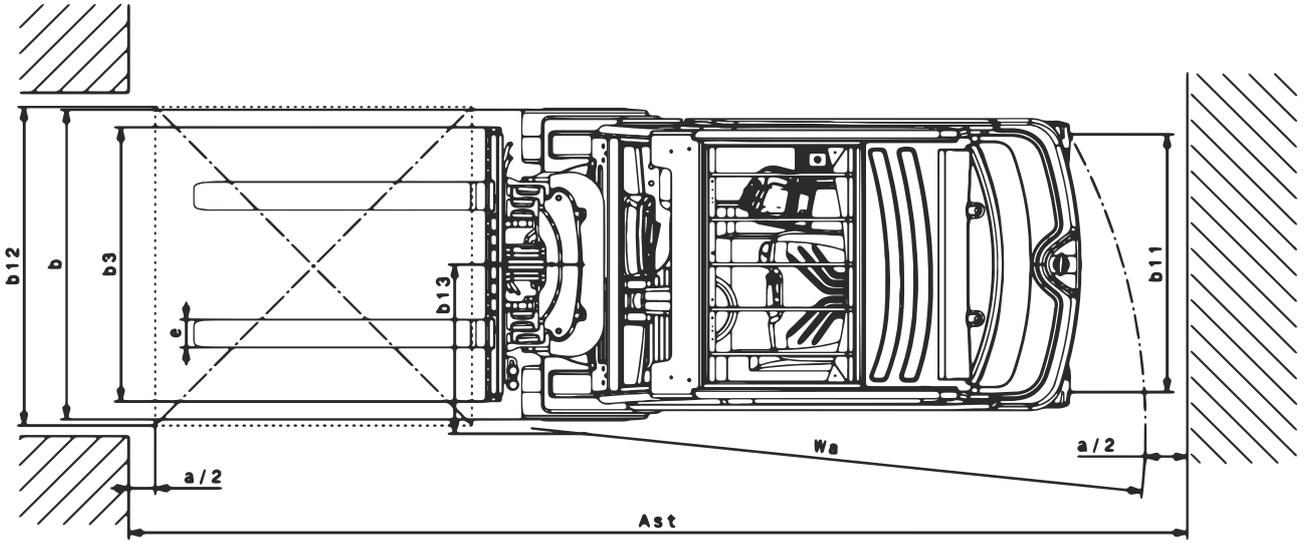
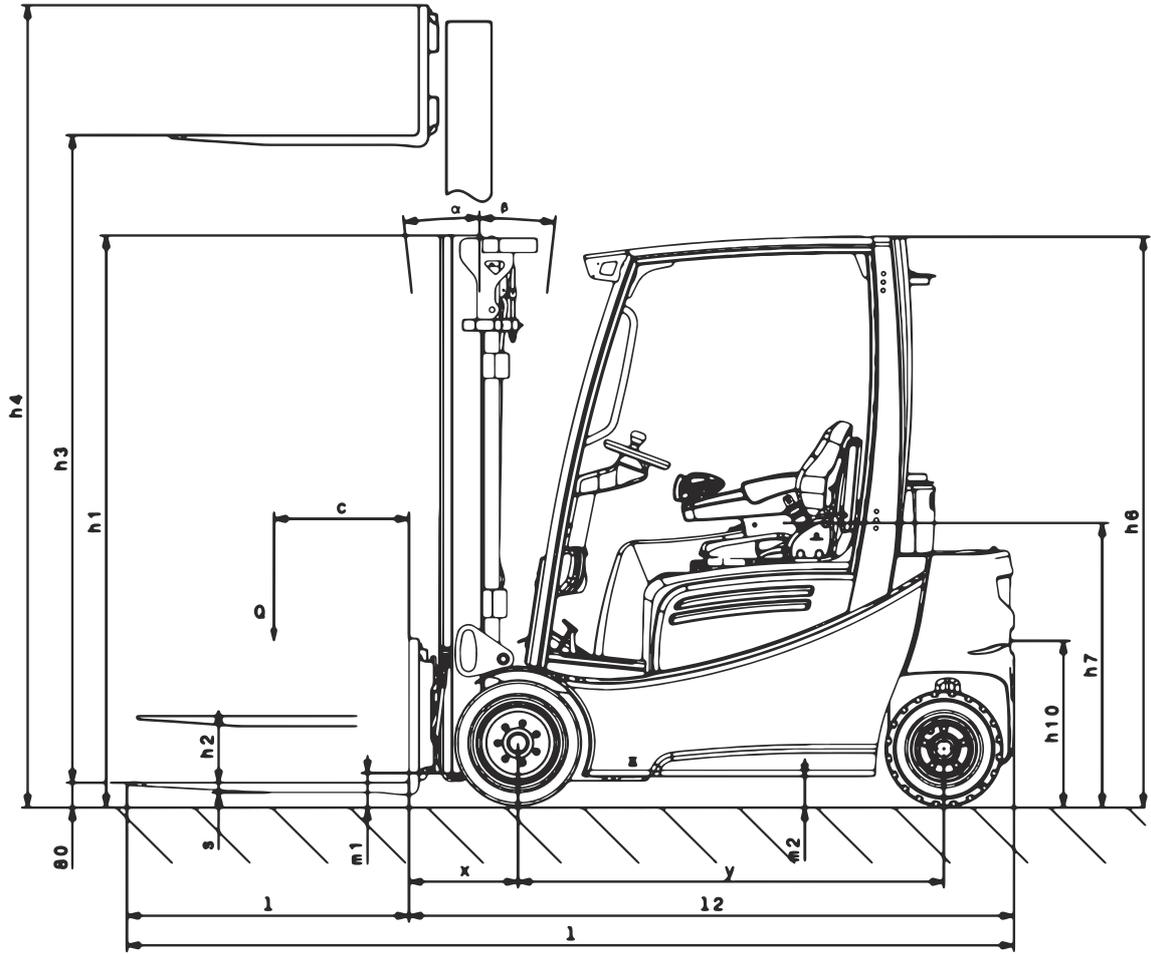
## EFG 112/213-220

	Description	EFG					
		112	215	216k	218k	220	
		213		216	218		
b	Overall width	1060	1060	1060	1120	1120	mm
e	Fork width	80	80	80	80	100	mm
m <sub>1</sub>	Ground clearance, laden, below mast	97	97	97	105	105	mm
m <sub>2</sub>	Centre wheelbase floor clearance	100	100	100	100	100	mm
Ast	Working aisle width, pallets 800x1200 length	3235	3235	3339	3339	3446	mm
				3446	3446		
Ast	Aisle width for pallets 1000x1200 transverse	3112	3112	3216	3216	3323	mm
				3323	3323		
Wa	Turning radius	1440	1440	1548	1548	1655	mm
				1655	1655		
X	Load distance	344	344	344	364	364	mm
y	Wheelbase	1249	1249	1357	1357	1465	mm
				1465	1465		



## EFG 316-320

	Description	EFG					
		316k	316	318k	318	320	
a/2	Safety clearance	100	100	100	100	100	mm
h <sub>1</sub>	Mast height retracted	2060	2060	2067	2067	2067	mm
h <sub>2</sub>	Free lift	150	150	150	150	150	mm
h <sub>3</sub>	Lift	3000	3000	3000	3000	3000	mm
h <sub>4</sub>	Mast height extended	3590	3590	3612	3612	3612	mm
h <sub>6</sub>	Height of overhead guard	2040	2040	2040	2040	2040	mm
h <sub>7</sub>	Seat height	920	920	920	920	920	mm
h <sub>10</sub>	Coupling height	410/580	410/580	410/580	410/580	410/580	mm
α	Mast tilt, fwd.	7	7	7	7	7	°
β	Mast tilt, back	6	6	6	6	6	°
L <sub>1</sub>	Length including forks	3144	3252	3164	3272	3272	mm
L <sub>2</sub>	Length to fork shank	1994	2102	2014	2122	2122	mm
b	Overall width	1060	1060	1120	1120	1120	mm
e	Fork width	80	80	80	80	100	mm
m <sub>1</sub>	Ground clearance, laden, below mast	97	97	105	105	105	mm
m <sub>2</sub>	Centre wheelbase floor clearance	100	100	100	100	100	mm
Ast	Working aisle width, pallets 800x1200 length	3599	3725	3599	3725	3725	mm
Ast	Aisle width for pallets 1000x1200 transverse	3403	3526	3403	3526	3526	mm
Wa	Turning radius	1859	1985	1859	1985	1985	mm
X	Load distance	344	344	364	364	364	mm
y	Wheelbase	1400	1508	1400	1508	1508	mm



### 3.3 Weights

→ All dimensions in kg.

#### EFG 112

Description	EFG 112
Net weight (including battery)	2622
Front axle load (without load)	1307
Front axle load (with load)	3318
Rear axle load (without load)	1315
Rear axle load (with load)	504

#### EFG 213-220

Designation	EFG				
	213	215	216k 216	218k 218	220
Net weight (including battery)	2692	2937	2959	3240	3366
			3018	3191	
Front axle load (without load)	1307	1290	1392	1423	1514
			1479	1534	
Front axle load (with load)	3534	3860	4043	4457	4784
			4050	4477	
Rear axle load (without load)	1385	1647	1567	1817	1852
			1539	1657	
Rear axle load (with load)	458	577	516	583	582
			566	514	

#### EFG 316-320

Designation	EFG				
	316k	316	318k	318	320
Net weight (including battery)	2994	2965	3159	3130	3290
Front axle load (without load)	1362	1474	1399	1512	1503
Front axle load (with load)	3995	4033	4413	4437	4753
Rear axle load (without load)	1632	1491	1760	1618	1787
Rear axle load (with load)	599	532	546	493	537

### 3.4 Mast versions

→ All dimensions in mm.

#### EFG 112/213-220 and 316-320

	Lift $h_3$	Free lift $h_2$		Height, mast retracted $h_1$		Height, mast extended $h_4$	
	EFG						
		112/213/ 215/216k/ 216/316/ 316k	218k/218/ 220/318/ 318k/320	112/213/ 215/216k/ 216/ 316/316k	218k/218/ 220/318/ 318k/320	112/213/ 215/216k/ 216/ 316/316k	218k/218/ 220/318/ 318k/320
ZT	3000	150		2060	2067	3590	3612
	3100			2110	2117	3690	3712
	3300			2210	2217	3890	3912
	3500			2310	2317	4090	4112
	3700			2410	2417	4290	4312
	4000			2560	2517	4590	4612
	4500			2810	2817	5090	5112
ZZ	3100	1475	1430	2065	2072	3690	3742
	3300	1575	1530	2165	2172	3890	3942
	3500	1675	1630	2265	2272	4090	4142
	3700	1775	1730	2365	2372	4290	4342
	4000	1925	1880	2515	2522	4590	4642
DZ	4400	1435	1390	2025	2032	4990	5042
	4640	1515	1470	2105	2112	5230	5282
	5000	1645	1600	2235	2242	5590	5642
	5500	1825	1780	2415	2422	6090	6142
	6000	1995	1950	2585	2592	6590	6642
	6500	2175	2130	2765	2772	7090	7142

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.

#### **EFG 112/213-220**

Description		EFG		
		112/213/215 216k/216	218k/218	220
Front tyres	SE *)	18x7-8	200/50-10	200/50-10
	Solid *)	18x7x12 1/8		
	Pneumatic *)	180/70-8 - LI125 (PR 16)	Not available	Not available
	Tyre pressure (bar)	10.0	-	-
	Torque (Nm)	225	225	225
Rear tyres	SE *)	140/55-9	140/55-9	140/55-9
	Solid *)	15x5x11¼	15x5x11¼	15x5x11¼
	Pneumatic *)	125/75-8 - LI100 (PR 12)	Not available	Not available
	Tyre pressure (bar)	10.0	-	-
	Torque (Nm)	225	225	225

\*) The models listed in the table correspond to the standard version. Other tyres can be used depending on the truck's equipment.

## EFG 316-320

Description		EFG		
		316k/316	318k/318	320
Front tyres	SE *)	18x7-8	200/50-10	200/50-10
	Solid *)	18x7x12 1/8	18x7x12 1/8	18x7x12 1/8
	Pneumatic *)	180/70-8 - LI125 (PR 16)	Not available	Not available
	Tyre pressure (bar)	10.0	-	-
	Torque (Nm)	225	225	225
Rear tyres	SE *)	16x6-8	16x6-8	16x6-8
	Solid *)	15x5x11¼	15x5x11¼	15x5x11¼
	Pneumatic *)	150/75-8 - LI113 (PR 16)	Not available	Not available
	Tyre pressure (bar)	10.0	-	-
	Torque (Nm)	225	225	225

\*) The models listed in the table correspond to the standard version. Other tyres can be used depending on the truck's equipment.

### 3.6 Engine Data

#### EFG 112/213-220 and 316-320

Description	EFG		
	112	213 / 215 / 216k / 216 / 218k / 218 / 220	316k / 316 / 318k / 318 / 320
Drive motor	2 x 2.8 kW	2 x 4.5 kW	2 x 4.5 kW
Lift motor	8.2 kW	11.5 kW	11.5 kW
Steer motor	0.9 kW	0.9 kW	0.9 kW

Throughput performance	
EFG 112	80 t/h
EFG 213 / 215	105 / 111 t/h
EFG 216k / 216	113 t/h
EFG 218k / 218	126 t/h
EFG 220	140 t/h
EFG 316k / 316	112 t/h
EFG 318k / 318	124 t/h
EFG 320	138 t/h

## 3.7 EN norms

### Noise emission level

- EFG 112: 65 dB(A)
- EFG 213-220: 67 dB(A)
- EFG 316-320: 67 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 112: 0,46 m/s<sup>2</sup>
- EFG 213-220: 0,53 m/s<sup>2</sup>
- EFG 316-320: 0,51 m/s<sup>2</sup>

in accordance with EN 13059.

- 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 329.

### 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 carrier 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 it can be used near the industrial truck.

## 3.8 Conditions of use

### Ambient temperature

- Standard truck – see page 15
- Tropical equipment (○) in continuous use: +30 °C to +50 °C

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

## 3.9 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 according to its purpose.

### 3.10 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.

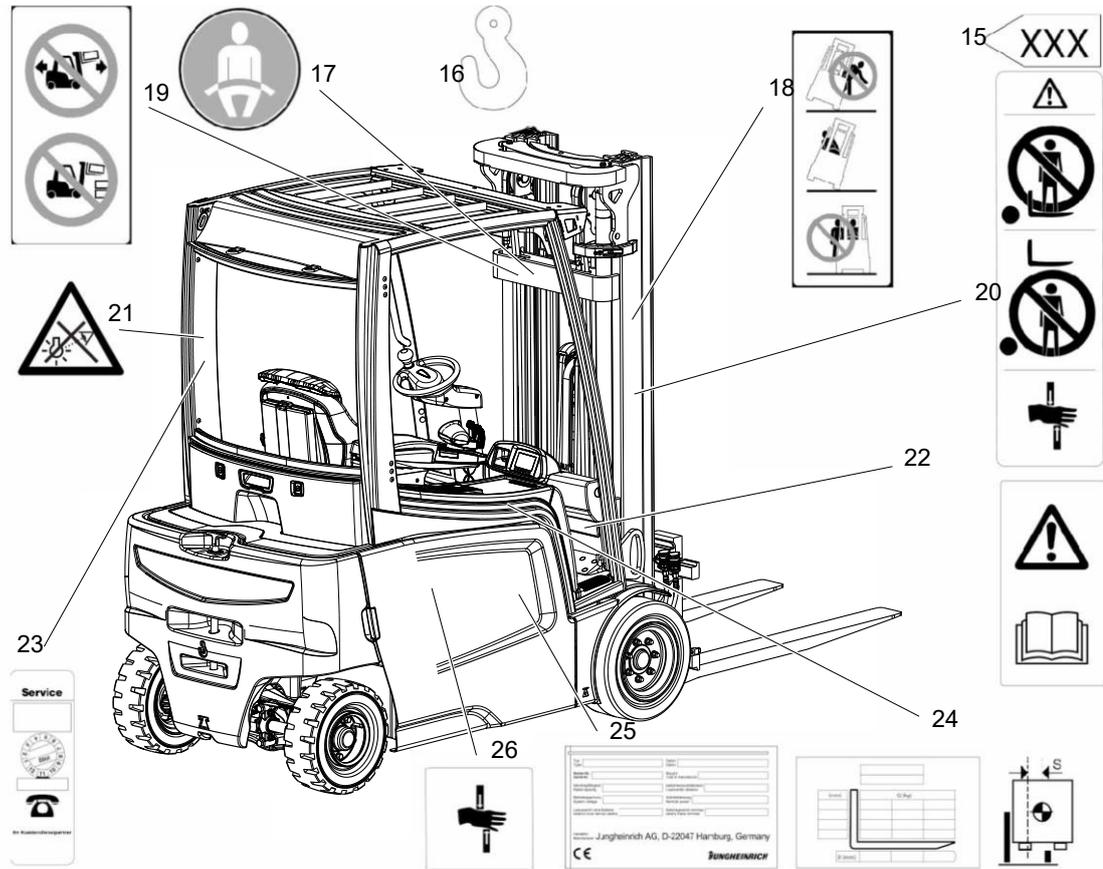
Component	Frequency range	Transmission power
WMT 110	13.56 MHz	< 100 mW
WMT 110	2.4 GHz	10 mW
Radio module (ISM Online)	433.05 - 434.79 MHz	< 10 mW
Access module (ISM Online)	13.56 MHz	< 100 mW
Transponder reader	13.56 MHz	< 100 mW
Transponder reader (EasyKey)	2.4 GHz	≤ 67,6 mW
Transponder reader (EasyKey)	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
Radio with CD player	87.5 - 108.0 MHz	-
Radio with CD player	522 - 1620 kHz	-
Digital radio with CD player	87.5 - 108.0 MHz	-
Digital radio with CD player	522 - 1620 kHz	-
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

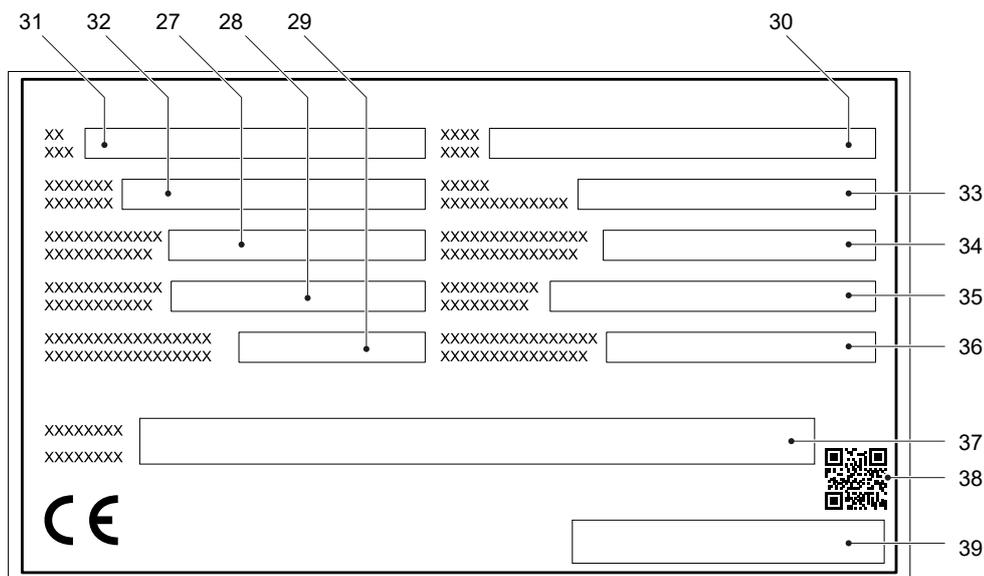
→ Warnings and notices such as capacity plates, attachment points and data plates must be legible at all times. Replace if necessary.



<b>Item</b>	<b>Designation</b>
15	Lift limit
16	Attachment points for loading by crane
17	Wear seat belt
18	Tipover warning, no passengers
19	Do not travel with a raised load or operate the mast forward tilt with a raised load
20	Do not step onto or beneath the load: risk of trapping with moving mast
21	Warning: optical radiation (Floor-Spot)
22	Observe the operating instructions
23	Inspection plaque (○)
24	Capacity (or reduced capacity)
25	Data plate, behind the battery door
26	Risk of crushing, in chassis behind the battery door

## 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
27	Rated capacity (kg)	34	Load centre distance (mm)
28	Battery voltage (V)	35	Output (kW)
29	Net weight without battery (kg)	36	Min./max. battery weight (kg)
30	Option	37	Manufacturer
31	Type	38	QR code
32	Serial number	39	Manufacturer's logo
33	Year of manufacture		

→ For queries regarding the truck or when ordering spare parts, always quote the truck serial number (32).

### NOTICE

The serial number (32) of the truck is specified on the data plate (25) and embossed on the truck chassis (see page 48).

### QR code

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



### 4.3 Truck capacity plate

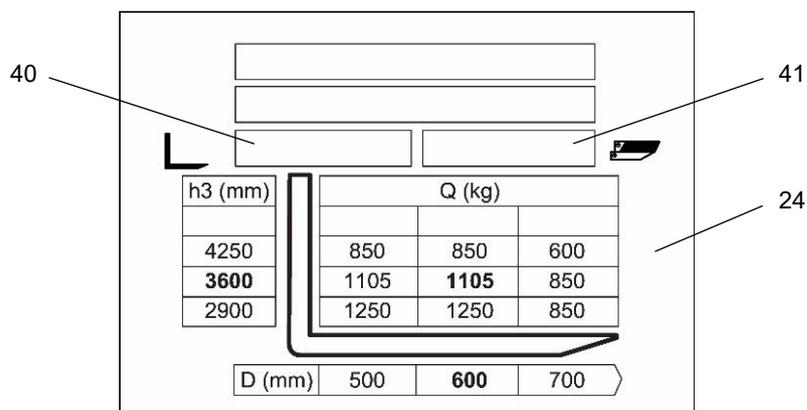
**⚠ CAUTION!**

#### Replacing the fork arms can cause accidents

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

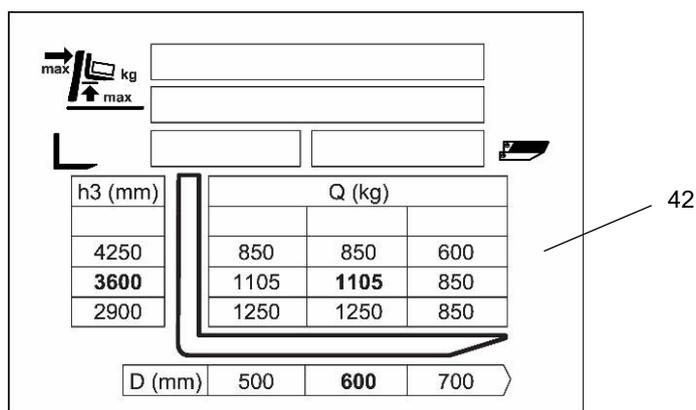
- ▶ An additional capacity plate must be attached to the truck when replacing the fork arms.
- ▶ The capacity of the fork arms must correspond to the capacity of the truck.
- ▶ Trucks supplied without fork arms are given a capacity plate for standard fork arms (length: 1150 mm).

The capacity plate (24) 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 (●) (40) or the fork extensions (○) (41) in as-delivered condition.

Capacity plate version in accordance with Australian guidelines (42)

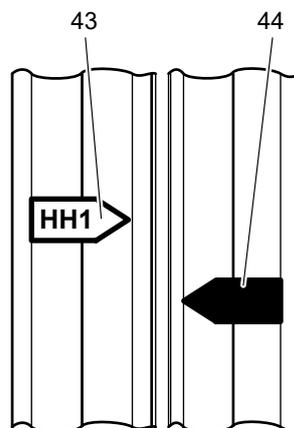


#### Example of how to calculate the maximum capacity

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

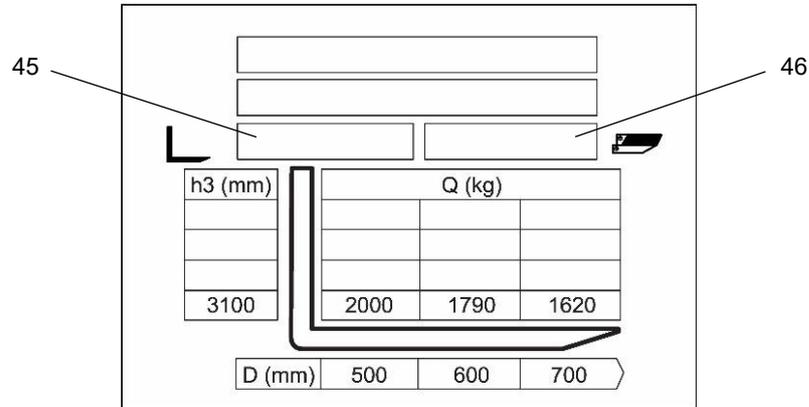
The arrow shaped markings (43 and 44) on the inner and outer masts show the operator when the prescribed lift limits have been reached.



## 4.4 Attachment capacity plate

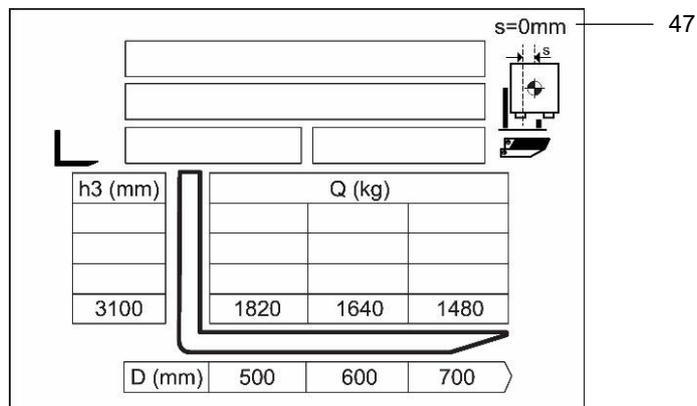
The attachment capacity plate is next to the truck capacity plate and gives the truck capacity  $Q$  (in kg) in conjunction with the attachment and the specified fork arms (●) (45) and where applicable fork extensions (○) (46).

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



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

The capacity plate of the attachment with more than 100 mm possible side shift for a current working position in the centre position (47) or pushed out offset to max. 100 mm side shift is affixed next to the truck capacity plate.



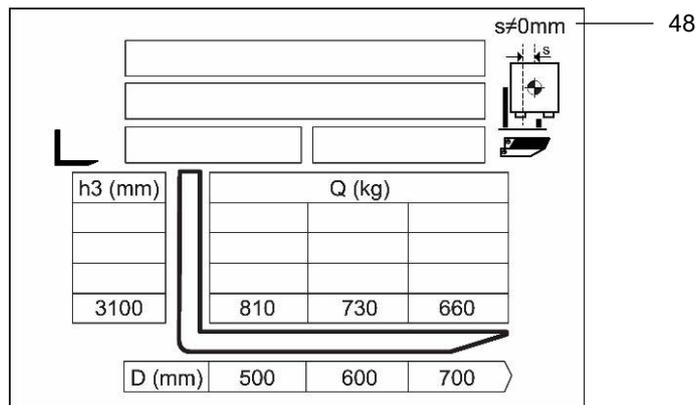
## ⚠ WARNING!

### 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.

The capacity plate of the attachment with more than 100 mm possible side shift for a current clear offset working position with 100 mm side shift pushed out (48) is affixed separately to the other capacity plates.



## 5 Stability

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)

## ⚠ WARNING!

### Loss of stability can cause accidents

Changing the components listed will affect stability.

If the attachment sideshift is off-centre, refer to the capacity data plate with reduced capacity, see page 48.

## 5.1 Wind loads

### **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.
- 

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

Transport can be carried out 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 dismantled (for large heights), all mechanical connections and hydraulic lines between the basic truck and the mast separated.

## 2 Truck laden

### 2.1 Centre of gravity

#### **⚠ WARNING!**

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

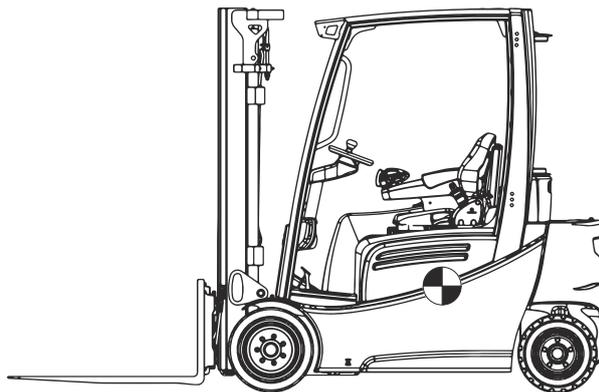
The overall centre of gravity can vary depending on the truck's equipment (especially the mast version).

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

### **WARNING!**

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

Incorrect crane loading procedures 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 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.

### **DANGER!**

#### **Crane slings can tear, resulting in accidents**

- ▶ Only use crane lifting gear with sufficient capacity.
- ▶ Loading weight = Net weight of truck (+ battery weight for electric trucks).
- ▶ The mast must be tilted back fully.
- ▶ The crane lifting gear on the mast must have a minimum clear length of 2 m.
- ▶ Crane slings 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 handled by people who are trained in using lifting slings and tools.
- ▶ Wear safety shoes when lifting the truck by crane.
- ▶ Do not walk into or stand in a hazardous area.
- ▶ Always attach the crane lifting gear to the prescribed strap points and prevent them from slipping.

 Truck net weight: see page 50.

 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.

## ***Lifting the truck by crane***

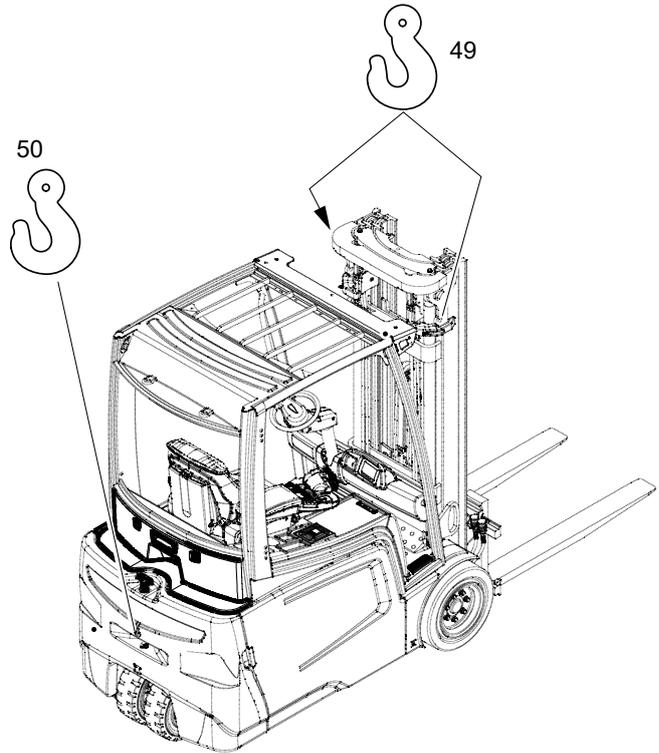
### ***Requirements***

- Park the truck securely, see page 140.

### ***Procedure***

- Secure the crane slings to the attachment points (49) and (50).
- Raise and load the truck.
- Lower and deposit the truck carefully (see page 140).
- Secure the truck with wedges to prevent it from rolling away.

*This concludes the loading by crane.*



## 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**

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 140.

##### *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 158.
- Lower the truck slowly onto the ground and prevent it from rolling away.

*The truck is now loaded.*

### **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).

### 3 Securing the truck during transport

#### **⚠ WARNING!**

##### **Accidental movement during transport**

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

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

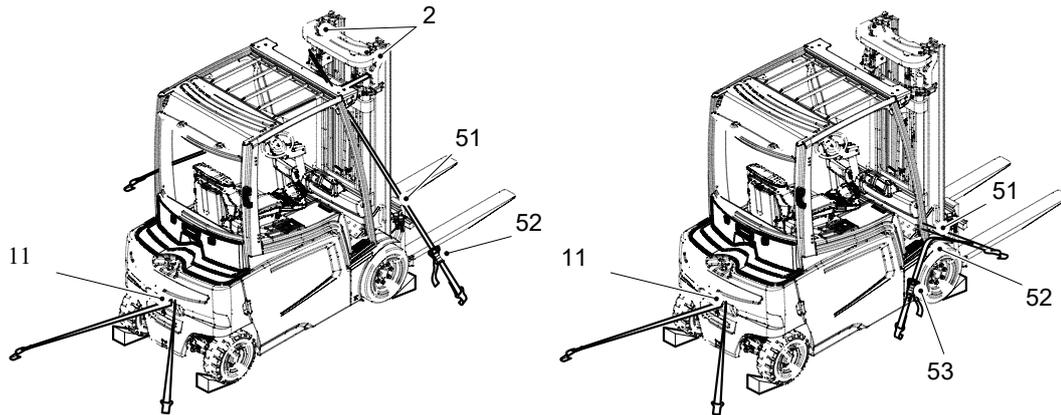
---

#### **NOTICE**

Loading must be carried out by specially trained personnel in accordance with the recommendations of guidelines VDI 2700 and VDI 2703 and/or other applicable national guidelines for loading industrial trucks.

---

## Securing with a mast    Securing without a mast



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

#### *Requirements*

- Position the industrial truck securely on a lorry or trailer, see page 140.

#### *Tools and Material Required*

- 2 fastening belts with a tensioner
- Retaining wedges.

#### *Procedure*

- Secure the truck with the fastening belt (51) at the top cross member of the mast (2) and the trailer coupling (11) or over the mud guard (53) and the trailer coupling (11).
- Tighten the fastening belt (51) with the tensioner (52).

*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!**

##### **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.

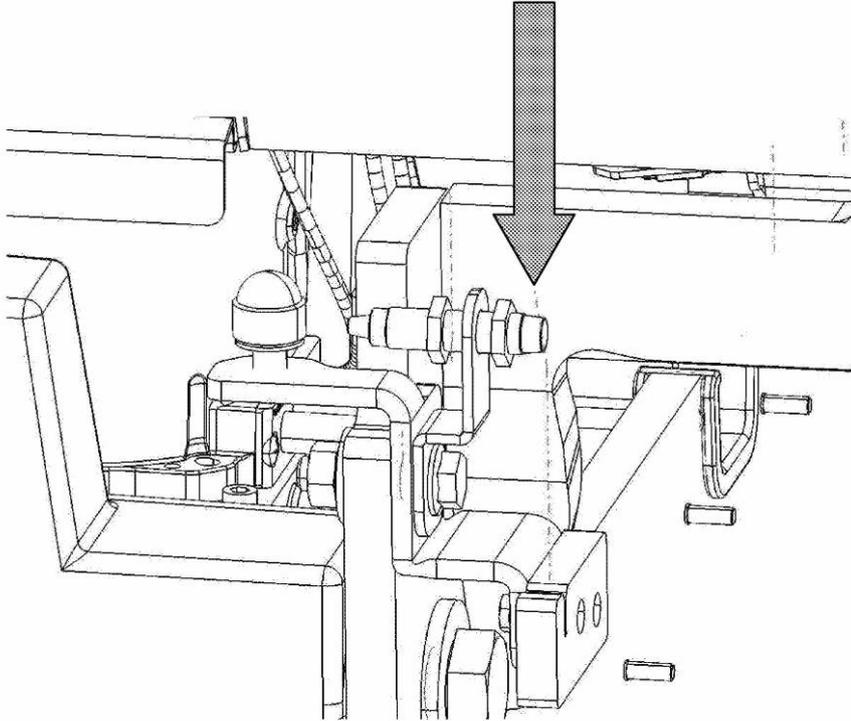
Unsuitable cable connections (too long, insufficient wire cross-section) to the battery (tow cables) can overheat, setting the truck and battery on fire.

- ▶ 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 50 mm<sup>2</sup>.
-

## Instruction for commissioning with battery door with sensor monitoring (○)

Before installing the battery, the "Remove before driving" information label must be removed.

# Remove before driving



- The truck may only be operated with the battery door closed.

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

#### *Procedure*

- Check the equipment is complete.
- Check the hydraulic oil level, see page 304.
- Check the transmission oil level, see page 309.
- Install the battery if necessary, see page 74.
- Charge the battery, see page 90.

*The truck can now be started, see page 119.*

- To operate the truck without its own drive system, see page 276.

# 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 140.

### 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!**

#### **Unsuitable batteries that have not been approved for the truck by the manufacturer can be hazardous**

The design, weight and dimensions of the battery have a considerable effect on the operational safety of the truck, in particular its stability and capacity. The use of unsuitable batteries that have not been approved for the truck by 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. 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 may 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!**

Hazardous contact voltages only arise in the event of a technical or physical defect. The batteries are normally charged. There is still some residual voltage in a discharged battery. This must be considered as a hazardous contact voltage.

---

With this kind of defect the battery must not be touched and must not come into contact with metal objects see page 65.

## 2 Safety Regulations for Handling Lead-Acid Batteries

### **⚠ WARNING!**

#### **Batteries can be hazardous**

Batteries contain an acid solution which is poisonous and corrosive. Avoid contact with battery acid at all times.

- ▶ Dispose of used battery acid in accordance with regulations.
  - ▶ Always wear protective clothing and goggles when working with 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 damage (e.g. skin or eye contact with battery acid) call for a doctor immediately.
  - ▶ Spilled battery acid should be neutralised immediately with plenty of water.
  - ▶ Only batteries with a sealed battery container may be used.
  - ▶ 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

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 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 battery fire.

#### 3.1 Fire Hazard

##### **WARNING!**

##### **Burning lithium ion battery cells can be hazardous**

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

If the inside of lithium ion battery cells burn, 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 only activated 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 container.
- Covered box with pressure and smoke discharge option.

## 3.2 Particular hazard from combustion products

### **⚠ WARNING!**

#### **Contact with combustion products can be hazardous**

Fires produce 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 and / or the skin, where they can produce and 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 (Co2)

## 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

### ⚠ CAUTION!

Always use batteries with insulated covers or live components.

The battery weights are indicated on the battery data plate.

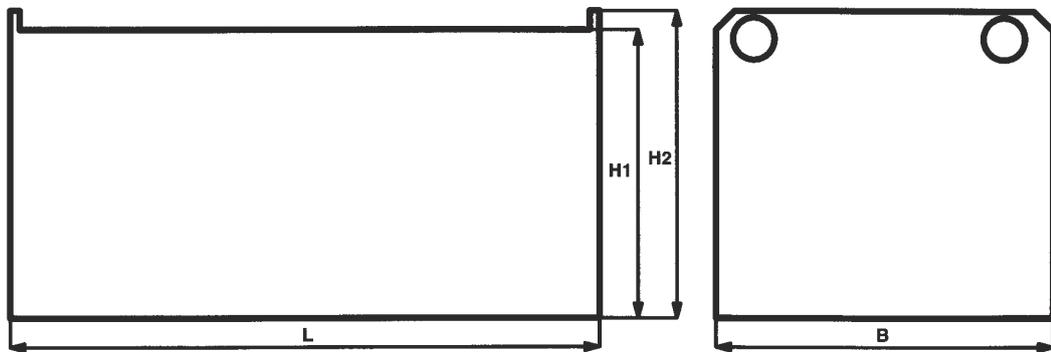
The truck will be equipped with different battery models, depending on the application. The following table shows which combinations are included as standard:

Truck type	Description	Capacity
EFG 112	48 V - 4PzS	460 Ah
EFG 213		
EFG 215		
EFG 216k	48V - 5PzS	575 Ah
EFG 218k		
EFG 216	48V - 6PzS	690 Ah
EFG 218		
EFG 220		
EFG 112	51.2 V - lithium-ion 360SB	360 Ah
EFG 213		
EFG 215		
EFG 216k	51.2 V - lithium-ion 360MB	360 Ah
EFG 218k		
EFG 216	51.2 V - lithium-ion 360LB	360 Ah
EFG 218		
EFG 220		
EFG 112	51.2 V - lithium-ion 480SB	480 Ah
EFG 213		
EFG 215		
EFG 216k	51.2 V - lithium-ion 480MB	480 Ah
EFG 218k		
EFG 216	51.2 V - lithium-ion 480LB	480 Ah
EFG 218		
EFG 220		

<b>Truck type</b>	<b>Model</b>	<b>Capacity</b>
EFG 316k	48V - 5PzS	575 Ah
EFG 318k		
EFG 316	48V - 6PzS	690 Ah
EFG 318		
EFG 320		
EFG 316k	51.2 V - lithium-ion 360MB	360 Ah
EFG 318k		
EFG 316	51.2 V - lithium-ion 360LB	360 Ah
EFG 318		
EFG 320		
EFG 316k	51.2 V - lithium-ion 480MB	480 Ah
EFG 318k		
EFG 316	51.2 V - lithium-ion 480LB	480 Ah
EFG 318		
EFG 320		

## 5 Battery dimensions

48 V battery					
Truck type	Dimension (mm)				Rated weight (-5/+8%) in kg
	L max.	B max.	H1 +/- 2mm	H2 +/- 2mm	
EFG 112/213/215	830	522	612	627	715
EFG 216k/ 218k/316k/ 318k	830	630	612	627	855
EFG 216/218/220/ 316/318/320	830	738	612	627	1025



- The dimensions of the lithium-ion batteries are identical to those of the lead-acid batteries.

### **⚠ 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

### Requirements

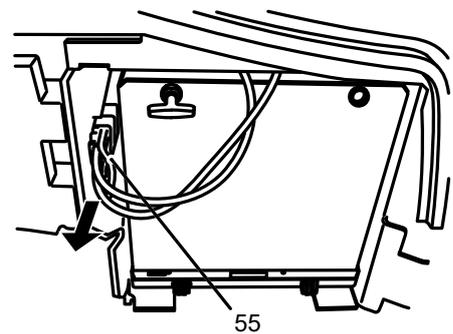
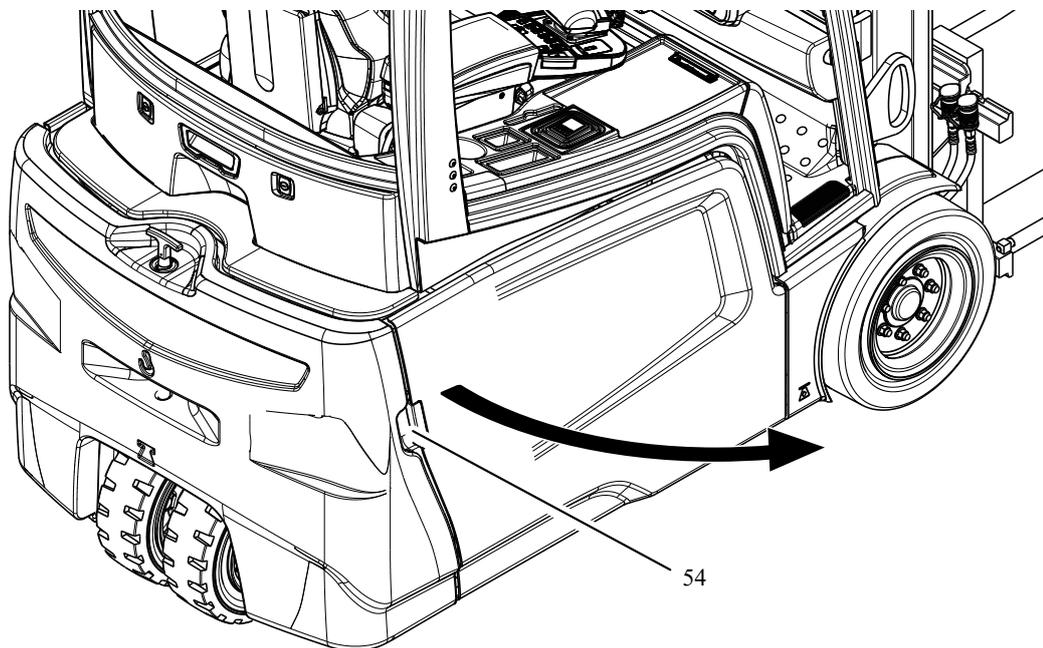
- Park the truck securely, see page 140.
- Load handler lowered.
- Key switch set to OFF.
- Key removed.
- Set the Emergency Disconnect OFF.

### Procedure

- Open the battery door (54) as far as the stop.
- Pull the battery connector (55) and let it hang down in front of the battery.

*The battery is now exposed.*

→ *Avoid collisions when opening and closing the battery latch.*



## 7 Removing or installing the battery

### **⚠ WARNING!**

#### **Accident risk during battery removal and installation**

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

- ▶ Note the "Safety regulations for handling acid batteries" section in this chapter.
  - ▶ Wear safety shoes when removing and installing the battery.
  - ▶ Use only batteries with insulated cells and terminal connectors.
  - ▶ Park the truck on a level surface to prevent the battery from sliding out.
  - ▶ Make sure the crane slings have sufficient capacity to replace the battery.
  - ▶ Use only approved battery replacement devices (battery roller stand, replacement trolley etc.).
  - ▶ Make sure the battery is securely located 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 in the event of lithium-ion batteries (○):

When performing the activities outlined below, disconnect the truck-side control line from the connection on the battery trough or from the interface converter (○) on the battery before unplugging disconnecting the battery connector.

Then open the lock on the battery connector to be able to disconnect the battery connector: loosen the bolted bar.



Deviating procedure in the event of lithium-ion batteries (○):

When performing the activities outlined below, ensure to restore the battery connector lock after reconnecting the battery connector: close and tighten the bolted bar.

Then reconnect the truck-side control line to the connection on the battery trough or to the interface converter (○) on the battery.

## 7.1 Removing or installing the battery using a pallet truck and "SnapFit" battery holder

### **⚠ CAUTION!**

#### **Trapping hazard**

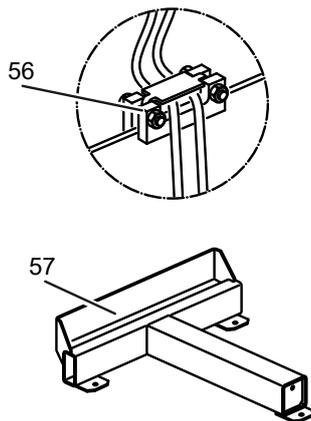
Trapping hazard when replacing the battery.

- ▶ 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 140.
- 



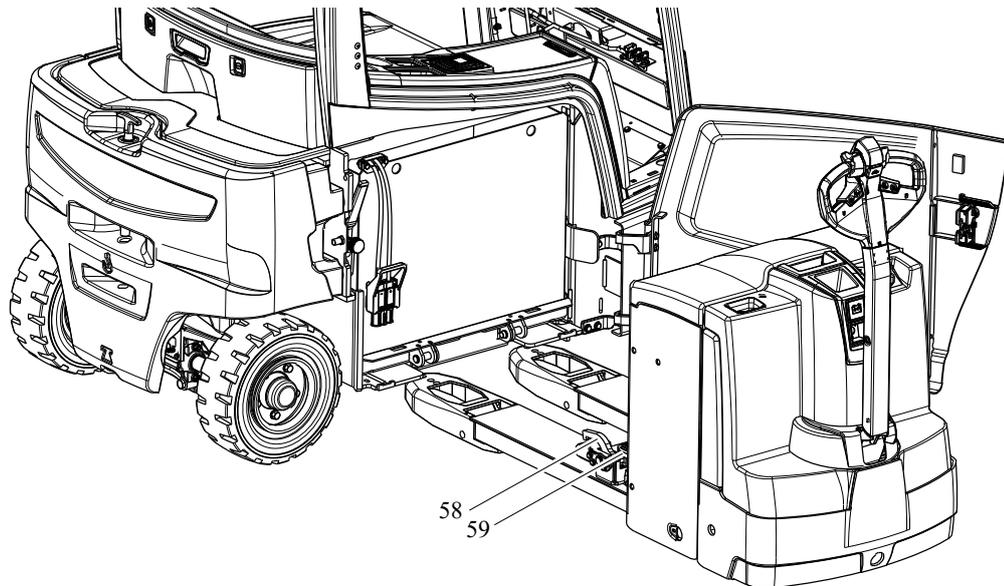
Battery exposed – see page 73.

##### *Tools and Material Required*

- Battery trolley with four wheels
- Pallet truck with SnapFit battery holder
- Battery with cable guard (56) (○)
- Charging station intended for the battery type (57) (○)

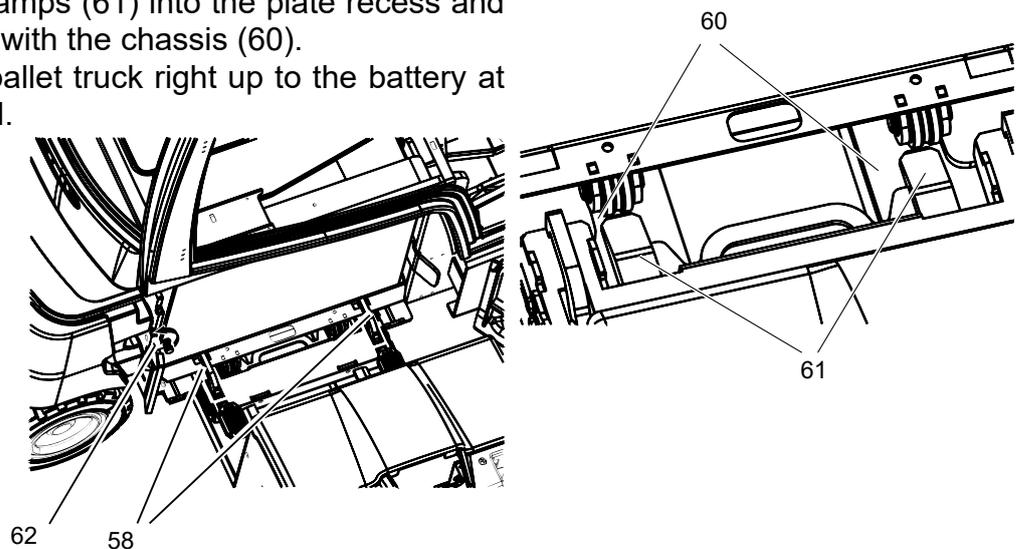
## Procedure

•



Close the safety catches (58).

- To do this, press the pedals (59).
- Move the pallet truck approx. 200 mm underneath the truck base so that it is central with the battery.
- Raise the forks of the pallet truck until they are just under the truck base.
- Push the ramps (61) into the plate recess and align them with the chassis (60).
- Bring the pallet truck right up to the battery at slow speed.
- Engage the safety



catches (58) on the battery trolley.

- Check that both safety catches (58) are firmly engaged in the battery trolley.
- ➔ Do not raise the forks.
- Undo the battery latch (62).

- Remove the battery with the pallet truck at slow speed as far as it will go (64).  
Raise the forks until the battery can be pulled clear of the battery compartment.

## 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.
- ▶ When lifting and removing the battery, make sure that the battery cable does not jam between the chassis and the battery tray.

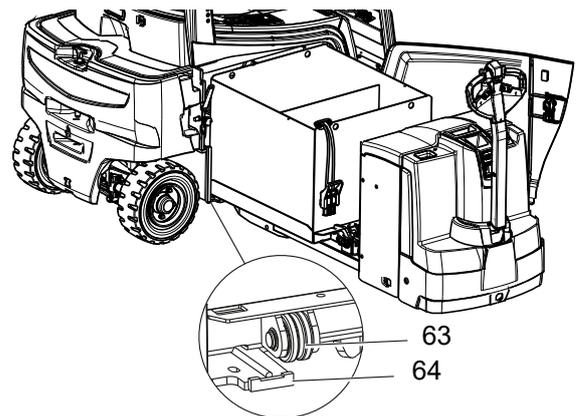
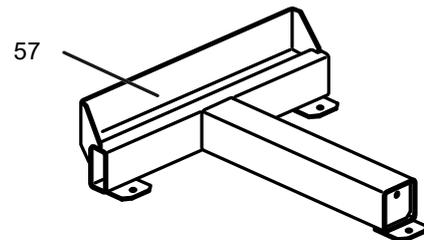
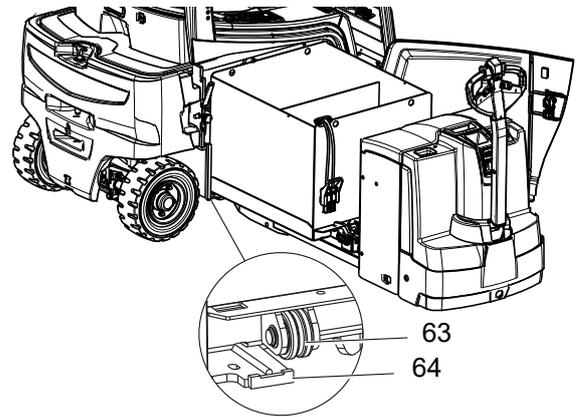
- Bring the battery to the charging station for charging.
- Place the battery carefully onto the charging station (57).
- Undo the safety catches (58) and remove the pallet truck.

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

### Installing the battery

#### Procedure

- Drive the pallet truck and battery to the truck.
- Deposit the battery trolley with the rollers (63) on the rails of the truck base.
- Lower the forks of the pallet truck until the battery is horizontal.



Align the height and push the forks of the pallet truck underneath the truck base.

## NOTICE

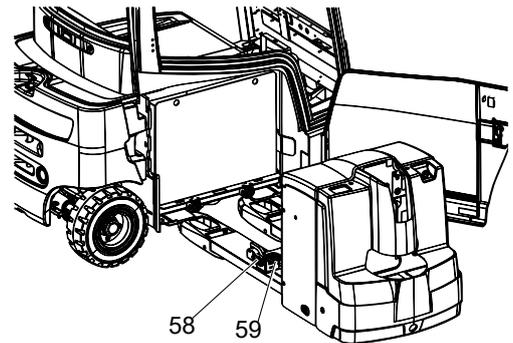
### Risk of material damage

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.
- ▶ When lifting and removing the battery, make sure that the battery cable does not jam between the chassis and the battery tray.

- 
- Insert the battery in the truck.
  - Close the battery latch (62).
  - Undo the safety catches (58).
    - To do this, press the pedals (59).
  - Move the pallet truck away from the forklift truck.
  - Close the battery door.

*The battery is now inserted.*



## 7.1.1 Battery holder assembly

### **⚠ CAUTION!**

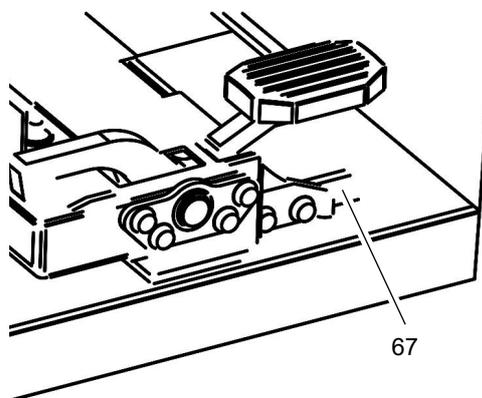
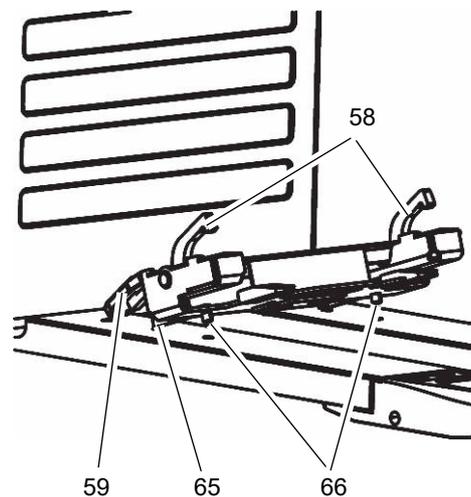
The battery holder can only be fitted to pallet trucks or hand pallet trucks with notice signs.

#### *Requirements*

- Pallet truck or hand pallet truck available with holes in accordance with assembly instructions, see page 80.

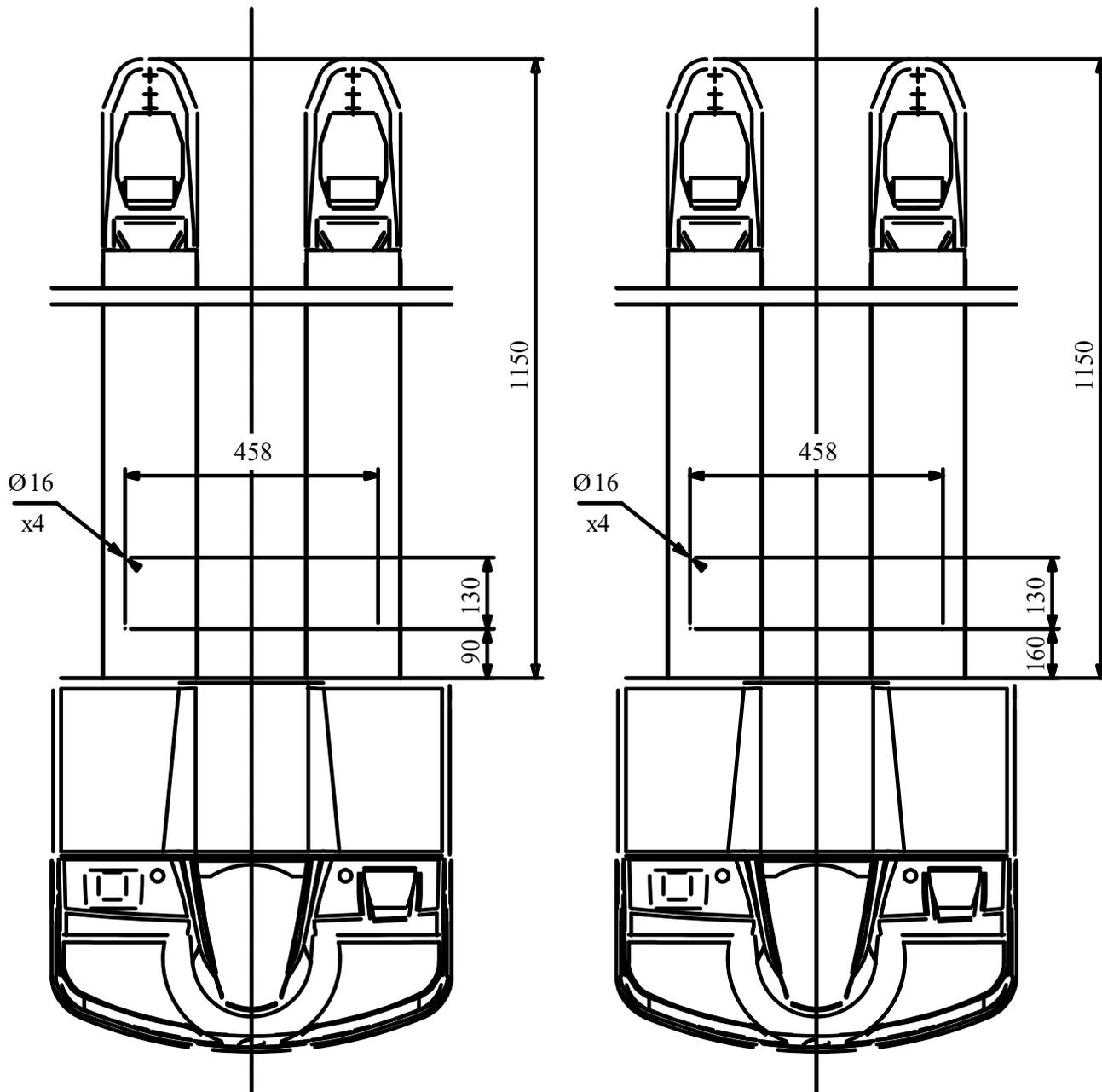
#### *Procedure*

- Open the safety catches (58).
  - To do this, press the pedals (59).
- Insert bent pins (65) into the forks of the pallet truck or hand pallet truck.
- Push the battery holder down and fit the bolts (66) in the holes.
- Close the safety catches (58).
  - To do this, press the pedals (59).
- Secure the locking plate (67) against theft with 4 screws (○).



## 7.1.2 Assembly instructions

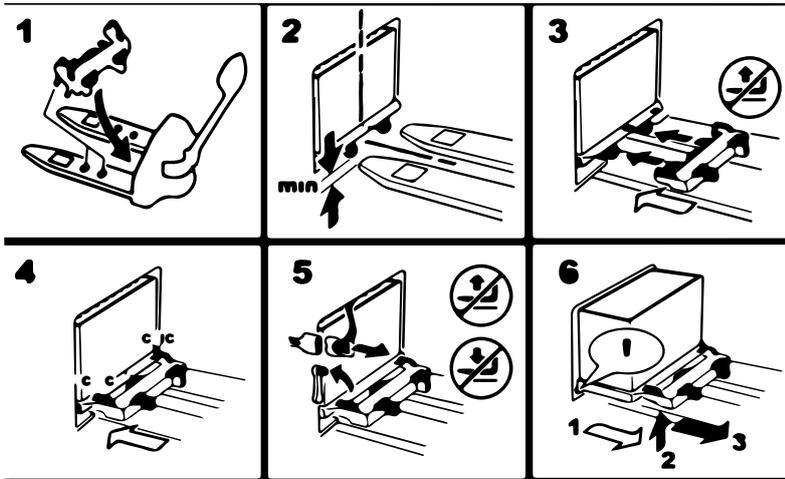
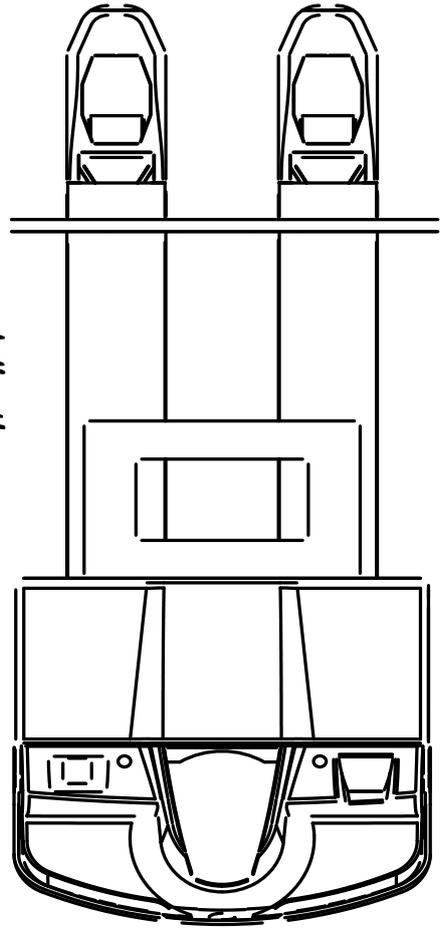
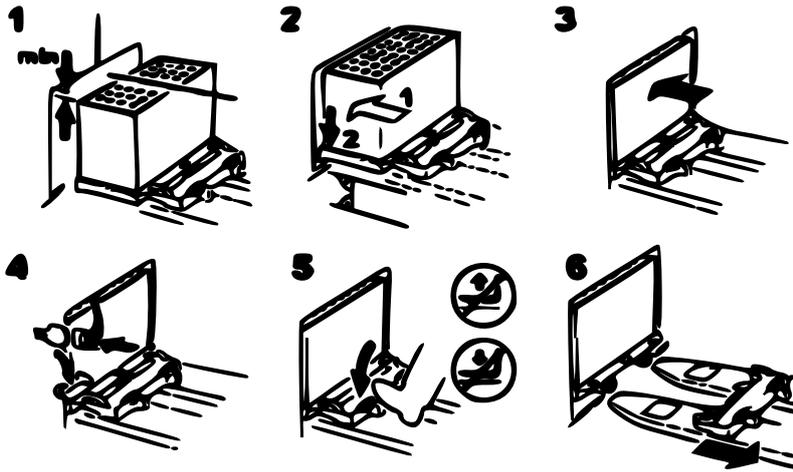
EFG 112 + EFG 213 + EFG 215



### 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 hand pallet truck and "SnapFit" battery holder

### **⚠ CAUTION!**

#### Trapping hazard

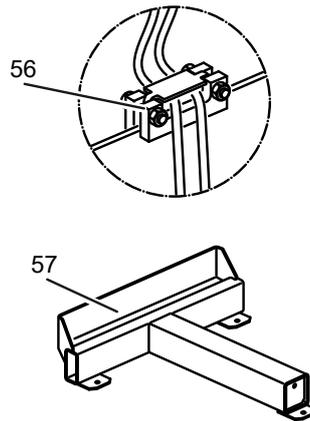
Trapping hazard when replacing the battery.

- ▶ 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 140.
- 



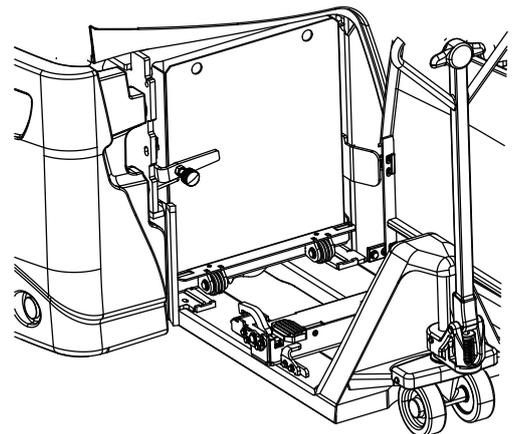
Battery exposed – see page 73.

##### Tools and Material Required

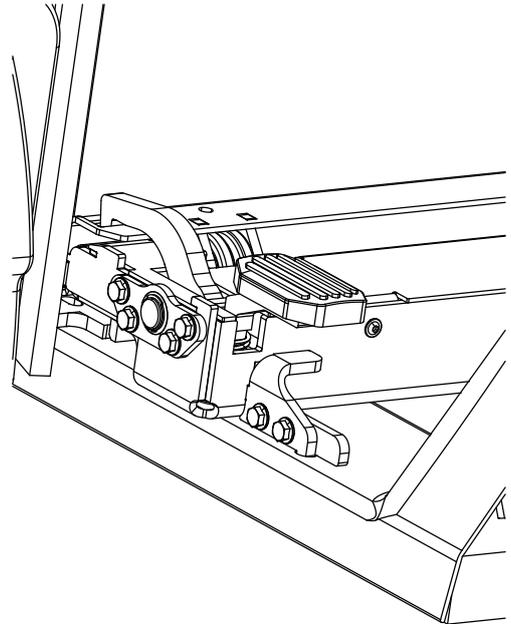
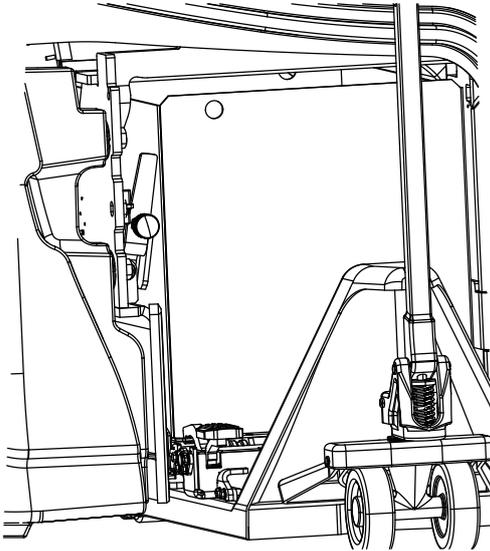
- Battery trolley with four wheels
- Battery with cable guard (56) (○)
- Hand pallet truck with SnapFit battery holder
- Charging station designed for the battery type (57) (○)

##### Procedure

- Close the safety catches (58).
  - To do this, press the pedals (59).
- Fully lower the hand pallet truck.
- Move the hand pallet truck up to the centre of the battery until Snapfit contacts the truck chassis.



- Raise the forks of the hand pallet truck until the recess is exposed.
- Move the hand pallet truck into the battery compartment until the safety catches lock the battery trolley.
  - Check that both safety catches (58) are firmly engaged in the battery trolley.
- Open the battery latch (62). Raise the hand pallet truck approx. 20 mm until the battery can be pulled clear of the battery compartment.



## NOTICE

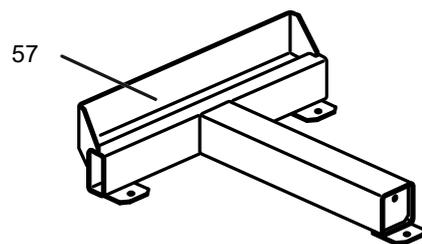
### Risk of material damage

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.
- ▶ When lifting and removing the battery, make sure that the battery cable does not jam between the chassis and the battery tray.

- Remove the battery.
- Bring the battery to the charging station for charging.
- Place the battery carefully onto the charging station (57).

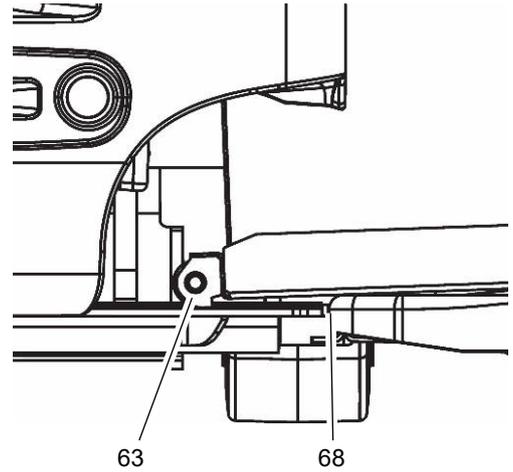
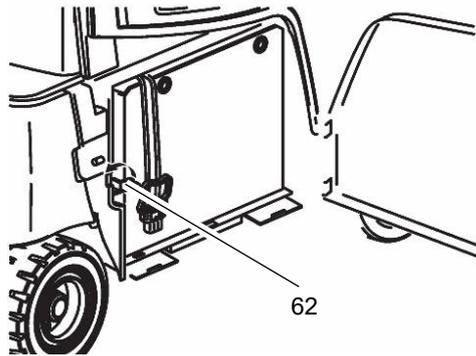
*The battery is now removed and positioned securely for charging.*



## Installing the battery

### Procedure

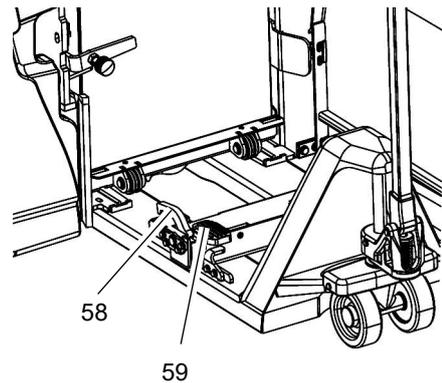
- Move the hand pallet truck and battery to the truck.
- Raise and move the hand pallet truck into the battery compartment until the fork tips contact the truck chassis.
- Deposit the battery trolley with the rollers (63) on the base of the truck.
- Lower the forks of the hand pallet truck until the battery is horizontal.
- Insert the battery in the truck.
- Close the battery latch (62).
- Lower the hand pallet truck.
- Undo the safety



catches (58).

- To do this, press the pedals (59).
- Move the hand pallet truck away from the truck.
- Close the battery door.

*The battery is now inserted.*



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

### ⚠ 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.

### ⚠ WARNING!

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

#### **Battery Removal and Installation**

##### *Requirements*

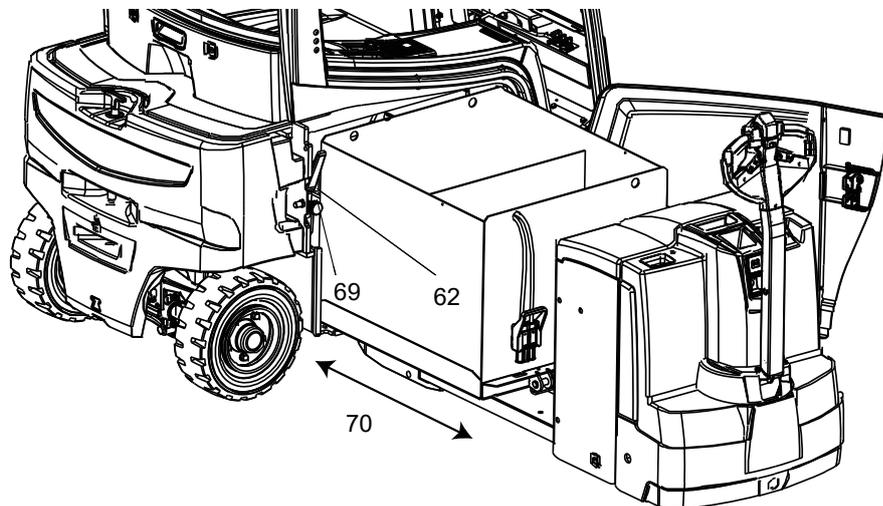
- Park the truck securely, see page 140.
- Battery exposed, see page 73.
- Battery disconnected.

##### *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 (70) 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 (69).
- Undo the battery latch (62).
- Remove the battery for maintenance.

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



Battery assembly is the reverse order.

## 7.4 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.

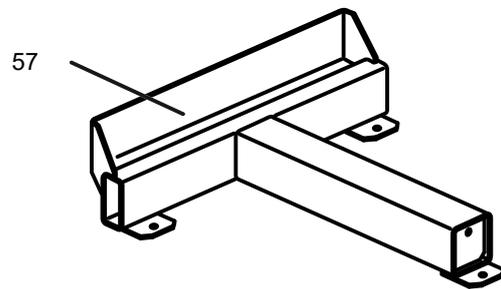
#### **Battery removal and installation**

##### *Requirements*

- Truck parked securely – see page 140.
- Battery exposed – see page 73.
- Battery disconnected.
- Battery latch released.

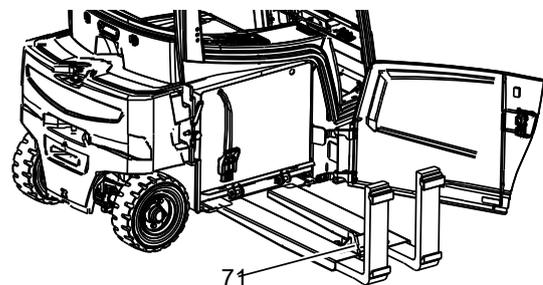
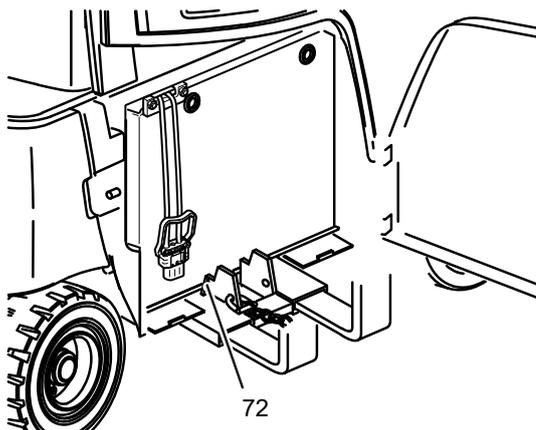
##### *Tools and Material Required*

- 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
- Battery with battery cable through crane eye
- Charging station designed for the battery type (57) (○)



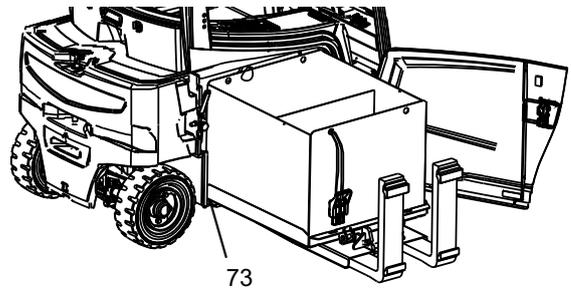
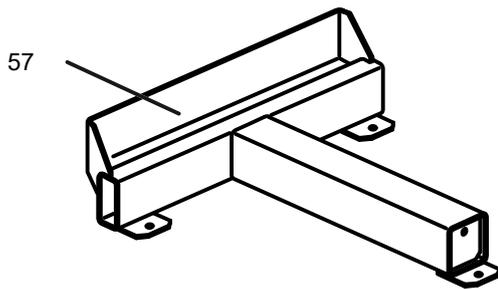
##### *Procedure*

- Place the fork shoe onto the forks of a second truck and secure it to the fork carriage with a chain (71).
- Tilt the mast forward.
- 



- Move the fork shoe up to the stop (72) underneath the battery.
- Raise the fork carriage until the battery is resting on the forks.

- Pull out the battery as far as the stop (73) 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 (57).

*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.

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

### ⚠ 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.

### ⚠ WARNING!

After inserting the battery close the battery lock.

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

##### *Requirements*

- Park the truck securely, see page 140.
- Battery exposed, see page 73.
- Battery disconnected.
- Battery lock released.

##### *Tools and Material Required*

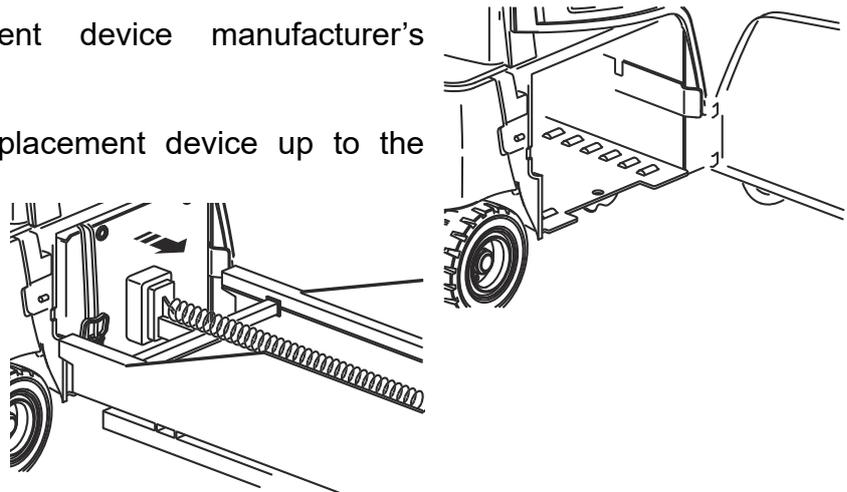
- External roller guided replacement device

##### *Procedure*

- ➔ Note the replacement device manufacturer's instructions.

Bring the external replacement device up to the truck.

- Pull the battery out 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.

## 7.6 Removing or installing the battery using a clip-in battery door

### **⚠ CAUTION!**

#### **Trapping hazard**

Trapping hazard when removing and installing the battery door.

- ▶ When removing and installing the battery door do not put your hands between the door and the chassis.
- ▶ Wear safety shoes.

→ Only for trucks with a roller conveyor.

#### **Battery door removal**

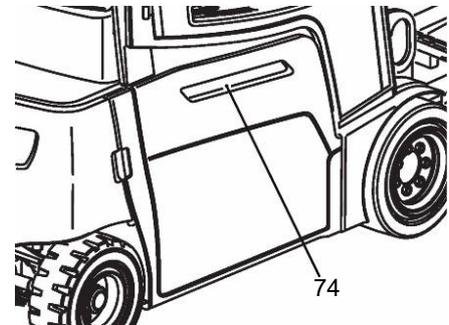
##### *Requirements*

- Park the truck securely, see page 140.
- Battery disconnected.

##### *Procedure*

- Open the battery door by moving the handle (74) up.
- Lift the battery door slightly to the outside.
- Pull the battery door up
- Put the battery door down securely.

*The battery door is now removed.*



#### **Battery door assembly**

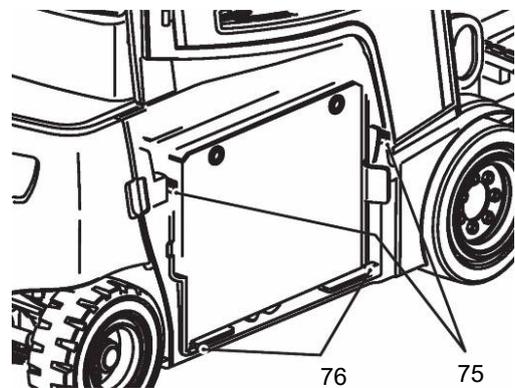
##### *Requirements*

- Park the truck securely, see page 140.
- Battery disconnected.

##### *Procedure*

- Insert the battery door in the receptacles (76).
- Push the battery door onto the truck.
- Push the battery door down and engage it in the bracket (75).

*The battery door is now assembled.*



→ There will be no travel release if the battery door is not closed properly. An information message (1915) appears on the display.

## 8 Charging the battery

### 8.1 Charging lead-acid batteries

#### **⚠ 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.
-

## 8.1.1 Charging the battery with a stationary battery charger

### **⚠ 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.

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

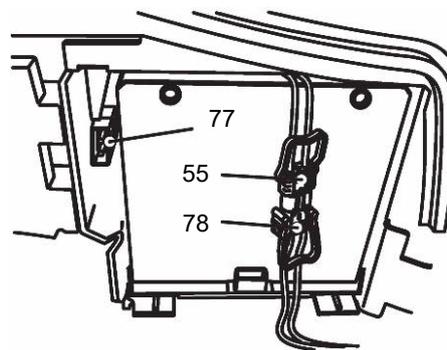
#### *Requirements*

- Truck parked securely, see page 140.
- Battery exposed, see page 73.
- Battery charger switched off.
- Disconnect the battery connector (55) from the truck connector (77).

#### *Procedure*

- Connect the battery connector (55) to the charger cable (78) of the stationary battery charger and switch on the battery charger.

*The battery is charged.*



## 8.1.2 Charging the Battery with a Comfort Charger Socket (○)

### ⚠ WARNING!

#### Risk of use of unsuitable battery charger on trucks with comfort charging socket

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 personal injury and material damage.

- ▶ The battery must 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.

## Charging

### ⚠ WARNING!

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

- ▶ Always check the fans each time you charge.

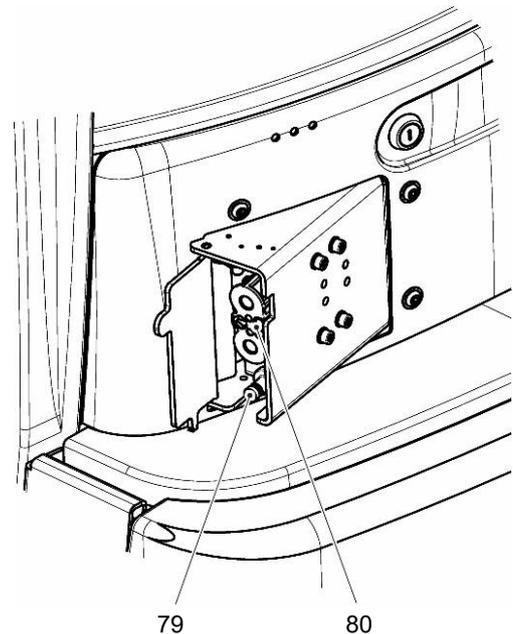
#### Requirements

- Truck parked securely – see page 140.

#### Procedure

- Connect the charger cable of the battery charging station to the charger socket (80).

- ➔ Test the fan. If the fan is not working, open the battery door at least 200 mm to ventilate the battery compartment.



- Depending on the battery, you may need to attach the water connection (79) to the battery charging station.
  - Switch on the battery charging station and charge the battery in accordance with the battery and charging station manufacturers' instructions.
- 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 max. charge current of 160 A/300 A (according to the marking).
- The truck is unable to move while the cover for the comfort charging socket is open. The battery door or battery latch open symbol illuminates on the display unit.

*Battery is charged.*

## 8.2 Charging lithium-ion batteries (○)

### **⚠ WARNING!**

#### **Risk of use of unsuitable battery charger on trucks with comfort charging socket**

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 personal injury and material damage.

- ▶ The battery must 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.

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

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

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

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

- Observe the battery charger operating instructions.

### **NOTICE**

#### **Intermediate charging**

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

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

## 8.2.1 Charging the battery by means of the comfort charger socket (○) on the truck

### Charging

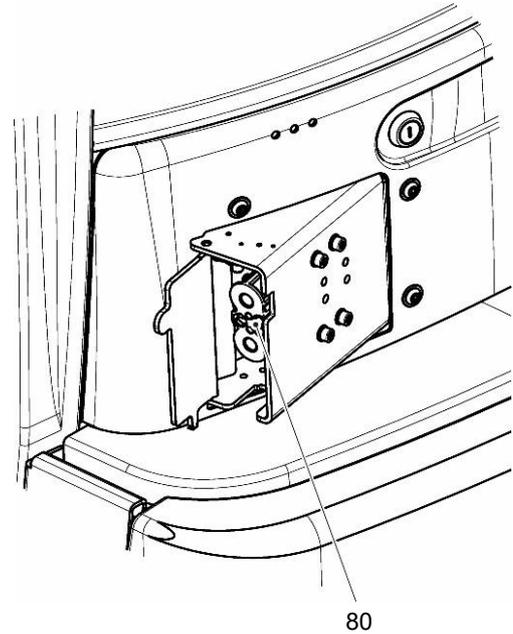
#### Requirements

- Truck parked securely, see page 140.

#### Procedure

- Connect the charger cable of the battery charger station to the charger socket (80).
- 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.

- The truck is unable to move while the cover for the comfort charging socket is open. The battery door or battery latch open symbol illuminates on the display unit.
- Regular charging when the truck is decommissioned: To charge the battery, insert the truck control line into the connection on the battery tray. After charging the battery, remove the truck control line from the connection on the battery tray.



# 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.

### **Unauthorised use of 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.

### **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.
-

## **⚠ CAUTION!**

### **Reduced headroom can cause injuries**

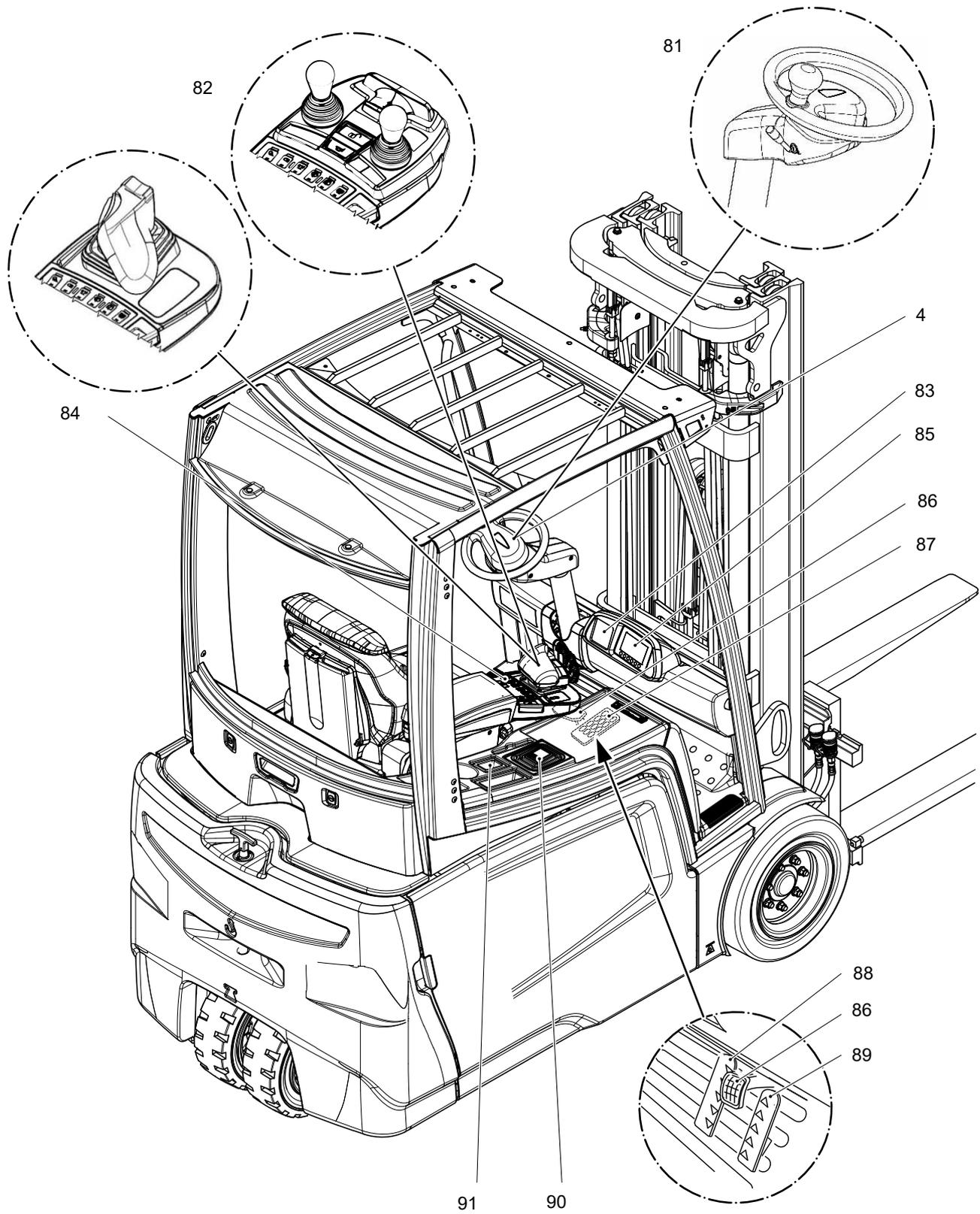
Trucks with reduced headroom are equipped with a warning label within the operator's line of sight.

- ▶ The max. recommended body size indicated on this warning sign must be observed.
  - ▶ The headroom is also reduced when you wear a protective helmet.
- 

- ➔ At least 40 mm of headroom must be maintained between the head and the roof window when the seat is correctly adjusted.
- ➔ A roof protective grille (○) is available for more demanding applications, e.g. when working at great lift heights or when working 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.

## 2 Displays and Controls

### 2.1 Controls



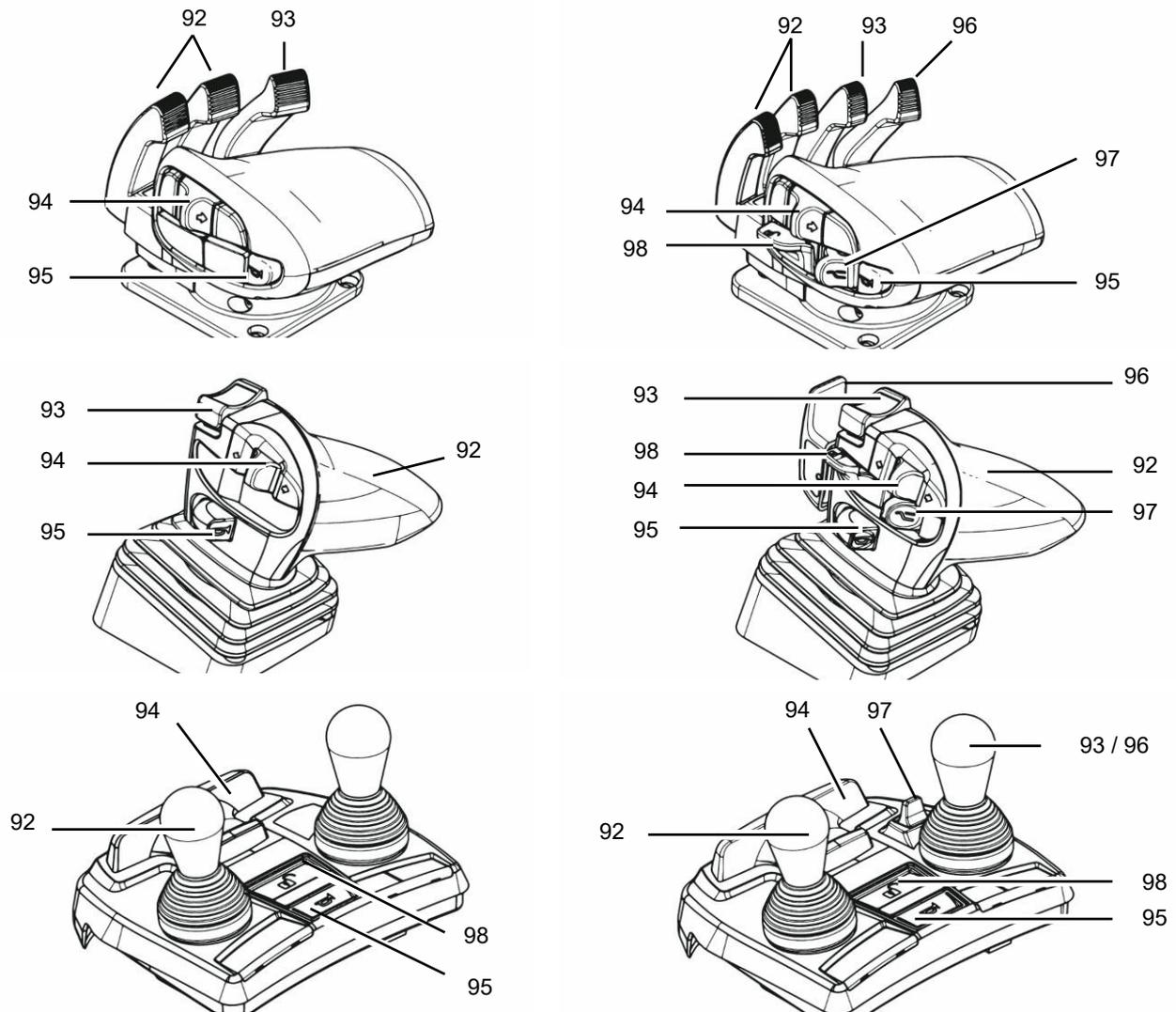
Item	Control/display		Function
4	Steering wheel	●	Steering the industrial truck.
82	soloPILOT	●	Controls the following functions: – Fwd/rev. travel direction – Load handler lift/lower – Mast forward/reverse tilt – "Horn" button – Side shift left/right (○) – Auxiliary hydraulics (○)
	multiPILOT	○	
	duoPILOT	○	
81	Flashing lever	●	Flashes in the required travel direction.
84	Armrest control panel	●	Used to switch optional electrical equipment on and off.
83	Key switch	●	Switches control current on and off. Removing the key prevents the truck from being switched on by unauthorised personnel.
	Jungheinrich Fleet Management System*	○	Switches the truck on and off.
	Keypad		Switches the truck on. Switch off via the control panel.
	Transponder reader		
85	Dashboard control panel	●	Displays the battery capacity, service hours, errors, key warning indicators, wheel position, travel direction and the operation of options (○).
86	Brake pedal	●	Provides infinitely variable braking control.
87	Accelerator pedal	●	Provides infinitely variable travel speed control
88	"Reverse" accelerator twin pedal control	○	The truck travels backwards when the accelerator pedal is applied. Provides infinitely variable travel speed.
89	"Forwards" accelerator twin pedal control	○	The truck travels forwards when the accelerator pedal is applied. Provides infinitely variable travel speed.
91	Side-compartment control panel	●	Used to switch optional electrical equipment on and off.
90	Emergency disconnect switch	●	Disconnects the main power supply; all truck operations are disabled.



\*If equipped with a Jungheinrich fleet management component, see the "Jungheinrich fleet management system" operating instructions.

## 2.2 Pilots

Item	Control / Display		Function
92	Basic hydraulic functions lever	●	Lever for operating the basic lift/tilt hydraulic functions.
93	Sideshifter/auxiliary hydraulics 1 optional button / lever	●	Sideshifter or auxiliary hydraulics 1 button
94	Travel direction switch (not available with dual pedal control)	●	Selects travel direction / neutral position.
95	"Horn" button	●	Activates an audible warning.
96	Fork positioner / auxiliary hydraulics 2 button /lever - optional	○	Fork positioner or auxiliary hydraulics 2 button
97	Toggle switch	○	Switches to the second function of the respective lever / button
98	Acknowledgement key	○	Additional operating means for hydraulic functions requiring acknowledgement

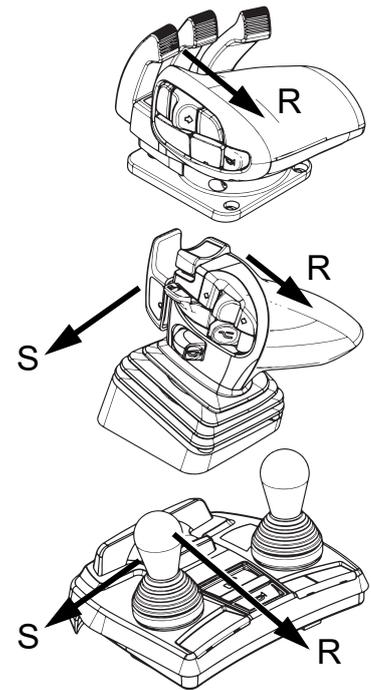


## 2.3 Function symbols for the Pilots

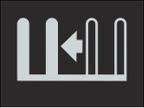
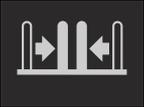
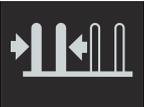
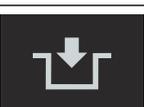
The pictogram shows the direction of movement that is executed when the operator pulls the lever in direction (R). The counter-movement of the work function is achieved by the operator pushing the lever accordingly.

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.



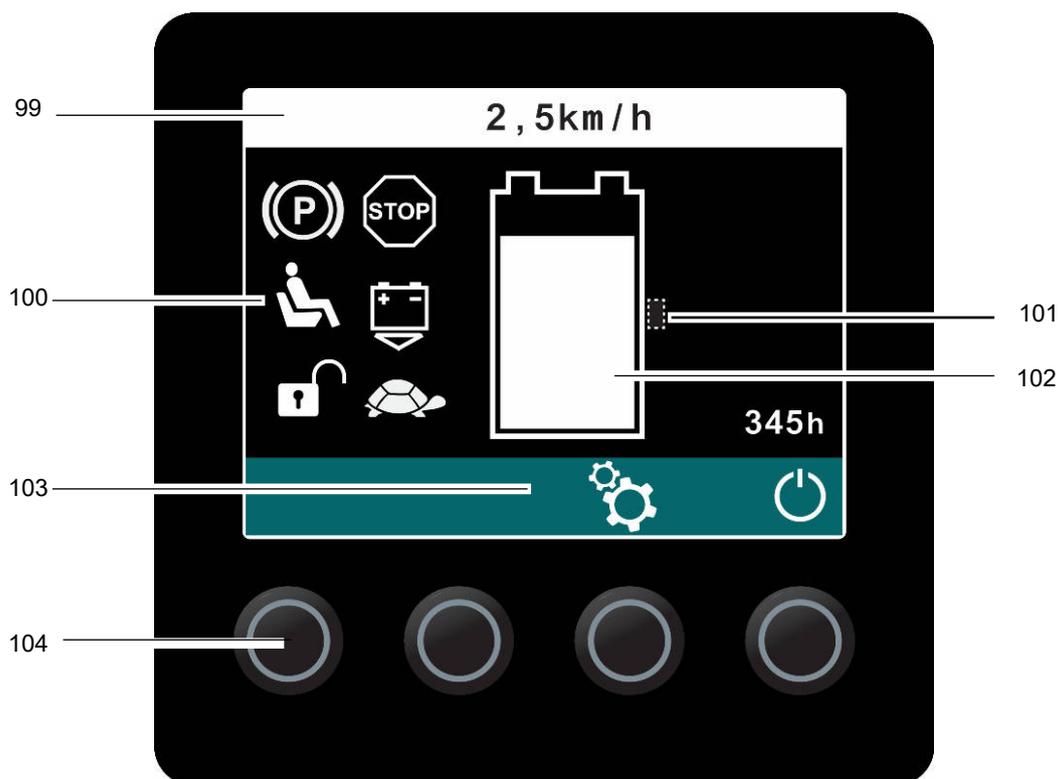
Symbol	Meaning
	Marking: Second function of a hydraulic function → Selection via toggle function
	Toggle function → Switch between main functions and second functions for hydraulic functions
	Marking: Hydraulic function requiring acknowledgement
	Acknowledgement button → Hydraulic function requiring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

Symbol	Meaning
	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
	Lock
	Crane

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

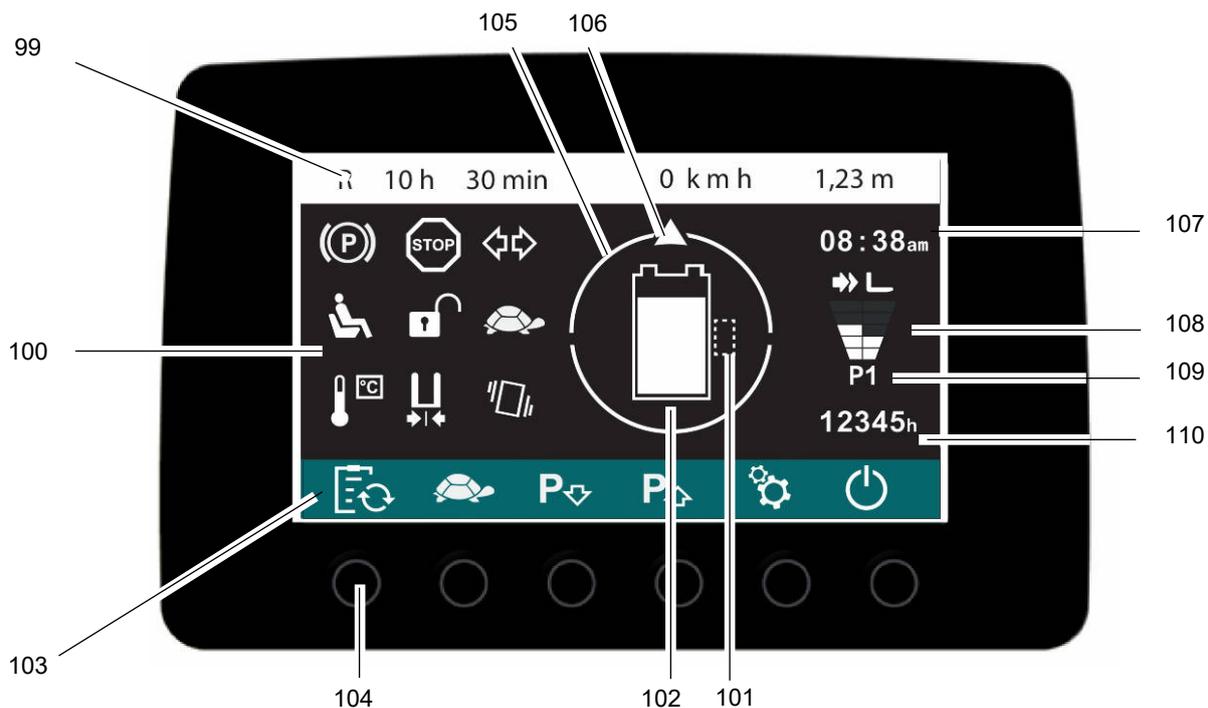
## 2.4 Control panel with display unit

### 2.4.1 2-Inch Display



Item	Control/display	Function
99	Information line	Displays event messages and speed
100	Symbol field	Displays the icons see page 110.
101	Battery Type	Empty = standard battery; 1 = Dry battery
102	Battery capacity display	Battery discharge status.
103	Button allocation	see page 108.
104	Buttons	Selection buttons for the functions shown above them.

## 2.4.2 4 Inch Display (○)



Item	Control/display	Function
99	Information line	Displays speed, event messages, residual runtime and optional information such as lift height, load weight.
100	Symbol field	Displays the icons see page 110.
101	Battery Type	Empty = standard battery; 1 = Dry battery
102	Battery capacity display	Battery discharge status.
103	Button allocation	see page 108.
104	Buttons	Selection buttons for the functions shown above them.
105	Direction presetting	Shows the travel direction selected.
106	Arrow to display the travel and steering directions	Shows the current travel direction of the truck and the current wheel position in 15° segments.
107	Time	Displays the time.
108	Power display	Shows the travel and lifting performance of the travel program selected.
109	Operating program	Shows the operating program selected.
110	Service hours	Shows the truck's service hours.

## 2.5 Button allocation of the display

Symbol	Meaning
	Information field toggle: Allows the information displayed in the information field to be changed.
	Slow travel: Switches slow travel on and off.
	Operating program down: To switch the operating program down.
	Operating program up: To switch the operating program up.
	Settings: Change to setting mode. Set time and access authorisations (optional).
	Switch off (optional): Allows the truck to be switched off (if option available).

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

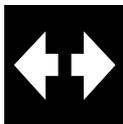
Symbol	Meaning
	Back: Cancels the current procedure and returns to the previous menu.
	Log-in history: Displays the chronological log-in history
	Change set-up code: To change the set-up code and to activate the keypad or the transponder reader.
	Edit access code / transponder: To add or delete access 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

## 2.6 Symbols in the display

Any number of pictograms can be displayed in the pictogram field (100). Which pictograms are shown in the pictogram field depends on the operating and truck status.

Symbol	Meaning	Colour	Function
	Indicator (warning indicator)	Green	Indicator and warning indicator active
	Slow travel	Green	Slow travel activated by operator
		Yellow	Slow travel activated by truck
		Red	Emergency recovery mode active (travel speed 2 km/h)
	Service note	Yellow	Maintenance due
		Red	Safety inspection due
	Warning	Yellow	Operating error
		Red	Truck malfunction
	Stop notice	Red	Functions deactivated due to truck malfunction
	Impact display	Yellow	Medium impact
		Red	Severe impact
	Overtemperature	Red	Overtemperature detected
	Regenerative brake fault	Red	Regenerative brake is not operational Special attention when on slopes: Do not travel faster than crawl speed.

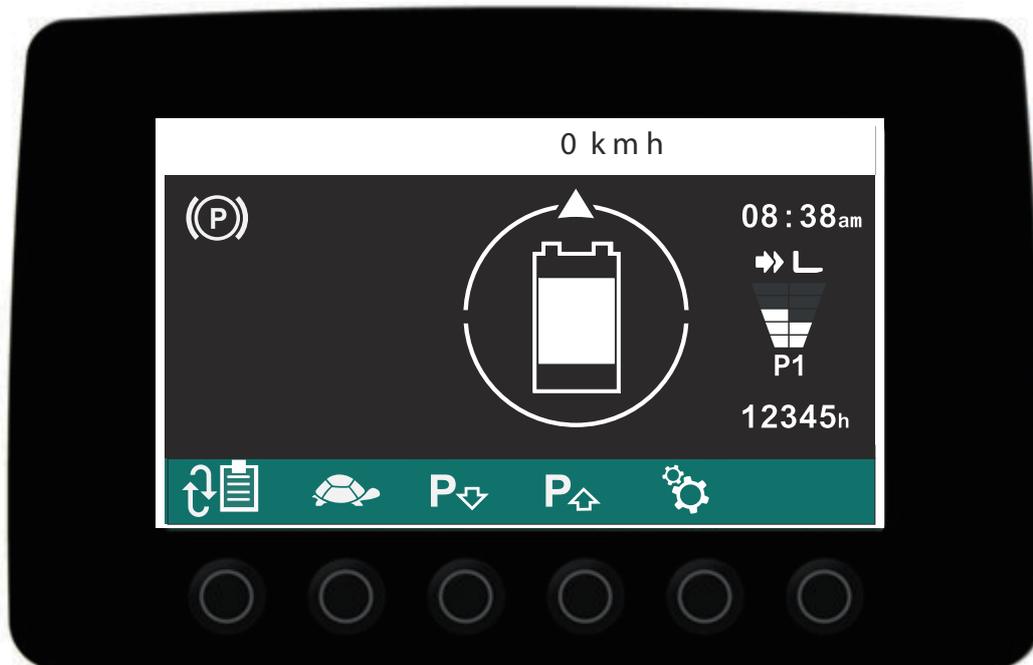
Symbol	Meaning	Colour	Function
	Automatic parking brake	Green	Automatic parking brake active Comfort feature, displayed when the automatic parking brake indicator lights up. Truck prevented from rolling away but not parked securely. The automatic parking brake is automatically activated a set time (0 to 60 sec) after the truck stops. The factory setting for this is 30 sec. The parking brake releases automatically when the accelerator pedal is applied.
	Manual parking brake	Red	Manual parking brake engaged
	Cabin door open	Yellow	Door not closed correctly
	Seat switch	Yellow	Seat switch not applied or seat switch applied for more than 6 hours uninterrupted
		Red	Error on seat switch
	Seat belt lock control	Yellow	Seat belt lock not engaged
		Red	Incorrect activation sequence of seat switch and belt lock
	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
	Side shift centred	Green	Side shift centred

Symbol	Meaning	Colour	Function
	Lift limit switch	Green	Lift cut-off overridden
		Yellow	Lift cut-off initiated
	Battery latch / battery door	Yellow	Battery latch/door open
	Battery acid level	Red	Battery acid level low

**Special symbols on the display unit when equipped with lithium-ion battery (○)**

Symbol	Meaning	Colour	Function
	Battery indicator, low residual capacity	Yellow	The battery must be charged soon.
		Red	The battery must be charged immediately.
	Battery excess temperature	Yellow	Overtemperature detected. Lifting, lowering and travel functions reduced
		Red	Overtemperature detected. Lifting, lowering and travel functions deactivated.
	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.
	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 inclines: do not travel faster than crawl speed.

## 2.7 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.*

## 2.8 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 90.
- 

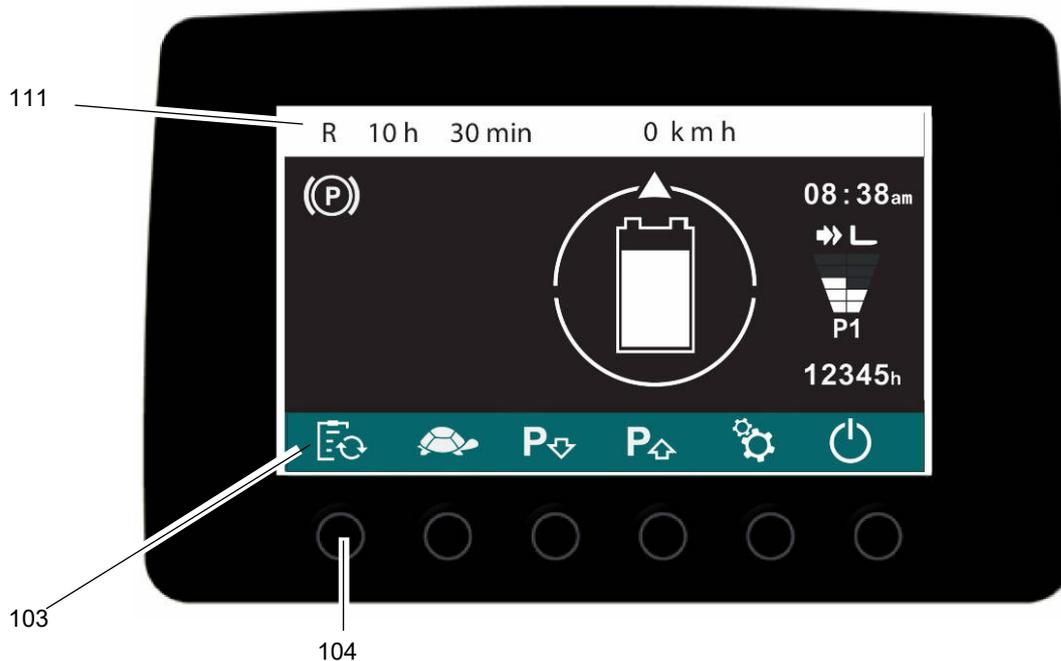
The battery charge status is shown on the truck display via a battery symbol (102). When a battery is discharged to the permissible discharge level, the battery symbol (102) is displayed empty.

## 2.9 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.

## 2.10 Residual time display



### Setting the residual time display

The residual time display (111) is switched on and off via the display toggle button (103/104).

## 2.11 Operating Programs

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

Starting from operating program 1 (limited acceleration and speed together with sensitive application of the operating functions), the performance levels increase to program 5 (maximum performance for high throughput performance).

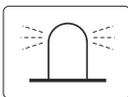
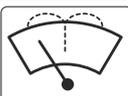
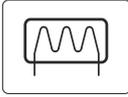
Operating program	Travel speed	Lift speed	Behaviour
Operating program 1	Significantly reduced	Extremely reduced	Very slow
Operating program 2	Reduced	Significantly reduced	Slow
Operating program 3 "efficiency plus"	Significantly reduced	Maximum	Consumption-optimised
Operating program 4	Maximum	Slightly reduced	Fast
Operating program 5	Maximum	Maximum	Maximum

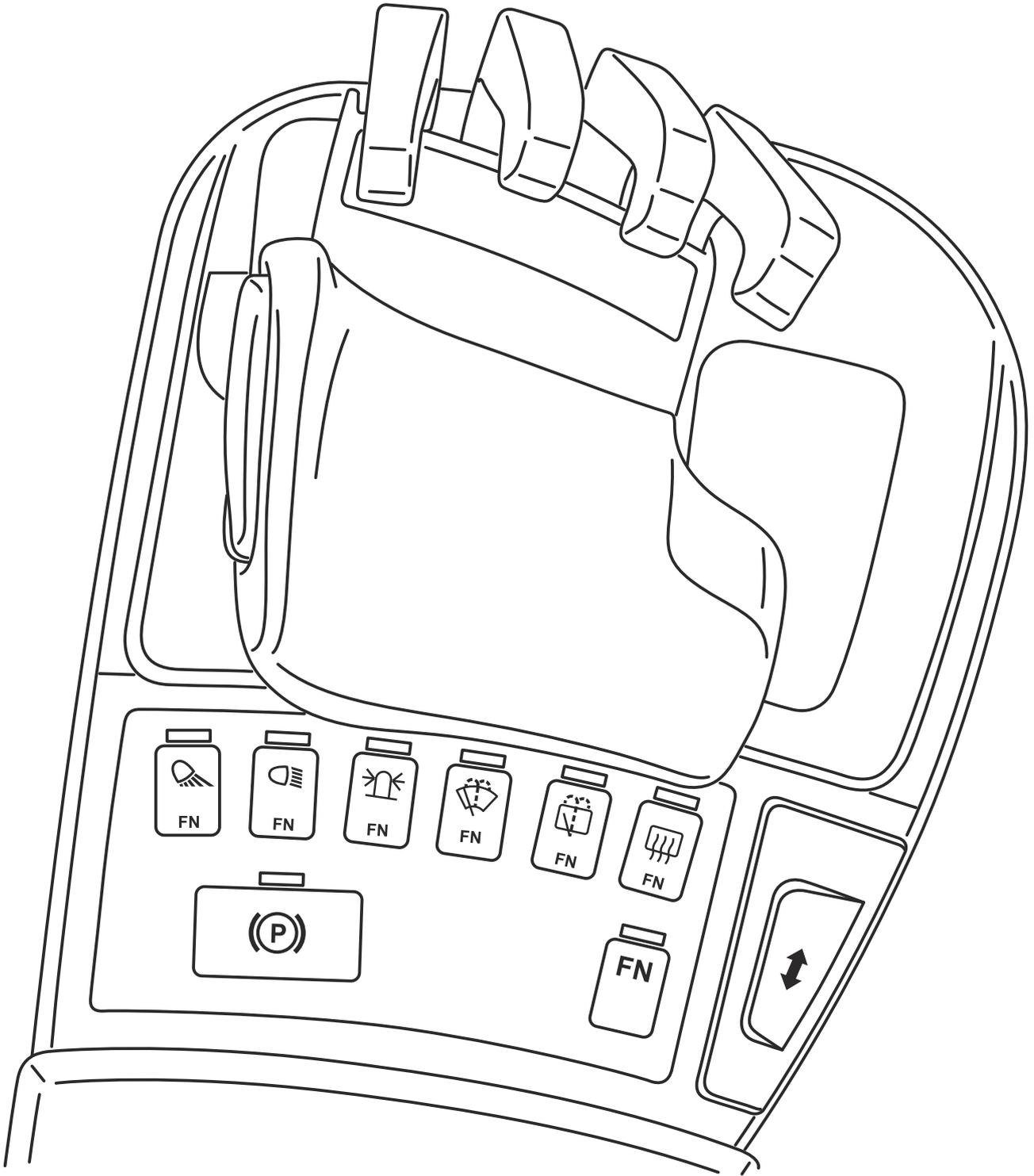
If necessary, the operating programs can also be adapted or restricted to suit the customer. Contact the manufacturer's customer service department.

## 2.12 Hourmeter

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

## 2.13 Armrest Control Panel Switch

Symbol	Function
	<p>Work lights</p> <ul style="list-style-type: none"> <li>– Brief press &gt; switch on/switch off</li> <li>– Two brief presses &gt; high beam / normal operation</li> </ul>
	<p>Dimmable work lights</p> <ul style="list-style-type: none"> <li>– Brief press &gt; switch on/switch off</li> <li>– Press and hold &gt; dim brightness</li> <li>– Two brief presses &gt; high beam / normal operation</li> </ul>
	<p>Travel light/auxiliary spotlights</p> <ul style="list-style-type: none"> <li>– Brief press &gt; switch on/switch off</li> <li>– Press and hold &gt; dim brightness</li> </ul>
	<p>Beacon/strobe light</p>
	<p>Front windscreen wipers</p> <ul style="list-style-type: none"> <li>– 1. press &gt; button flashes green - intermittent</li> <li>– 2. press &gt; button lights up green - continuous operation</li> <li>– 3. press &gt; off</li> <li>– Press and hold &gt; switch on the windscreen washing system</li> </ul>
	<p>Rear windscreen wiper</p> <ul style="list-style-type: none"> <li>– 1. press &gt; button flashes green - intermittent</li> <li>– 2. press &gt; button lights up green - continuous operation</li> <li>– 3. press &gt; off</li> <li>– Press and hold &gt; switch on the windscreen washing system</li> </ul>
	<p>Rear windscreen heater</p>
	<p>Parking brake button Secure truck parking</p>
<b>FN</b>	<p>FN button Press the FN button. Assignment of buttons display changes to auxiliary options – see page 229.</p>



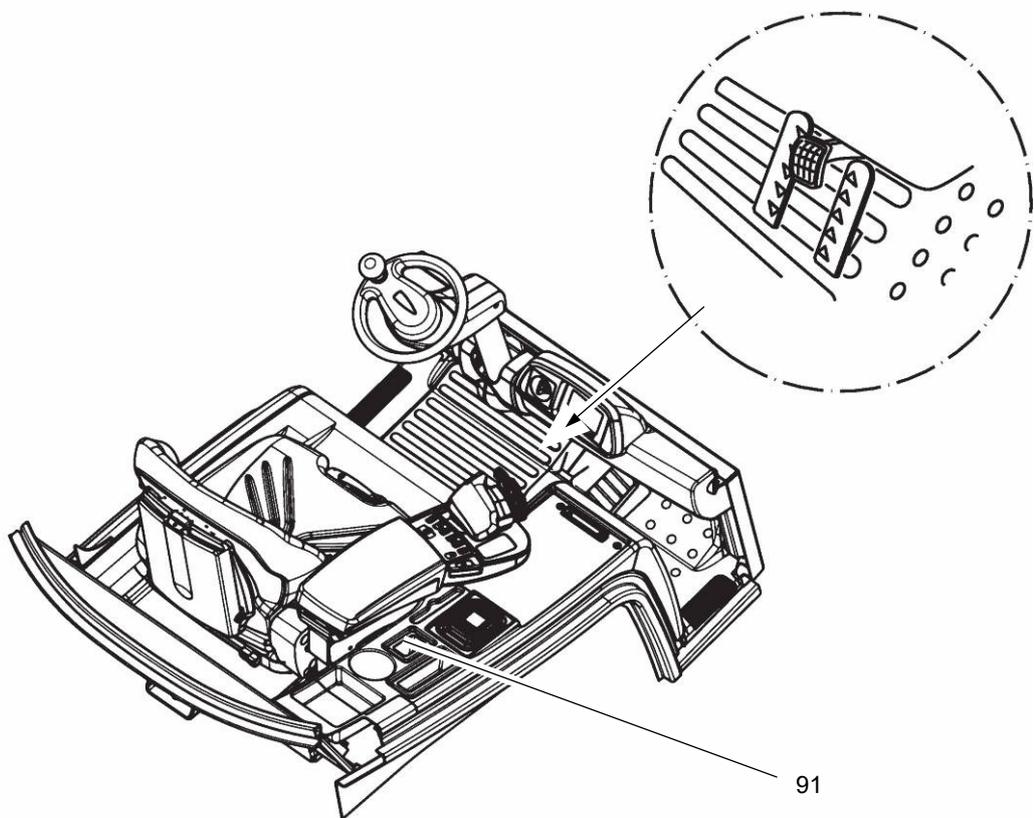
**NOTICE**

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

## 2.14 Side compartment control panel switch (○)

These switches are located in the side control panel (91).

	Function
	Parking light
	Warning indicator



## 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.

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

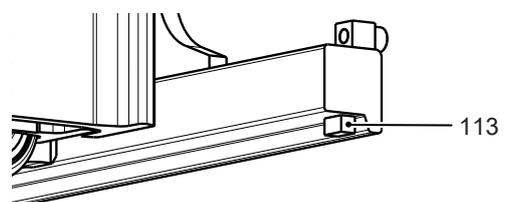
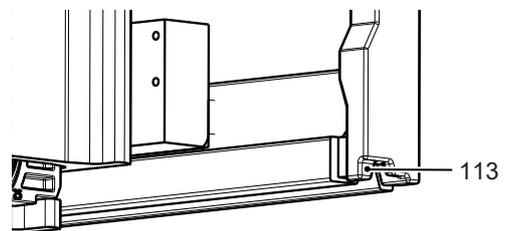
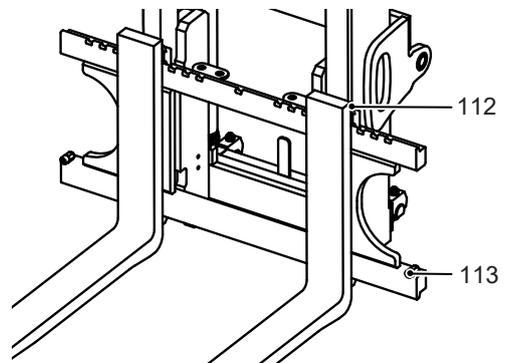
##### **Checks before daily operation**

###### *Procedure*

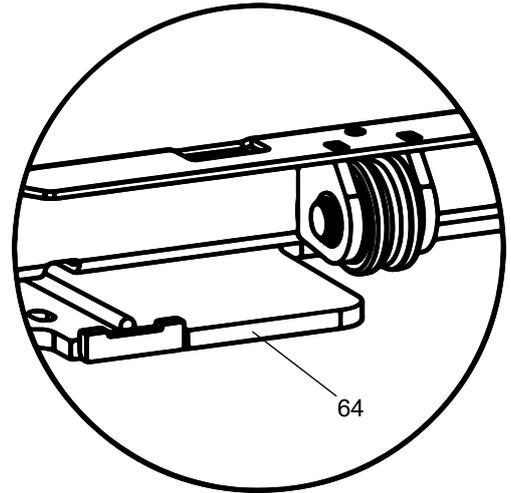
- Visually inspect the entire truck (in particular wheels, wheel bolts and load handler) for damage.
- Visually inspect the visible area of the hydraulic system for damage and leaks.
- Check that the load chains are evenly tensioned.
- Check the fork stop (112) and fork retaining mechanism (113).

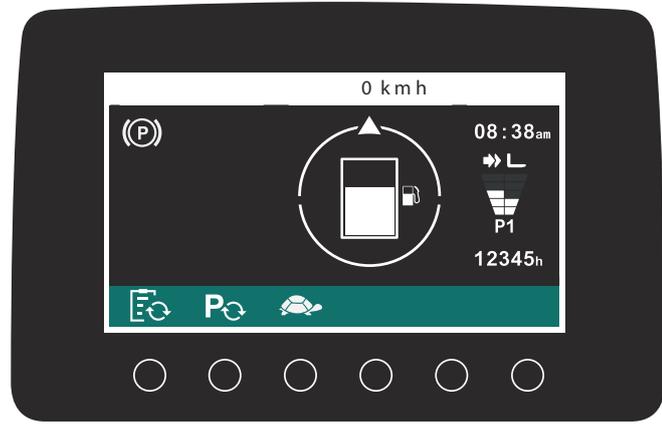
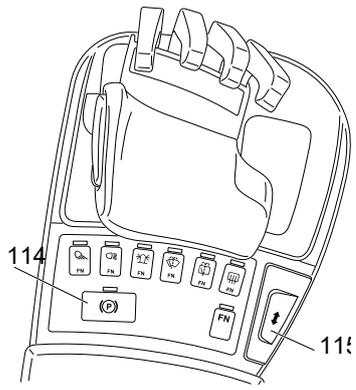
- Depending on the fork carriage, the fork arms are secured (113) with retaining bolts (85 Nm) or fixed stops.

- 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 (64) on the left and right of the battery compartment for damage.
- Visually check antistatic strap (○) for integrity and cleanliness.
- Visually inspect the roof window and the adhesive bonding on the underside of the roof window for cracks or 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.
- 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 310.
- Check that the emergency hammer (○) is present – see page 284.
- 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 horn, and where applicable, the reversing buzzer (○).
- Test the lift/lower, tilt hydraulic functions 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 131.
- Check the restraint system.
- Check the functionality of the restraint systems via the display unit.
  - Belt lock control symbol (see page 110) lights up when the belt is not locked.
  - Cabin door monitoring symbol (see page 110) 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 (131) lit red) and the truck is idling, by pressing it several times.
- Test the service brake and parking brake button (114): Drive off carefully and test the effectiveness of the brake pedal, see page 149.
- 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).





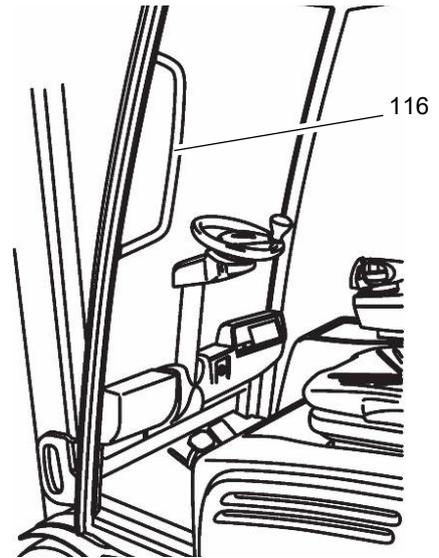
## 3.2 Entering or exiting

### Requirements

- Truck stationary.

### Procedure

- Cab door open (if applicable).
- To enter and exit the cab, hold onto the handle (116). Always face the truck when entering and exiting.



- Always use the entry aid (116) provided to climb onto the truck.
- An additional step is provided for the driver position extension (○).

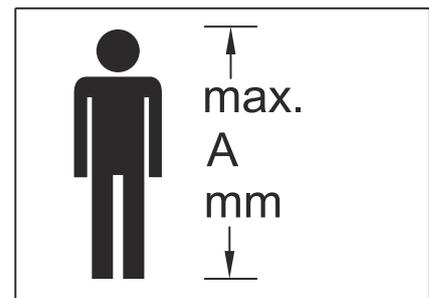
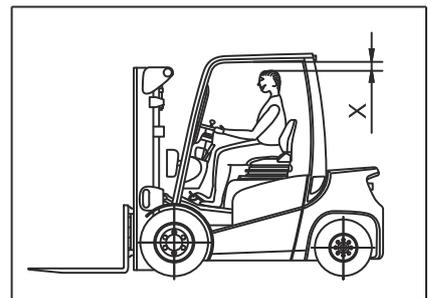
## 3.3 Trucks with reduced headroom (○)

### ⚠ WARNING!

#### An unsuitable workplace can damage your health

Failure to observe the recommended body size 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 operating company must ensure that truck operators do not exceed the maximum body size indicated.
- ▶ The operating company must check that the operators can sit in a normal and upright position without having to strain.



## 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 adjust the individual driver's seat setting before starting up the truck.

▶ Hold the weight setting lever only by the recess, do not reach through underneath the lever.

---

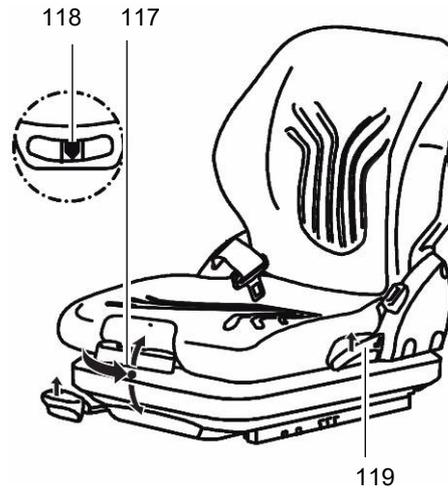
## Setting the driver's weight

### **⚠ 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 (117) as far as it will go in the direction of the arrow.
  - Move the weight setting lever (117) up and down to set the seat to a higher weight.
  - Move the weight setting lever (117) up and 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 (118). 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 (117) 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 window when the seat is correctly adjusted.

#### **Adjusting the backrest**

#### *Procedure*

- Sit on the driver's seat.
- Pull the lever (119) to adjust the backrest.
- Adjust the backrest tilt.
- Release the lever (119) again. The backrest is locked.

*The backrest is now set.*

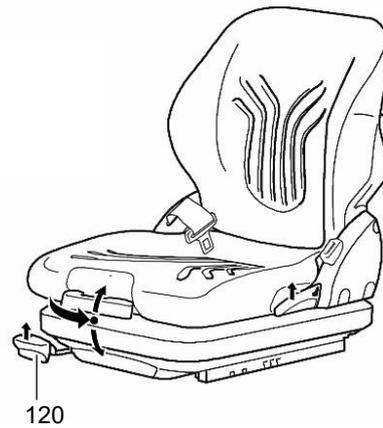
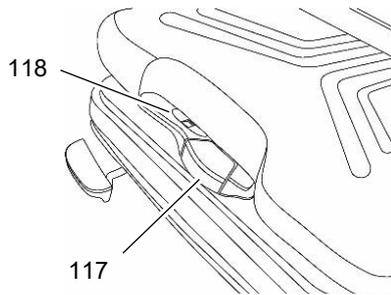
- Hold the weight setting lever (117) only by the recess, never reach through underneath the lever.

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

**Procedure**

- Pull the weight adjustment lever (117) up to set the seat to a higher weight.
- Push the weight adjustment lever (117) down to set the seat to a lower weight.

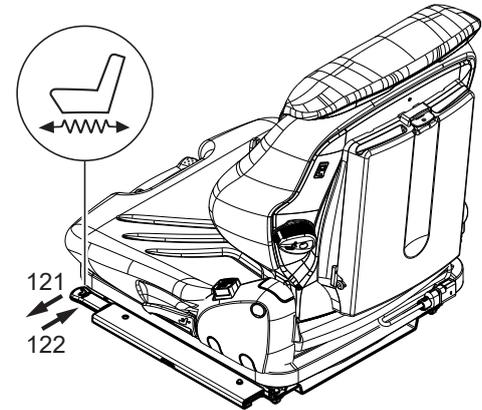
The driver's weight is correct when the arrow is in the middle of the display window (118).



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

**Procedure**

- To activate the fore/aft suspension, pull the locking lever in direction 121.
- To deactivate the fore/aft suspension, push the locking lever in direction 122.



→ 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.

**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 120 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 (120) in position.

The seat position is now correctly set.

## **Adjusting the backrest extension (O)**

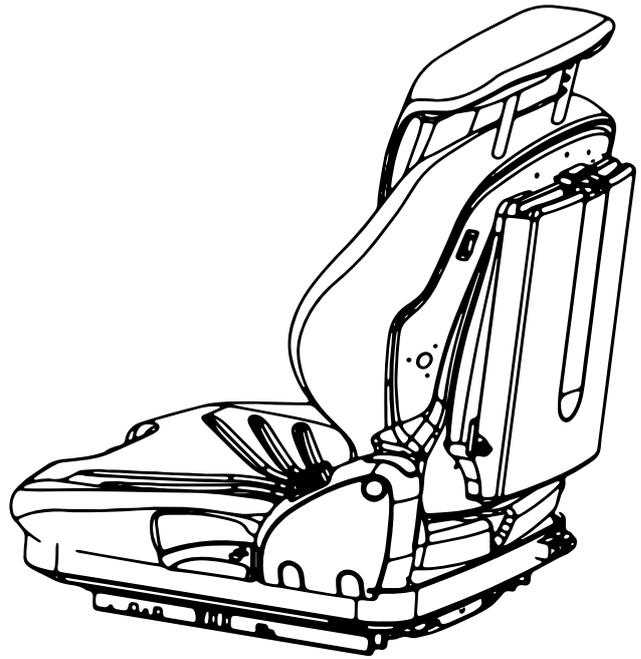
### **⚠ CAUTION!**

#### **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)**

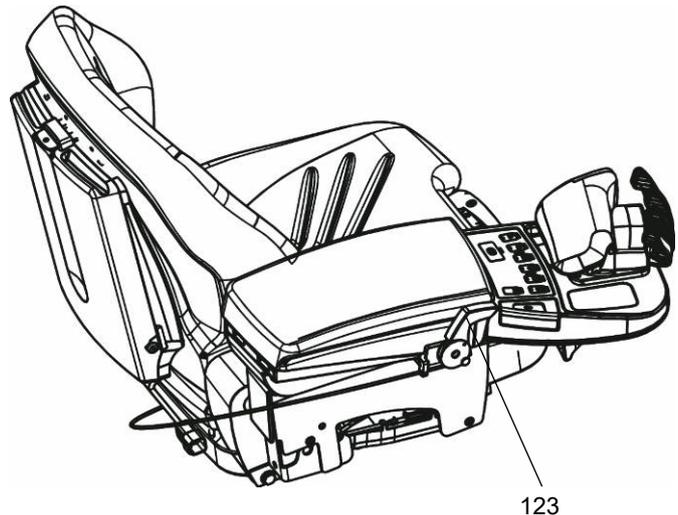
#### *Procedure*

- Pull the locking lever (123) back while simultaneously turning the seat to the required position.
- Allow the lock to engage.

*The swivel seat is adjusted and locked in position.*



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



## **Adjusting the lumbar support (O)**

### *Procedure*

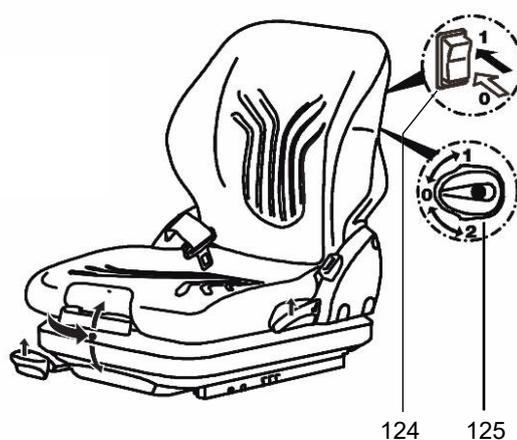
- Turn the hand wheel (125) to the required position.  
Position 0 = no warping in lumbar vertebrae area.  
Position 1 = increasing warping in upper lumbar vertebrae area.  
Position 2 = increasing warping in lower lumbar vertebrae area.

*The lumbar support is now adjusted.*

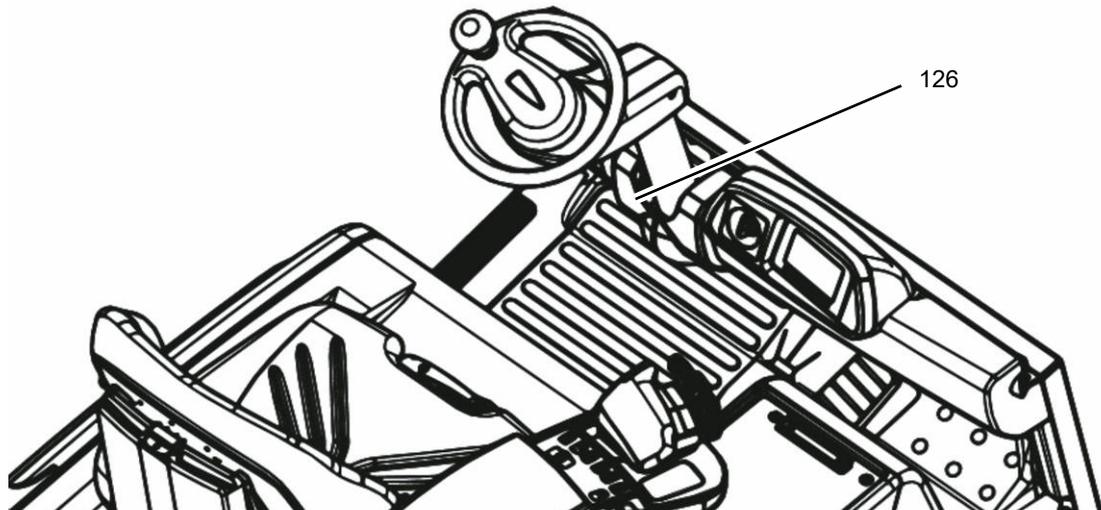
## **Switching the seat heating on and off (O)**

### *Procedure*

- Press the seat heating switch (124).  
Switch setting 1 = Seat heating on.  
Switch setting 0 = Seat heating off.



### 3.4.2 Adjusting the steering column



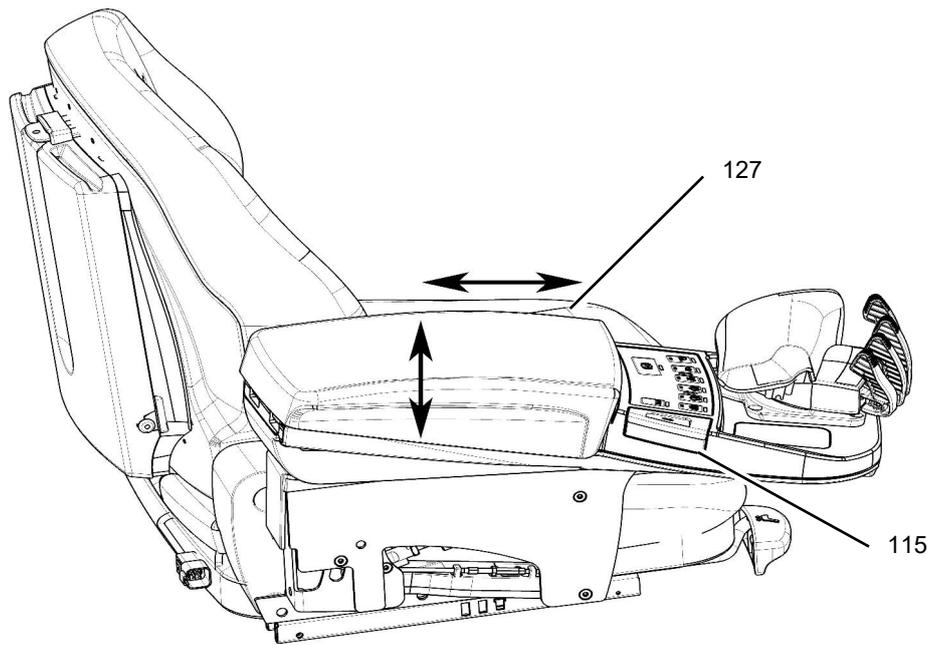
#### ***Adjusting the steering column***

##### *Procedure*

- Release the steering column stop (126).
- Set the steering column to the required position (height and angle).
- Fix the steering column stop (126) in position.

*The steering column is now positioned.*

### 3.4.3 Adjusting the arm rest



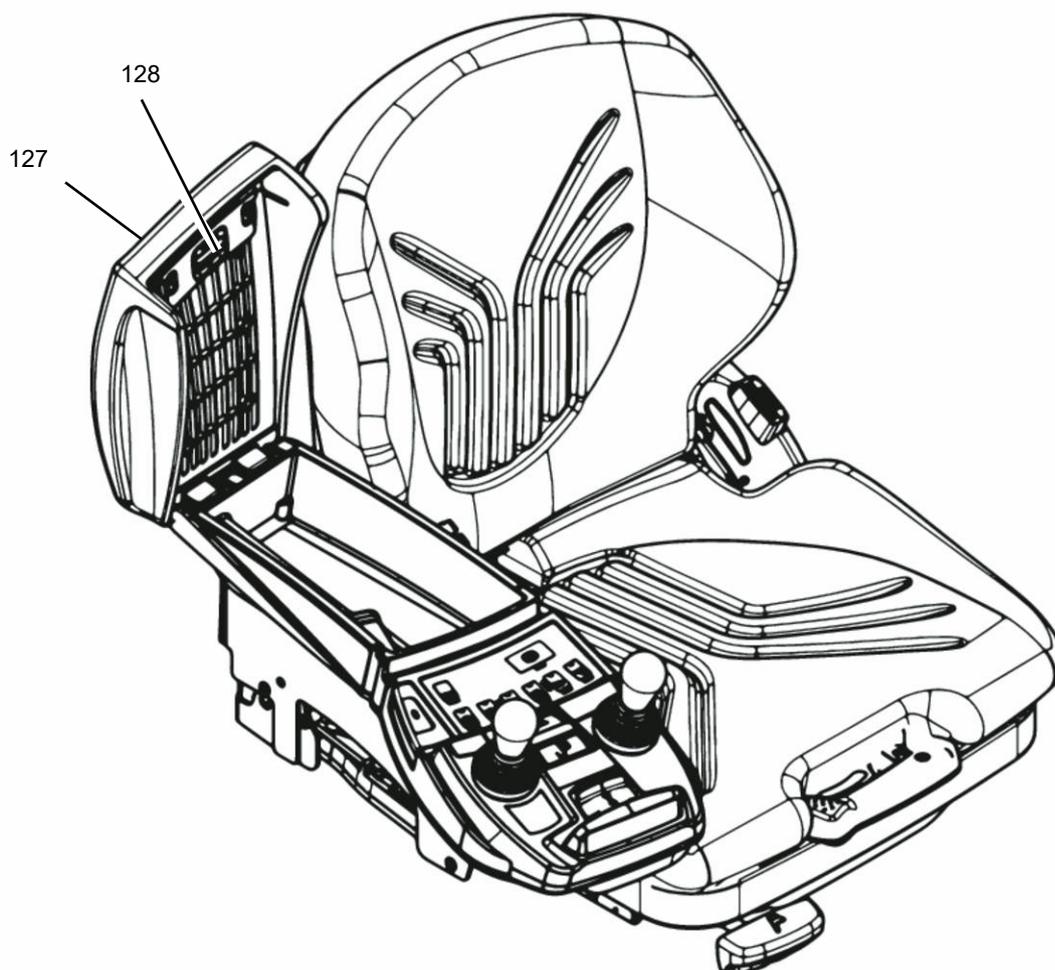
#### ***Adjusting the Armrest***

##### *Procedure*

- Press the lock (115) and hold it in this position.
- Move the armrest (127) vertically and horizontally.
- Release the lock (115) at the desired position.
- Push the armrest (127) slightly forward or back until it locks in position.

*The armrest is now positioned.*

### 3.4.4 Adjusting the armrest



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

##### *Procedure*

- Fold up the armrest (127).
- Set the height adjuster (128) to the desired position (high/low).
- Fold the armrest (127) down.

### 3.5 Restraint systems

#### **Restraint systems**

Approved restraint systems:

- Seat belt (see page 131)
- Cabin door (see page 218)
- Folding gate (see page 224)
- Summer door (see page 226)

➔ At least one of these restraint systems must be in place and monitored electrically. This applies to trucks from the production date 01/12/2020.

## 3.6 Seat Belt

### **WARNING!**

#### **Travelling without a seat belt increases the risk of injury.**

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

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

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

#### **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 110) lights up in the display unit.
- The speed of the truck is restricted to 4 km/h.

#### **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.

## **⚠ 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.
- 

## **⚠ 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.
- 

### ***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.*

## 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.

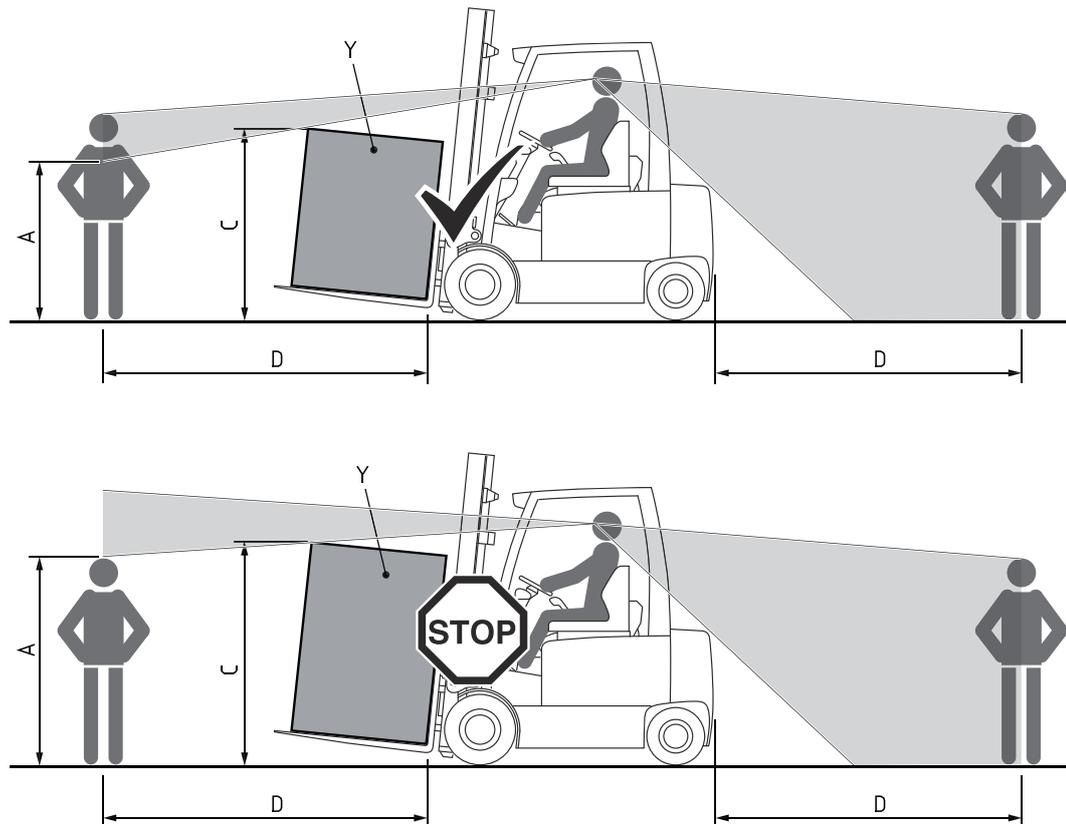
##### **Hazardous situations**

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 fall.

##### **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!**

#### **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.

#### **Type of loads to be carried**

The operator must make sure that the load is in a satisfactory condition. Loads must always be positioned safely and carefully. Use suitable precautions to prevent parts of the load from tipping or falling down. Prevent liquid loads from sloshing out.

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



For safety instructions on the nature of loads to be carried with attachments, see page 158.

## 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 190.

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

The lithium-ion battery can be deactivated to guard against deep discharge or faults. In the event that no fault is present, the lithium-ion battery can be activated by charging.

### *Requirements*

- For troubleshooting, see the operating instructions for the lithium-ion battery.

### *Procedure*

- For charging the lithium-ion battery, see the operating instructions for the lithium-ion battery.

*The battery has been activated.*

### 4.2.1 Battery activation button (○)

Depending on their type, some lithium-ion batteries have a battery activation button (○) on the battery trough and an energy-saving operating mode.

The battery activation button activates the lithium-ion battery and switches it back to normal operation from energy-saving operation.

- Depending on type, the lithium-ion battery switches to energy-saving mode after a set time. The default setting can be changed by the manufacturer's customer service department.

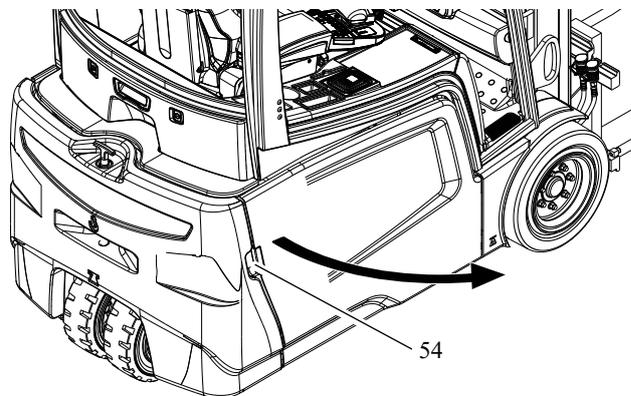
### *Requirements*

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

### *Procedure*

- Open the battery door (54) as far as it will go.
- Press the battery activation button (129).
- Close the battery door (54).

*The battery has been activated.*

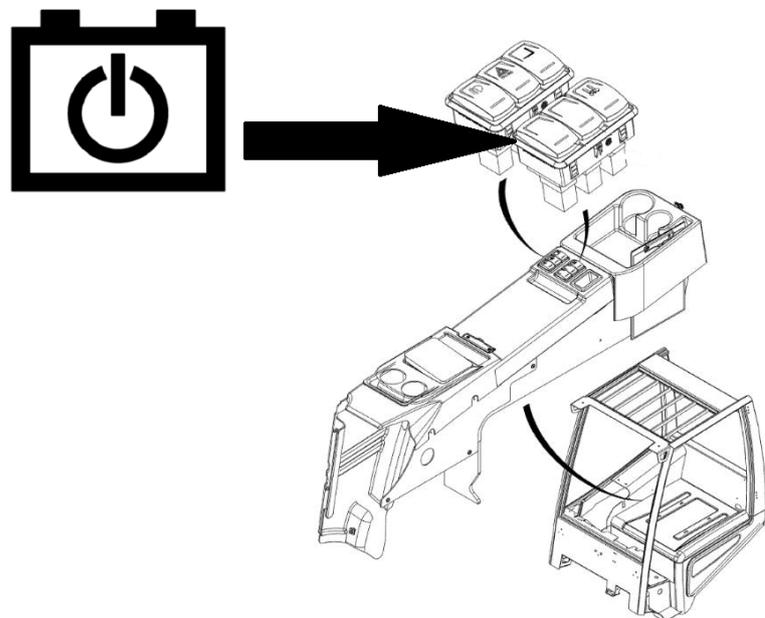
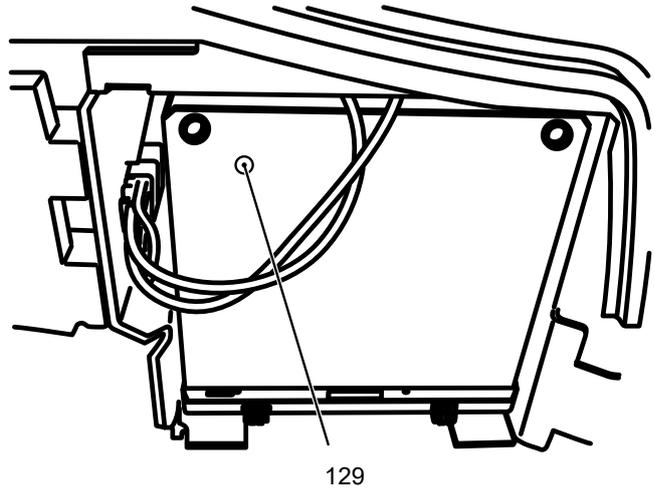


### Wake-up button on the control panel

For easy activation of the lithium-ion battery, trucks are equipped with an additional wake-up button in the right control panel of the truck.

The battery activation button/wake-up button activates the lithium-ion battery and switches it back to normal operation from energy-saving operation. The button must be pressed for approx. 3 seconds.

Depending on type, the lithium-ion battery switches to energy-saving operation after a set time. The default setting can be changed by the manufacturer's customer service department.



## 4.3 Preparing the truck for operation

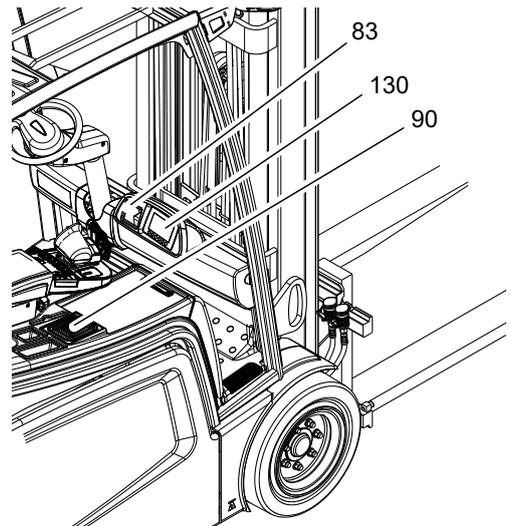
### Switching on the truck

#### Requirements

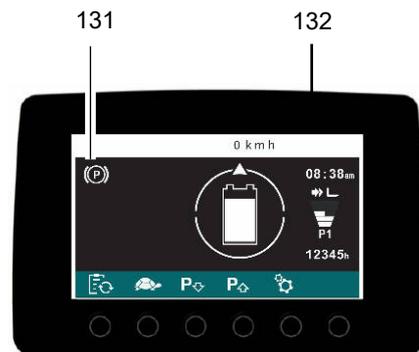
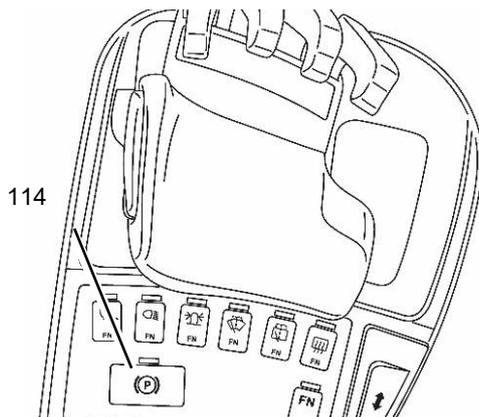
- Checks and operations to be performed before starting daily work, see page 119.

#### Procedure

- Unlock the emergency disconnect switch (90); to do this:
  - Press the rocker in (↓) and pull it up until you feel the emergency disconnect switch engaging.
- Insert the key in the key switch (83) and turn it clockwise as far as it will go to the "I" position.
- Test the parking brake (114 and 131 light up simultaneously).
- Test the service brake (brake pedal).



The truck is ready for operation. The display unit (132) shows the remaining battery capacity.



- When you have pulled the Emergency Disconnect and turned the key switch to the right, the truck carries out a self test for approx. 3-4 seconds (tests the controllers and motors). During this time the truck cannot move or lift. If the accelerator or a lift mechanism lever is applied during this time, an information message will be displayed.

## 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.

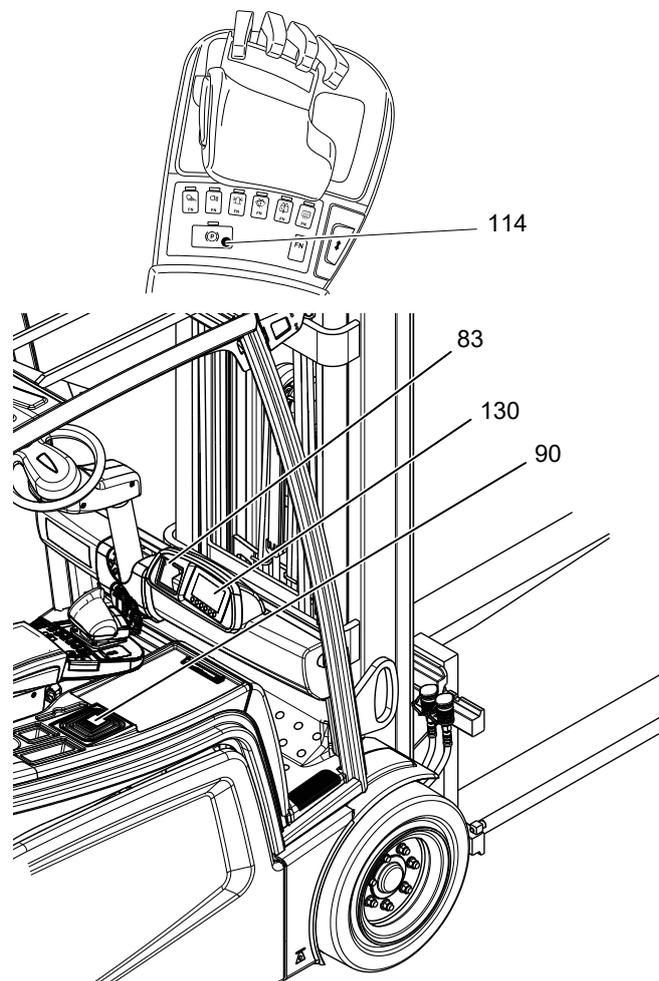
- ▶ Always park the truck on a level surface. In special cases the truck may need to be secured with wedges.
- ▶ Always fully lower the mast and load handler.
- ▶ Tilt the mast forward.
- ▶ Always apply the parking brake button before parking the truck.
- ▶ Choose a place to park where no other people are at risk of injury from lowering forks.
- ▶ Do not park and abandon a truck on an incline.

#### ***Parking the Truck Securely***

##### *Procedure*

- Lower the load handler.
- Apply the parking brake button (114).
- Turn the key in the key switch (83) to the "0" position.
- Remove the key from the key switch (83).
- Press the Emergency Disconnect switch (90) down.

*The truck is now 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.

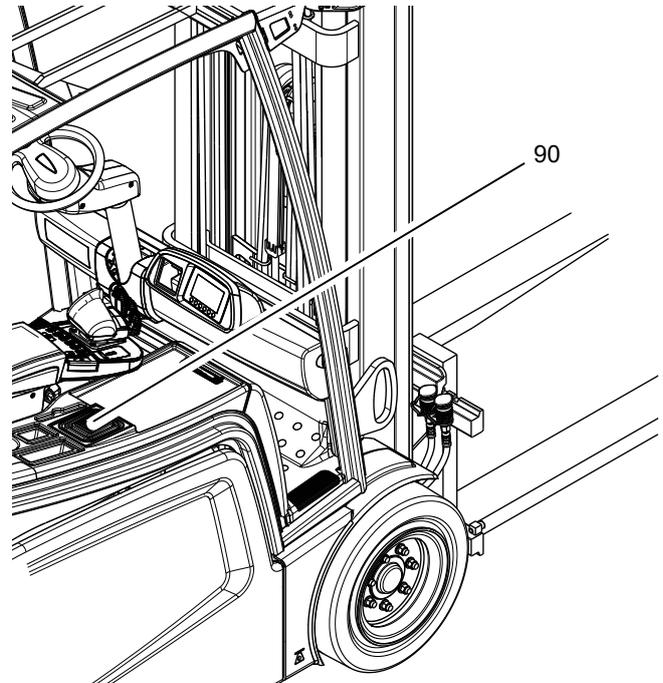
- ▶ The operation of the Emergency Disconnect switch must not be affected by any objects placed in its way.
  - ▶ Report any defects on the Emergency Disconnect switch immediately to your supervisor.
  - ▶ Mark defective truck and take out of service.
  - ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
-

## **Applying the Emergency Disconnect**

### *Procedure*

- Press the Emergency Disconnect switch (90).

*All electrical travel, steering and hydraulic functions are cut out. The truck brakes to a halt at maximum brake force.*



## **Releasing the Emergency Disconnect**

### *Procedure*

- Press the rocker in (↓) and pull the Emergency Disconnect switch (90) up until you feel the Emergency Disconnect (90) switch engaging.

*All electrical functions are enabled and the truck is operational again (assuming the truck was operational before the Emergency Disconnect was pressed).*

## 4.6 Travel

### **⚠ 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.
- 

### **⚠ CAUTION!**

#### **Risk of accident due to improper lighting when travelling in areas where StVZO rules apply**

Do not use work lights when travelling in areas where StVZO road traffic rules apply (in accordance with § 52a StVZO road traffic regulations).

---

- ➔ Trucks with laminate splinter protection (○) may only be used for internal use. In the event of heavy contamination or scratches, the laminate splinter protection must be replaced in good time to ensure a sufficient view.

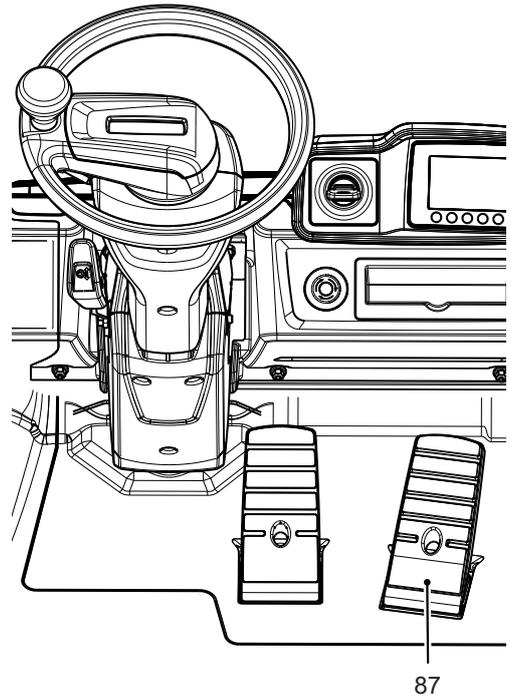
## 4.6.1 Single pedal

### Requirements

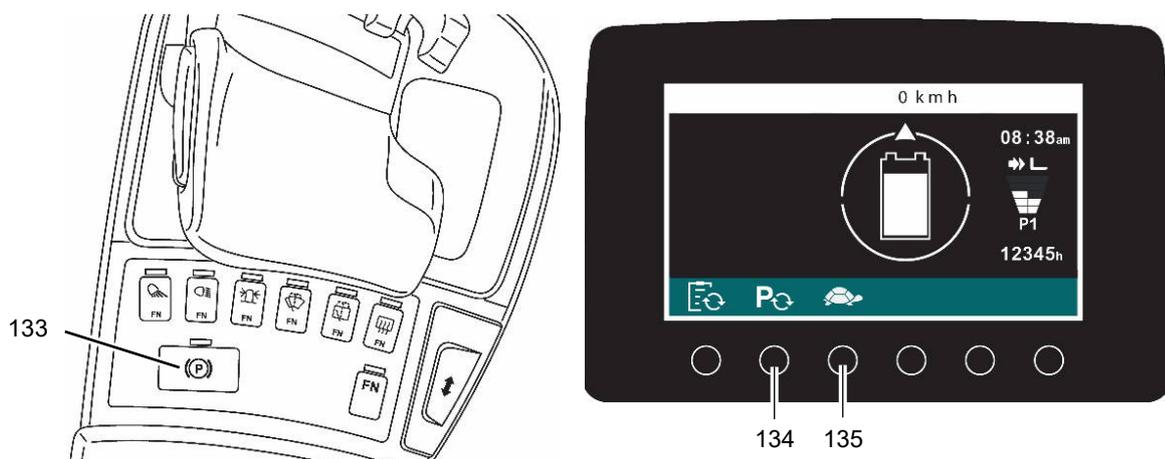
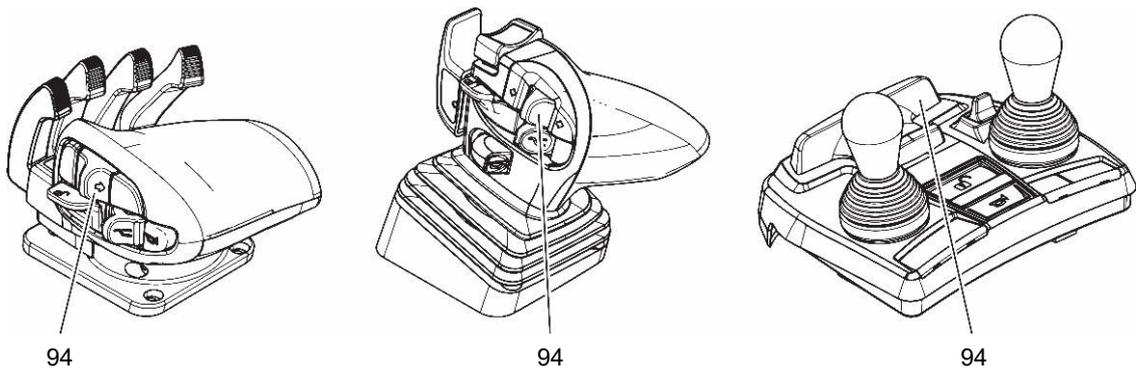
- Truck prepared for operation, see page 139.

### Procedure

- Release the parking brake, to do this press the parking brake button (133).
- Move the travel direction switch (94) from the neutral position into the desired travel direction.
- Select the travel speed if necessary; to do this, press the slow travel button (135) or the program selector (134).
- Raise the load handler approx. 200 mm.
- Tilt the mast back.
- Apply the accelerator pedal (87). The travel speed is governed by the accelerator pedal (87).



*The truck travels in the selected travel direction.*



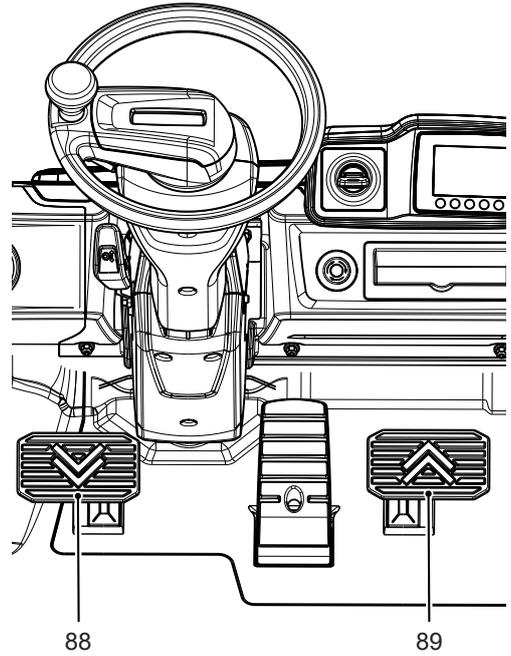
## 4.6.2 Twin pedal (○)

### Requirements

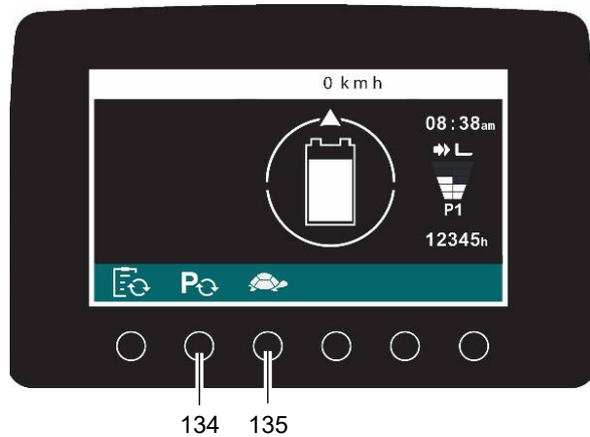
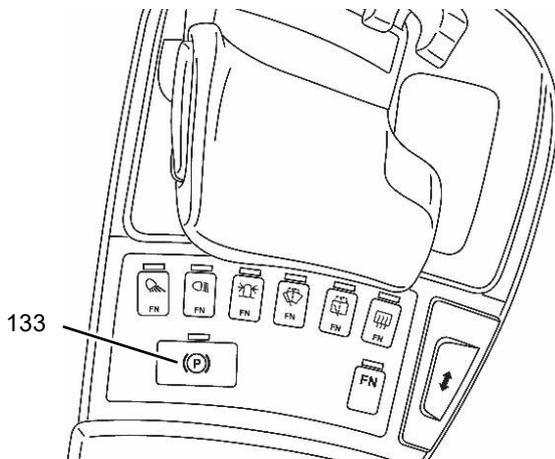
- Truck prepared for operation, see page 139

### Procedure

- For trucks with a twin pedal, the travel direction is selected via the accelerator pedals (89;88). 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 (133).
  - 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 (135) or the program selector (134).
  - Apply the accelerator pedal (89) for forward travel. The travel speed is governed by the accelerator pedal (89).
  - Apply the accelerator pedal (88) for reverse travel. The travel speed is governed by the accelerator pedal (88).



*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 off the accelerator pedal in time. Changing direction during travel causes the truck to decelerate sharply.

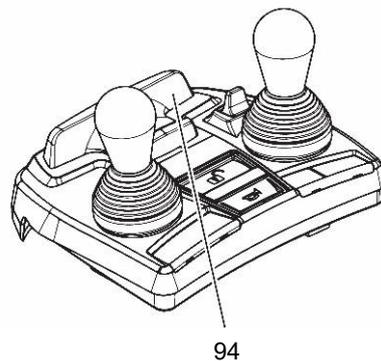
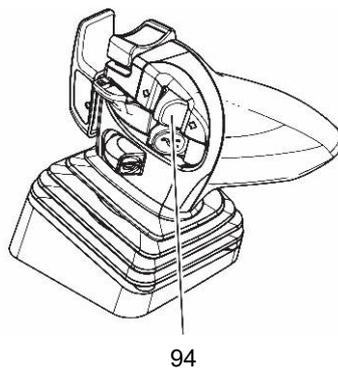
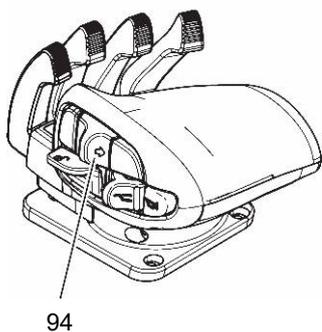
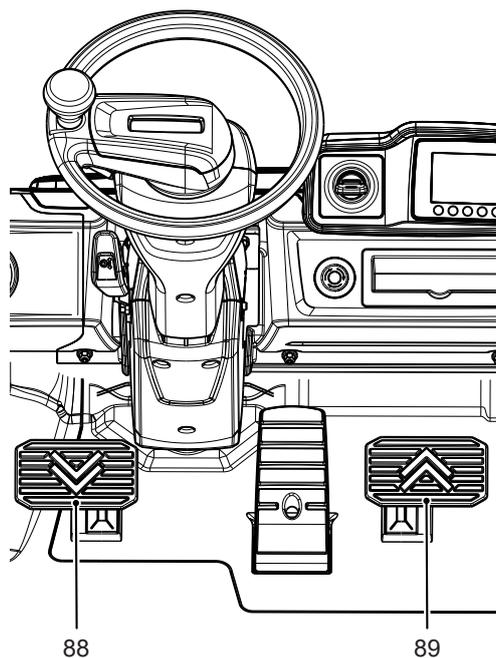
- ▶ When the truck starts to move in the opposite direction, only depress the accelerator pedal lightly or not at all.
- ▶ Do not make any abrupt steering movements.
- ▶ Look in the direction of travel.
- ▶ Have an adequate overview of the route to be travelled.

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

##### *Procedure*

- Set the travel-direction switch (94) to the opposite direction while travelling.
- For the twin pedal version, apply the accelerator pedal in the opposite direction to the travel direction (88 or 89).

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



## 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.

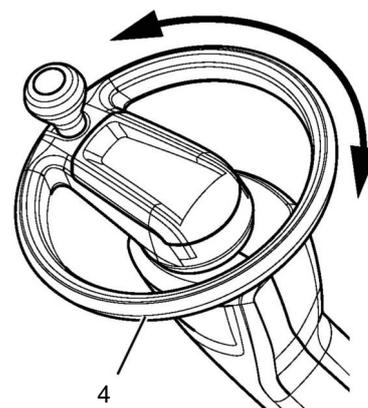
Equipment and mast version can influence the centre of gravity and operational stability.

- ▶ 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 (4) 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 110.

## 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.
  - ▶ Use the service brake in emergencies.
- 

### **⚠ 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.
- 

The truck can brake in three different ways:

- Coasting brake
- Service brake

and for secure parking:

- Parking brake

## 4.8.1 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.
- 

### **⚠ 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.

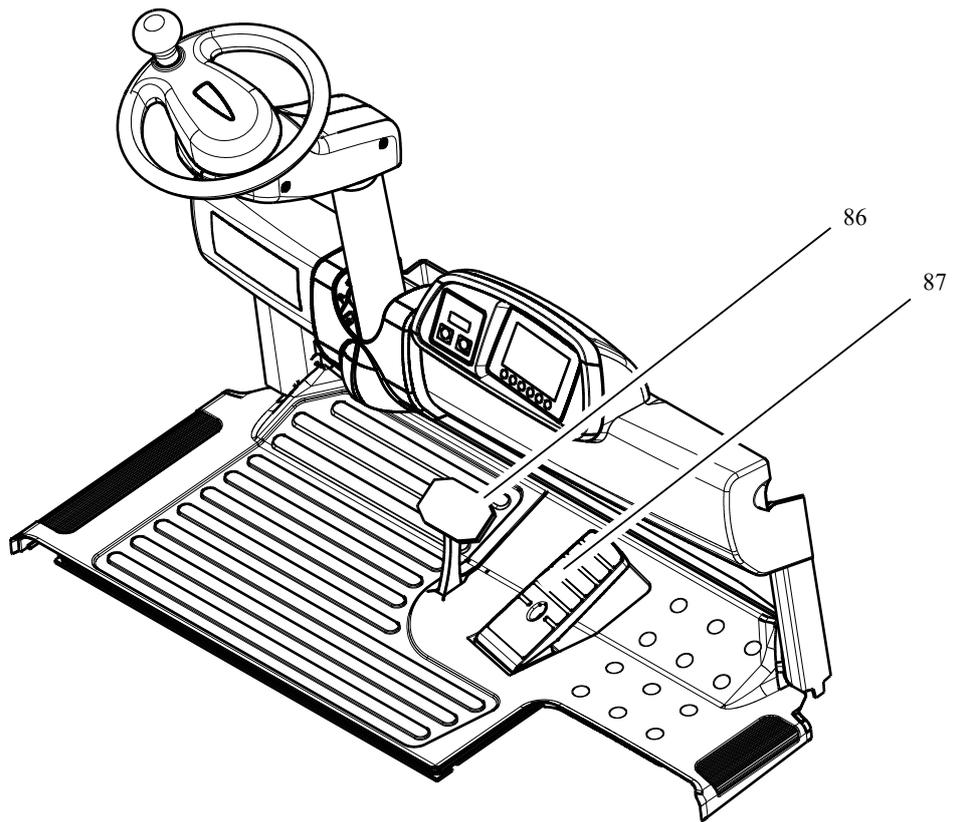
- ▶ Keep all persons out of the hazardous area during travel operations.
  - ▶ Instruct other people to move out of the hazardous area of the truck. Stop using the truck immediately if people do not vacate the hazardous area.
  - ▶ The truck must travel carefully and not faster than crawl speed when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

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

##### *Procedure*

- Take your foot off the accelerator pedal (87).

*The truck brakes.*



#### 4.8.2 Service brake

##### ***Braking with the service brake***

##### *Procedure*

- Depress the brake pedal (86) until you feel the brake pressure.

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

### 4.8.3 Manual parking brake

#### **⚠ DANGER!**

##### **Accident risk**

- ▶ The parking brake will hold the truck with maximum load on a clean ground surface, on inclines of up to 15%.
- ▶ Do not park and abandon the truck on an incline.
- ▶ Applying the parking brake during travel will cause the truck to brake to a halt at maximum force. This may cause the load to slide off the forks. There is a greater risk of accidents and injury.

#### **NOTICE**

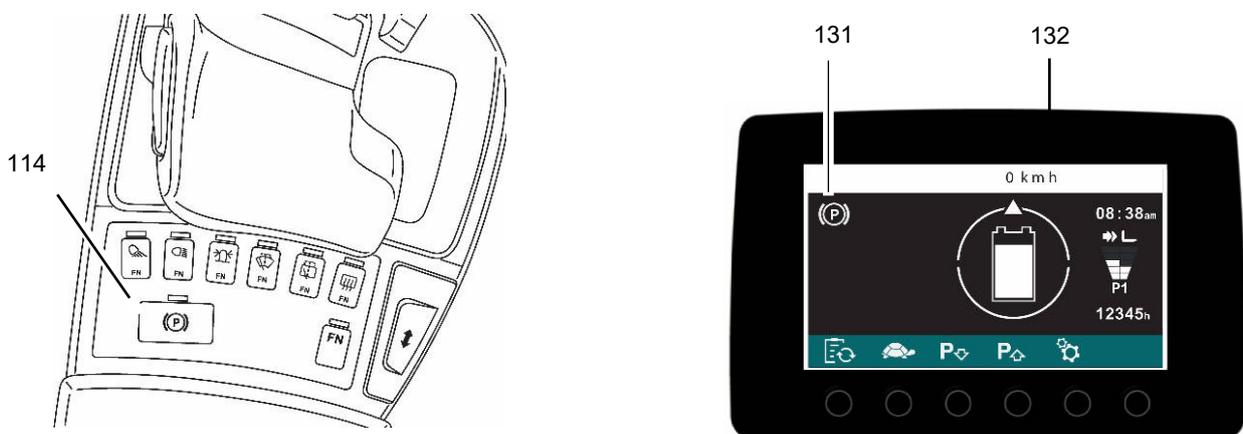
- ▶ The parking brake can be used as an emergency brake.
- ▶ The truck brakes at maximum regeneration irrespective of the position of the accelerator pedal and the brake pedal. As soon as the truck comes to a halt, the parking brake applies automatically.

#### **Activating the manual parking brake with the parking brake button**

##### *Procedure*

- Apply the parking brake button (114) . The LED above the parking brake button (114) lights up red.
- ➔ The manual parking brake icon (131) on the display lights up red and confirms that the manual parking brake is activated.

*The truck is secure when the LED above the parking brake button (114) and the manual parking brake icon (131) on the display light up red. Travel is disabled.*

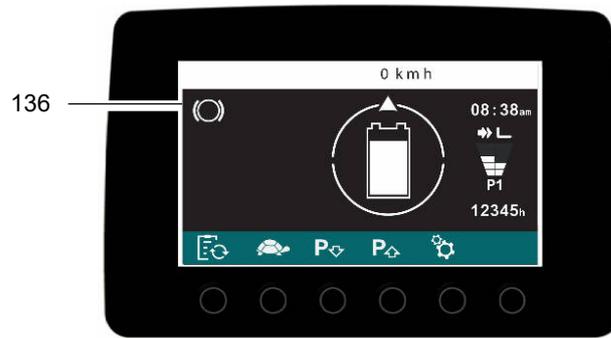


#### **Deactivating the manual parking brake with the parking brake button**

##### *Procedure*

- Apply the parking brake button (114) . The red LED above the parking brake button (114) goes out.
- ➔ The red manual parking brake icon (131) on the display goes out and the automatic parking brake icon (136) lights up green.

*The manual parking brake with the parking brake button is deactivated when the LED above the parking brake button (114) goes out and the automatic parking brake icon (136) lights up green see page 154.*

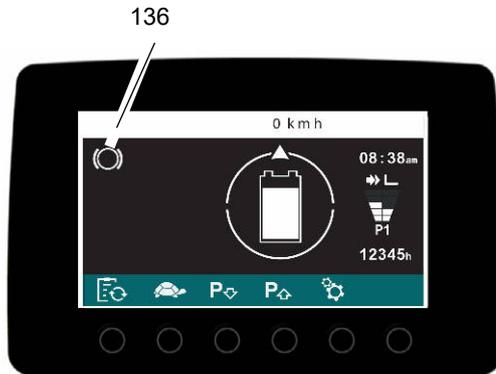


- When the truck is switched on, the manual parking brake is activated and travel is inhibited. The LED above the parking brake button (114) and the manual parking brake icon (131) light up red.

#### 4.8.4 Automatic parking brake

The automatic parking brake is a comfort feature and is not designed to park the truck securely. The automatic parking brake is automatically activated a set time (0 - 60 sec) after the truck stops. The factory setting is 30 sec. The time setting can only be adjusted by the manufacturer's customer service department.

##### – Truck prevented from rolling away (automatic parking brake)



When the truck is at a standstill, the automatic parking brake is automatically activated after a set time (0 - 60 sec), preventing the truck from rolling away, and the automatic parking brake indicator (136) lights up in green. When the accelerator pedal is applied, the automatic parking brake is released and the parking brake indicator (136) goes out.

**This function of the parking brake prevents the truck from rolling away on inclines up to a maximum of 15%. The truck accelerates when the accelerator pedal is depressed.**

## 4.9 Adjusting the forks

### **⚠ WARNING!**

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

Make sure that the fork retaining mechanisms (113) are fitted before adjusting the forks. Depending on the fork carriage, the fork-retaining mechanism (113) 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.

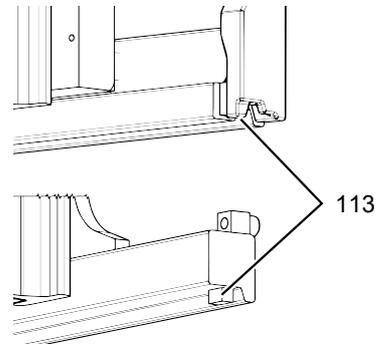
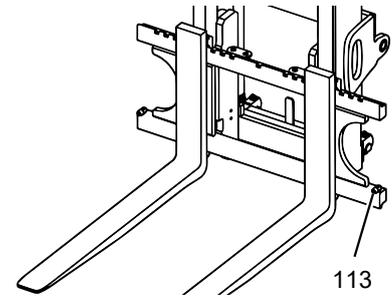
- ▶ Adapt the travel speed to the situation.
  - ▶ Set the fork arms as far apart as possible.
- 

### **⚠ WARNING!**

#### **Trapping hazard**

There is a trapping hazard when you perform this operation.

- ▶ Wear work gloves and safety shoes.
-



### **Adjusting the forks**

#### *Requirements*

- Park the truck securely, see page 140.

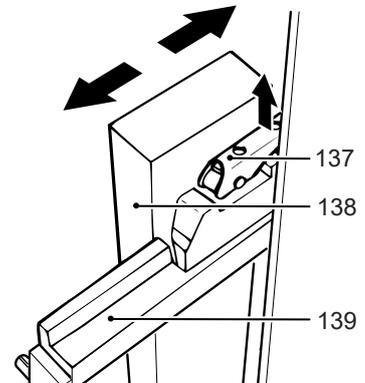
#### *Procedure*

- Lift up the locking lever (137).
- Push the forks (138) into the correct position on the fork carriage (139).



To lift the load securely, the forks (138) 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 (138).

- Push the locking lever down (137) 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 (113) and make sure that the bolts are seated correctly.
- ▶ Retaining bolt torque: 85 Nm.

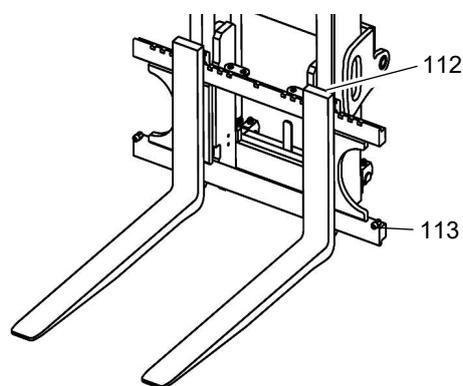
#### ***Replacing the forks (fork carriages with retaining bolts)***

##### *Requirements*

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

##### *Procedure*

- Disassemble the retaining bolts (113).
- Loosen the fork stop (112).
- Carefully push the fork tines off the fork carriage.



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

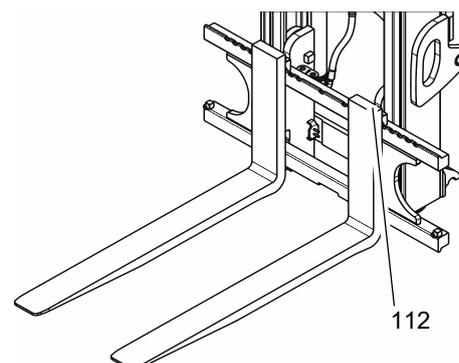
#### ***Replacing the forks (fork carriages with fixed stops)***

##### *Requirements*

- Load handler lowered and forks not touching the ground.

##### *Procedure*

- Loosen the fork stop (112).
- 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.*

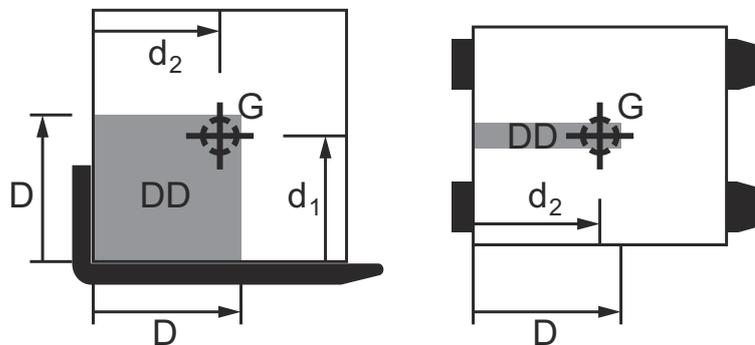
## 4.11 Lifting, transporting and depositing loads

### ⚠ 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 51.
- ▶ 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!

#### Risk of accident due to unsecured and incorrectly positioned loads

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

- ▶ Instruct people to move out of the hazardous area of the truck. Stop using the truck immediately if people do not vacate the hazardous area.
- ▶ Only transport 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.
- ▶ Tilting the mast forward when the load handler is raised >300 mm beyond the vertical position is permissible only in front of 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 32. 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.

## **⚠ WARNING!**

### **Risk of accidents during storage and retrieval**

During the storage and retrieval process, operators as well as people around the truck can be crushed or struck.

- ▶ During storage and retrieval operations, ensure that there are no limbs between the truck and the load.
- ▶ Make sure there is nobody around the truck.

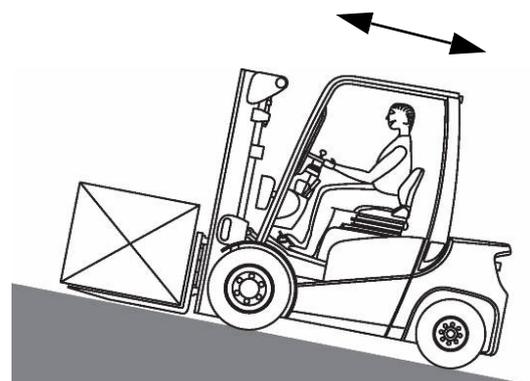
### **Lifting loads**

#### **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.

## 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.

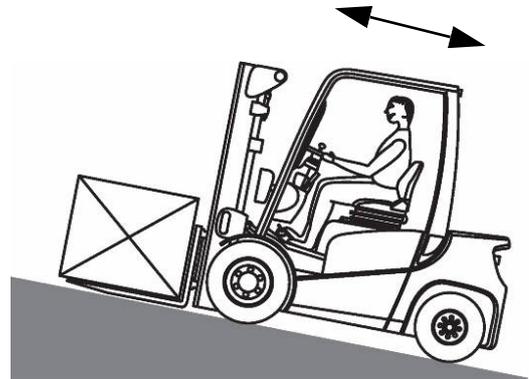
### **Transporting loads**

#### *Requirements*

- Load raised correctly.
- Load handler lowered for transport (approx. 150 - 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 lifting device with the Solo-Pilot

##### **Lifting and lowering**

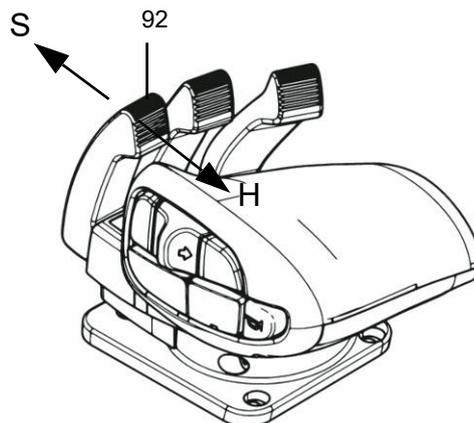
###### **Requirements**

- Truck prepared for operation, see page 139.

###### **Procedure**

- Pull the lever (92) in direction H to raise the load.
- Push the lever (92) 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.

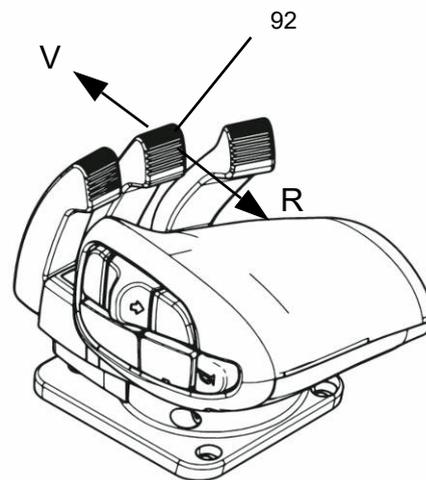
###### **Requirements**

- Truck prepared for operation, see page 139.

###### **Procedure**

- Pull the lever (92) in direction R to tilt the mast back.
- Push the lever (92) 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.

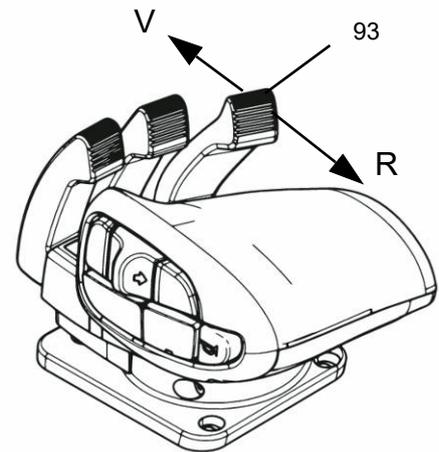
### ***Positioning the integrated sideshifter (option)***

#### ***Requirements***

- Truck prepared for operation, see page 139.

#### ***Procedure***

- Pull the lever (93) in direction R to move the load handler to the right (from the driver's viewpoint).
- Push the lever (93) 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.

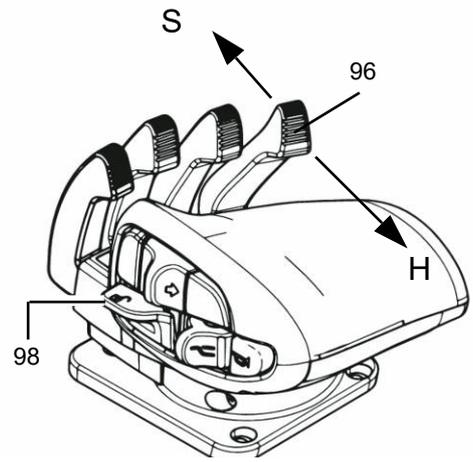
#### **Requirements**

- Truck prepared for operation, see page 139.

#### **Procedure**

- Press the acknowledgement key (98) and then within 2 seconds pull the lever (96) in direction H to bring the forks together.
- Press the acknowledgement key (98) and then within 2 seconds push the lever (96) in direction S to move the forks apart.

*The forks are now positioned.*



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

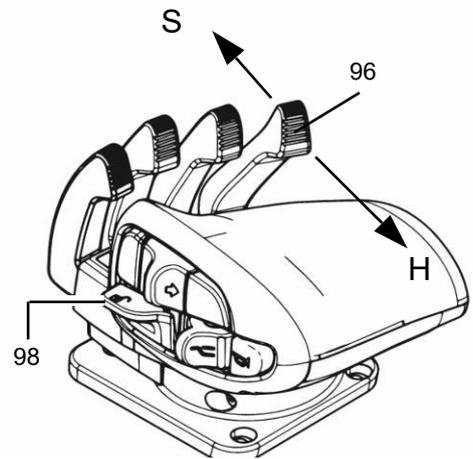
#### **Requirements**

- Truck prepared for operation, see page 139.
- The fork tines are no longer aligned.

#### **Procedure**

- Press the acknowledgement key (98) and then within 2 seconds push the lever (96) in direction S to move the forks apart as far as the stop.
- Press the acknowledgement key (98) and then within 2 seconds push the lever (96) 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

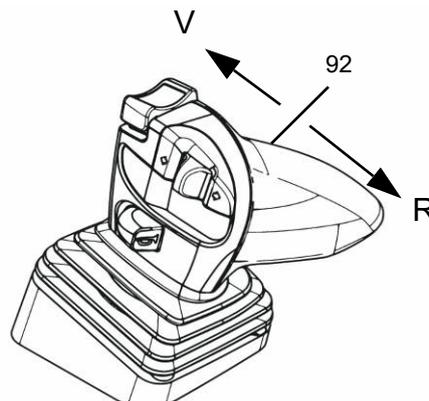
### **Lifting and lowering**

#### **Requirements**

- Truck prepared for operation, see page 139.

#### **Procedure**

- Pull the Multi-Pilot (92) in direction R to raise the load.
- Push the Multi Pilot (92) 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**

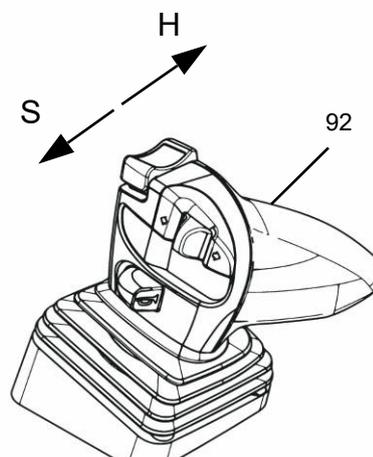
- ▶ Make sure no part of your body is between the mast and driver's cab when tilting the mast back.

#### **Requirements**

- Truck prepared for operation, see page 139.

#### **Procedure**

- Push the Multi-Pilot (92) in direction H to tilt the mast forward.
- Push the Multi-Pilot (92) 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.

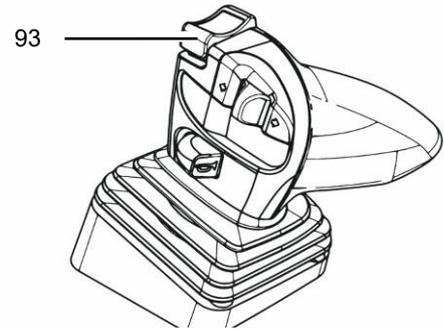
### ***Positioning the integrated sideshift (option)***

#### ***Requirements***

- Truck prepared for operation, see page 139.

#### ***Procedure***

- Press the button (93) to the left to move the load handler to the left (from the driver's viewpoint).
- Press the button (93) 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 139.

#### *Procedure*

- Press the acknowledgement key (141) and then within 2 seconds push the fork positioner lever (96) in direction V to move the fork arms apart.
- Press the acknowledgement key (141) and then within 2 seconds pull the fork positioner lever (96) 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 139.
- The fork arms are no longer synchronised.

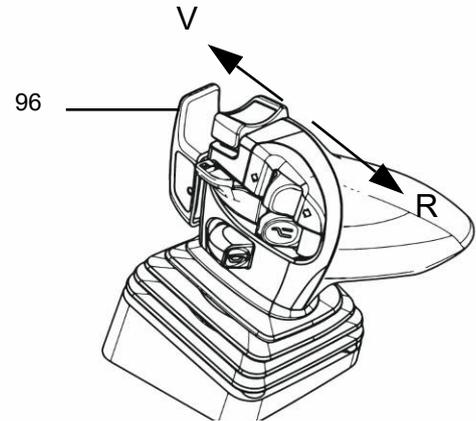
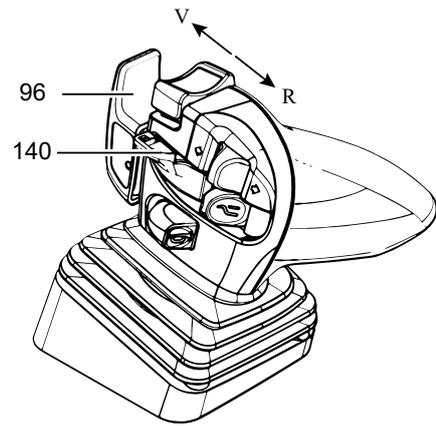
#### *Procedure*

- Press the acknowledgement key (141) and then within 2 seconds push the fork positioner lever (96) in direction V to move the fork arms apart as far as the stop.
- Press the acknowledgement key (141) and then within 2 seconds push the fork positioner lever (96) 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

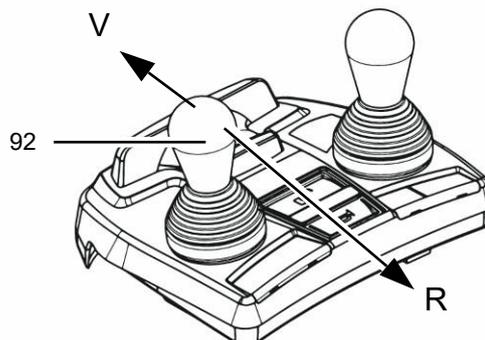
#### **Lifting and lowering**

##### *Requirements*

- Truck prepared for operation, see page 139.

##### *Procedure*

- Pull the lever (92) in direction R to raise the load.
- Push the lever (92) 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**

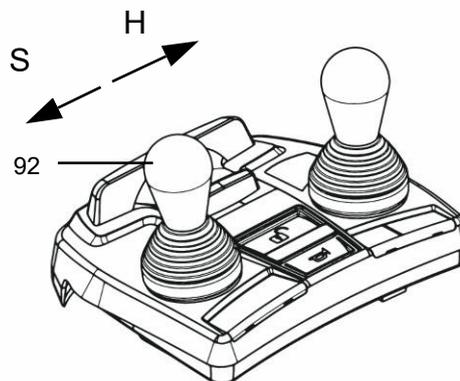
- ▶ Make sure no part of your body is between the mast and driver's cab when tilting the mast back.

##### *Requirements*

- Truck prepared for operation, see page 139.

##### *Procedure*

- Push the lever (92) in direction H to tilt the mast forward.
- Pull the lever (92) 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.

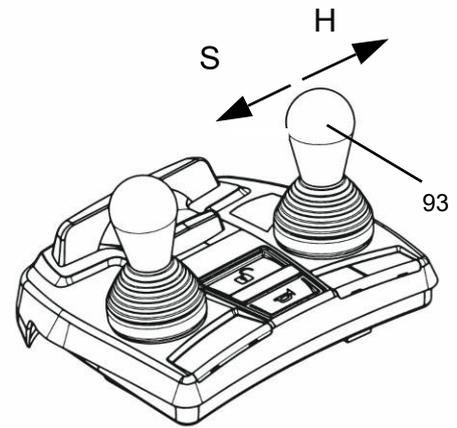
### ***Positioning the integrated sideshifter (option)***

#### ***Requirements***

- Truck prepared for operation, see page 139.

#### ***Procedure***

- Pull the lever (93) in direction S to move the load handler to the left (from the driver's viewpoint).
- Push the lever(93) 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.

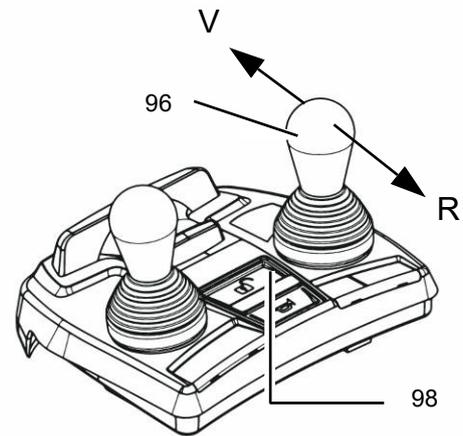
#### *Requirements*

- Truck prepared for operation, see page 139.

#### *Procedure*

- Press the acknowledgement key (98) and then within 2 seconds pull the lever (96) in direction R to bring the forks together.
- Press the acknowledgement key (98) and then within 2 seconds push the lever (96) in direction V to move the forks apart.

*The forks are now positioned.*



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

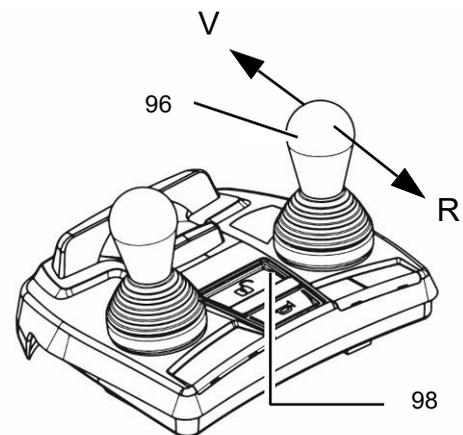
#### *Requirements*

- Truck prepared for operation, see page 139.
- The fork tines are no longer aligned.

#### *Procedure*

- Press the acknowledgement key (98) and then within 2 seconds push the lever (96) in direction R to move the forks together up to the stop.
- Press the acknowledgement key (98) and then within 2 seconds push the lever (96) 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 designed by the attachment manufacturer for use with the respective industrial truck.
- ▶ Only use attachments that are suitable for the operating pressure and oil flow available at the hydraulic port, see page 29.
- ▶ 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 29.

### **⚠ 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 29.

→ 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 185.

→ 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.
- 

#### **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 185.
  - ▶ 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.

#### **Safety instructions for clamping attachments (e.g. baling 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 must only be used on trucks that feature a button for enabling additional hydraulic functions.
  - ▶ Clamping attachments must only be operated on trucks with auxiliary hydraulics ZH1, ZH2 or ZH3 or ZH3.
  - ▶ When connecting the attachment, make sure that the hydraulic lines of the attachment are connected to the correct ports – see page 185.
  - ▶ 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.

## 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!**

#### **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.
- 

### **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 119, 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 starting, see page 119, 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.
- 

### **⚠ 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.
-

## 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.

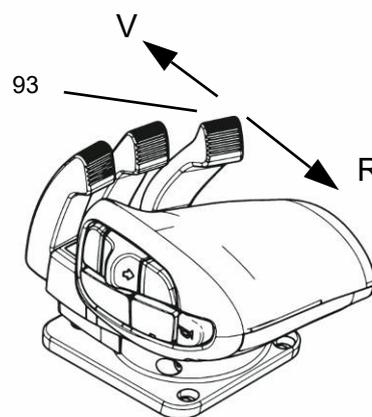
### 4.14.1 soloPILOT with control of ZH1 hydraulic port

- Depending on the attachments used the lever (93) is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

#### *Procedure*

- Operating hydraulic port ZH1:  
Move the lever (93) in direction V or R.

*The attachment performs its operation.*



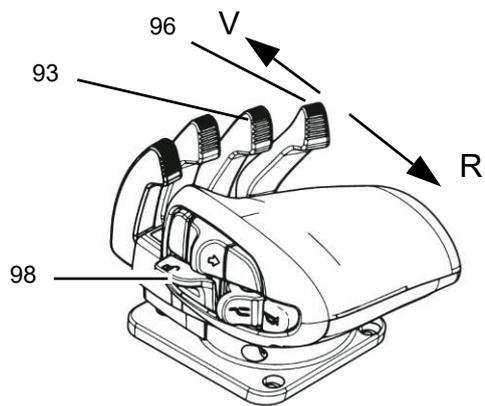
#### 4.14.2 soloPILOT with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used the lever / button (93, 96, 98) is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

##### *Procedure*

- Operating hydraulic port ZH1:  
Move the lever (93) in direction V or R.
- Operating hydraulic port ZH2:  
Press the acknowledgement key (98) and then within 2 seconds move the lever (96) in direction V or R.

*The attachment performs its operation.*



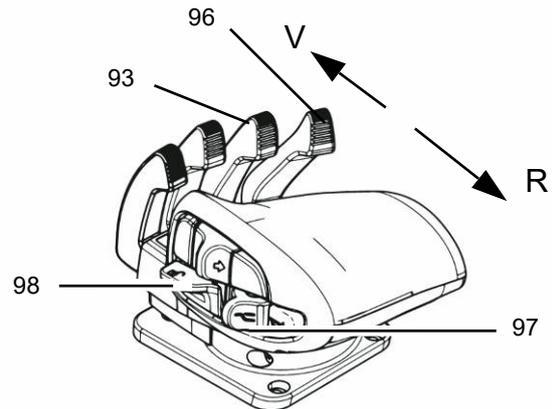
#### 4.14.3 soloPILOT with control of ZH1, ZH2 and ZH3 hydraulic ports

➔ Depending on the attachments used the levers / buttons (93, 96, 98, 97) are assigned the respective functions. Unused levers have no function. For connections see page 185.

##### *Procedure*

- Operating hydraulic port ZH1:  
Move the lever (93) in direction V or R.
- Operating hydraulic port ZH2:  
Move the lever (96) in direction V or R.
- Operating hydraulic port ZH3:  
Apply the toggle switch (97), press the acknowledgement key (98) and then within 2 seconds move the lever (96) in direction V or R.
- Now pull the toggle switch (97).

*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.

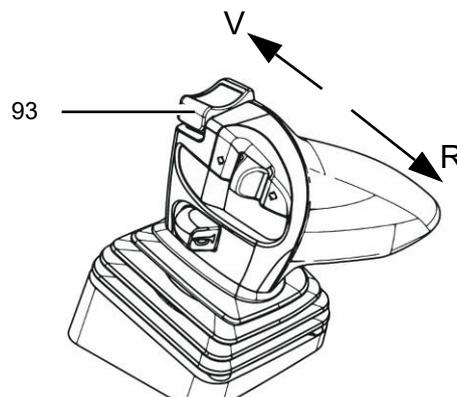
### 4.15.1 multiPILOT with control of ZH1 hydraulic port

- Depending on the attachments used, the (93) button is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

#### *Procedure*

- Operating hydraulic port ZH1:  
Press the (93) button to the left or right.

*The attachment performs its operation.*



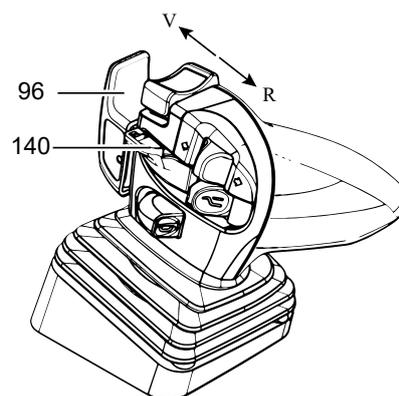
#### 4.15.2 Multi Pilot with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used the lever / button (96,92,93) is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

##### *Procedure*

- Operating hydraulic port ZH1:  
Press the (93) button to the left or right.
- Operating hydraulic port ZH2:  
Press the acknowledgement key (98) and then within 2 seconds push the lever (96) in direction V or pull it in direction R.

*The attachment performs its operation.*



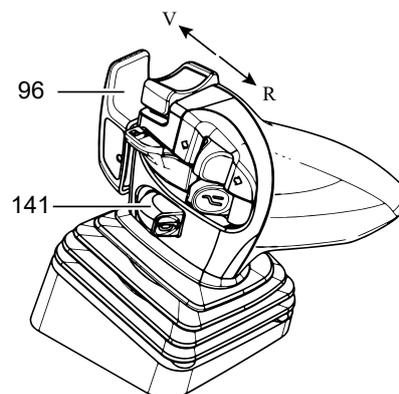
#### 4.15.3 multiPILOT with control of ZH1, ZH2 and ZH3 hydraulic ports

→ Depending on the attachments used the levers / buttons (92, 93, 97, 98) are assigned the respective functions. Unused levers have no function. For connections see page 185.

##### *Procedure*

- Operating hydraulic port ZH1:  
Press the (93) button to the left or right.
- Operating hydraulic port ZH2:  
Push the lever (96) in direction V or pull it in direction R.
- Operating hydraulic port ZH3:  
Push the toggle switch (97), press the acknowledgement key (98) and within 2 seconds move the lever (96) to the left or right.
- Now pull the toggle switch (97).

*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.

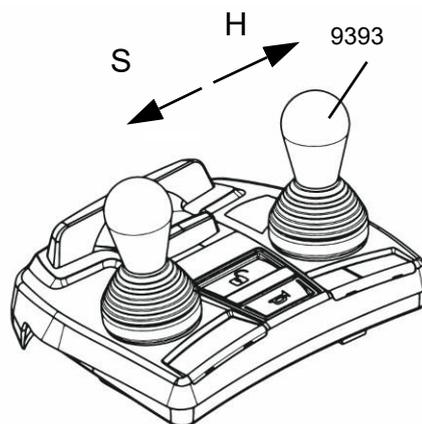
### 4.16.1 duoPILOT with control of ZH1 hydraulic port

- Depending on the attachments used the lever (93) is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

#### *Procedure*

- Operating hydraulic port ZH1:  
Press the lever (93) in direction S or H.

*The attachment performs its operation.*



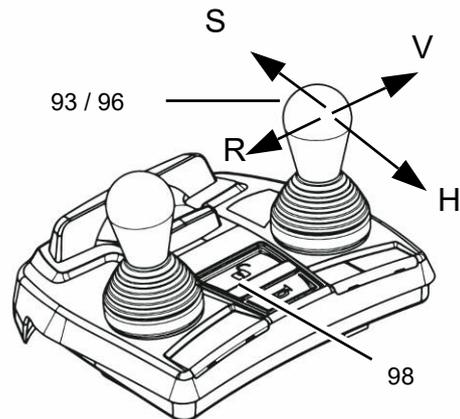
## 4.16.2 duoPILOT with control of ZH1 and ZH2 hydraulic ports

→ Depending on the attachments used the lever / button (93,96,98) is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

### *Procedure*

- Operating hydraulic port ZH1:  
Push the lever (93) in direction V or R.
- Operating hydraulic port ZH2:  
Press the acknowledgement key (98) and then within 2 seconds pull the lever(96) in direction H or push it in direction S.

*The attachment performs its operation.*



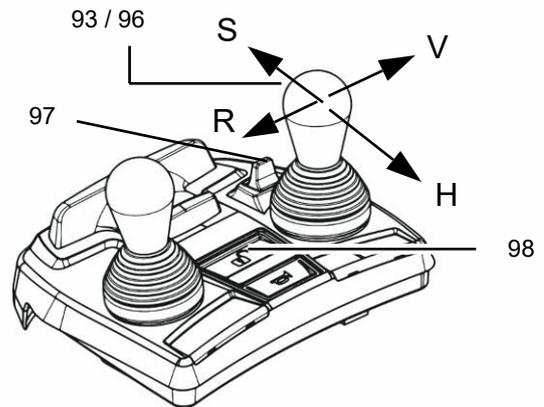
### 4.16.3 duoPILOT with control of ZH1, ZH2 and ZH3 hydraulic ports

→ Depending on the attachments used the levers / buttons (93,96,97,98) are assigned the respective functions. Unused levers have no function. For connections see page 185.

#### *Procedure*

- Operating hydraulic port ZH1:  
Push the lever (93) in direction V or R.
- Operating hydraulic port ZH2:  
Pull the lever (96) in direction H or push it in direction S.
- Operating hydraulic port ZH3:  
Flip the toggle switch (97) forward, press the acknowledgement key (98) and then within 2 seconds push the lever(96) in direction S or pull it in direction H.
- Now flip the toggle switch (97) back.

*The attachment performs its operation.*



## 4.17 Fitting additional attachments

### **⚠ 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.
-

## **Connect attachment hydraulically**

### *Requirements*

- Non-pressurised hydraulic hoses and plug-in couplings.
- The exchange ports on the truck are marked ZH1, ZH2 and ZH3.
- Attachment movement directions defined to match the direction of movement of the controls.

### *Procedure*

- Connect the plug-in couplings and engage it in position.
- Mark the controls with symbols that indicate their function.

*The attachment is now hydraulically connected.*

## **Depressurising the hydraulic plug-in couplings**

### *Requirements*

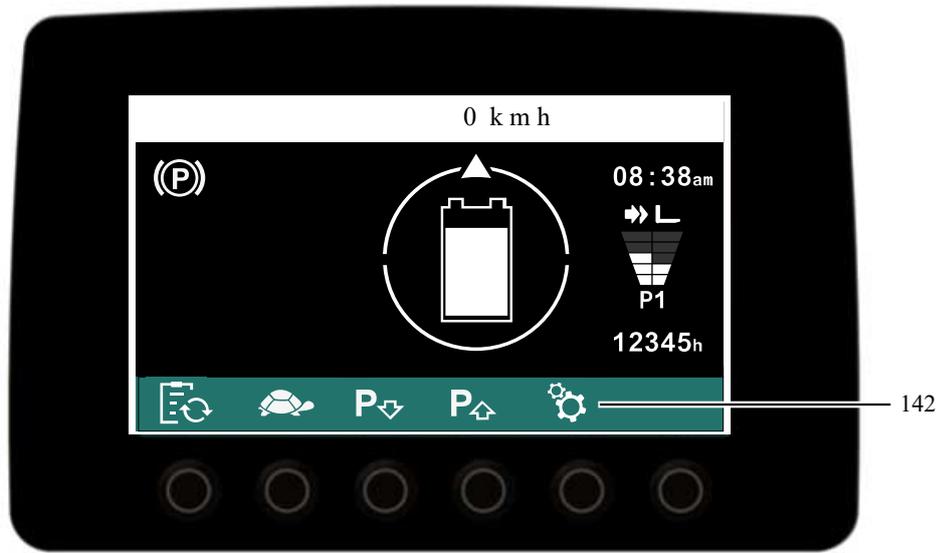
- The operator is in the operating position.
- Parking brake activated.
- Travel direction switch in neutral.
- All controls in neutral.

### *Procedure*

- Press the button (142) for more than 5 seconds.
- Move the auxiliary hydraulics lever in both directions and hold it briefly, see page 102.
- For auxiliary hydraulic functions requiring acknowledgement, the acknowledgement button must also be actuated in order to depressurise, see page 102.

*Hydraulic hoses and plug-in couplings are depressurised.*

- Press the button (142) for more than 5 seconds to return to normal operating mode.



## **⚠ 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***

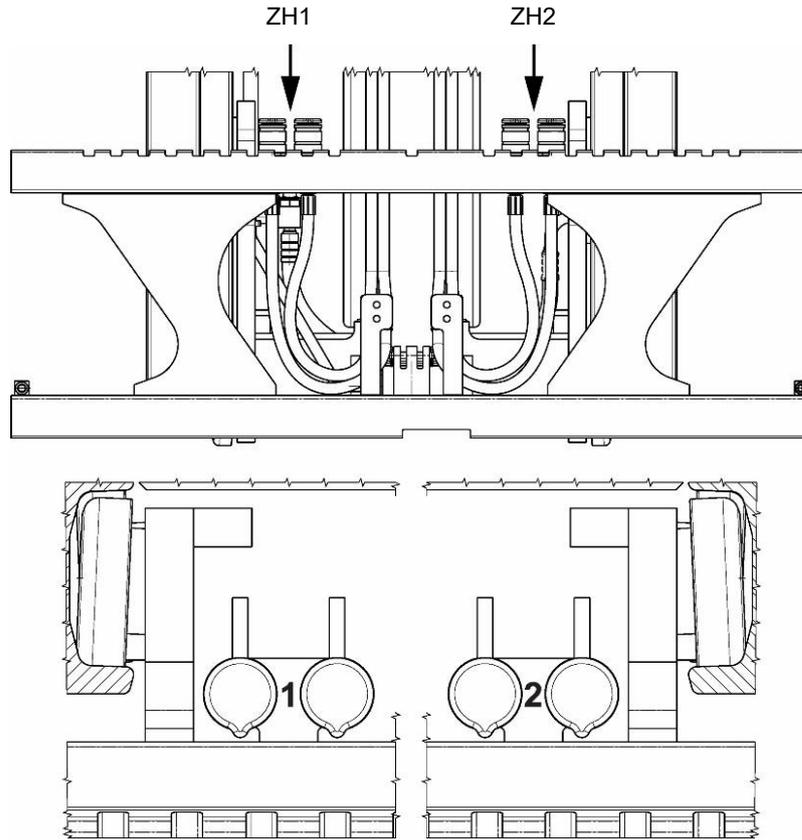
#### *Requirements*

- 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.

## 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 48. 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.
  - ▶ A special trailer coupling must be used for frequent trailer operation.
  - ▶ Do not use supporting loads.
  - ▶ Towing must only be performed on level, secure travel routes.
  - ▶ The owner must test trailer operation with the permissible trailer load by means of a trial run under the applicable operating conditions on site.
  - ▶ Special approvals on request.
- 

The national regulations for the use of unbraked trailers on trucks must be observed.

## Attaching the trailer

### ⚠ CAUTION!

#### Trapping hazard

There is a trapping risk when you attach a trailer.

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

### ⚠ 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.

## Attaching the trailer

### Requirements

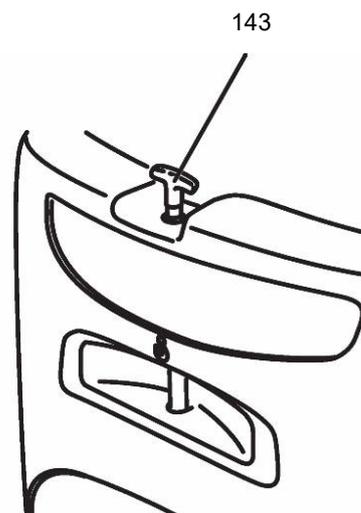
- Truck and trailer are on a level surface.
- Trailer prevented from rolling away.

### Procedure

- Push the tow pin (143) down and turn it 90°.
- Pull the tow pin up 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, push it down, turn it 90 degrees and engage it.

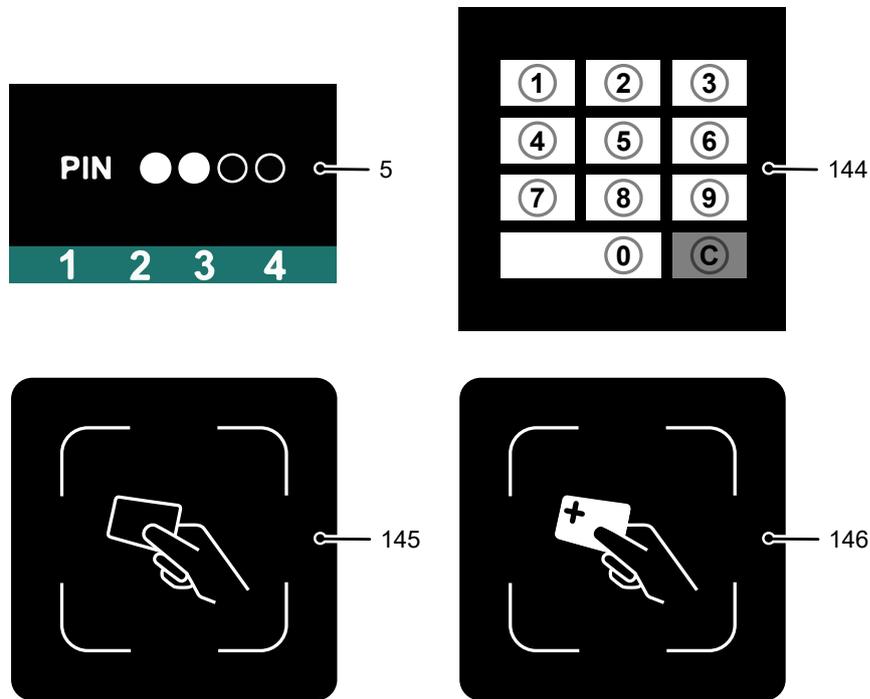
*The trailer is now attached to the truck.*



## 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
5	Display unit (EasyAccess Softkey): – Description see page 106 – 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
144	Keypad (EasyAccess PinCode): – consists of the keys 0 to 9 and C (delete) – Entry of 4-digit set-up and access codes – Up to 100 access codes can be stored
145	Transponder reader (EasyAccess Transponder): – Up to 100 transponders can be saved
146	Transponder reader Plus (EasyAccess Transponder): – Up to 100 transponders can be stored The transponder reader Plus supports additional transponder standards.

→ Operation of transponder reader Plus (146) corresponds to the operation of the standard transponder reader (145).

## 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 141.
- Enter the default code 1-2-3-4 using the keys below the display unit (5).

*The truck is switched on.*

- Press the key below the "Settings" symbol (147).
- Press the key below the "Change set-up code" symbol (148).
- Enter the set-up code 2-4-1-2 using the keypad (144).

*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 (149).

*The set-up code is deleted.*

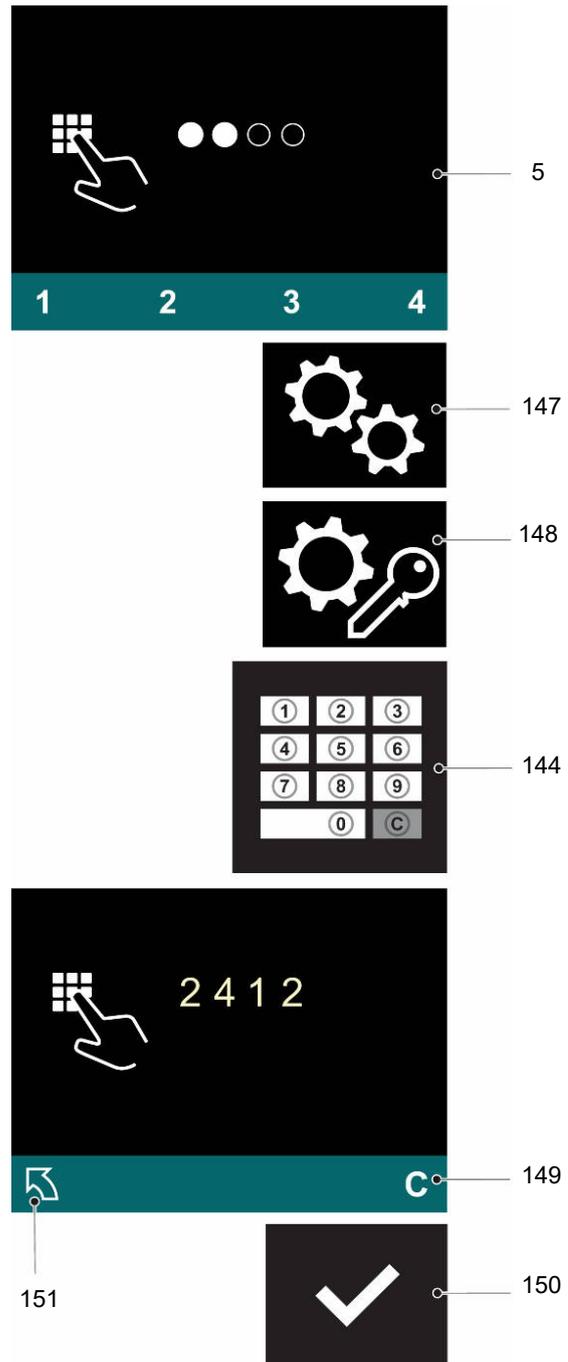
- Enter the new set-up code using the keypad (144).
- Press the key below the "Confirm" symbol (150).

*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 (149).

- To return to the main menu, press the key below the "Back" symbol (151).
- Delete the default code, see page 204.
- Create access codes, see page 203.

*The keypad is active.*



## 6.3.2 Activating the transponder reader

### Procedure

- Release the emergency disconnect switch, see page 141.
- Enter the default code 1-2-3-4 using the keys below the display unit (5).

*The truck is switched on.*

- Press the key below the "Settings" symbol (147).
- Press the key below the "Change set-up code" symbol (148).
- Enter the set-up code 2-4-1-2 using the keys below the display unit (5).

*The set-up code entered is displayed.*

- Press the key below the "Delete" symbol (149).

*The set-up code is deleted.*

- Hold a transponder in front of the transponder reader (145).

*This transponder thus becomes the set-up transponder.*

- Press the key below the "Confirm" symbol (150).

*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 (149).*

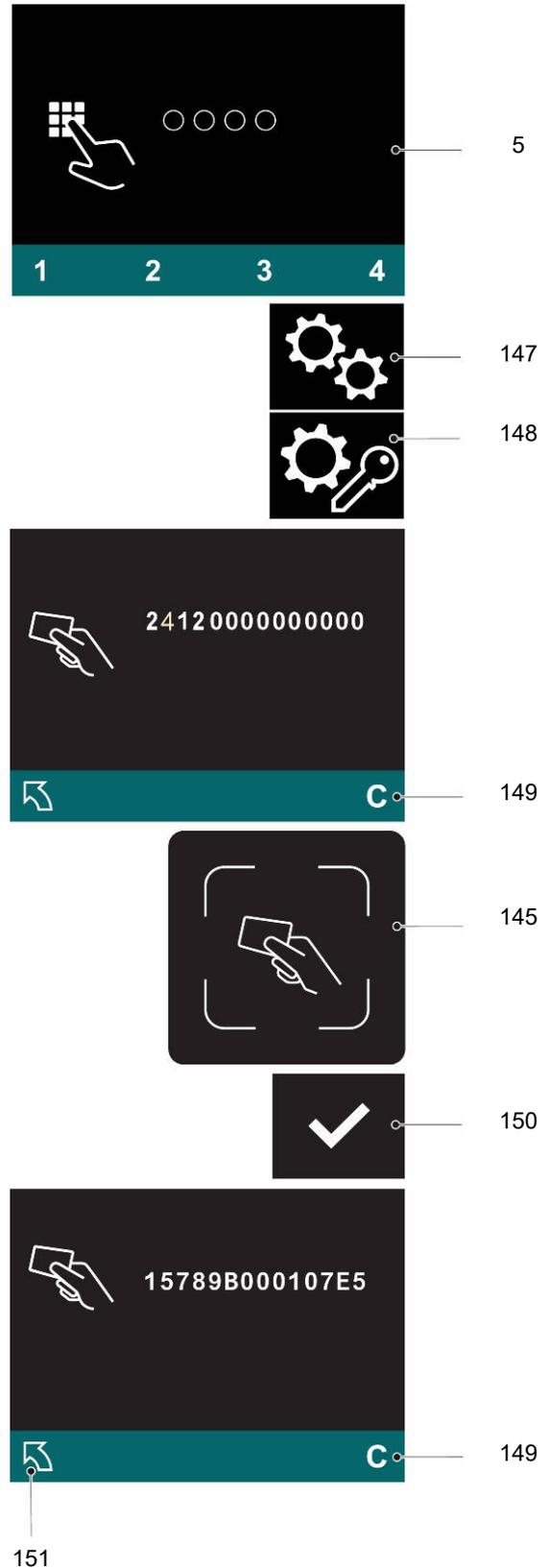
- To return to the main menu, press the key below the "Back" symbol (151).

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

Delete the default code, see page 209.

- Add new transponders, see page 208.

*The transponder reader is now active.*



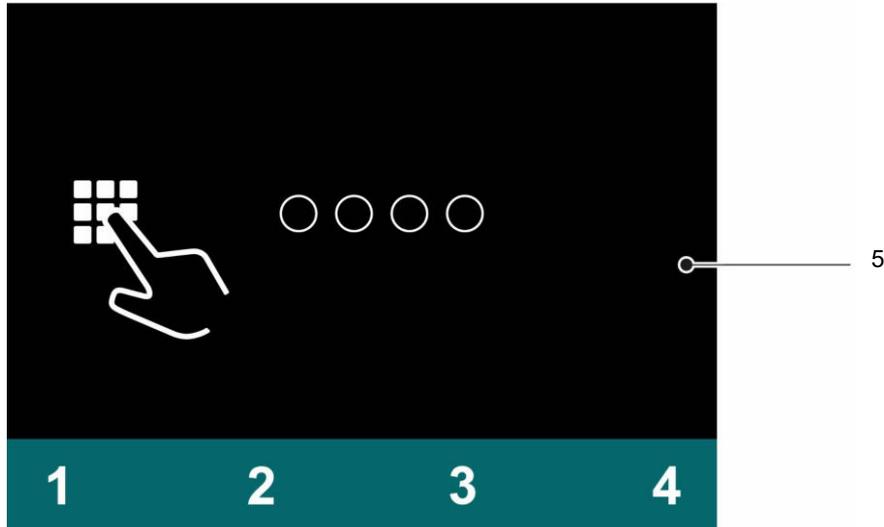
## 6.4 Keyless access system - display unit

### 6.4.1 Switching on the truck with an access code unit (display unit)

#### Procedure

- Release the emergency disconnect switch, see page 141.
- Enter the access code with the buttons below the display (5).

*The truck is switched on.*

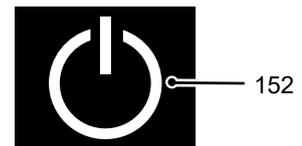


- The truck can only be switched on when the display unit (5) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

### 6.4.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (152) in the display unit.
- Press the Emergency Disconnect switch, see page 141.



*The truck is switched off.*

### 6.4.3 Changing the set-up code

#### Requirements

- The truck is switched on, see page 196.

#### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Change set-up code" symbol (148).
- Enter the set-up code using the keys below the display unit (5).

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

- Press the key below the "Delete" symbol (149).

*The set-up code is deleted.*

- Enter the new set-up code using the keys below the display unit (5).

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

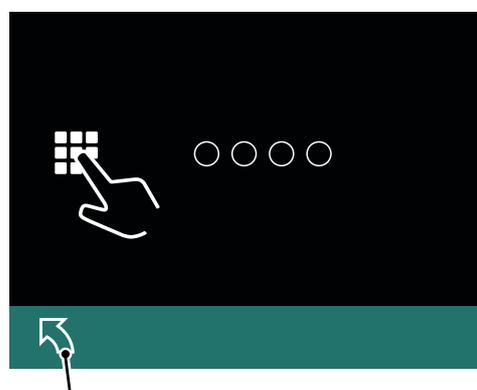
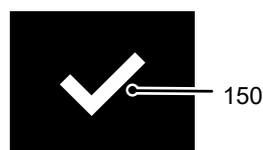
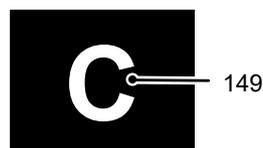
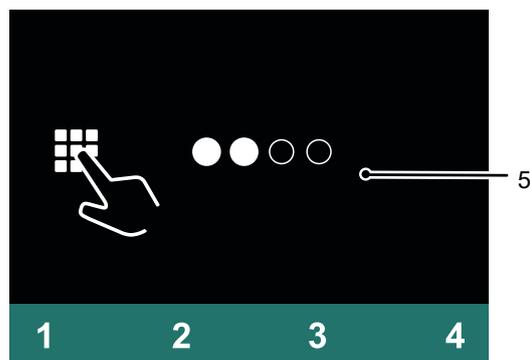
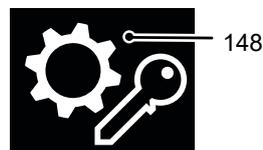
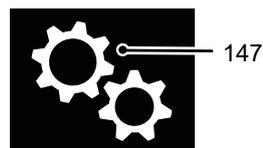
- Press the key below the "Confirm" symbol (150).

*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 (151).

*The set-up code has been changed.*



## 6.4.4 Adding a new access code

### Requirements

- The truck is switched on, see page 196.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Edit access code" symbol (153).

*The set-up code is requested.*

- Enter the set-up code using the keys below the display unit (5).

*All the access codes are displayed.*

- Press the key below the "Add" symbol (154).
- Enter the new access code using the keys below the display unit (5).

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

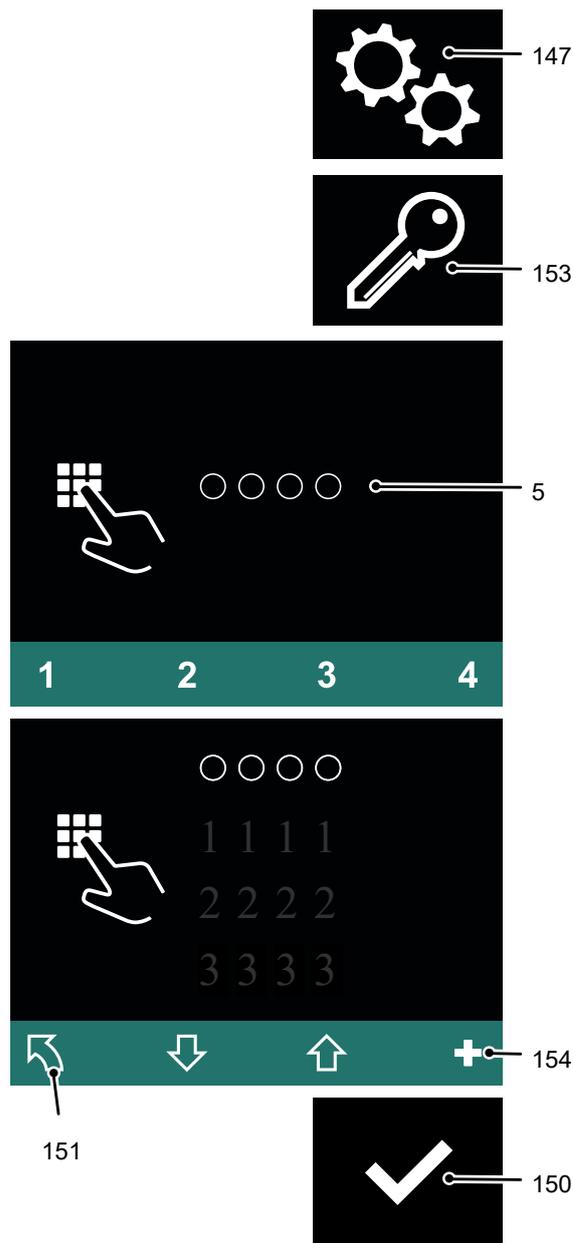
- Press the key below the "Confirm" symbol (150).

*The new access code is displayed.*

→ If the new access code has been entered incorrectly, delete it, see page 199, and add an access code again.

To return to the main menu, press the key below the "Back" symbol (151).

*A new access code has been added.*



## 6.4.5 Deleting an access code

### Requirements

- The truck is switched on, see page 196.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Edit access code" symbol (153).

*The set-up code is requested.*

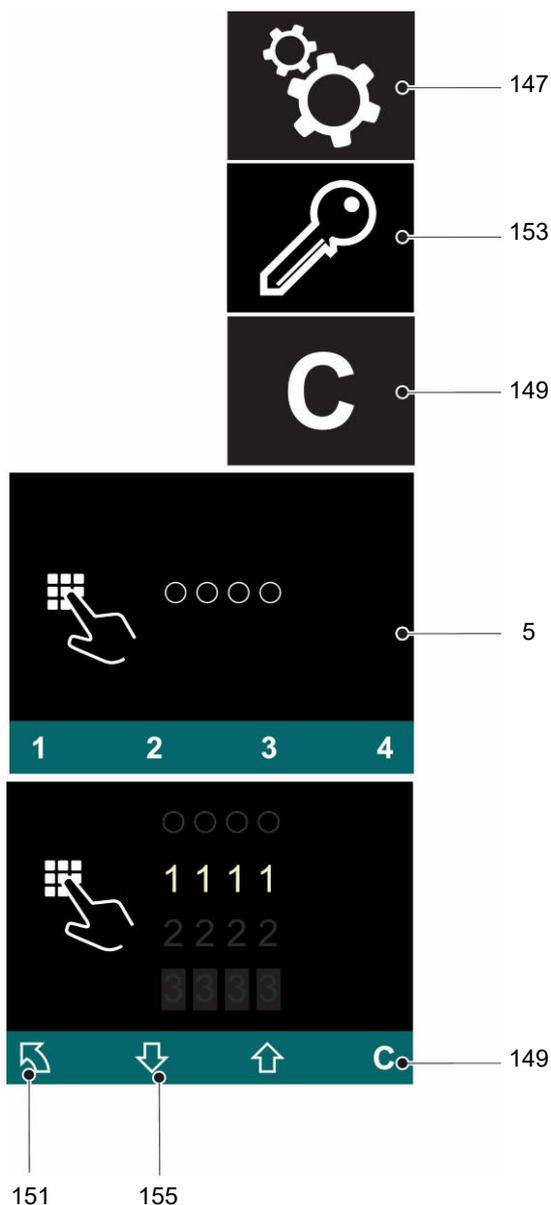
- Enter the set-up code using the keys below the display unit (5).

*All the access codes are displayed.*

- Select the access code to be deleted using the key below the "Down selection" symbol (155).
- Press the key below the "Delete" symbol (149).

*The access code has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (151).



## 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 196.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Log-in process" symbol (156).
- Enter the set-up code using the keys below the display unit (5).

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

- To scroll forward, press the button under the "Down selection" symbol (155) as many times as necessary.

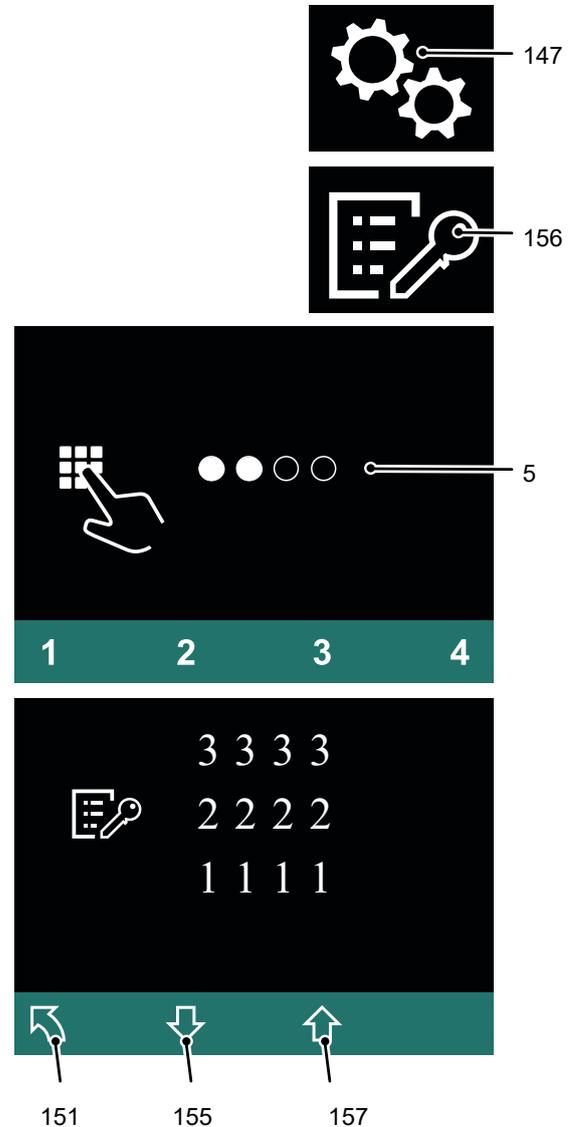
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (157) 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 (151).

*The log-in process is displayed.*



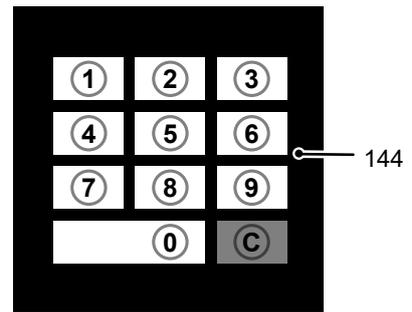
## 6.5 Keyless access system - keypad

### 6.5.1 Switching on the truck with the access code (keypad)

#### Procedure

- Release the emergency disconnect switch, see page 141.
- Enter the access code with the keypad (144).

*The truck is switched on.*



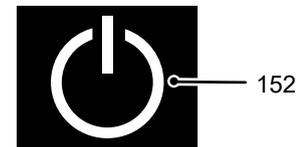
- The truck can only be switched on when the display unit (5) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

### 6.5.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (152) in the display unit.
- Press the Emergency Disconnect switch, see page 141.

*The truck is switched off.*



### 6.5.3 Changing the set-up code

#### Requirements

- The truck is switched on, see page 201.

#### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Change set-up code" symbol (148).
- Enter the set-up code using the keypad (144).

*The set-up code entered is shown in the display unit (5) as filled-in circles.*

- Press the key below the "Delete" symbol (149).

*The set-up code is deleted.*

- Enter the new set-up code using the keypad (144).

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

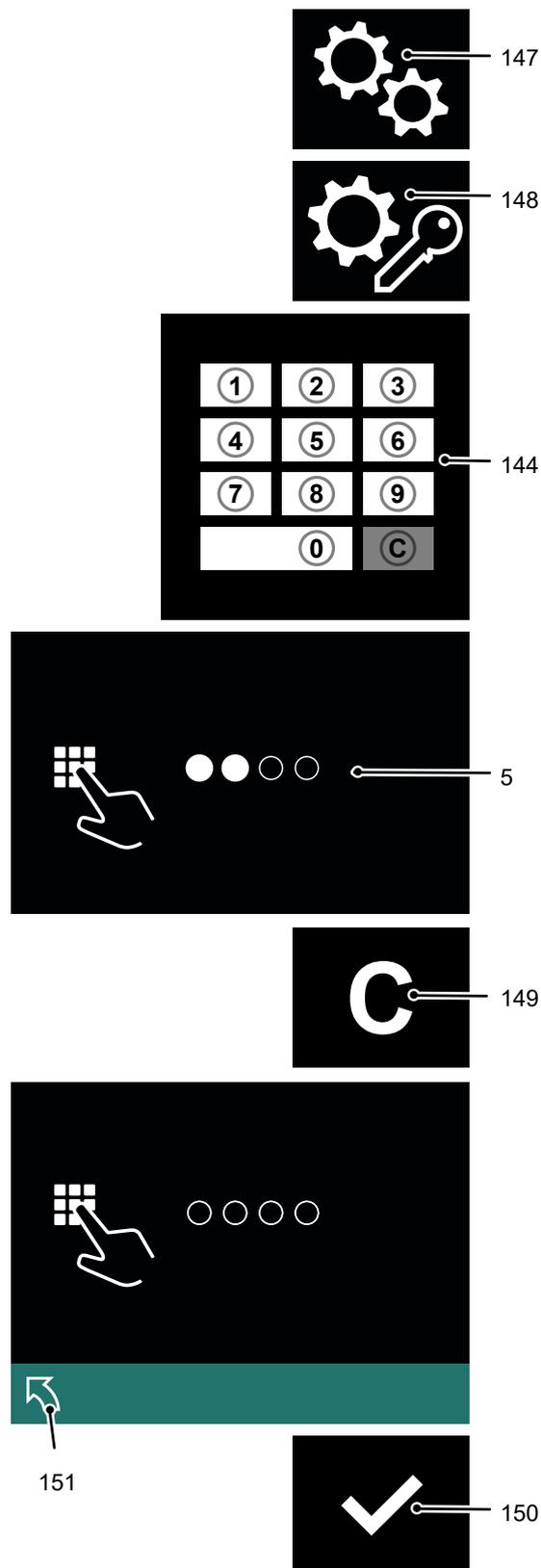
- Press the key below the "Confirm" symbol (150).

*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 (151).

*The set-up code has been changed.*



## 6.5.4 Adding a new access code

### Requirements

- The truck is switched on, see page 201.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Edit access code" symbol (153).

*The set-up code is requested.*

- Enter the set-up code using the keypad (144).

*All access codes are shown on the display unit (5).*

- Press the key below the "Add" symbol (154).
- Enter a new access code using the keypad (144).

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

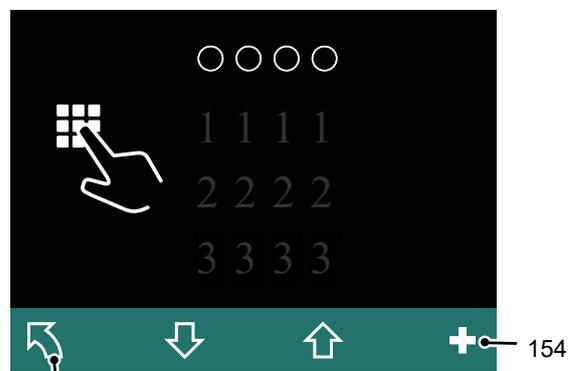
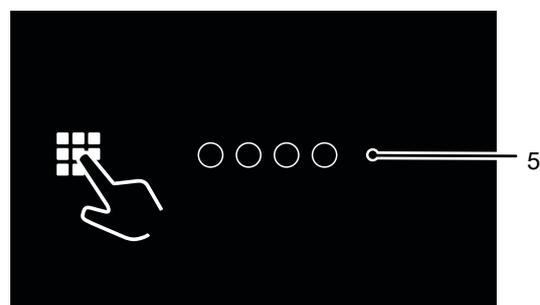
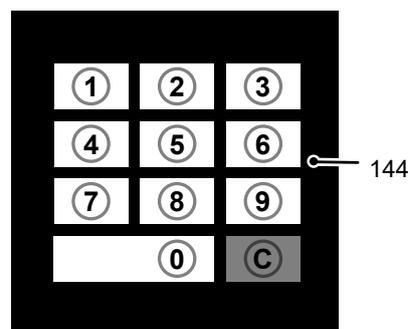
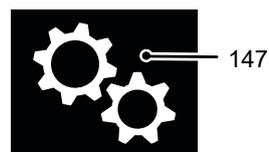
- Press the key below the "Confirm" symbol (150).

*The new access code is shown on the display unit (5).*

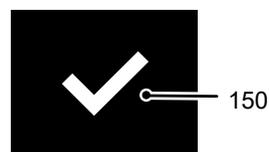
→ If the new access code has been entered incorrectly, delete it, see page 204, and enter the correct access code.

To return to the main menu, press the key below the "Back" symbol (151).

*A new access code has been added.*



151



## 6.5.5 Deleting an access code

### Requirements

- The truck is switched on, see page 201.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Edit access code" symbol (153).

*The set-up code is requested.*

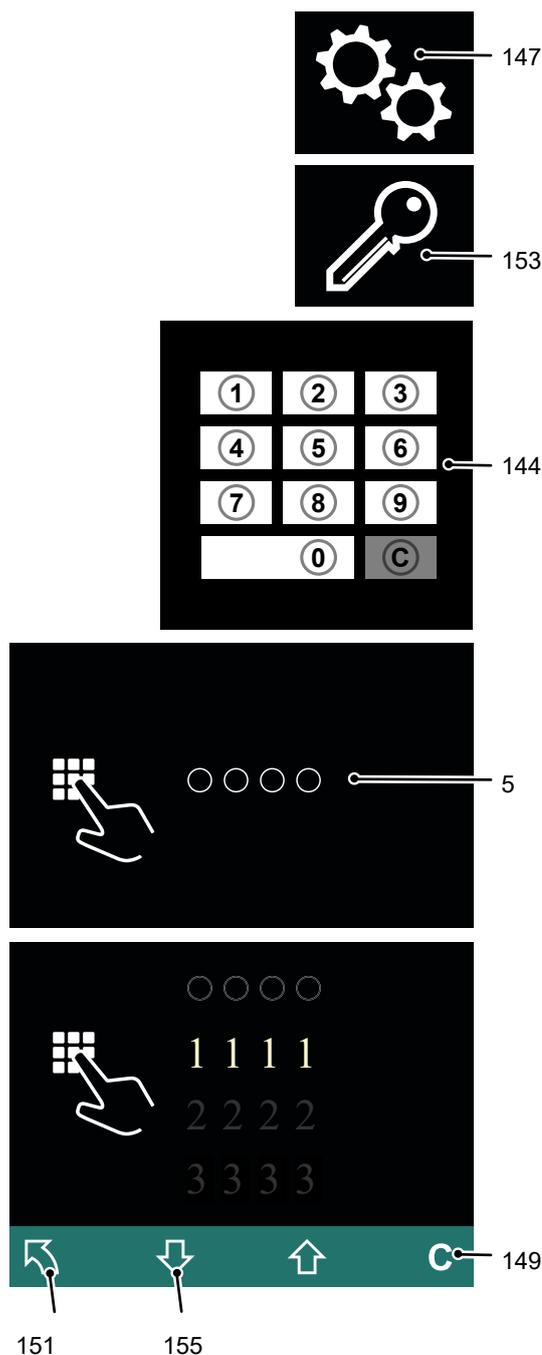
- Enter the set-up code using the keypad (144).

*All access codes are shown on the display unit (5).*

- Select the access code to be deleted using the key below the "Down selection" symbol (155).
- Press the key below the "Delete" symbol (149).

*The access code has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (151).



## 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 201.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Log-in process" symbol (156).
- Enter the set-up code using the keypad (144).

*The set-up code entered is shown in the display unit (5) as filled-in circles.*

- To scroll forward, press the button under the "Down selection" symbol (155) as many times as necessary.

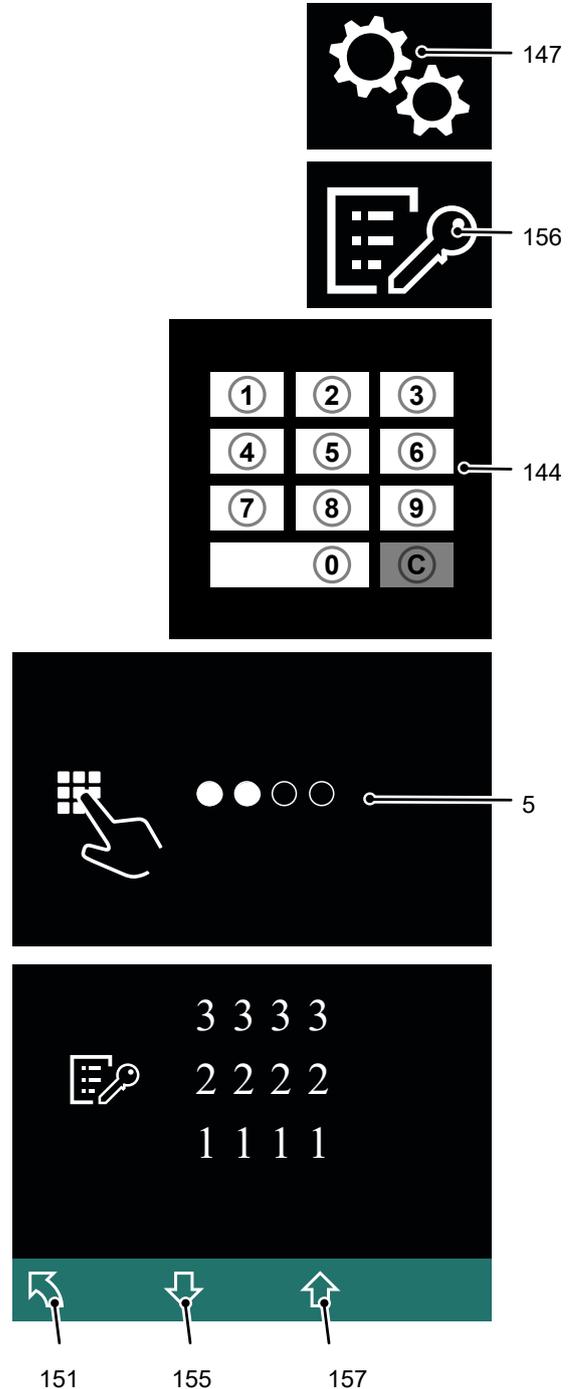
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (157) 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 (151).

*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

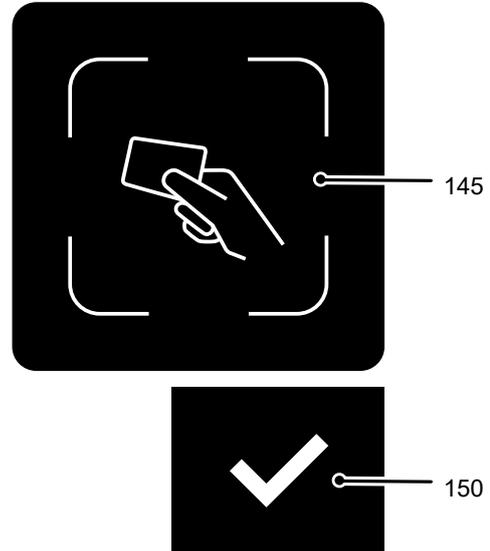
#### Procedure

- Release the Emergency Disconnect switch, see page 141.
- Hold the transponder in front of the transponder reader (145).

*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 (150).

*The truck is switched on.*



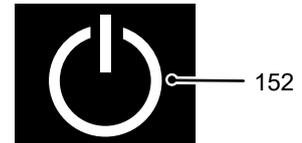
- The truck can only be switched on when the display unit (5) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

### 6.6.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (152) in the display unit.
- Press the Emergency Disconnect switch, see page 141.

*The truck is switched off.*



### 6.6.3 Changing the set-up transponder

#### Requirements

- The truck is switched on, see page 206.

#### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Change set-up code" symbol (148).
- Place the set-up transponder on the transponder reader (145).

*The code of the set-up transponder is shown on the display unit (5).*

- Press the key below the "Delete" symbol (149).
- Place the new set-up transponder on the transponder reader (145).

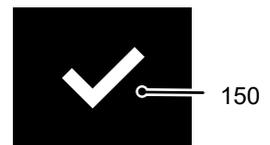
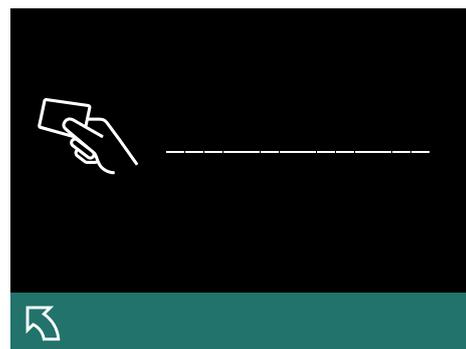
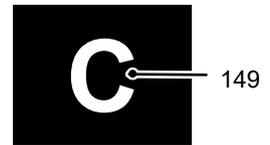
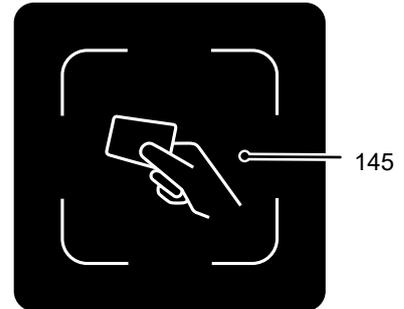
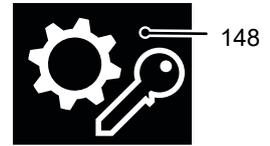
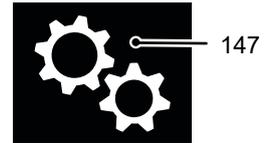
→ The new set-up transponder code must be different from existing transponder codes.

- Press the key below the "Confirm" symbol (150).  
*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 (149).

To return to the main menu, press the key below the "Back" symbol (151).

*The set-up transponder has been changed.*



151

## 6.6.4 Adding a new transponder

### Requirements

- The truck is switched on, see page 206.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Edit transponder" symbol (153).

*The set-up transponder is requested.*

- Place the set-up transponder on the transponder reader (145).

*All transponder codes are shown on the display unit (5).*

- Press the key below the "Add" symbol (154).
- Place the new transponder on the transponder reader (145).

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

- Press the key below the "Confirm" symbol (150).

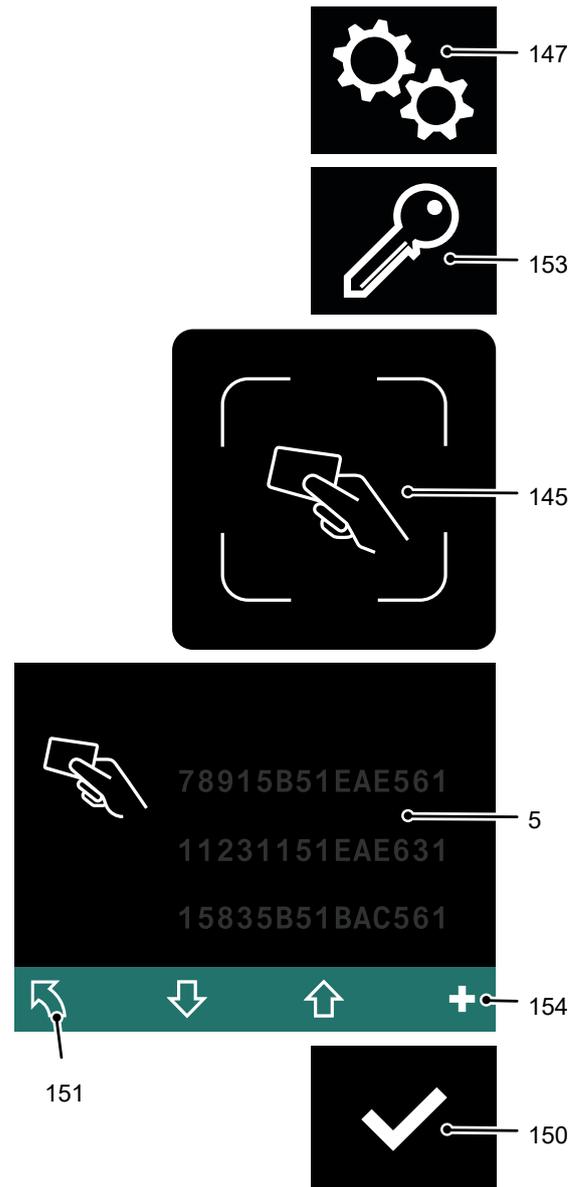
*The new transponder code is displayed.*

→ If the wrong transponder has been used, delete it, see page 209, and add a correct transponder.

To return to the main menu, press the key below the "Back" symbol (151).

*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 206.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Edit transponder" symbol (153).

*The set-up transponder is requested.*

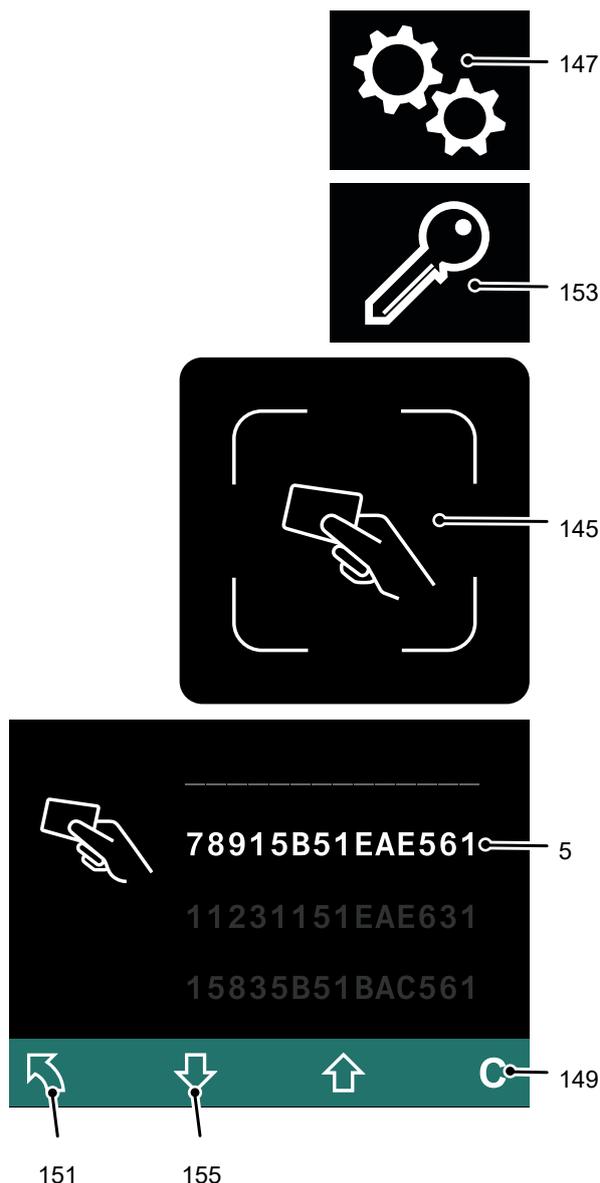
- Place the set-up transponder on the transponder reader (145).

*All transponder codes are shown on the display unit (5).*

- Select the transponder code to be deleted using the key below the "Down selection" symbol (155).
- Press the key below the "Delete" symbol (149).

*The transponder has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (151).



## 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 206.

### Procedure

- Press the key below the "Settings" symbol (147).
- Press the key below the "Log-in process" symbol (156).
- Place the set-up transponder on the transponder reader (145).
- To scroll forward, press the button under the "Down selection" symbol (155) as many times as necessary.

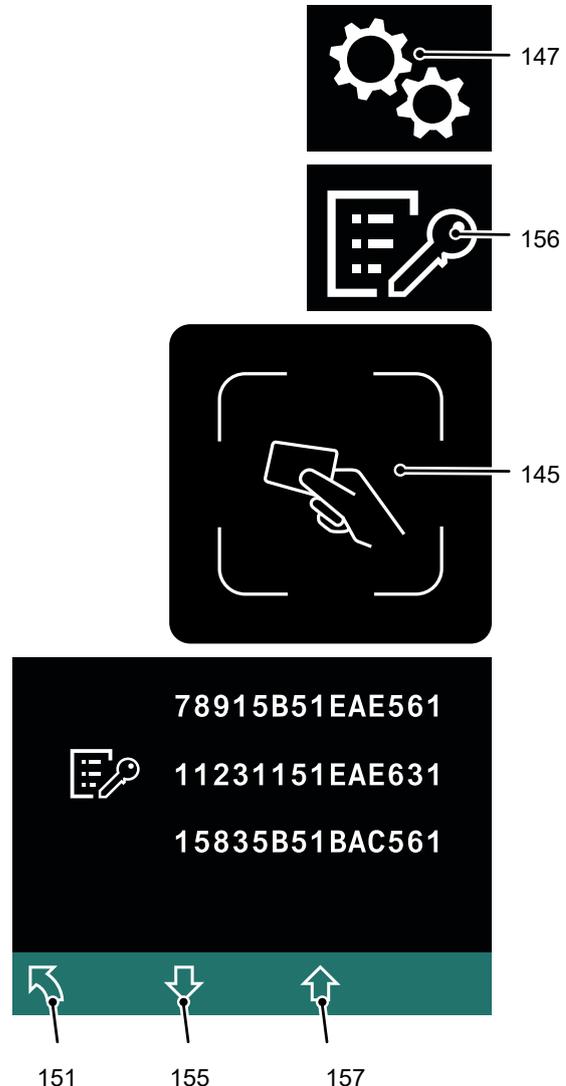
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (157) 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 (151).

*The log-in process is displayed.*



## 6.7 Voltage Transformer

### Voltage transformer and interfaces

Performance data 12V: 12V / 150 W

Pin 1 and 2

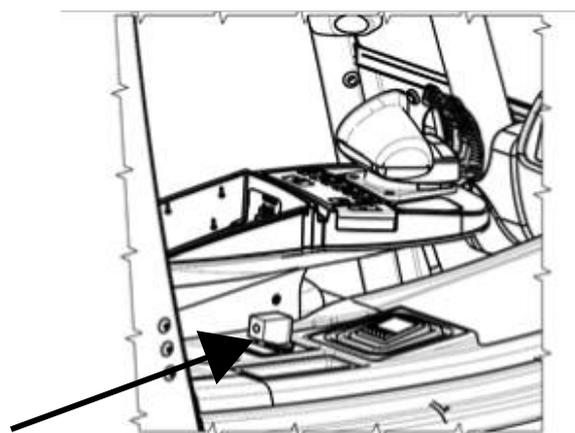
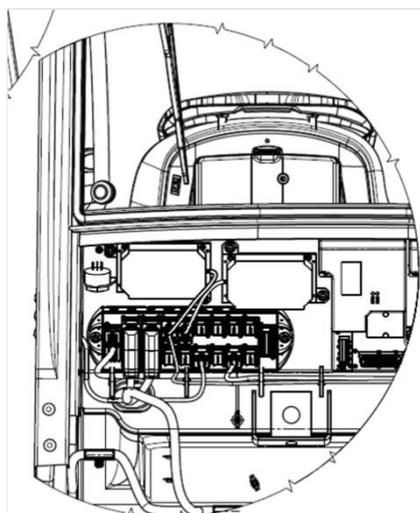
Pin no.	Pin definition
1	12 V
2	0 V

Performance data: 24V / 150 W

Pin 1 and 2

Pin no.	Pin definition
1	24 V
2	0 V

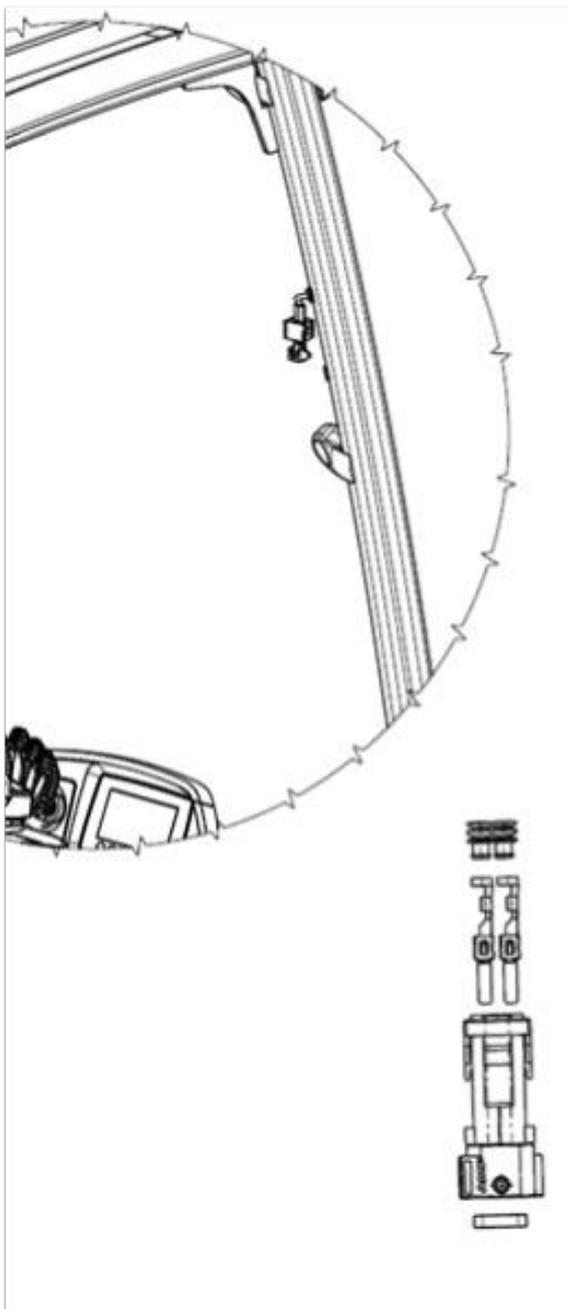
### Rear and storage facility



Voltage tap central 24V: 96 Watt

Pin no.	Pin definition
1	24 V
2	0 V

## Overhead guard



## WMT voltage supply (permanent voltage)

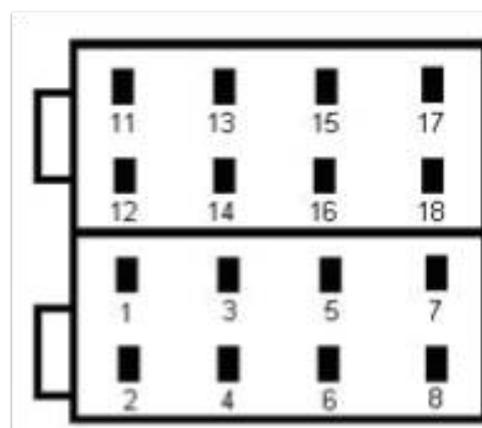
Performance data: 48V

Pin no.	Pin definition
1	0V (GND)
2	+ (with key switch switched)
3	+ (permanent)
4	GND
5	GND



## Voltage supply – radio preparation

Pin no.	Pin definition
1	NC
2	Telemute
3	NC
4	Battery +12V
5	Switch output +12V
6	Lighting
7	ACC +12V
8	Earth 0V
11	Rear right (+)
12	Rear right (-)
13	Front right (+)
14	Front right (-)
15	Front left (+)
16	Front left (-)
17	Rear left (+)
18	Rear left (-)



## 6.8 Assistance systems

The Access, Drive and Lift Control systems help the driver operate the truck with regard to safety regulations, see page 133 of the present operating instructions.

### 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.

#### 6.8.1 Access Control

The truck is only released for operation if:

1. The operator is seated.
2. The truck is switched on via the key switch (ISM ○ / transponder ○ / keypad ○).
3. He 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	Yellow	Seat switch not applied or seat switch applied for more than 6 hours uninterrupted
		Red	Error on seat switch
	Seat belt lock control	Yellow	Seat belt not latched
		Red	Wrong activation sequence of seat switch and belt lock

## 6.8.2 Drive Control

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 119 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.

## 6.8.3 liftCONTROL

This option includes Drive Control 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.

Optional:

- Tilt angle display.

***In addition to the daily checks before starting, the driver 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.

## 6.8.4 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.

## 6.9 Steel cab

For trucks fitted with a steel cabin, both doors can be closed.

Trucks with cabin door monitoring may experience the following situations if the cabin door is not locked:

- The cabin door open symbol (see page 110) 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.

### **⚠ 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.

### **⚠ 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.

### **⚠ CAUTION!**

#### **Risk of crushing from the cabin door**

You can trap hands or feet when the cabin doors are opened and closed.

- ▶ Do not allow anything to come between the cabin frame/footwell and cabin doors when opening and closing the cabin doors.

### **⚠ CAUTION!**

#### **Risk of injury if the seat belt is not fastened**

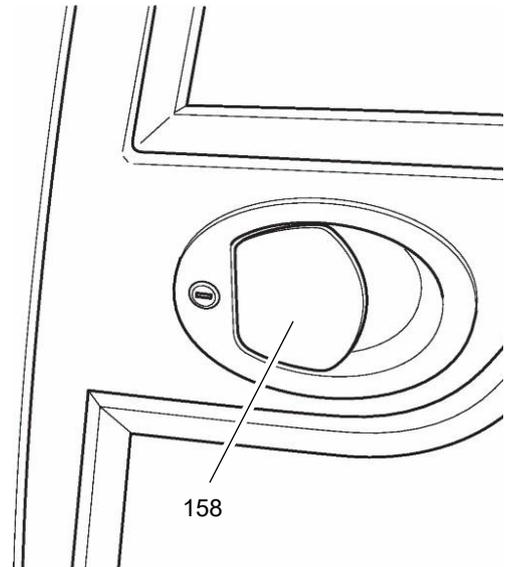
The following must be observed for trucks with approved restraint systems:

- ▶ 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.

## ***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 (158).
- 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.

## 6.10 Sliding windows

### **⚠ CAUTION!**

**An unlocked sliding window can cause accidents**

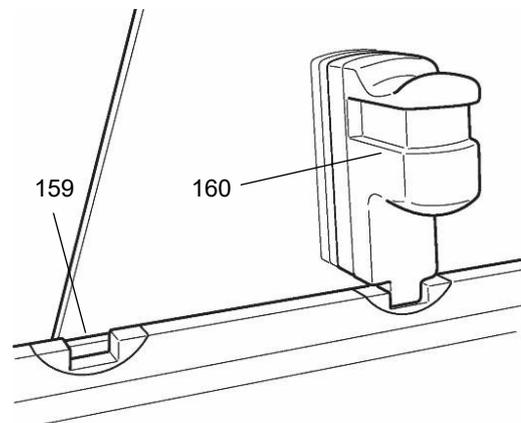
► The sliding windows must be locked at all times.

---

### ***Opening and closing the windows***

#### *Procedure*

- Push the lock (160) up.
- Move the window forward or back.
- Insert the lock in the stop (159).

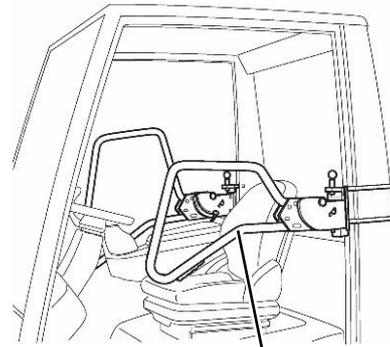


## 6.11 Gate

### ⚠ 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 131.
- ▶ When the driver's seat is under load, a distance of 90 mm must be observed between the swivelling gate (161) and the seat to ensure operational safety.



161

### ⚠ 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!

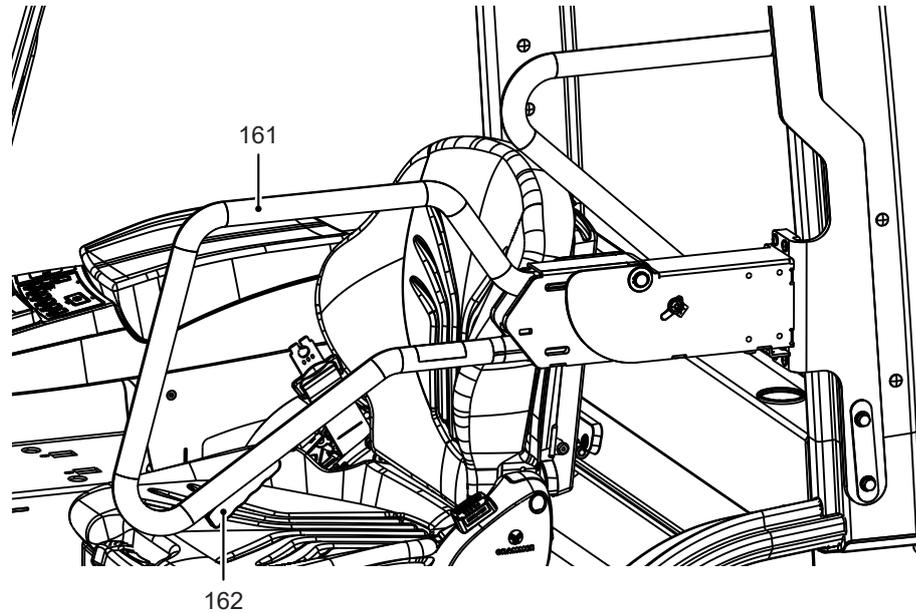
#### Risk of injury if the seat belt is not fastened

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, (161) press the handle (162).  
*The gate automatically folds up and remains in this position.*
- To close the gate (161), 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:

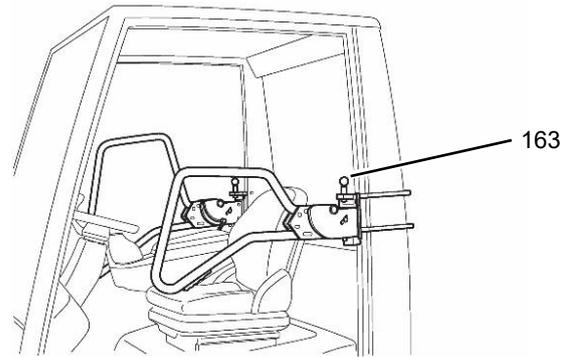
- The cabin door open symbol lights up in the display unit.
- The truck speed is limited to a maximum of 4 km/h or the travel cut-off is activated.

→ The right swivelling gate is not monitored.

## **Moving the gate**

### **Procedure**

- For service work the gate can be moved out. To do this, pull the spring pin (163) up and turn the gate out manually.



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.

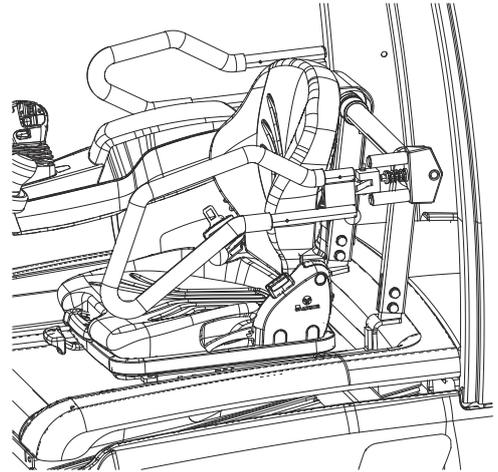
→ The right swivelling gate is not monitored.

## 6.12 Automatic / mechanical folding gate

### ⚠ CAUTION!

#### A faulty folding gate can cause accidents

- ▶ Never use the truck with a non-functional folding gate. Have the folding gate checked by authorised specialist personnel after an accident. Do not modify the folding gate.
- ▶ After closing the folding gate, fasten the seat belt, see page 131.



### ⚠ CAUTION!

#### Accident risk when opening the folding gate during travel

If the folding 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 folding gate while driving.

- ▶ Do not open the folding 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.

On trucks with folding gate monitoring, the following occurs if the folding 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.



In the case of trucks with multiple restraint systems, the use of the seat belt is not always mandatory. However, the manufacturer strongly recommends the additional use of the seat belt, since the seat belt also prevents injuries caused by a rear-end collision for example.

#### Hazardous situations

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 fall.

### ***Mechanical folding gate operation***

#### *Procedure*

- To open, push the left gate in and at the same time lift it up.
- When the gate is released, it automatically moves forward and locks in position.

### ***Automatic folding gate operation***

#### *Procedure*

- To open, push the left gate in and at the same time lift it up. This prevents the truck from travelling.
- Travel is activated again when the system has been closed.

## 6.13 Panel door

### **⚠ CAUTION!**

#### **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 131.
- 

### **⚠ 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.
- 

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 110).
- The truck speed is limited to a maximum of 4 km/h or the travel cut-off is activated.

- ☞ Additional use of the seat belt is recommended for trucks with summer door monitoring.

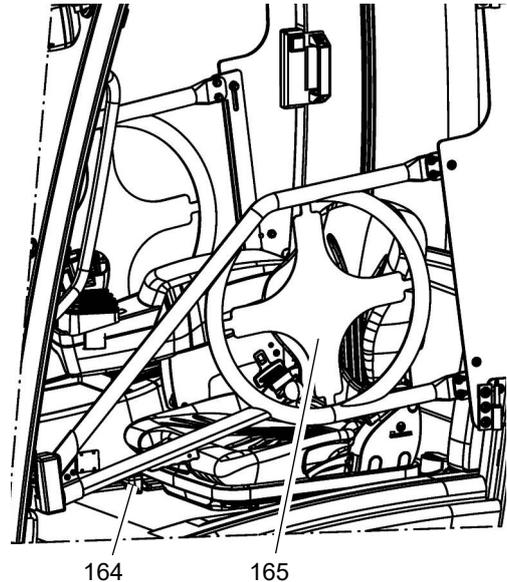
## What to do in hazardous situations

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 (164) towards the operator position, the door swings open.
- Pull the door (165) towards the operator until the lock engages; the door closes.



- The position of the door is monitored. Travel is only enabled when the door is closed.

## 6.14 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 300 mm, see page 32.

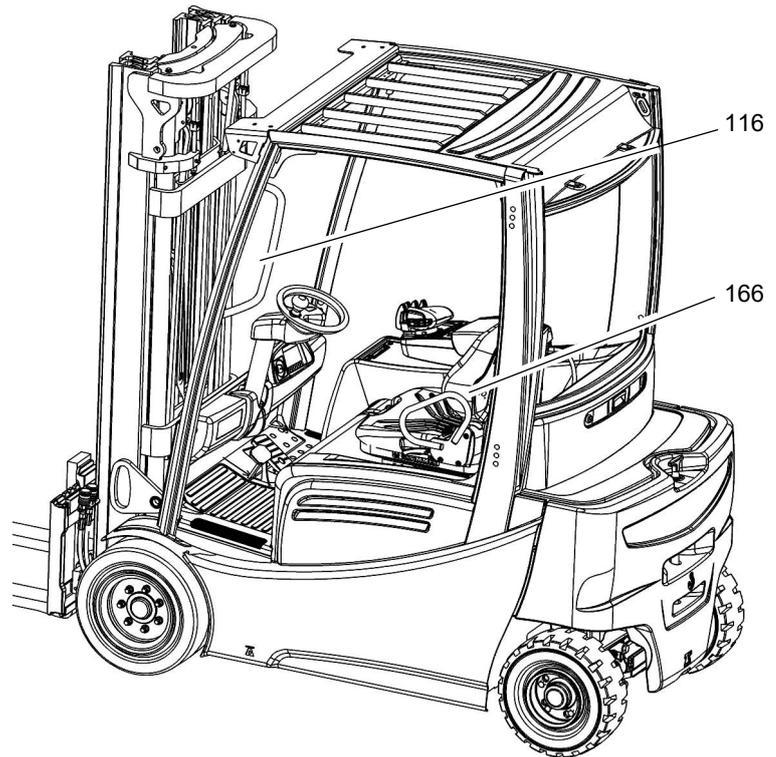
▶ Adapt the travel speed of the truck, in particular when cornering.

- For entry and exit see page 122.

## 6.15 Entering or exiting with the hip restraint on the driver's seat

### Procedure

- Open the cab door (○).
- To enter and exit the cab, hold onto the handle (116) and (166). Always face the truck when entering and exiting.



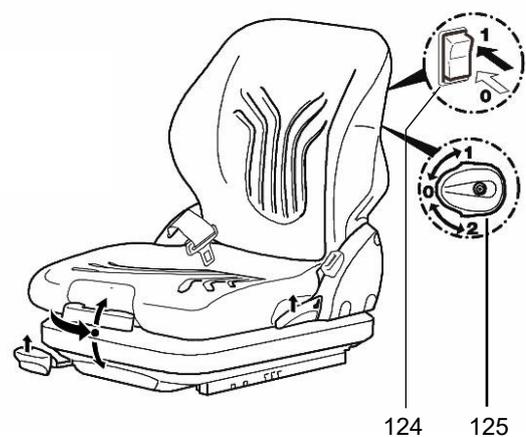
- ➔ Always use the entry aids (116) and (166) provided to climb onto the truck.
- ➔ An additional step is provided for the driver position extension (○).

## 6.16 Switching the Seat Heating On and Off

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

#### Procedure

- Press the seat heating switch (124).  
Switch setting 1 = Seat heating on.  
Switch setting 0 = Seat heating off.



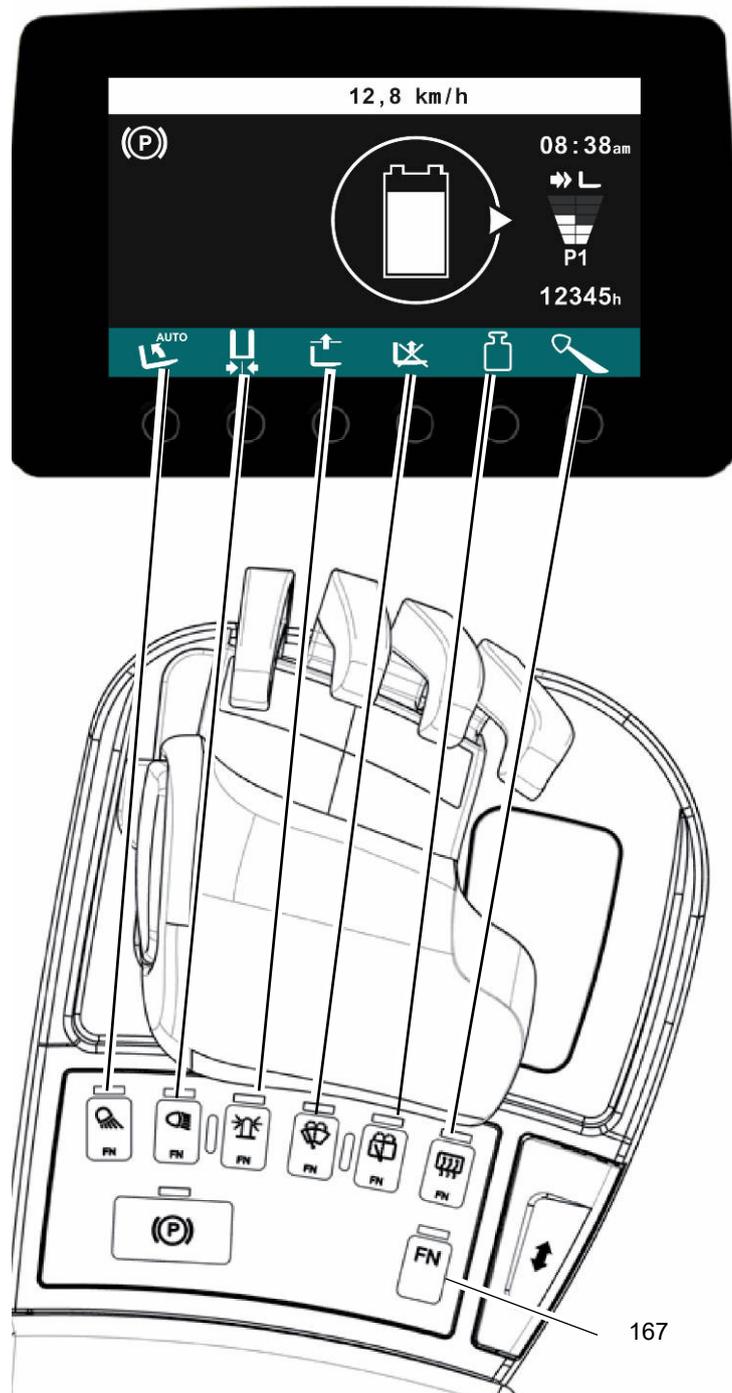
## 6.17 Auxiliary Functions on the Armrest

### 6.17.1 Activating the auxiliary functions on the armrest

#### Procedure

- Press the FN (167) button. Status lamp above the FN button lights up. Auxiliary functions are displayed.
- Press the corresponding button in the armrest control panel and activate/deactivate the auxiliary option. The icons of the auxiliary functions activated have white backgrounds.
- Press the FN button. The display automatically switches back to normal operating mode after 5 seconds or when the "FN" button is pressed.

*Additional feature is activated or deactivated.*



- The truck can be switched off at any time.
- When the FN button is pressed, the soft keys under the display are deactivated.

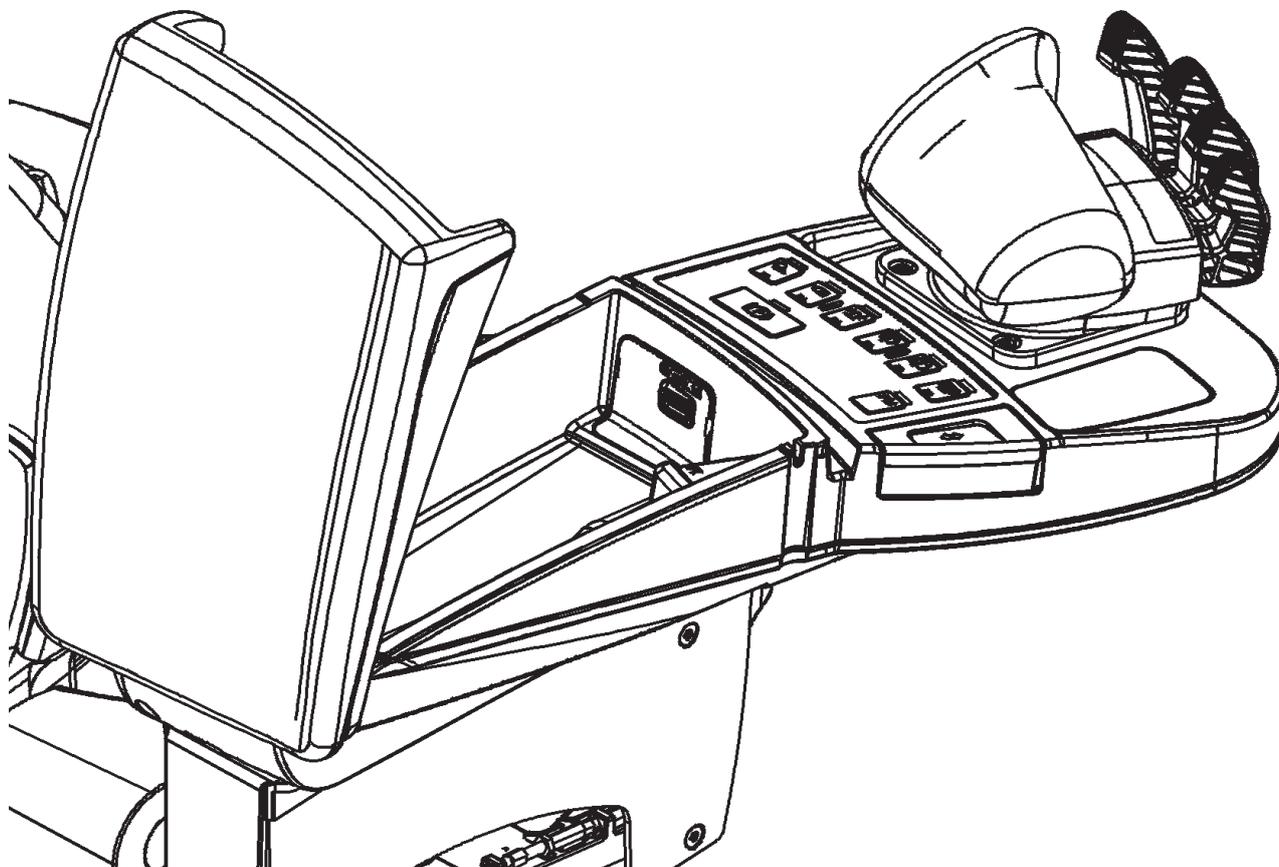
## 6.17.2 Auxiliary functions in the display unit above the FN button

Symbol	Meaning
	Lift cut-off override: Allows the lift cut-off to be overridden.
	Side shift centre position: Activates the side shift centre function
	Load weighing
	Operating hydraulics function cut-off
	Fork tilt horizontal: Activates the fork tilt horizontal function, see page 244.

### 6.17.3 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 Switching off the operating hydraulics

Change over via the FN button in the armrest to deactivate all operating hydraulics functions (lifting, tilting, auxiliary functions 1, 2, 3).

Symbol	Meaning
	Operating hydraulics function cutout

## 6.19 Load Weighing

The integrated load weighing system measures the weight continuously with a tolerance of 2% of the rated capacity. The weighing system is not a substitute for calibrated scales.

Change over via the FN button in the armrest to activate the load weighing display. A load measurement is performed for each lifting and lowering operation that lasts longer than 1 second. The reading appears at the top left of the display.

A tare value can be set at the customer's request. Contact the manufacturer's customer service department for this specific task.



Symbol	Meaning
	Load weigh

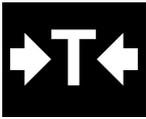
## 6.20 Load Weighing Plus

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.

### 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.

## 6.21 tiltCONTROL

The Tilt Control function is activated when a pre-configured load is raised, and is used to compensate the simultaneous forward tilt of the truck and backward tilt of the mast.

Symbol	Meaning
	Tilt Control

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

## 6.22 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).

### Centre position at 0 deg



### Slightly tilted forwards -1 deg to -5 deg



**Heavily tilted forwards > -5 deg**



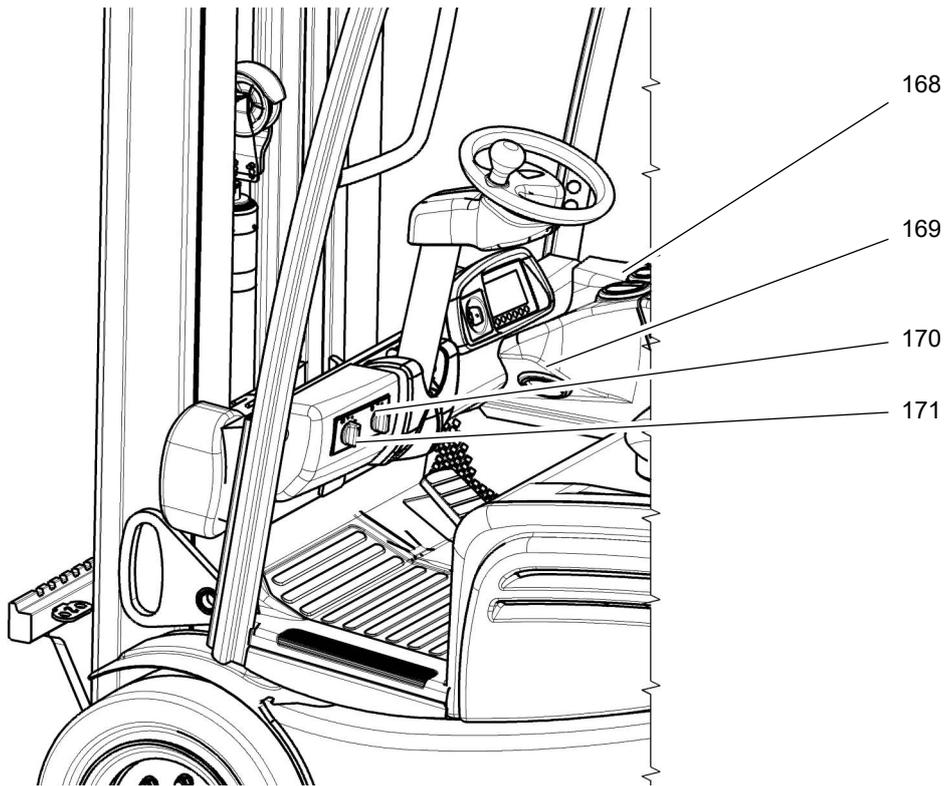
**Slightly tilted backwards 1 deg to 5 deg**



## Heavily tilted backwards > 5 deg



## 6.23 Heating



Item	Designation
168	Body / window nozzles
169	Foot compartment jet
170	Temperature controller
171	Fan settings

### ***Heating operation***

#### ***Procedure***

- Press the switch (171) to switch on the fan.
- Set the nozzles (168,169) to the required position.
- Turn the temperature controller (170) to the right to increase the cab temperature.
- Turn the temperature controller (170) to the left to decrease the cab temperature.

➔ Regular maintenance is required to ensure that the heater functions correctly, see page 331

## **Replacing the air conditioning filter**

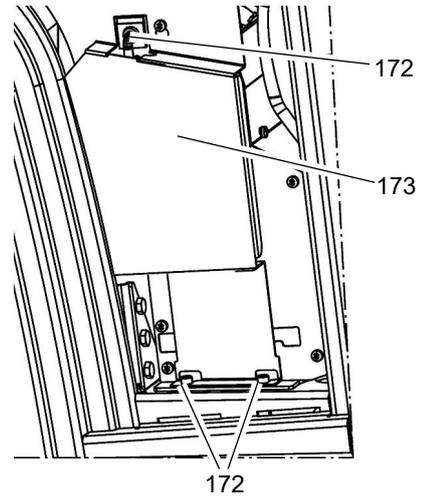
### **Requirements**

- Filter contaminated

### **Procedure**

- Loosen the screws (172).
- Remove the panel (173).
- Replace the filter.
- Attach the panel (173).
- Tighten the screws (172).

*The filter cassette is now replaced.*



## 6.24 Removable load backrest

### **⚠ CAUTION!**

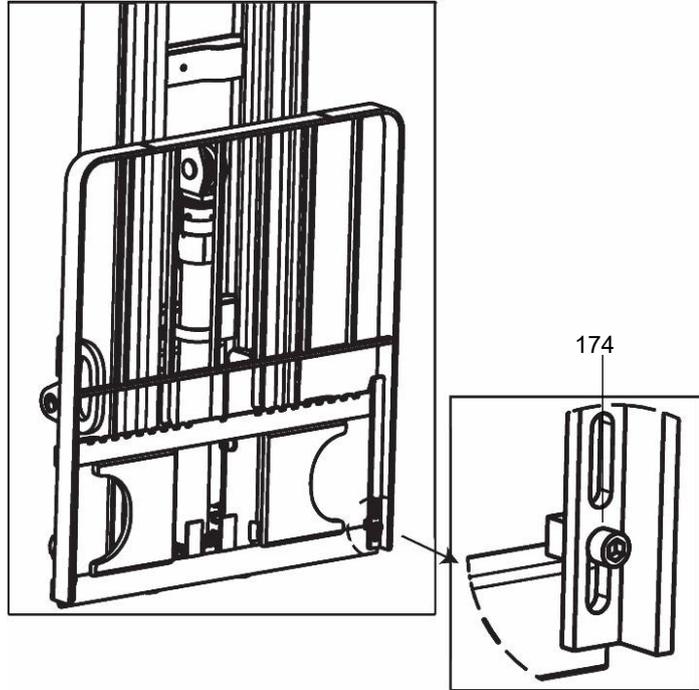
#### **Trapping hazard and heavy load backrest weight**

- ▶ 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 (174).
- 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

## 6.25 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 296.
- ▶ 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.

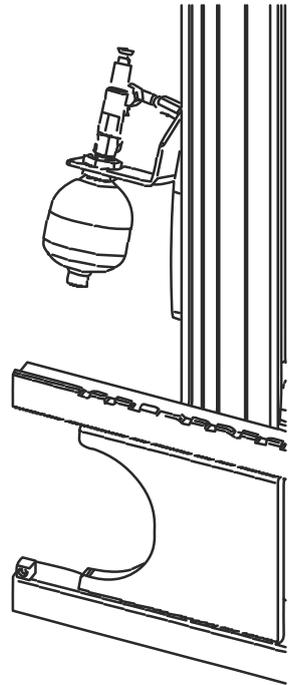
- ▶ Do not touch pressurised hydraulic lines.
- ▶ Report any defects immediately to your supervisor.
- ▶ Mark defective truck and take out of service.
- ▶ Do not return the industrial truck to service until you have identified and rectified the fault.
- ▶ Remove any spilled hydraulic immediately with 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 Overriding the lift cut-off

- A lift cutout device can be factory fitted when working in areas of restricted height. This interrupts lifting.

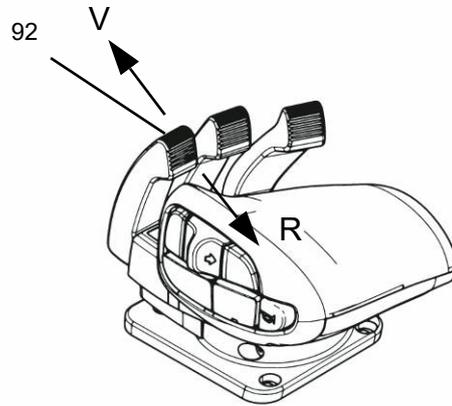
### **To continue lifting:**

#### *Requirements*

- Inspection and tasks before starting daily operations performed (see page 119).
- "Lift cutout" tested with function key (see page 229).

#### *Procedure*

- Press the lift cutout override button (see page 229).
- Pull the lever (92) to continue lifting beyond the lift cutout.



*Lift cutout is deactivated until the fork carriage is lowered below the height limit setting.*

## 6.27 Sideshifter Centre Position

Automatic sideshifter centring operation.

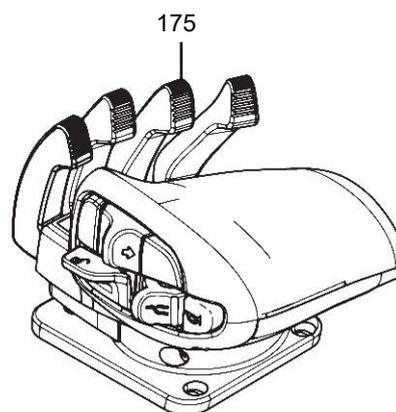
### *Requirements*

- Inspection and tasks before starting daily operations performed (see page 119).
- Check automatic sideshifter centring checked with the function key, see page 108.

### *Procedure*

- Press the sideshifter centring button, see page 108.
- Pull or push the lever (175) until the sideshifter cuts out in the middle.

*"Sideshifter centring" is deactivated when the fork carriage stops in the middle.*



## 6.28 Fork Tilt Horizontal

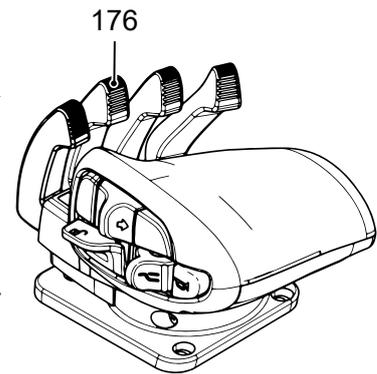
Operation of automatic fork tilt horizontal.

### Requirements

- Checks and operations before starting daily work completed, see page 119.
- "Fork tilt horizontal" function tested, see page 229.

### Procedure

- Press the fork tilt horizontal button (see page 110) if the function is not permanently triggered after switching on (○) or through previous actuation (○).
- Pull or push the lever (176) 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

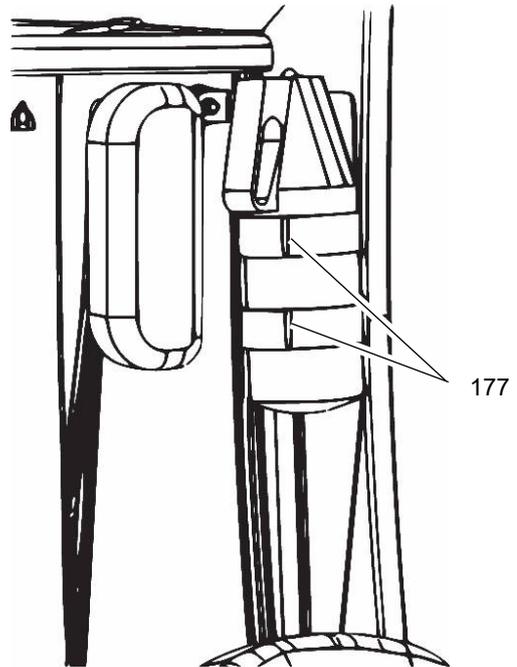
Symbol	Meaning	Colour	Function
	Fork tilt horizontal	Green	Forks horizontal, mast tilt 0°

## 6.29 Fire extinguisher

### *Procedure*

- Open the fasteners (177).
- Pull the fire extinguish out of its bracket.

→ To operate, refer to the illustrations on the fire extinguisher.



## 6.30 Rockinger coupling with hand lever or remote control

→ Refer to the instructions for towing trailers, see page 190.

### **⚠ CAUTION!**

**Incorrectly coupled trailers can cause accidents**

- ▶ Make sure the coupling is engaged securely before starting the truck.
- ▶ The control pin (180) must be flush with the control sleeve (181).

### **Operating the Rockinger 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 (179)/remote control (178) (○).

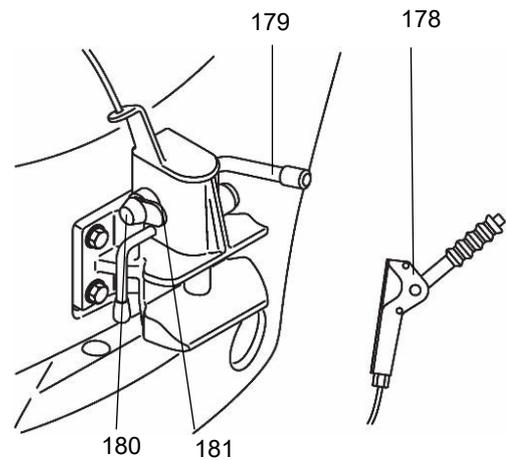
→ Depending on the truck version, the remote control (178) (○) is in the overhead guard area.

- Slowly reverse the truck until the coupling engages.
- Push down the hand lever (179)/remote control (178) (○).

### **Operating the Rockinger coupling (uncoupling the trailer)**

#### *Procedure*

- Prevent the trailer from rolling away.
- Pull up the hand lever (179)/remote control (178) (○).
- Drive the truck forward.
- Push down the hand lever (179)/remote control (178) (○).



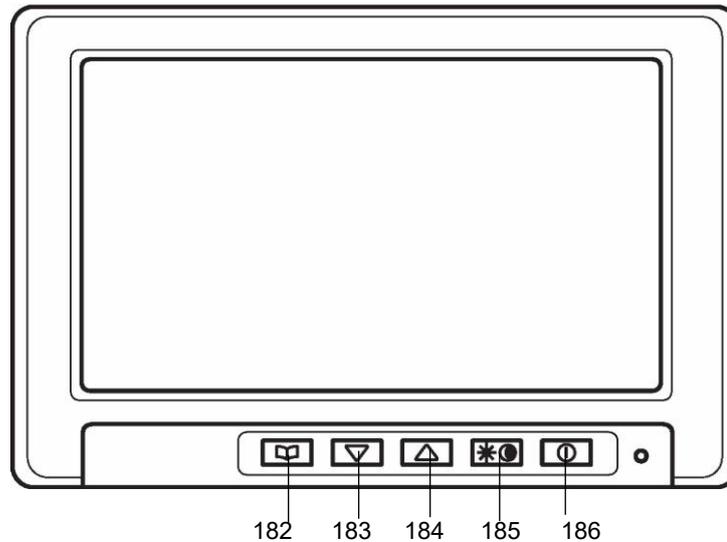
## 6.31 Camera system

### **⚠ CAUTION!**

#### **Accident risk from hidden work areas**

- ▶ The camera system acts as an aid to assist safe operation.
- ▶ Practice travelling and working with the camera system.
- ▶ Align the camera so that the hidden work area can be seen.

- When using the camera to reverse, the monitor automatically switches on when you engage reverse gear.



#### **Using the camera system**

- Press the button (186) on the monitor to switch the camera system on or off.
- Press the button (185) to lighten or darken the screen (day / night settings).
- Press the button (182) to open the menu.

- Pressing the button several times changes the menu item (contrast, brightness, colour saturation, language, video, light reflection) or quits the menu.

#### Adjusting the menu items

- Press the button (184) to go one step forward.
- Press the button (183) to go one step back.

- Clean a dirty screen or vent slots with a soft cloth or brush.

## 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**

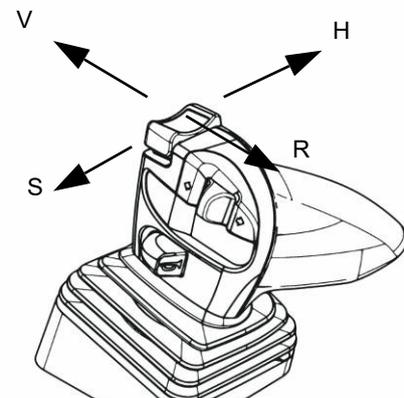
### **⚠ CAUTION!**

#### **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.

## **Duo-Pilot**

### **Lifting**

#### *Procedure*

- Push the Duo-Pilot lever (92) to the right (direction H) to raise the load.
- Push the Duo-Pilot lever (92) to the left (direction S) to lower the load.

## Tilting

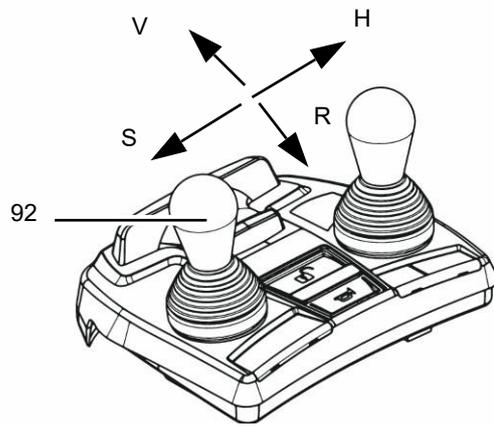
### **⚠ CAUTION!**

#### **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 (92) forward (direction V) to tilt the load forward.
- Pull the Duo-Pilot lever (92) 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.
-

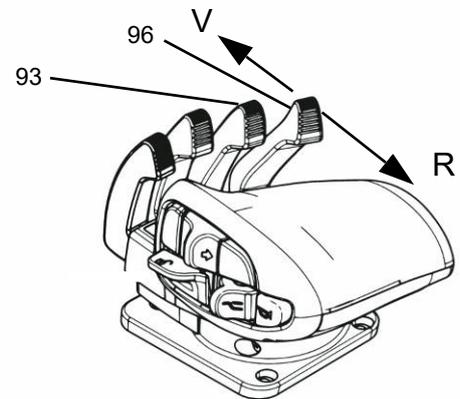
### 6.33.1 soloPILOT with control of ZH1 and ZH2 hydraulic ports

- Depending on the attachments used the lever / button (93,96), is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

#### Procedure

- Operating hydraulic port ZH1:  
Move the lever (93) in direction V or R.
- Operating hydraulic port ZH2:  
Move the lever (96) in direction V or R.

*The function of the attachment is performed.*



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

#### **⚠ CAUTION!**

#### **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.

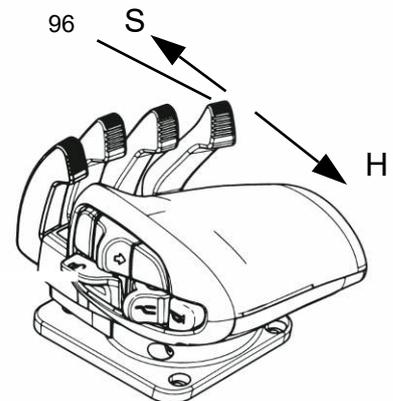
#### Requirements

- Truck prepared for operation see page 139.

#### Procedure

- Pull the lever (96) in direction H, the forks move together.
- Push the lever (96) in direction S, the forks move apart.

*The forks are now positioned.*



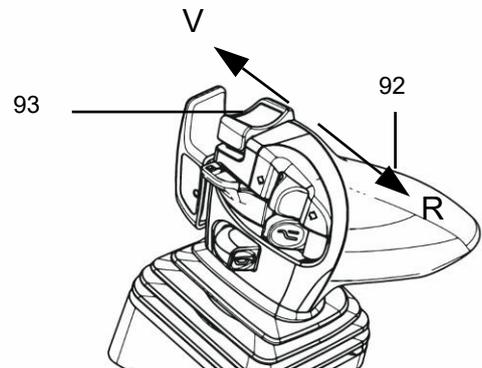
### 6.33.3 multiPILOT with control of ZH1 and ZH2 hydraulic ports

- Depending on the attachments used the lever / button 92,93), is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

#### Procedure

- Operating hydraulic port ZH1:  
Press the (93) button to the left or right.
- Operating hydraulic port ZH2:  
Push the lever (92) 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)

#### **⚠ CAUTION!**

#### **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.

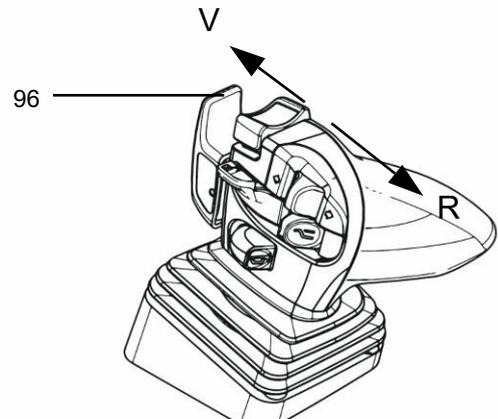
#### Requirements

- Truck prepared for operation see page 139.

#### Procedure

- Pull the button (96) in direction R, the forks move apart.
- Push the button (96) in direction V, the forks move together.

*The forks are now positioned.*



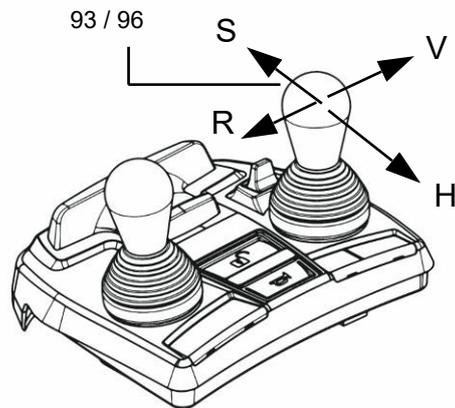
### 6.33.5 duoPILOT with control of ZH1 and ZH2 hydraulic ports

- Depending on the attachments used the lever / button (93,96), is assigned the function of the attachment. Unused levers have no function. For connections see page 185.

#### Procedure

- Operating hydraulic port ZH1:  
Push the lever (93) in direction V or R.
- Operating hydraulic port ZH2:  
Pull the lever (96) 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)

#### **⚠ CAUTION!**

#### **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.

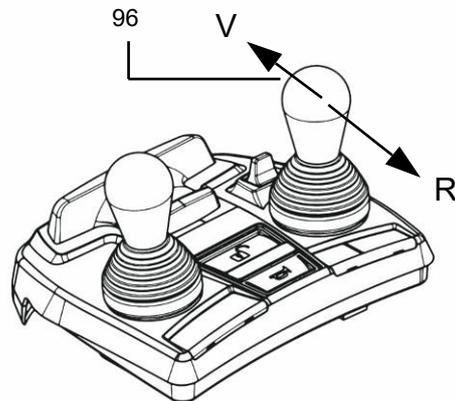
#### Requirements

- Truck prepared for operation see page 139.

#### Procedure

- Pull the lever (96) in direction R, the fork arms will move apart.
- Push the lever (96) 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.

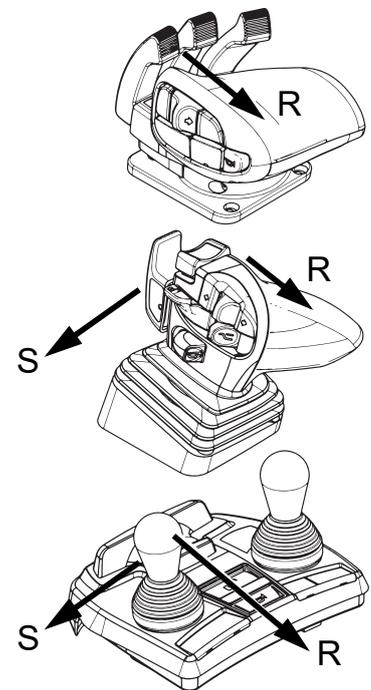
The sequence/assignment of the hydraulic functions available on the truck (lifting, lowering, tilting forwards and backwards, ZH1 - ZH4) may deviate where necessary (e.g. at the changeover level) from the standard assignment.

The respective hydraulic function is visible on the label for the control.



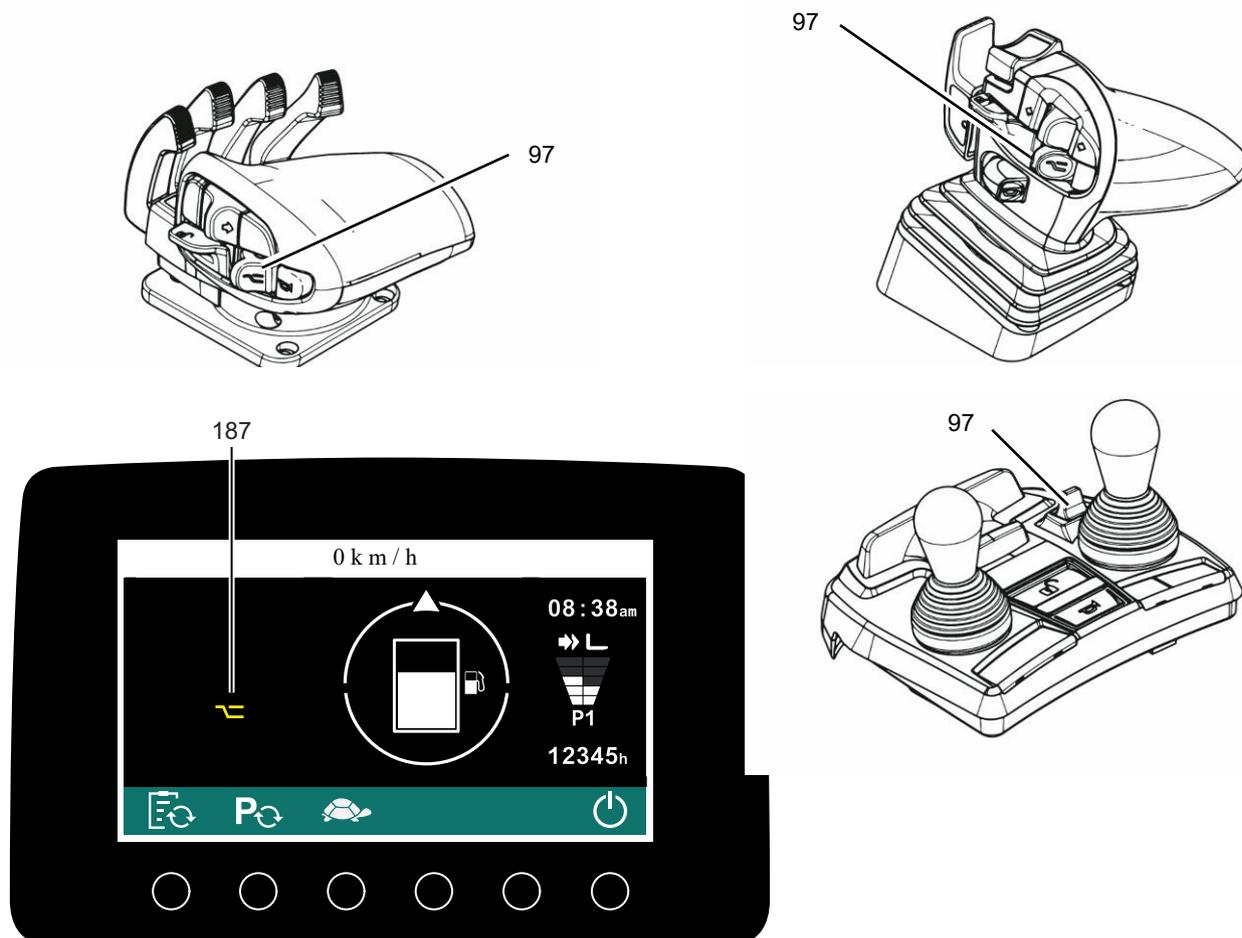
The pictogram shows the direction of movement that is executed when the operator pulls the lever in direction (R). The counter-movement of the work function is achieved by the operator pushing the lever accordingly.

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.

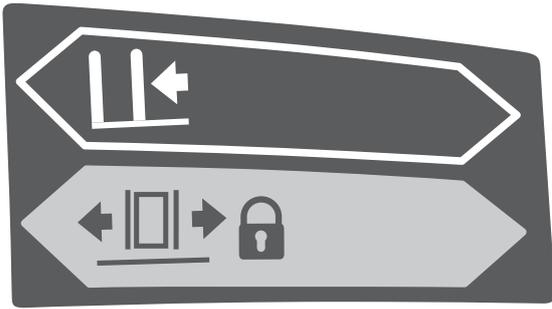


## Changeover level

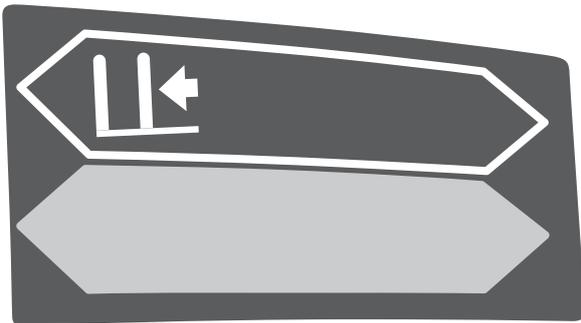
The changeover level is activated and deactivated via the button (97) on the control. The symbol for the active changeover level (187) is shown in yellow on the display.



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 (98) on the control.

The acknowledgement feature is activated by actuating the acknowledgement key (98) with the padlock symbol.

If a hydraulic function is set to require acknowledgement, the acknowledgement key (98) must be actuated regardless of the lever assignment at operating level.

### Procedure

- Press the acknowledgement key (98) and then actuate the control within 2 seconds.

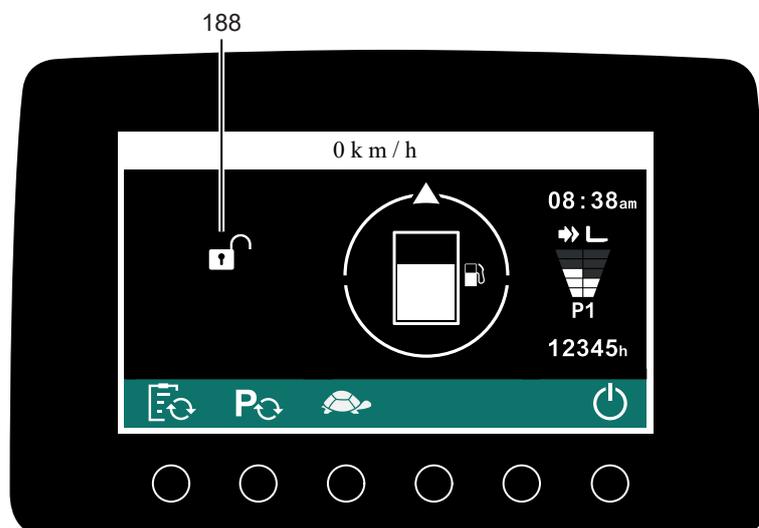
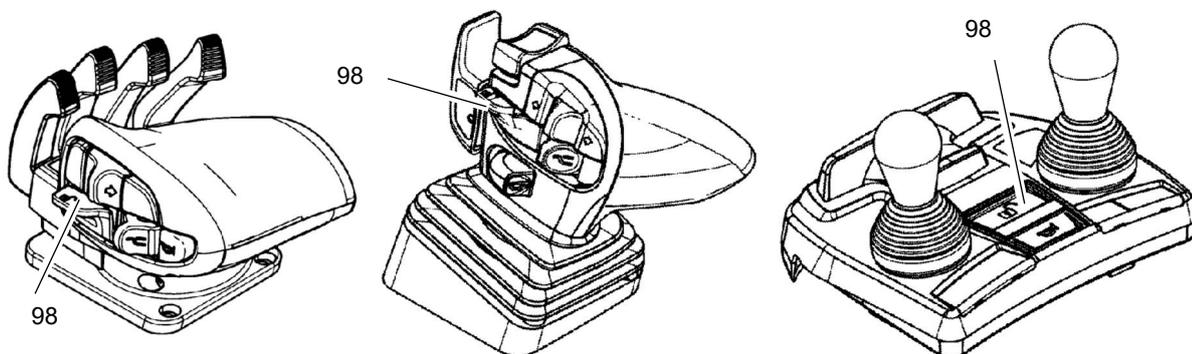
→ The active acknowledgement feature is shown on the display through the green padlock symbol (188).

*The hydraulic function requiring acknowledgement is performed.*

→ If the control is not actuated within 2 seconds, the green padlock symbol (188) 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 (188) goes out.

→ The manufacturer's customer service department must be contacted in order to assign hydraulic functions to the controls.



## 6.35 Floor-Spot (○)

### ⚠ CAUTION!

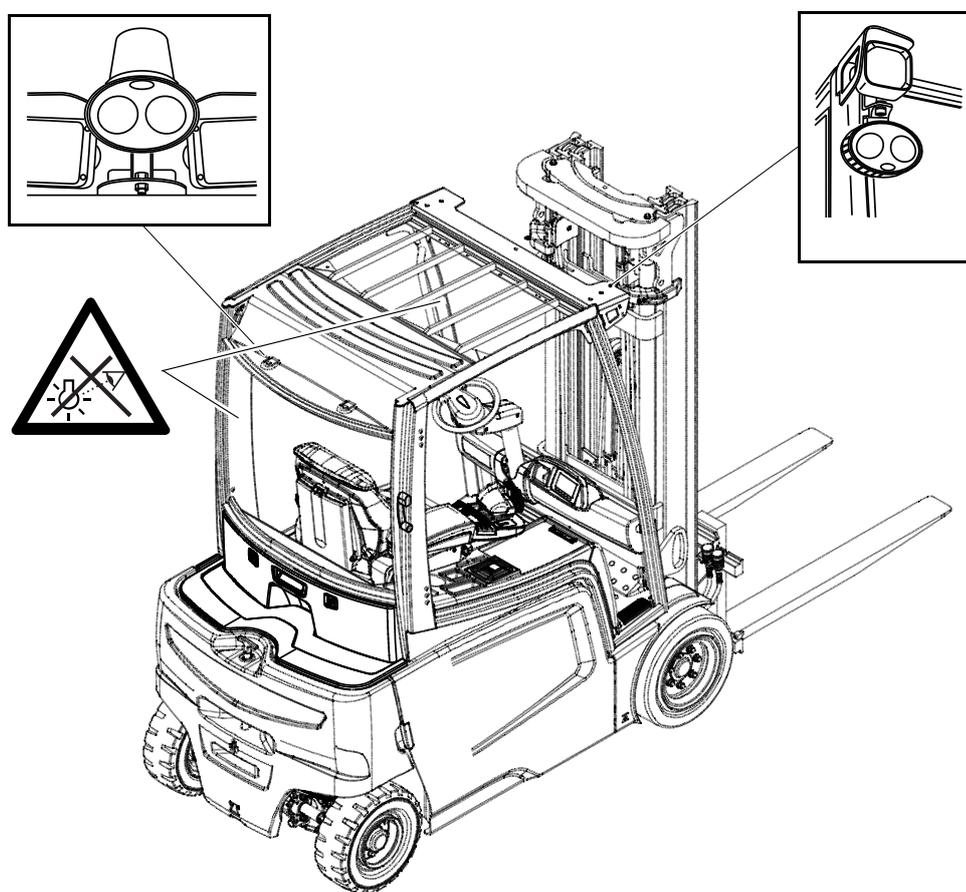
#### Risk of accident due to dazzling

Looking directly into the light beam of the Floor-Spot can dazzle and temporarily impair eyesight.

- ▶ Do not look directly into the light beam of the Floor-Spot.
- ▶ Do not adjust the position and alignment of the Floor-Spot on the truck.

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 Additional information on Floor-Spot blue

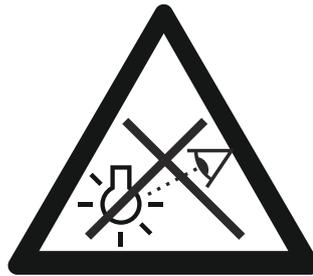
The activated Floor-Spot gives persons advance warning of the travel path of the forklift truck by projecting a blue dot onto the ground at a set distance.

## **⚠ 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.

## 6.36 Floor-Bow

### **⚠ CAUTION!**

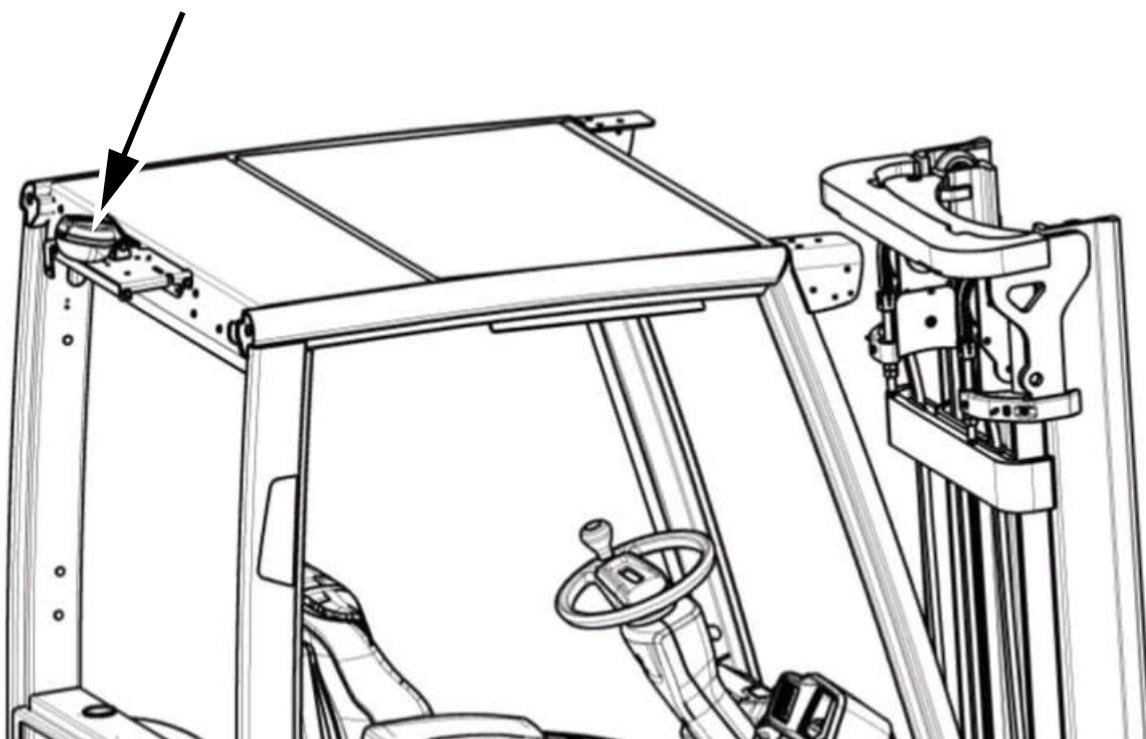
#### **Risk of accident due to dazzling**

Looking directly into the light beam of the Floor-Bow can dazzle and temporarily impair eyesight.

- ▶ Do not look directly into the light beam of the Floor-Bow.
- ▶ Do not alter the position and alignment of the Floor-Bow on the truck.
- ▶ Deactivate the Floor-Bow when travelling on public roads.

---

The Floor-Bow serves as an auxiliary device and projects a coloured dot on the ground behind the truck when reverse travel (●) is selected, the engine is running (○) or after pressing a button (○, see page 108).



### 6.36.1 Additional information for the blue Floor-Bow

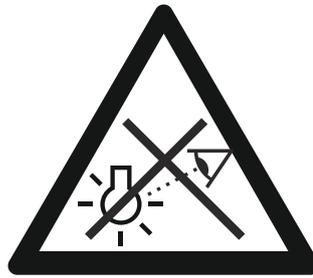
The activated Floor-Bow forewarns people of the truck's travel path by projecting a blue dot onto the floor at the set distance.

#### **⚠ 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.

## 6.37 Additional equipment for road traffic

### **⚠ 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 (e.g. deactivate work lights and additional lighting equipment such as Floor-Spot, Floor-Bow, Floor-Stripes, warning beacon and strobe light before entering public traffic areas and do not use these systems in public traffic areas).
- ▶ Do not make any unauthorised modifications to the function, position, alignment, colour or output of lighting equipment.

### **⚠ CAUTION!**

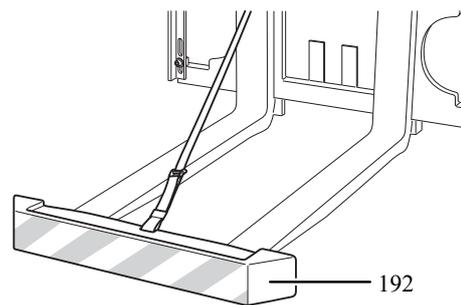
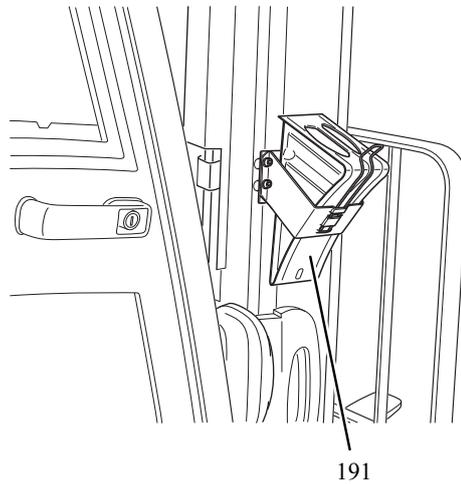
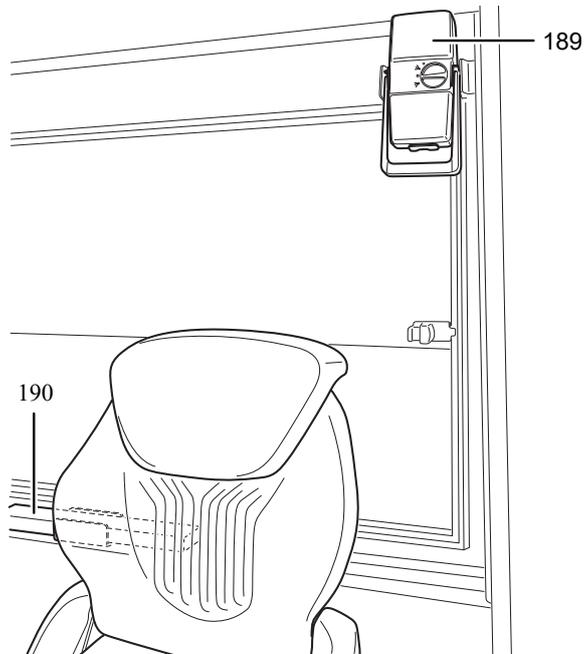
#### **Requirement to use winter tyres when driving the truck on public highways (StVZO, German road traffic regulations)**

The StVZO requires the use of winter tyres on trucks used on public highways.

- ▶ Either pneumatic or SE tyres with a minimum profile depth of 4 mm may meet the requirement.

The following assemblies are available as optional equipment for road traffic:

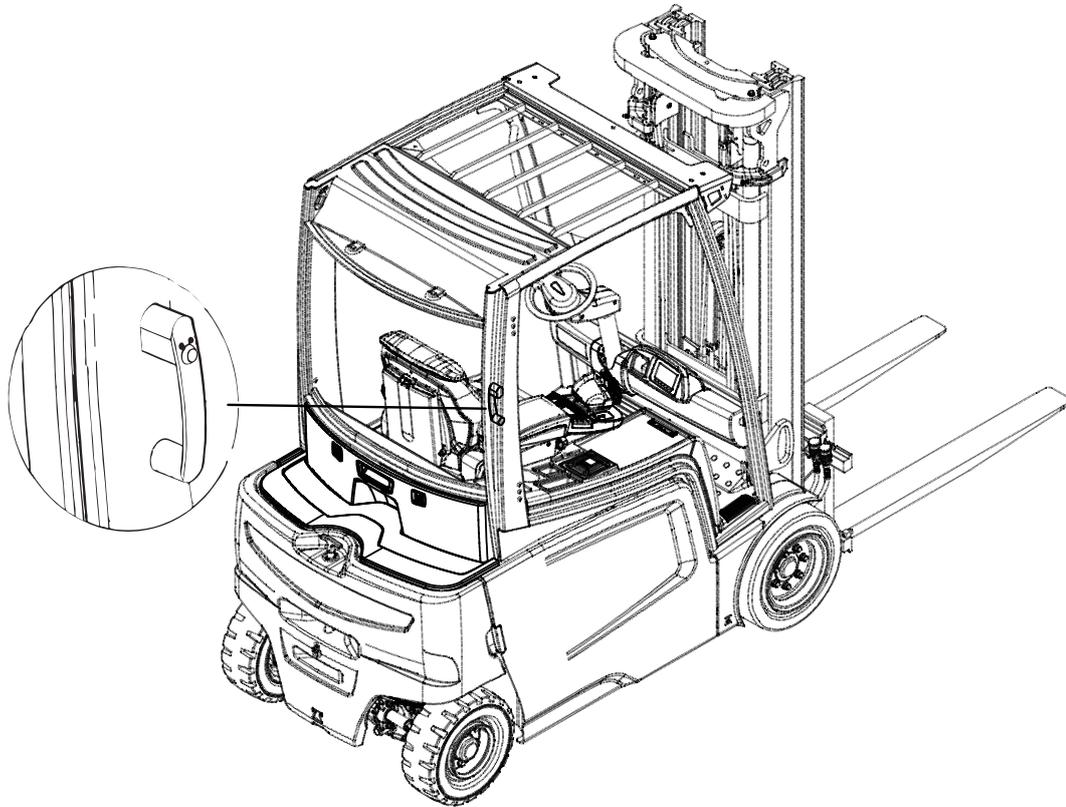
- Warning indicator (189)
- Warning triangle (190)
- Fork cover (192)
- Wheel chock (191)



## 6.38 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.



## 6.39 Truck Terminal

### 6.39.1 Application

The truck terminal is a data radio PC with a WLAN port for mobile use.

- Operation in industrial and commercial environments.
- Permissible temperature range: -30 °C to +50 °C at a relative air humidity of 10 % to 95 %, non-condensing.
- Operation in areas at risk of explosion is not permitted.

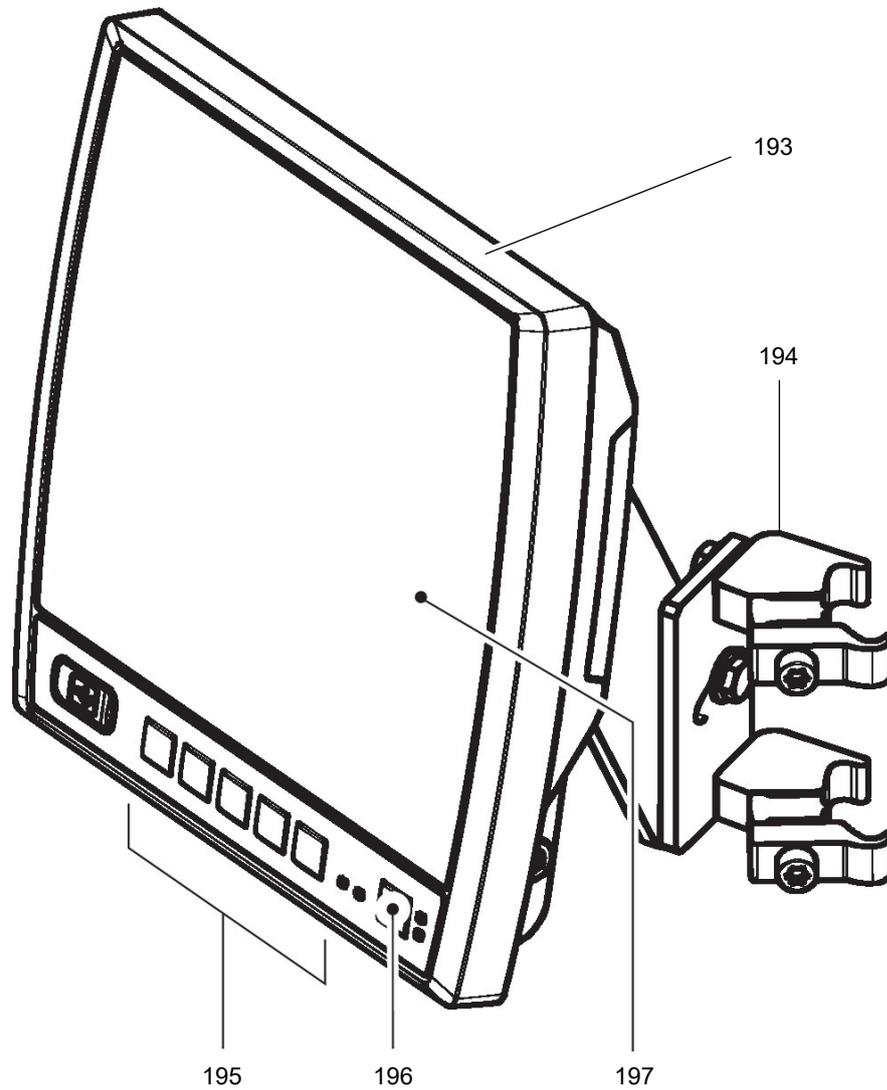
→ The truck terminal is approved for use in cold stores.

The truck terminal offers a wide range of applications:

- Recording goods arrivals at goods inward and subsequent depositing in the warehouse.
- Immediate booking of goods arrivals in the warehouse management system / enterprise resource management system. Communicating jobs to the warehouse management system / enterprise resource management system and booking goods arrivals into the warehouse management system / enterprise resource management system is performed in real time by radio link (WLAN / wireless local network).
- Order picking: Communicating and checking the picking location with specification of the items to be picked.
- Recording goods deliveries at goods outward and the associated goods retrieval.

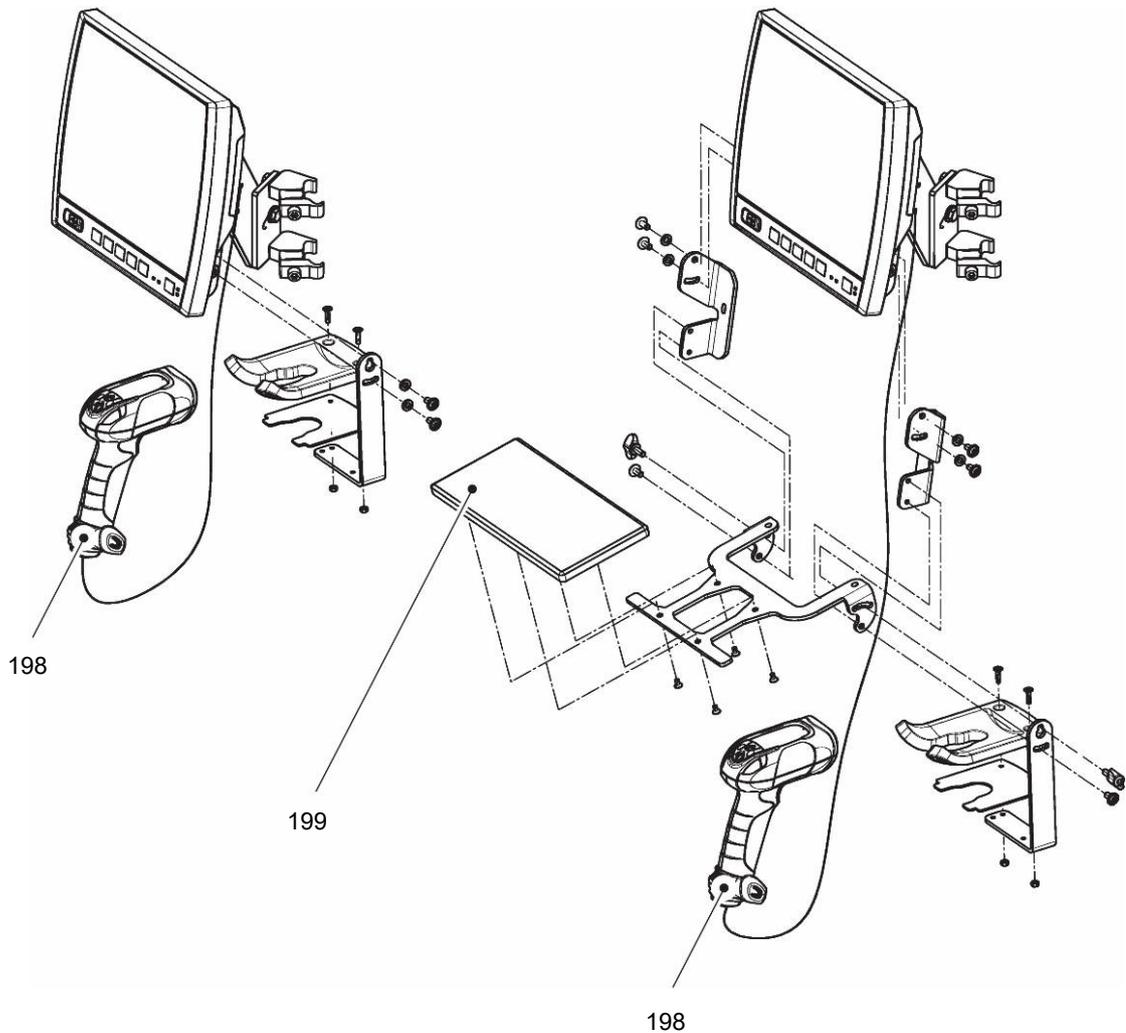
### 6.39.2 Assembly description

The truck terminal is operated via the touchscreen and the front buttons. The front buttons can be used to perform most tasks of a typical operation.



#### WMT 110 truck terminal with bracket

Item		Description
193	●	Truck terminal
194	●	Bracket
195	●	Front-buttons keypad
196	●	On/off switch at the bottom right on the front of the casing
197	●	Touchscreen



### Optional equipment for the WMT 110 truck terminal

Item		Description
198	<input type="radio"/>	Wired barcode scanner (51130909), mounted with support
199	<input type="radio"/>	External keyboard in DE layout (51513774), fastened with support
	<input type="radio"/>	External keyboard in US layout (51513777), fastened with support



The manufacturer's customer service department is responsible for the connection of the optional equipment and the adjustment of the truck terminal.

### 6.39.3 General

#### **⚠ WARNING!**

##### **Risk of collision when using the truck terminal**

Use of the truck terminal, keyboard or barcode scanner during travel or hydraulic operations can lead to collisions with persons and objects.

- ▶ Do not use the truck terminal, keyboard or barcode scanner during travel or hydraulic operations.
  - ▶ Adapt the brackets for the truck terminal, keyboard and barcode scanner to the operator such that injury during normal operation is ruled out.
  - ▶ Adjust the operator's seat such that impact with the truck terminal, keyboard and barcode scanner during normal operation is ruled out.
- 

#### **⚠ WARNING!**

##### **Risk of collision due to accidental load movement**

Use of the barcode scanner can give rise to accidental actuation of the controls, such as the soloPILOT, multiPILOT and duoPILOT, due to the free length of the device's spiral cable. Accidental actuation of controls can lead to load movement and collisions with persons and objects.

- ▶ Increased attention required when using the barcode scanner.
  - ▶ Avoid contact with controls when using the barcode scanner.
  - ▶ In the event of accidental load movement when using the barcode scanner, press the emergency disconnect button.
  - ▶ Store the barcode scanner in the designated support only.
  - ▶ Do not use the barcode scanner if the free length of the spiral cable exceeds 900 mm.
-

**⚠ WARNING!**

**Risk of collision due to restricted visibility or distraction**

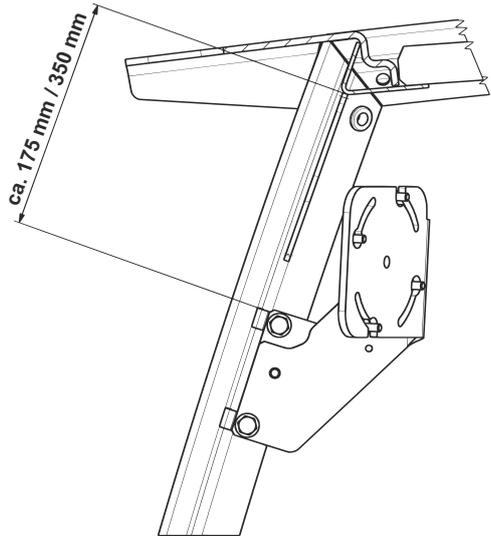
The truck terminal restricts the view of the operator. A restricted view or distraction can lead to collisions with persons and objects.

- ▶ Increased attention required during travel and hydraulic operations.
- ▶ Ensure that the operating area and working area are clear.
- ▶ Adjust the travel speed and load operations to the visibility.
- ▶ Do not alter the mounting position of the truck terminal.
- ▶ Check the secure fit of the truck terminal, bracket and accessories on a weekly basis.



When the truck terminal is mounted on the standard overhead guard, an optimum view is ensured when the distance between the bracket and the roof area is 175 mm as shown.

If the optional right-hand internal mirror is included, an optimum view is ensured when the distance between the bracket and the roof area is 350 mm as shown.



#### 6.39.4 Operation of the truck terminal WMT 110

The truck terminal is suitable for connection to the Jungheinrich warehouse management system and to all common warehouse management systems. The software supplier is responsible for the connection to the enterprise resource management system / warehouse management system.

The truck terminal is operated via:

- the touchscreen,
- an external keyboard (○) or
- a barcode scanner (○).

#### **NOTICE**

The touchscreen of the truck terminal should be operated only with the fingers or a suitable plastic stylus. The use of sharp-edged objects to operate the truck terminal can damage the touchscreen.

---

- Further instructions and details including additional programs can be found on the disk provided.

#### 6.39.5 Cleaning

#### **⚠ CAUTION!**

##### **Risk of damage to the truck terminal and truck as well as injuries**

Wet cleaning of the truck can result in damage to the truck terminal and the truck due to liquids penetrating as well as injuries.

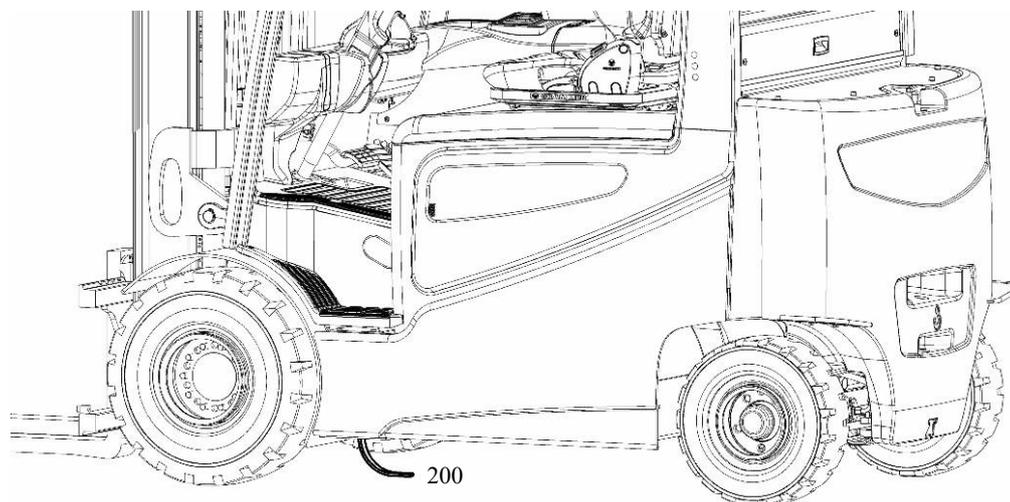
The truck terminal can be damaged if cleaned with unsuitable cloths.

- ▶ Do not wet clean the truck terminal with a water jet or anything similar.
  - ▶ For damp cleaning use a standard commercial glass cleaner with a low alcohol content.
  - ▶ Spray the housing and touchscreen for damp cleaning and wipe dry with a clean, soft cotton cloth, microfibre cloth or a new soft disposable paper towel.
  - ▶ Do not use dirty or large-fibre cleaning cloths as these can scratch the touchscreen.
-

## 6.40 Antistatic strap

The antistatic strap (200) depends on the tyres and ensures that the truck does not become statically charged. Before setting off, make sure that the antistatic strap (200) is undamaged and clean. When the truck is stationary, the contact surface of the antistatic strap (200) should be approx. 50 mm on the floor.

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

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

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

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

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

### Info messages

Display	Meaning
0915.2	Truck not operational, battery door open (○).
0938.1	Battery flat (0%).
1901.1	Accelerator pedal applied during power up.
1904.1	No travel direction selected when accelerator pedal applied.
1908.1	Seat switch or seat belt lock not engaged when accelerator pedal applied.
1909.1	Accelerator pedal applied when parking brake not released.
1917.1	Accelerator pedal and brake pedal pressed simultaneously.
1918.1	Truck operational but cabin door open (○).
2908.1	Seat switch or seat belt lock not engaged when a hydraulic function is applied.
2937.3	Simultaneous actuation of several hydraulic functions that can be operated only as a single function.
2951.1	Hydraulic function applied during power-up.
5409.1	Battery temperature too high (○).
5393.1	Battery cell faulty (○).
5915.2	Battery door open when stationary.

<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 "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 hydraulic oil level.
	– Battery discharge monitor has switched off.	– Charge the battery.
	– Faulty fuse.	– Check the fuses (○).
	– Excessive load.	– Note the maximum capacity, see page 50.
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	Action
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 trough. – 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 trough, and reconnect.
	– Emergency disconnect switch pressed.	– Unlock the emergency disconnect switch.
	– Key switch set to O.	– Set the key switch to "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 hydraulic oil level.
	– Battery discharge monitor has switched off.	– Charge the battery.
	– Faulty fuse.	– Check the fuses (○).
	– Excessive load.	– Note the maximum capacity, see page 50.
Fault display on 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

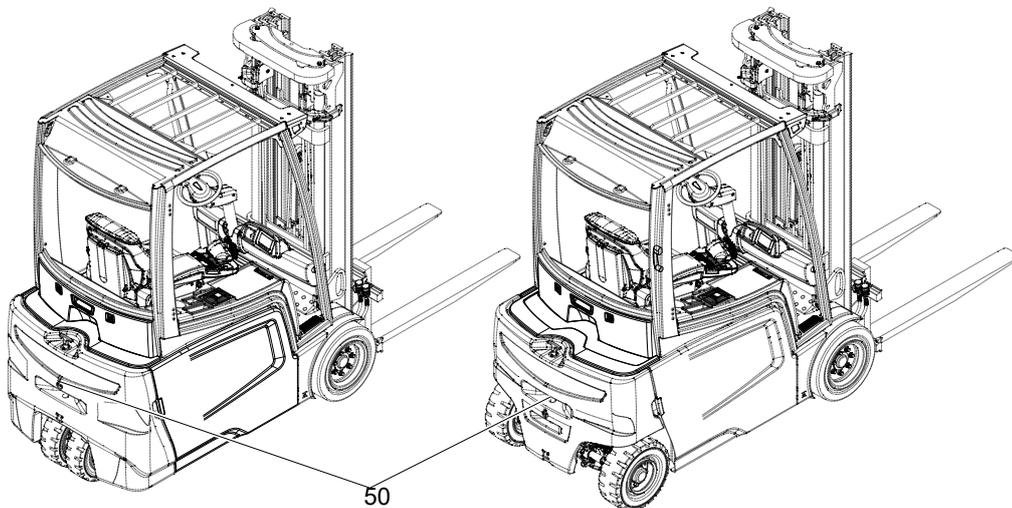
### 7.2.1 Towing the truck

#### **⚠ 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.
- 



##### ***Towing the truck***

###### *Requirements*

- Park the truck securely.
- Equipped with lithium-ion battery(○):
  - disconnect the truck-side control line from the connection on the battery trough or from the interface converter (○) on the battery.
  - Open the battery connector lock: loosen the bolted bar.
- Disconnect the battery.

###### *Procedure*

- Connect the pull rod to the trailer coupling (50) of the towing truck and attach it to the truck to be towed.
- Release the parking brake, see page 277.
- Tow the truck to its destination.
- Apply the parking brake, see page 277.
- Undo the tow connection.

*The truck has now reached its destination and is secure.*

## 7.2.2 Release the parking brake.

### **⚠ 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.

#### **Releasing the parking brake**

##### *Requirements*

- Turn off the emergency disconnect switch and key switch.
- Disconnect the battery.
- Prevent the truck from rolling away.
- Remove the floor plate by undoing the floor plate mounting screws.

##### *Tools and Material Required*

- Auxiliary tool (201) removed from the document compartment in the backrest of the truck.

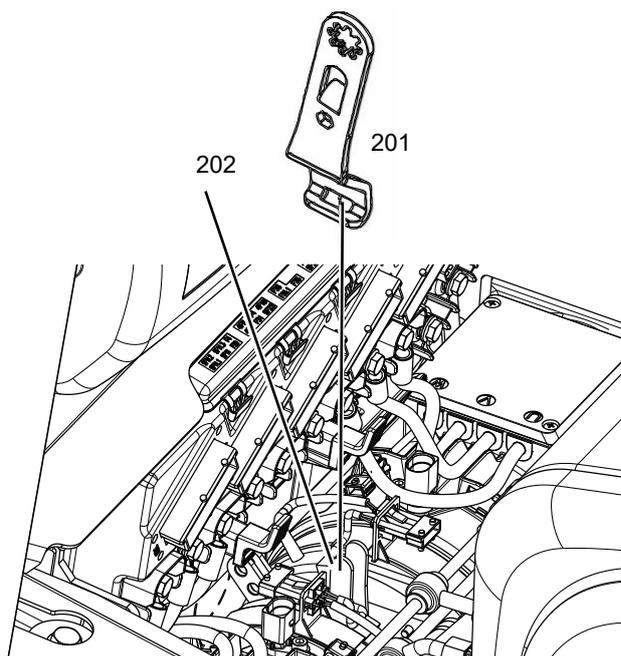
##### *Procedure*

- Place the auxiliary tool (201) on the lever (202).
- Use the auxiliary tool (201) to pull the lever (202) forward (fork direction) or backward (towards the operator position) and lock it in position.

➔ The lever must engage. The parking brake for the drive wheels is now released and the truck can be moved

- Tow the truck to its destination using the pull rod.

*The truck has now reached its destination.*



## **Applying the parking brake**

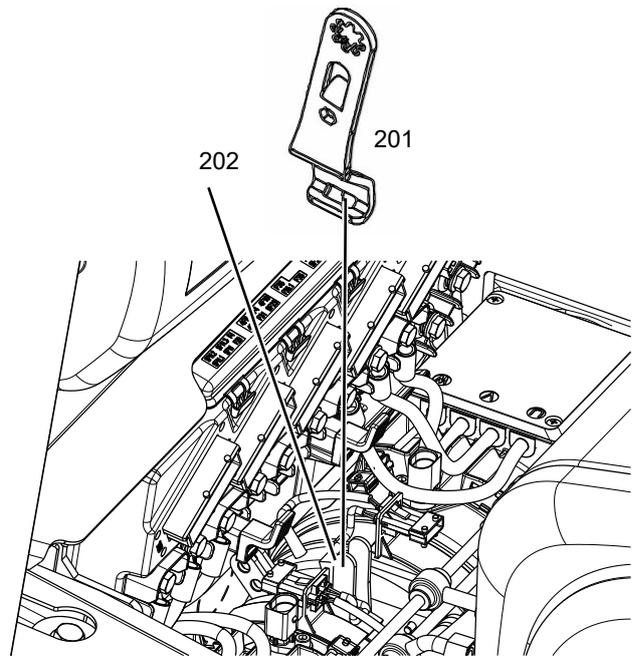
### *Procedure*

- Place the auxiliary tool (201) on the lever (202).
- Bring the auxiliary tool (201) and lever (202) into the centre position (travel position).

→ The parking brake for the drive wheels is now activated and the truck cannot be moved.

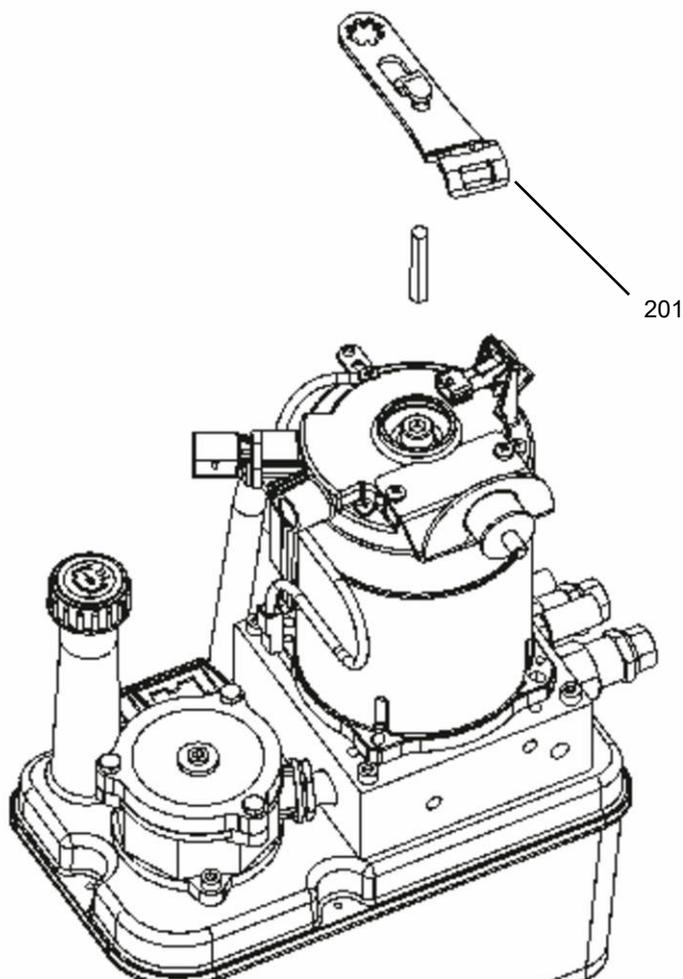
- Fit the floor plate.

*Truck parked securely.*



### 7.2.3 Steering the truck when the electric/hydraulic steering has failed

- The truck cannot be steered if the steering hydraulic system or the truck electronics are damaged.



#### ***Steering the truck when the electric/hydraulic steering has failed***

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

- Turn off the emergency disconnect switch and key switch.
- Equipped with lithium-ion battery(○):
  - disconnect the truck-side control line from the connection on the battery trough or from the interface converter (○) on the battery.
  - Open the battery connector lock: loosen the bolted bar.
- Disconnect the battery.
- Prevent the truck from rolling away.
- Release the parking brake.

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

- Auxiliary tool (201) removed from the document compartment in the backrest of the truck.

##### ***Procedure***

- Undo the sensor connector above the motor shaft (pull the red unlocking lever) and place the auxiliary tool (201) on the Allen screw.
- Turn the drive system to the required steering position.
- Tow the truck to its destination using the pull rod, see page 276.

*The truck has now reached its destination.*

## 7.3 Emergency lowering

### **WARNING!**

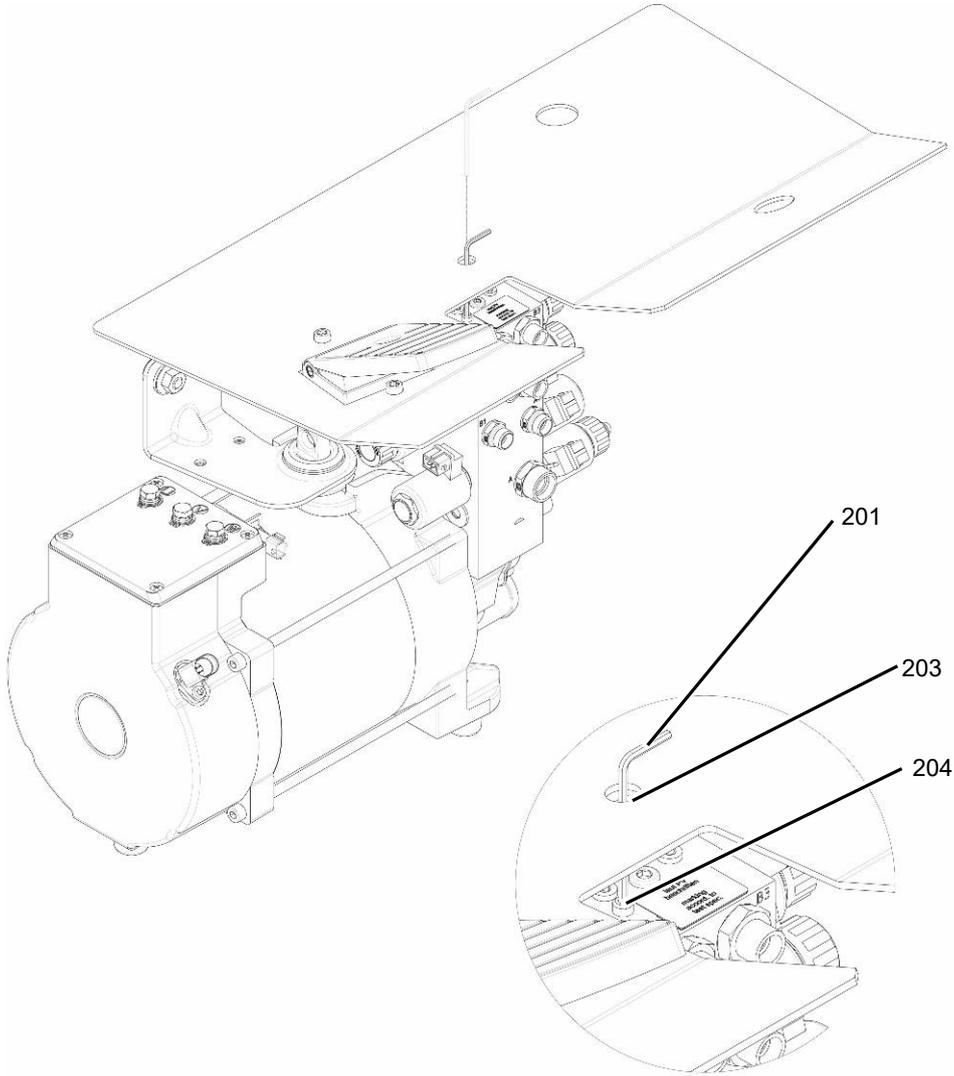
#### **Load handler emergency lowering**

- ▶ 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.
-

**⚠ WARNING!**

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

- The load handler can be lowered manually if a fault occurs in the hydraulic controller.



## ***Mast emergency lowering***

### *Requirements*

- Load handler is not in the rack.
- Turn off the emergency disconnect switch and key switch.
- Equipped with lithium-ion battery (○):
  - Disconnect the truck-side control line from the connection on the battery trough or the interface converter (○) on the battery.
  - Open the battery connector lock: Loosen the bolted bar.
- Disconnect the battery.

### *Tools and Material Required*

- Allen key, size 3 (201).

### *Procedure*

- Remove the floor mat from the floor plate.
- Place the Allen key (201) through the opening (203) in the floor plate on the emergency lowering valve (204).
- Slowly turn the emergency lowering valve (204) anticlockwise (maximum 1.5 turns).

*The mast and load handler are lowered.*



If the emergency lowering valve is slowly turned clockwise and slightly tightened, the lowering process stops.

## 7.4 Leaving the driver's cab through the right side window or the rear windscreen

### ⚠ 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.

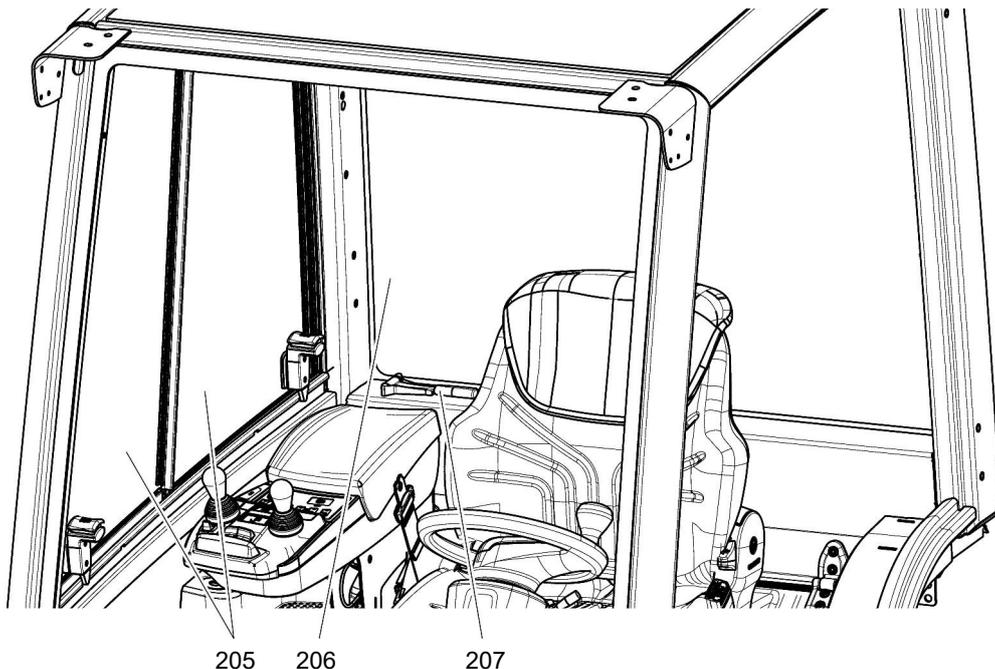
- ▶ Carefully remove the broken glass before leaving the driver's cab through the smashed window.
- ▶ Use hand protection when removing the broken glass.

#### Requirements

- It is not possible to exit the driver's cab through the cabin door.

#### Procedure

- Switch off the truck, see page 140.
- Press the emergency disconnect switch.
- Pull the emergency hammer (207) out of its support in the driver's cab.
- Strike the right-hand side window (205) or the rear windscreen (206) with the emergency hammer.
- Push out the broken glass from the smashed window towards the outside.
- Watch out for obstacles when exiting.



# 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 50.



## 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 331.

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 331.

### **WARNING!**

#### **Risk of accidents and component damage**

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

---

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

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

### **NOTICE**

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

---

-  On completion of inspection and service work, carry out the operations listed in the "Recommissioning the truck after cleaning or maintenance work section, see page 326.

## 3 Maintenance Safety Regulations

### Maintenance and repair personnel

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

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

#### Customer Services

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

#### Operating company

The maintenance personal of the operating company has the technical expertise and experience to perform the activities in the maintenance check list for the operating company. The maintenance and repair work to be performed by the operating company are also written down, see page 296.

- Equipped with lithium-ion battery (○): read the manufacturer's operating instructions.

### 3.1 Working on the electrical system

#### **⚠ CAUTION!**

##### **Accident risk from Working on the electrical system:**

Make sure the electrical system is voltage-free before starting work on it.

- ▶ Remove any rings or metal bracelets etc. before working on electrical components.
  - ▶ Only trained personnel may work on the electrical system.
  - ▶ Switch off the truck securely (see page 140).
  - ▶ Before working on the electrical system, all precautionary measures must be taken to avoid electrical accidents.
  - ▶ Remove the starter battery connecting leads to de-energise the truck.
-

## 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 and pivot pins 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.
- 

### **⚠ WARNING!**

#### **Diesel fuel can be hazardous**

- ▶ Diesel fuel can cause irritation if it comes into contact with the skin. Rinse any affected areas thoroughly.
  - ▶ If it comes into contact with the eyes rinse them immediately with flowing water and call for a doctor.
  - ▶ Wear safety gloves when handling diesel fuels.
-

## 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.
-

## 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.
- 

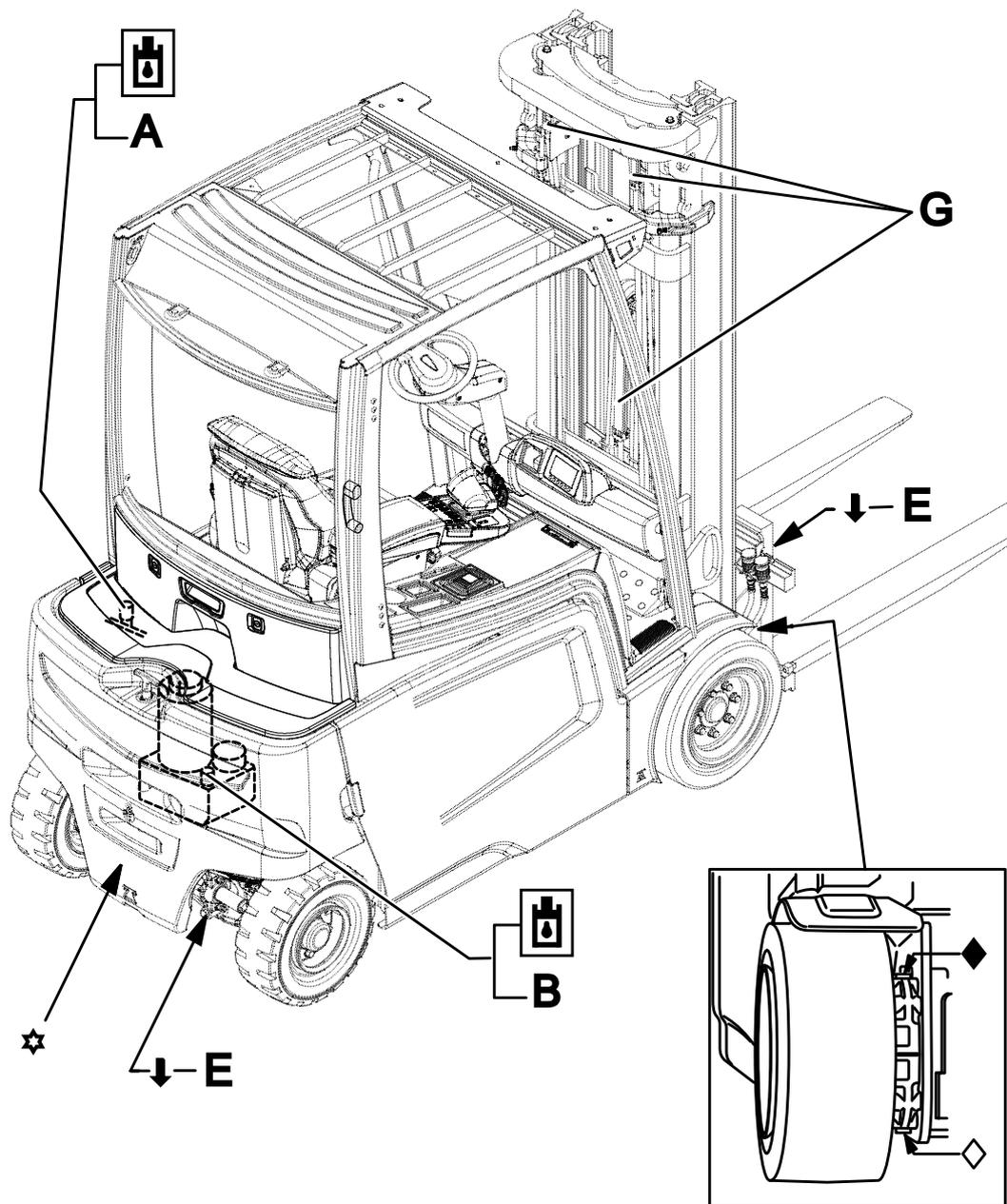
## **⚠ WARNING!**

### **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	☆	Hydraulic oil drain plug
↓	Grease nipple	◆	Transmission oil filler neck
🛢️	Hydraulic oil filler neck	◇	Transmission oil drain plug

### 4.3 Consumables

Code	Order no.	Supplied quantity	Volume	Description	Used for
A	51 132 827*	5l	440AH= 18 l 550AH= 20.5 l 660AH= 24 l	Manufacturer hydraulic oil 1)	Hydraulic system
	50 426 072	20l		HLPD 32 1)	
	51 082 888	5l		HLPD 22 2)	
	50 429 647	20l		HLPD 22 2)	
	50 124 051	5l		HV 68 3)	
	51 082 888	5l		Plantosyn 46 HVI (BIO hydraulic oil)	
	51 415 593	20l		Shell Tellus S2 VA 46 4)	
		5 l			
B	51 132 827*	5l	2.5 l	Manufacturer hydraulic oil 1)	Steering (EFG 316-320)
	50 426 072	20l		HLPD 32 1)	
	50 429 647	20l		HLPD 22 2)	
	50 124 051	5l		HV 68 3)	
	51 082 888	5l		Plantosyn 46 HVI (BIO hydraulic oil)	
E	50 157 382	1kg		Lubrication grease K-L 3N 3)	Steer axle (EFG 316-320)
G	29 201 280	400ml		Chain spray	Chains
N	50 468 784	1l	2 x 0.55 l	Transmission oil, Shell Spirax MA 80 W	Transmission

- 1) Applicable for temperature range -5/+30°C
- 2) Applicable for temperature range -20/-5 °C
- 3) Applicable for temperature range +30/+50 °C
- 4) Applicable for temperature range -5/+40 °C



\*The trucks are factory-equipped with a special manufacturer's hydraulic oil (the Jungheinrich hydraulic oil with a blue colouration) or the Plantosyn 46 HVI bio hydraulic oil. This special hydraulic oil can only be obtained from the manufacturer's customer service department. The use of named alternative hydraulic oils is not prohibited, but may lead to a decline in functionality. This hydraulic oil may be mixed with one of the named alternative hydraulic oils.

**⚠ WARNING!**

Industrial trucks are factory-equipped with "HLP D22/32" hydraulic oil or "Plantosyn 46 HVI" BIO hydraulic oil.

You cannot change from "Plantosyn 46 HVI" BIO hydraulic oil to the manufacturer's hydraulic oil. The same applies to changing from the manufacturer's hydraulic oil to "Plantosyn 46 HVI" bio hydraulic oil.

Do not mix the Plantosyn 46 HVI bio hydraulic oil with the manufacturer's hydraulic oil or one of the named alternative hydraulic oils.

---

**Grease guidelines**

Code	Saponification	Dew point °C	Worked penetration at 25 °C	NLG1 class	Application temperature °C
E	Lithium	185	265 - 295	2	-35/+120

## 5 Maintenance and repairs

### 5.1 Preparing the truck for maintenance and repair work

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

#### *Procedure*

- Park the truck securely, see page 140.
- Fully lower the load handler.
- Equipped with lithium-ion battery(○):
  - disconnect the truck-side control line from the connection on the battery trough or the interface converter (○) on the battery.
  - Open the battery connector lock: Unscrew the screwed-on latch.
  - Open the battery connector lock: loosen the bolted bar.
- Disconnect the battery to prevent the truck from being switched on accidentally.

## 5.2 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 2500 kg kg.
  - ▶ Raise the unladen truck on a level surface.
  - ▶ When raising the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).
- 

#### ***Raising and jacking up the truck securely***

##### *Requirements*

- Prepare the truck for maintenance and repairs (see page 296).

##### *Tools and Material Required*

- Jack
- Hard wooden blocks

##### *Procedure*

- Place the jack against the contact point.

 Jack contact point, see page 48.

- Raise the truck.
- Support the truck with hard wooden blocks.
- Remove the jack.

*The truck is now securely raised and jacked up.*

 To lower the truck, proceed in reverse order.



## 5.3 Opening or closing the rear panel

### ***Opening the panel***

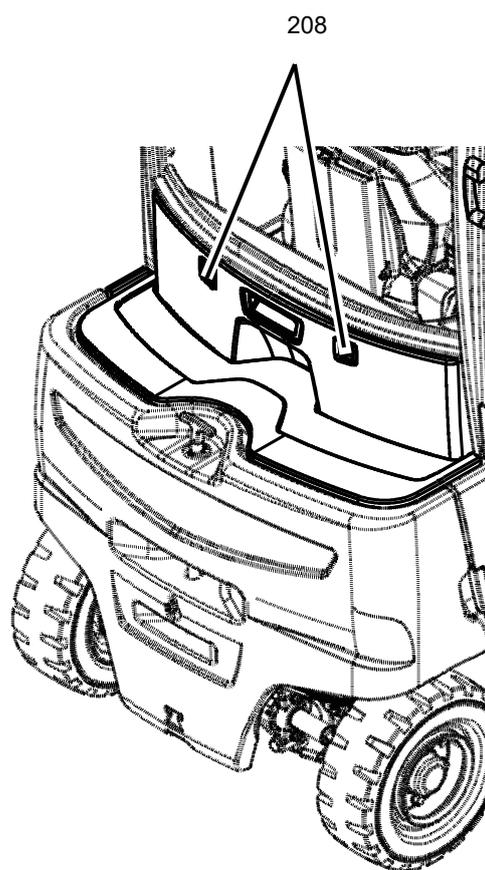
#### *Requirements*

- Prepare the truck for maintenance and repairs (see page 296).

#### *Procedure*

- Undo the two quick release fasteners (208).
  - Pull the rear panel back and remove it.

*The rear panel is now open. The fuses and other electrical components can now be reached.*



### ***Closing the panel***

#### *Procedure*

- Place the rear panel in position.
  - Secure two quick release fasteners (208).

*The rear panel is now closed.*

## 5.4 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 nuts are secure after 10 service hours.
- ▶ Always use tyres of the same make, model and profile.
- ▶ For pneumatic tyres, only remove the steel ring when the tyre is depressurised.

#### **Checking the mounting of wheels**

##### *Requirements*

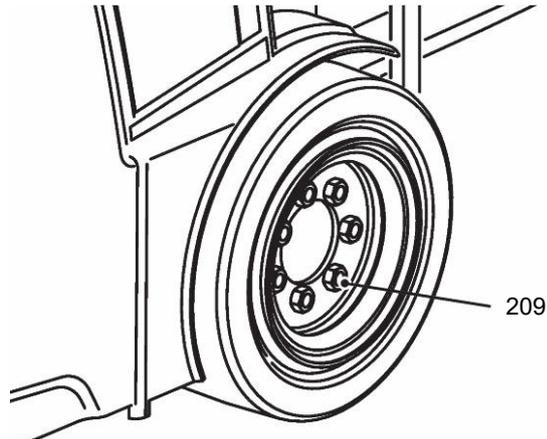
- Prepare the truck for maintenance and repairs (see page 296).

##### *Tools and Material Required*

- Torque wrench

##### *Procedure*

- Torque the wheel nuts (209) crosswise with a torque wrench; tightening torques see page 42.



*The mounting of wheels is now checked.*

- When using pneumatic tyres check the air pressure, for the air pressure see page 42

## 5.5 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 2500 kg kg.
- ▶ Raise the unladen truck on a level surface.
- ▶ When raising the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).

### **⚠ 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.

#### **Removing the wheels**

##### *Requirements*

- Prepare the truck for maintenance and repairs (see page 296).

##### *Tools and Material Required*

- Jack
- Hard wooden blocks
- Mounting lever
- Torque wrench

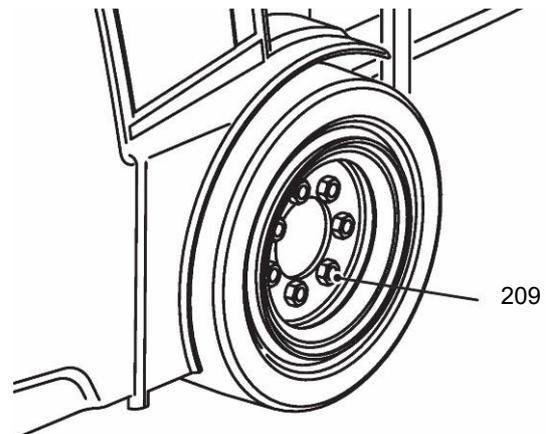
##### *Procedure*

- Place the jack against the contact point.

➔ Jack contact point, see page 48.

- Raise the truck.
- Support the truck with hard wooden blocks.
- Undo the wheel attachment (209).
- Remove the wheel, using a suitable mounting lever if necessary.

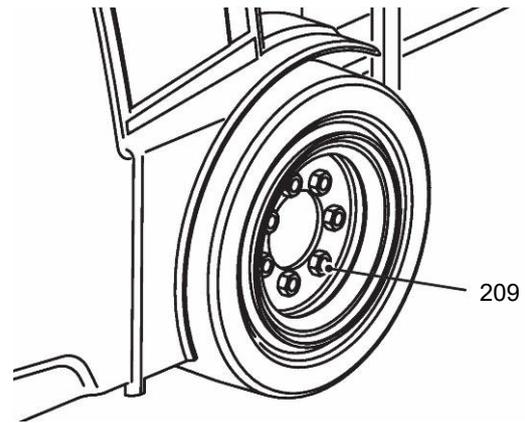
*The wheel has now been removed.*



## ***Fitting the wheels***

### *Procedure*

- Fit the wheel using a suitable mounting lever if necessary.
- Fit the wheel attachment.
- Remove the hard wooden blocks.
- Lower the truck.
- Torque the wheel attachment (209) crosswise with a torque wrench; tightening torques see page 42.



*The wheel has now been fitted.*

- ➔ When using pneumatic tyres check the air pressure, for the air pressure see page 42

## 5.6 Hydraulic system

### **⚠ 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 immediately with an appropriate bonding agent.
- ▶ The bonding agent / consumable mixture must be disposed of in accordance with regulations.
- ▶ Observe national regulations when handling hydraulic oil.
- ▶ Wear safety gloves when handling hydraulic oil.
- ▶ Prevent hydraulic oil from coming into contact with hot motor parts.
- ▶ Do not smoke when handling hydraulic 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!**

#### **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.



When carrying out maintenance and repair work in the motor compartment, the pedal plate/floor plate must be removed. To remove the plate, the connector to the accelerator pedal must be disconnected.

## 5.6.1 Checking the hydraulic oil level

### **⚠ 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.

### **Checking the hydraulic oil level and adding hydraulic oil**

#### *Requirements*

- Park the truck on a level surface.
- Prepare the truck for maintenance and repair work (see page 296).
- Panel open, see page 299

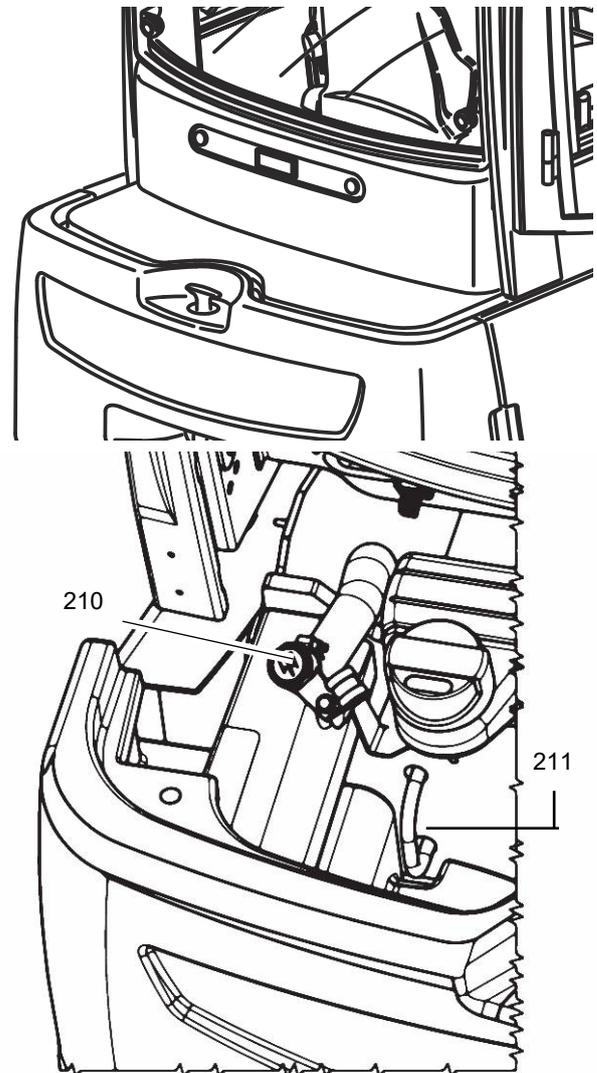
#### *Procedure*

- Visually inspect the hydraulic oil level on the hose (211).

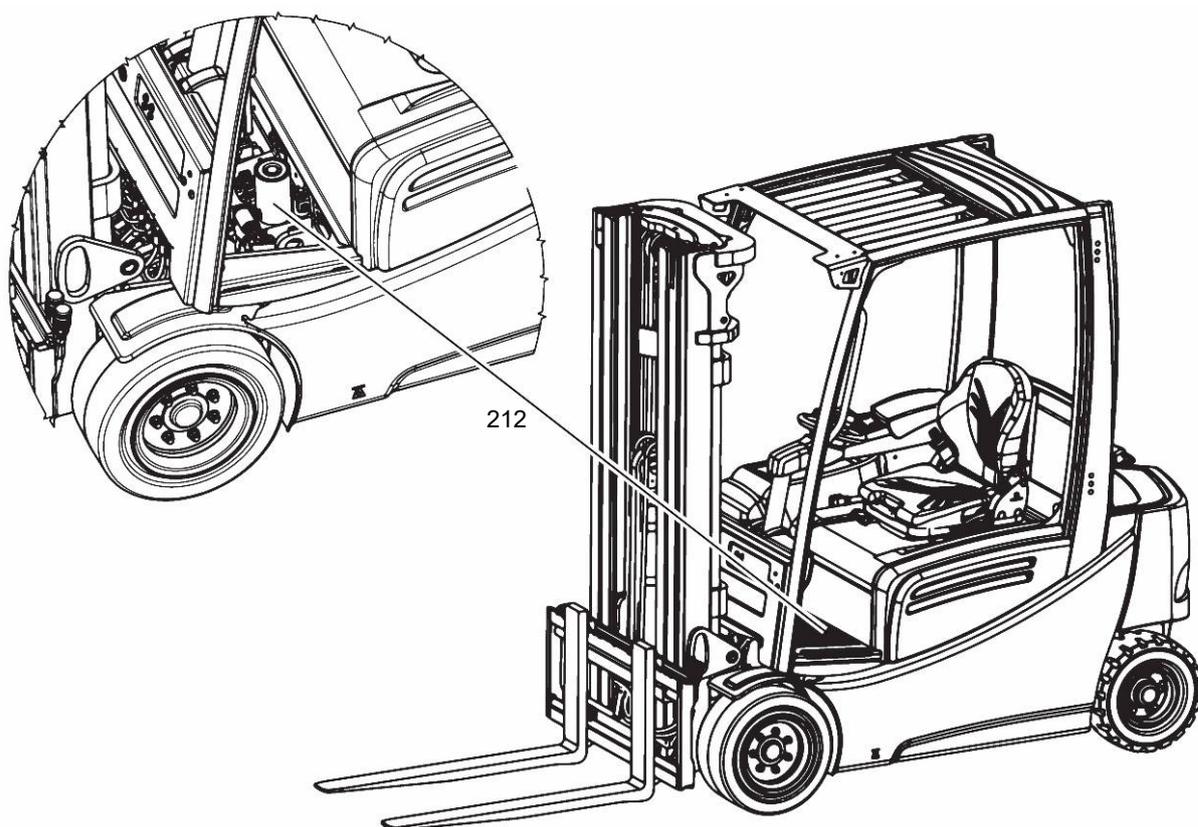
→ If the reservoir is filled sufficiently, the hose will be approx. 1 cm full from the bottom.

- Add hydraulic oil through the oil filler neck (210) until the oil can be seen in the hose.

*The hydraulic oil level has now been checked.*



## 5.6.2 Replacing the hydraulic oil filter



### ***Replacing the oil filter***

#### ***Requirements***

- Park the truck on a level surface.
- Prepare the truck for maintenance and repair work (see page 296).

#### ***Procedure***

- Unscrew the hydraulic oil filter cap (212). The filter element is located on the cap.
- Replace the filter insert; if the O ring is damaged it will also need to be replaced. Apply a thin layer of oil to the O ring on assembly.
- Refit the cap with the new filter element in place.

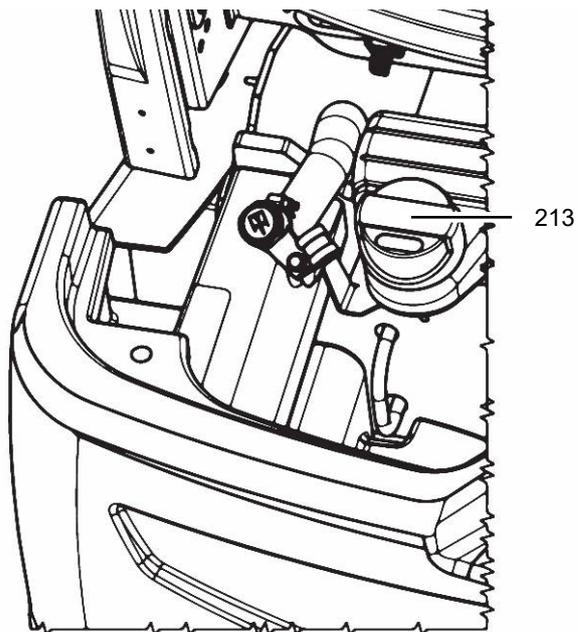
### 5.6.3 Replacing the ventilation and discharge filter

#### *Requirements*

- Park the truck on a level surface.
- Prepare the truck for maintenance and repairs (see page 296).
- Panel open, see page 299

#### *Procedure*

- Untwist the breather filter lid (213).
- Replace the breather filter.



- Collect any spilled hydraulic oil. Dispose of the hydraulic oil and hydraulic oil filter and fuel in accordance with environmental regulations.

## 5.6.4 Checking the Oil Level of the Electric Steering (EFG 3 only)

The electric steering oil level can be checked with the dipstick.

### Requirements

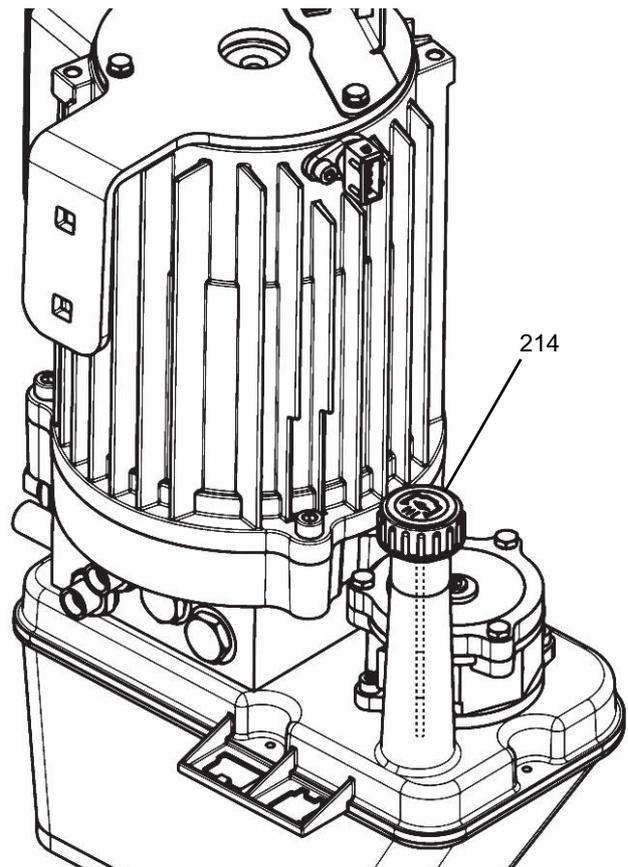
- Park the truck on a level surface.
- Prepare the truck for maintenance and repairs (see page 296).
- Panel open, see page 299.

### Procedure

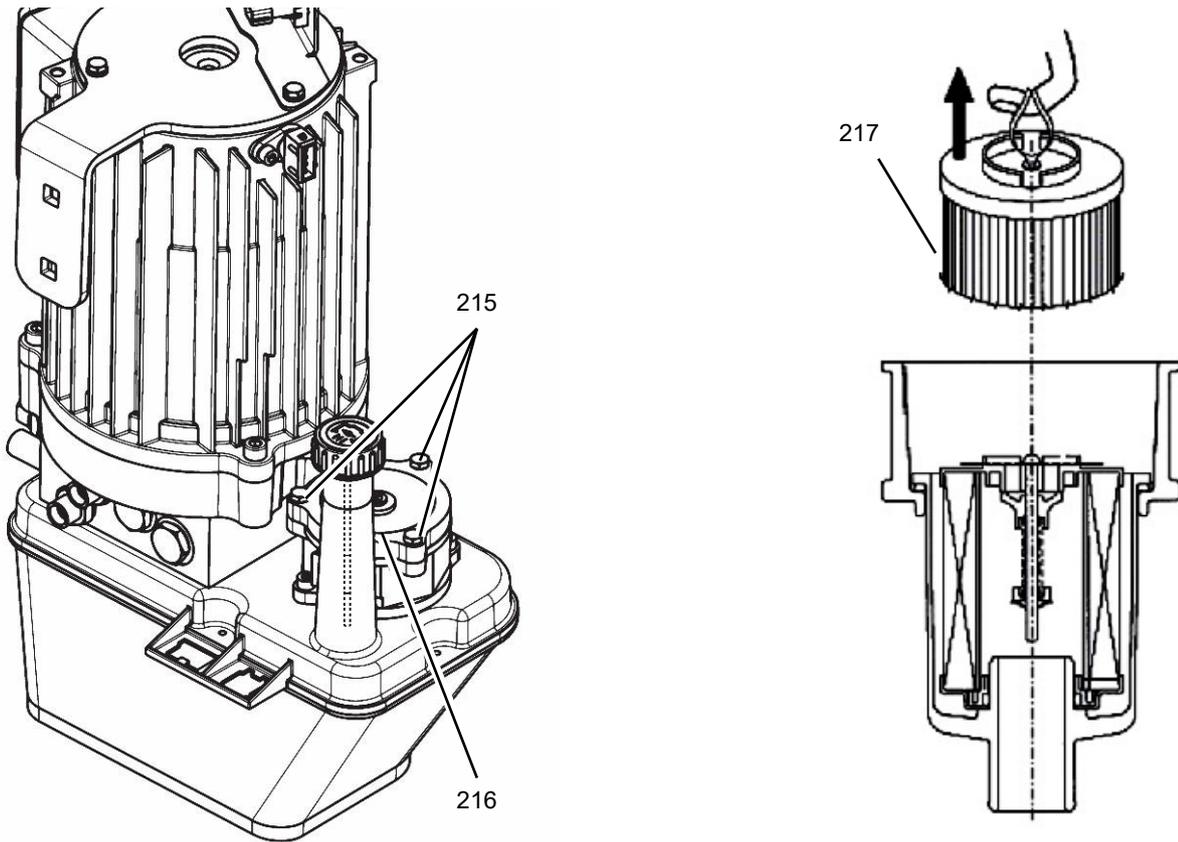
- Unscrew the cover with the dipstick (214).
- Check the oil level from the marking on the dipstick (214). The oil level should lie between the top and bottom markings.

*The electric steering oil level is now checked.*

- If the reading is below the bottom marking on the dipstick (214), replenish with oil.



## 5.6.5 Changing the Oil Filter of the Electric Steering (EFG 3 only)



### *Requirements*

- Park the truck on a level surface.
- Prepare the truck for maintenance and repairs (see page 296).
- Panel open, see page 299.

### *Procedure*

- Undo the screws (215) from the cover (216) of the electric steering with a screwdriver (key width 10) and remove them.
- Take off the cover (216).
- Pull out and replace the oil filter (217).

→ The screws (215) are torqued to 8 Nm after the filter change.

## 5.7 Checking the gear oil level

### **⚠ 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.

#### **Check the gear oil level**

##### *Requirements*

– Park the truck securely, see page 140

##### *Tools and Material Required*

– Oil sump

##### *Procedure*

- Place the oil sump underneath the transmission
- Unscrew the oil dipstick (219).
- Check gear oil level, top up if necessary through the filler hole (218).

➔ The oil level should reach the bottom mark of the oil check hole (219).

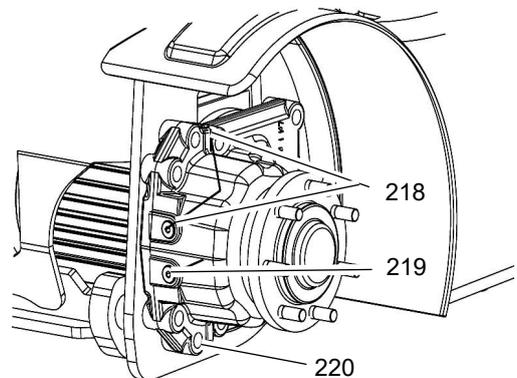
*The transmission oil level is now checked.*

#### **Draining the oil**

##### *Procedure*

- Drain oil at operating temperature.
- Place the oil sump underneath the transmission
- Unscrew the oil drain plug (220) and drain the transmission oil.

➔ To ensure swift and complete draining of the transmission oil, unscrew the oil dipstick (219).



*The oil is now drained.*

#### **Adding oil**

##### *Procedure*

- Insert the oil drain plug (220).
- Unscrew the oil control screw (219) and add new gear oil in the filler hole (218).

*The oil has now been added.*

## 5.8 Heating

### **Replacing the air conditioning filter**

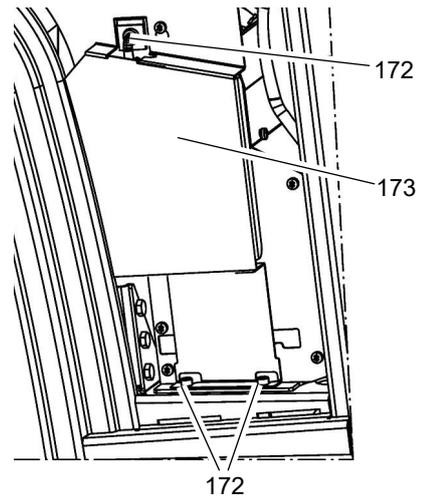
#### *Requirements*

- Filter contaminated

#### *Procedure*

- Loosen the screws (172).
- Remove the panel (173).
- Replace the filter.
- Attach the panel (173).
- Tighten the screws (172).

*The filter cassette is now replaced.*

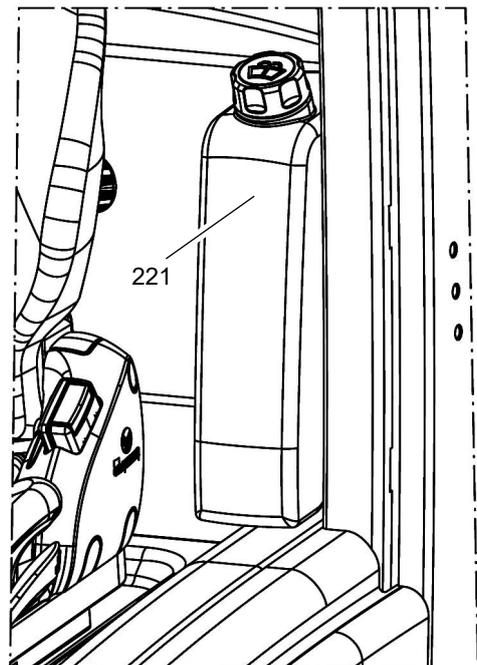


- Regular maintenance is required to ensure that the heater functions correctly, see page 331

## 5.9 Adding window washer system fluid

#### *Procedure*

- Make sure there is sufficient window fluid in the container (221).
- If necessary top up with anti-freeze.



## 5.10 Checking the electrical fuses

### **⚠ WARNING!**

#### **Electrical current can cause accidents**

Ensure the electrical system is de-energised before starting work. Before starting maintenance on the electrical system:

- ▶ Park the truck securely (see page 140).
  - ▶ Press the emergency disconnect switch.
  - ▶ Equipped with lithium-ion battery (○):  
disconnect the truck-side control line from the connection on the battery trough or the interface converter (○) on the battery.  
Open the battery connector lock: loosen the bolted bar.
  - ▶ 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 313.
- 

#### ***Checking electrical fuses***

##### *Requirements*

- Prepare the truck for maintenance and repair work (see page 296).

##### *Procedure*

- Remove the rubber mat with floor plate.
- Before opening, clean the electrical-system cap and the area around the cap.
- Open the electrical-system cap.
- Use a screwdriver to undo the fastenings on the rear cover.
- Remove the rear cover.
- Undo the caps on the voltage distributors.
- Check condition and rating of the fuses in accordance with the table.
- Replace any damaged fuses in accordance with the table.
- Close the electrical system cap.
- Fit the floor plate/rear cover.

*The electrical fuses have now been checked.*

#### ***Checking the electrical fuses at the main fuse***

##### *Requirements*

- Prepare the truck for maintenance and repair work (see page 296).

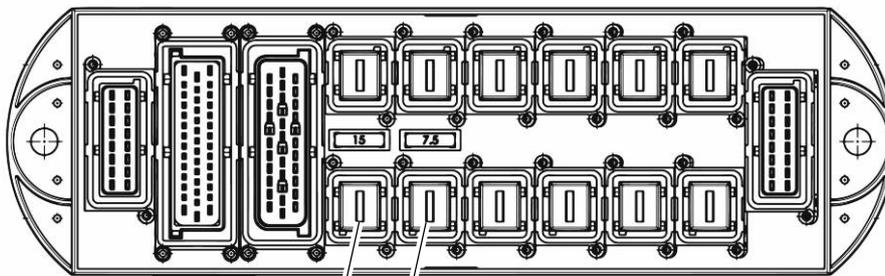
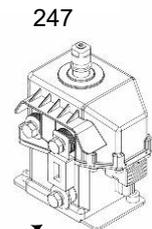
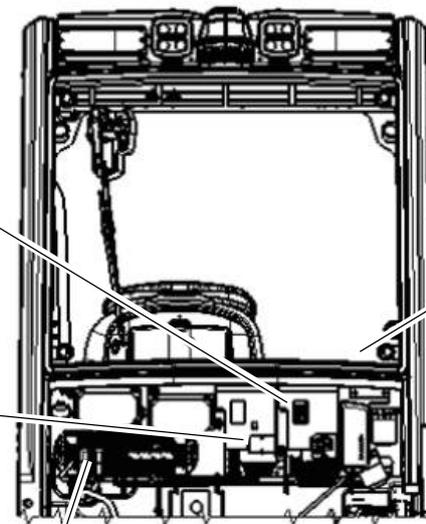
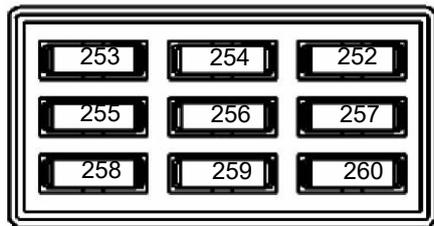
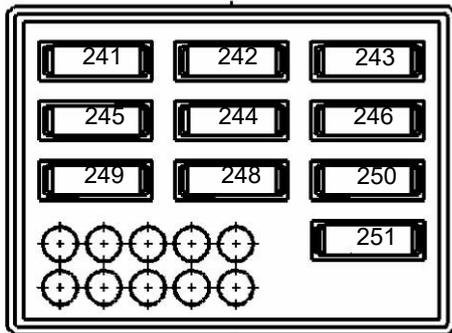
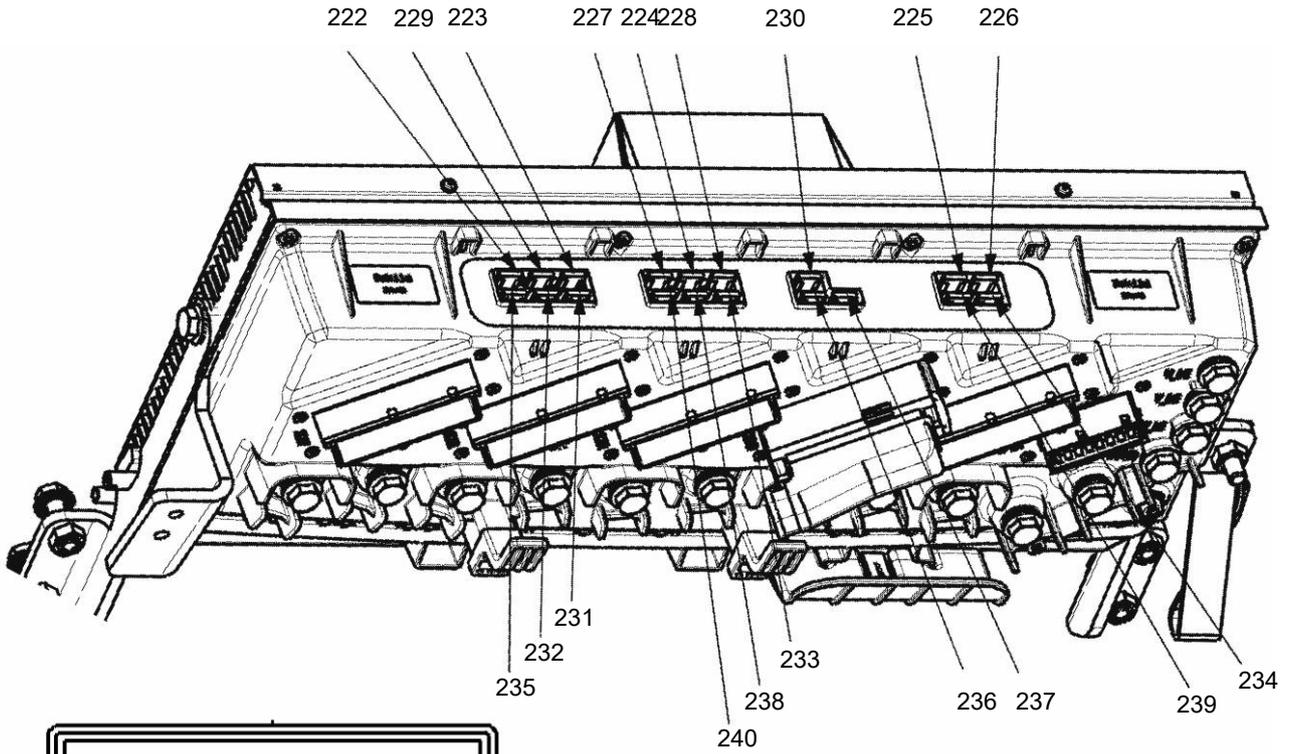
##### *Procedure*

- Undo the screw under the clip of the writing pad.
- Disconnect the bellows from the emergency disconnect switch from the panel.
- Remove the panel.
- Undo the screws.
- Replace any damaged fuses in accordance with the table.

- Tighten the screws to 12 Nm.
- Fit the panel, bellows and clip.

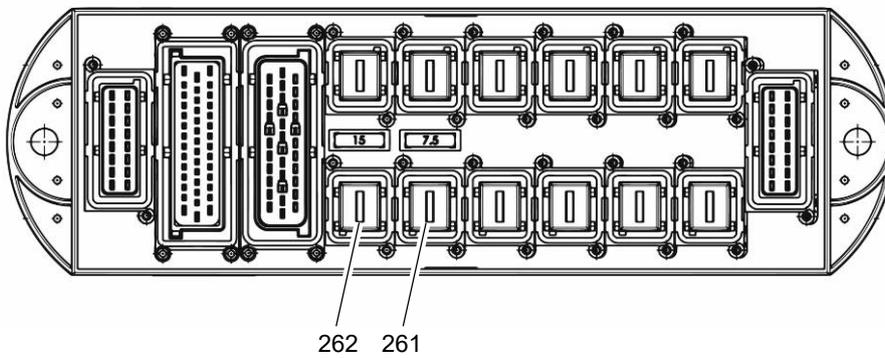
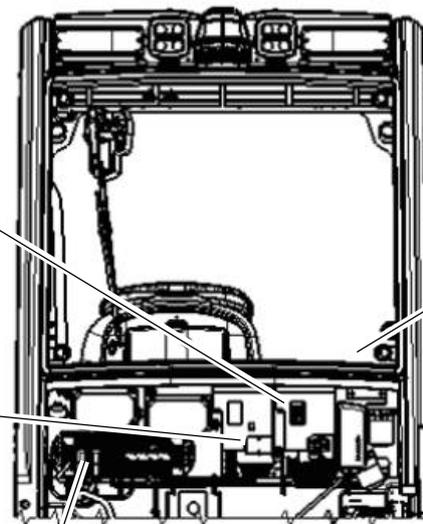
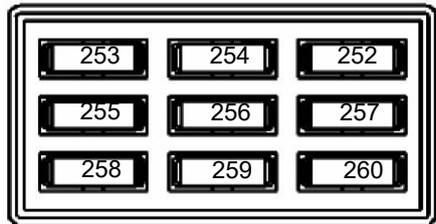
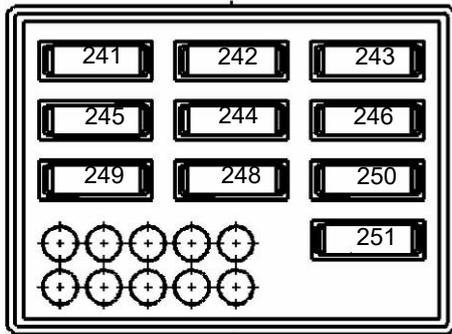
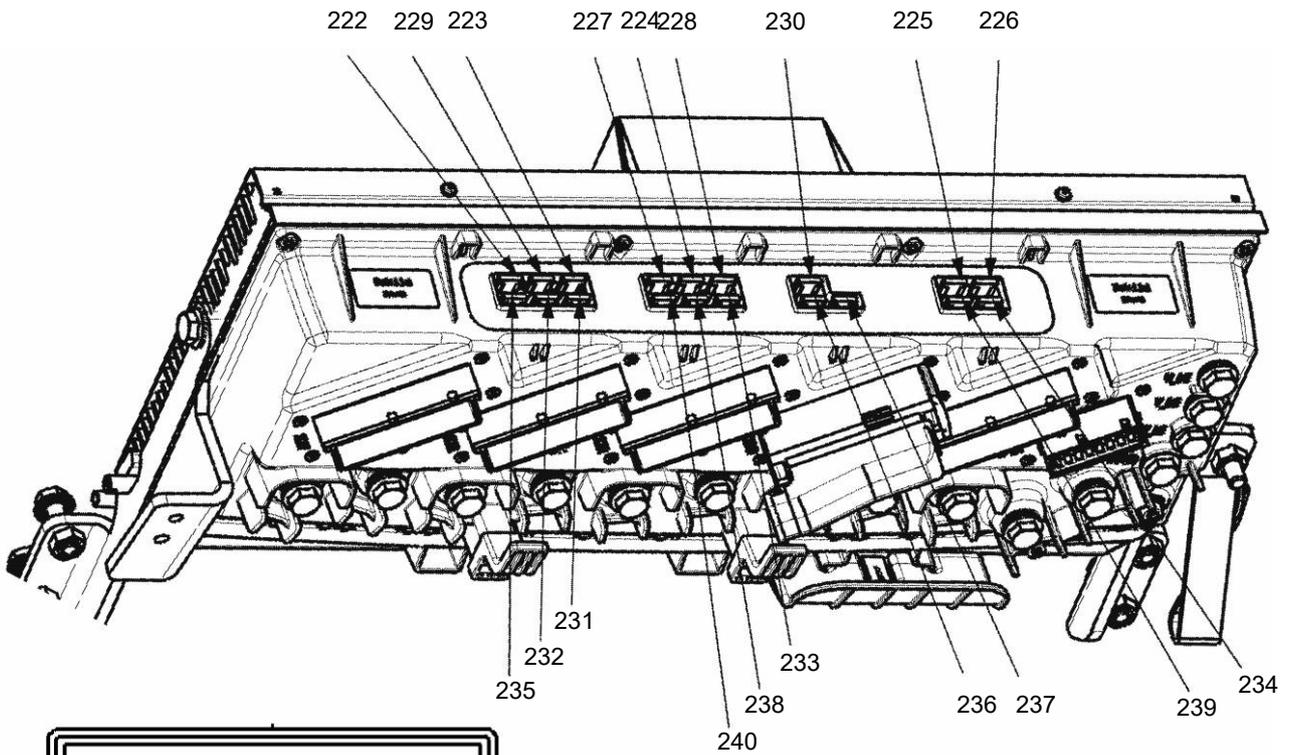
*The electrical fuses at the main fuse have now been checked.*

### 5.10.1 Fuse ratings



## Electrical system fuses

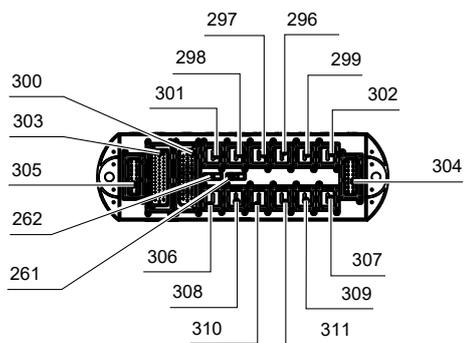
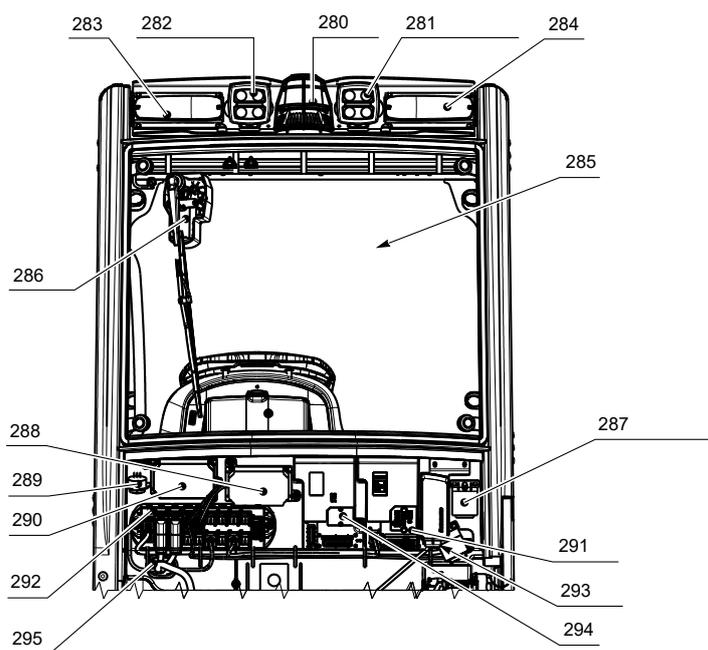
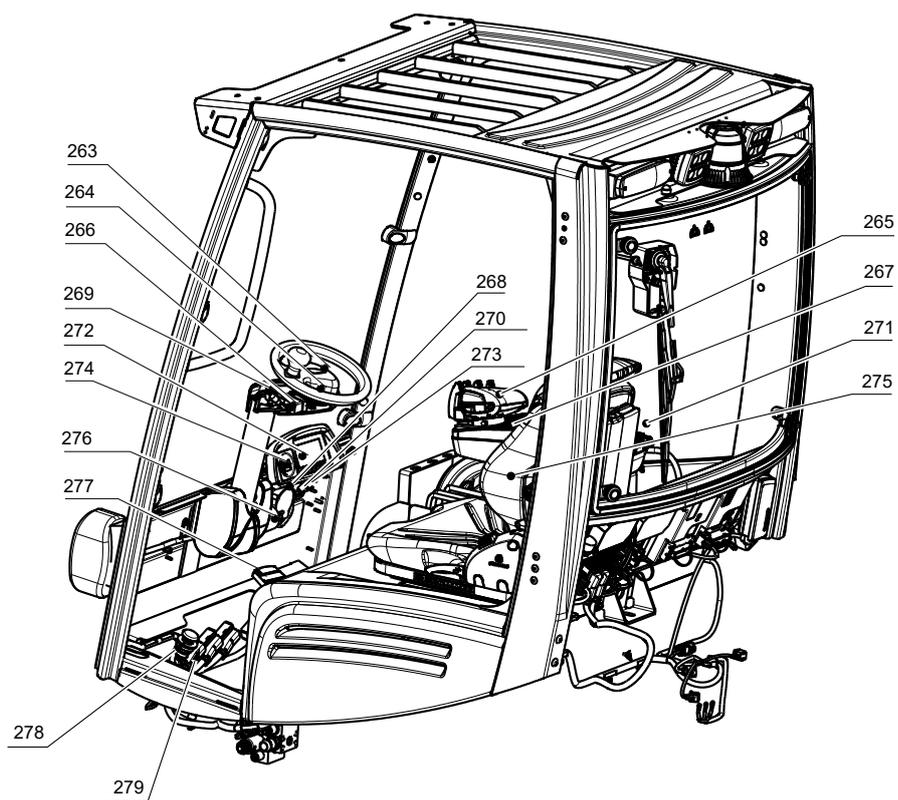
Item	Designation	Electrical circuit	Rating / type
222	5F11.2	Rear LH work lights fuse	FK1 MINI 32V / 4A / UL
223	F4	Main contactor fuse	FK1 MINI 32V / 3A / UL
224	4F4	Beacon fuse	FK1 MINI 32V / 4A / UL
225	7F11	DC/DC converter	FK1 MINI 58V / 15A / UL
226	7F4	DC/DC converter	FK1 MINI 58V / 10A / UL
227	4F8	Display control unit fuse (MFA)	FK1 MINI 32V / 3A / UL
228	4F10	Fan fuse Lift height sensors fuse	FK1 MINI 32V / 3A / UL
229	5F11.3	Rear RH work lights fuse	FK1 MINI 32V / 4A / UL
230	F36	Rear windscreen heater fuse Release valve fuse	FK1 MINI 58V / 2A / UL
231	F29	24V standby	FK1 MINI 32V / 3A / UL
232	5F11	Front LH work lights fuse	FK1 MINI 32V / 4A / UL
233	9F23	Toggle valve fuse	FK1 MINI 32V / 4A / UL
234	7F3	DC/DC converter	FK1 MINI 58V / 10A / UL
235	5F11.1	Front RH work lights fuse	FK1 MINI 32V / 4A / UL
236	F35.1	48V fuse (CUST 2)	FK1 MINI 58V / 15A / UL
237	F35	48V fuse (CUST 1)	FK1 MINI 58V / 15A / UL
238	F31	Sensor system - 24 V	FK1 MINI 32V / 3A / UL
239	5F2	DC/DC converter	FK1 MINI 58V / 15A / UL
240	4F1	Horn control fuse Steering wheel magnetic brake fuse	FK1 MINI 32V / 4A / UL



## Fuses for optional equipment

Item	Designation	Electrical circuit	Rating / type
241	9F17.9	Option fuse 24V	FK1 MINI 32V / 4A / UL
242	9F17.6	Option fuse 24V	FK1 MINI 32V / 4A / UL
243	9F17.3	Option fuse 24V	FK1 MINI 32V / 3A / UL
244	9F17.5	Option fuse 24V	FK1 MINI 32V / 4A / UL
245	9F17.8	Option fuse 24V	FK1 MINI 32V / 4A / UL
246	9F17.2	Option fuse 24V	FK1 MINI 32V / 5A / UL
247	F8	Main fuse (emergency disconnect)	FK1 MINI 48V / 425A / UL
248	9F17.4	Option fuse 24V	FK1 MINI 32V / 4A / UL
249	9F17.7	Option fuse 24V	FK1 MINI 32V / 4A / UL
250	9F17.1	Option fuse 24V	FK1 MINI 32V / 7.5A / UL
251	9F17	Option fuse 24V	FK1 MINI 32V / 7.5A / UL
252	5F5	Lighting control fuse	FK1 MINI 32V / 3A / UL
253	4F6.1	LH brake light control fuse	FK1 MINI 32V / 3A / UL
254	4F6.2	RH brake light control fuse	FK1 MINI 32V / 3A / UL
255	5F5.3	RH tail lights control fuse	FK1 MINI 32V / 3A / UL
256	4F5.1	Left indicator control fuse	FK1 MINI 32V / 3A / UL
257	5F4.1	RH lighting control fuse	FK1 MINI 32V / 3A / UL
258	5F5.1	LH lighting control fuse	FK1 MINI 32V / 3A / UL

<b>Item</b>	<b>Designation</b>	<b>Electrical circuit</b>	<b>Rating / type</b>
259	4F5.2	Right indicator control fuse	FK1 MINI 32V / 3A / UL
260	5F4	LH tail lights control fuse	FK1 MINI 32V / 3A / UL
261	F3.1	Output fuse DVC 150	FK1 MINI 32V / 7.5A / UL
262	F19	Output fuse DVC 150	FK1 MINI 58V / 15A / UL



## Overhead guard connector positions

Item	Designation	Electrical circuit
263	3Y5	Steering wheel magnetic brake
264	3U10	Steering setpoint device
265	2U13	multiPILOT
266	5S3	Switch
267	S8	Keypad
268	X3	Locking interface/display
269	X34/X36	Steering wheel magnetic brake interface/ Steering setpoint device interface
270	X159	Front wiper motor interface
271	8U6	WG electronics
272	3U7	Control unit display
273	X127	Front work lights interface
274	S2	Key switch
275	7S9	Switch in seat
276	9M2.1	Front windscreen wiper motor
277	1B12	Accelerator pedal
278	AS1/7S3	Deadman button
279	X37/A18	Overhead guard on-board power supply interface
280	4H3.1	Strobe light
281	5E18/5E22	OHG rear left/right work light
282	E17/5E21	OHG rear left work light
283	3E1	Combi tail light - left
284	3E2	Combi tail light - right
285	9R4	Rear windscreen heater
286	9M2.2	Rear windscreen wiper motor
287	Cust R1-4	Cust relays
288	U27	DC/DC converter 80V/24V
289	4H2	Buzzer
290	U25	DC/DC converter 80V/12V
291	7U6.1	DC/DC converter option-24
292	U15	Overhead guard distributor
293	X6U15	Globus
294	7U6	DC/DC converter option-24
295	9M4	Windscreen washing system motor
296	XS82	Lift cut-off override interface
297	XS35	Floor-Spot interface
298	XS173	DC/DC converter 24V interface

Item	Designation	Electrical circuit
299	XS92	Cab door monitoring interface
300	XS67	Chassis on-board power supply interface
301	XS172	DC/DC converter 12V interface
302	XS150	Side shift button interface
303	XS64	Chassis on-board power supply interface
304	XS80	DC/DC converter PIO interface
305	XS65	Interface for multifunction armrest/driver's seat
306	XS132	Rear work lights interface
307	XS84	Warning buzzer interface
308	XS138	Interface for warning beacon/strobe light
309	XS171	DC/DC converter POC interface
310	XS154	Wash pump interface
311	XS156	Rear windscreen interface

### Overhead guard fuses

Item	Designation	Electrical circuit	Rating/ type
262	F19	12V fuse	15A/32V
261	F3.1	24V fuse	7.5A/32V
294	4F6.1	Left brake light, trailer coupling brake light	3A/32V
294	5F5.3	Right dipped light	3A/32V
294	5F5.1	Left dipped light	3A/32V
294	4F6.2	Right brake light, trailer coupling brake light	3A/32V
294	4F5.1	Left indicator	3A/32V
294	4F5.2	Right indicator	3A/32V
294	5F5	Sensor system	3A/32V
294	5F4.1	Right parking and tail light, right trailer coupling tail light	3A/32V
294	5F4	Left parking and tail light, left trailer coupling tail light, search lighting switch	3A/32V
291	9F17	Seat heating	7.5A/32V
291	9F17.1	Fan for heater	7.5A/32V
291	9F17.2	Restraint system	5A/32V
291	9F17.3	Cabin fan	3A/32V
291	9F17.4	Cust 1	4A/32V
291	9F17.5	Cust 2	4A/32V

<b>Item</b>	<b>Designation</b>	<b>Electrical circuit</b>	<b>Rating/ type</b>
291	9F17.6	Cust 3	4A/32V
291	9F17.7	Cust 4	4A/32V
291	9F17.8	Cust 5	4A/32V
291	9F17.9	Cust 6	4A/32V

## 5.11 Cleaning

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

### 5.11.1 Cleaning the truck

#### **⚠ CAUTION!**

##### **Fire hazard**

Do not use flammable liquids to clean the industrial truck.

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

#### **⚠ CAUTION!**

##### **Risk of component damage when cleaning the truck**

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

- ▶ Cover all electronic system assemblies (controllers, sensors, motors etc.) before cleaning the truck with a pressure washer.
  - ▶ Do not hold the jet of the pressure washer by the marked points to avoid damaging them (see page 48).
  - ▶ Do not clean the truck with pressurised water.
- 

#### **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.
-

**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 truck******Requirements***

- Truck prepared for maintenance and repair work (see page 296).

***Tools and Material Required***

- Water-based solvents
- Sponge or cloth

***Procedure***

- Clean the surface of the truck with water-based solvents and water. Use a sponge or cloth to clean.
- In particular, clean the following areas:
  - Windscreens
  - 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 328).

*The truck is now clean.*



## 5.11.2 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 296.

##### *Tools and Material Required*

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

##### *Procedure*

- Expose the electrical system – see page 299.
- 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 299.
- Carry out all the tasks listed in the section "Recommissioning the truck after cleaning or maintenance work" – see page 328.

*The electrical-system assemblies are now clean.*

## 5.12 Working on the electrical system

### **⚠ WARNING!**

#### **Electrical current can cause accidents**

Ensure the electrical system is de-energised before starting work. The capacitors in the control 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 work 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 140).
  - ▶ Equipped with lithium-ion battery (○):  
disconnect the truck-side control line from the connection on the battery trough or the interface converter (○) on the battery.  
Open the battery connector lock: loosen the bolted bar.
  - ▶ Disconnect the battery.
  - ▶ Remove any rings, metal wristbands etc.
- 

## 5.13 Restoring the truck to service after maintenance and repairs

### *Procedure*

- Connect the battery connector to the truck.
- Equipped with lithium-ion battery (○):
  - Close the battery connector lock: tighten the bolted bar.
  - Insert the truck-side control line into the connection on the battery trough or into the interface converter (○) on the battery.
- Commission the truck, see page 139.

## 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 297.

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

→ Equipped with lithium-ion battery (○): read the manufacturer's operating instructions.

### 6.1 Prior to decommissioning

#### *Procedure*

- Thoroughly clean the truck, see page 322.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and top up if necessary, see page 304.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the forklift truck according to the lubrication schedule, see page 293.
- Charge the battery – see page 90.
- 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 lead-acid battery (●): Disconnect the battery, clean it and grease the battery terminal screws with terminal grease.
- Equipped with lithium-ion battery (○) without interface converter on the battery: Disconnect the truck-side control line from the connection on the battery trough.
- Equipped with lithium-ion battery (○) with interface converter on the battery:
  - Disconnect the truck-side control line from the connection on the interface converter on the battery.
  - Pull the battery forward.
  - Disconnect the control line from the battery connection at the top of the battery, or from the inside of the trough.
  - Slide the battery back in.

### 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 90.

### 6.2.1 Lithium-ion battery system

→ Equipped with lithium-ion battery (○): read the manufacturer's operating instructions.

→ Equipped with lithium-ion battery (○) with comfort charger socket on the truck: 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.

## 6.3 Restoring the truck to service after decommissioning

### *Procedure*

- Thoroughly clean the truck – see page 322.
- Lubricate the forklift truck according to the lubrication schedule – see page 293.
- Equipped 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 90.
- Commission the forklift truck – see page 296.

## **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 140).
  - ▶ 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. Open the battery connector lock: Loosen the bolted bar.
  - ▶ 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 wear-free.

The components are maintenance-free, and therefore no maintenance intervals are defined for this battery.

The battery is continually monitored by the battery management system.

## **1 Maintenance Contents EFG 112-220**

Issued on: 2022-06-22 09:00

## 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.

<b>Hydraulic operations</b>
Lubricate the load chains.
Lubricate the contact surfaces of the mast.
Correct the hydraulic-oil level.

#### 1.1.1.2 Optional Equipment

##### Fork positioner

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

##### Clamping device

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

##### Side shift

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

##### Telescopic forks

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

##### Windscreen washing system

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

##### Electrical heating

<b>Chassis/structure</b>
Clean heater breather filter.

## Automatic battery extraction

<b>Chassis/structure</b>
--------------------------

Clean and lubricate the contact surfaces
--

## Pneumatic tyres

<b>Travel</b>
---------------

Correct the tyre air pressure.
--------------------------------

## Lead-acid battery, international

<b>Power supply</b>
---------------------

Correct the battery-acid level using demineralised water.
---

## Lead-acid battery

<b>Power supply</b>
---------------------

Correct the battery-acid level using demineralised water.
---

## 1.1.2 Inspection contents

### 1.1.2.1 Standard equipment

The following points must be checked:

<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>
Check battery and battery components for 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

<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 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
---

## 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 112-220 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

<b>Brakes</b>
Test the brake.
Measure the air gap of the magnetic brake.
Adjust and lubricate the brake mechanism.

<b>Electrical system</b>
Test key switch or alternative access system including the access rights.
Test the contactors and/or relays.
Clean the fan.
Perform insulation inspection.

<b>Travel</b>
Correct the transmission oil level or grease filling of the transmission.

<b>Hydraulic operations</b>
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.

<b>Agreed services</b>
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

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
Adjust the axial play of the front and rear rollers.
Clean and grease attachment bearings, guides and stops.

### Clamping device

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
Adjust the axial play of the front and rear rollers.
Check that the attachment and retainer to protect against accidental displacement and unhinging are present and function correctly.
Clean and grease attachment bearings, guides and stops.

### Side shift

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
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

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
Clean and grease attachment bearings, guides and stops.
Adjust the pistons and piston rods.

### Windscreen washing system

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

### Radio data

<b>System components</b>
Clean the scanner and terminal.

## Video system

### System components

Clean the camera.

Clean the display.

## Weigher sensors/switches

### Electrical system

Test the weigher.

## Restraint system / HRS-E-DUO

### Chassis/structure

Test the travel cut-off.

## Automatic battery extraction

### Chassis/structure

Clean and lubricate the contact surfaces

## Pneumatic tyres

### Travel

Correct the tyre air pressure.

## Lead-acid battery, international

### Electrical system

Perform insulation inspection.

### Power supply

Clean the battery.

Clean and grease the battery terminals.

Measure acid density and battery voltage.

Correct the battery-acid level using demineralised water.

## Lead-acid battery

### Electrical system

Perform insulation inspection.

### Power supply

Clean the battery.

Clean and grease the battery terminals.

Measure acid density and battery voltage.

Correct the battery-acid level using demineralised water.

## 1.2.2 Inspection contents

The following points must be checked:

### 1.2.2.1 Standard equipment

<b>Brakes</b>
Test brake mechanism and check for damage
<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
Contactors and/or relays for wear and 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>
Battery latch and battery attachment for correct function and damage
Battery connector for secure fit, functionality and damage
<b>Travel</b>
Drive system bearings for wear and damage
Transmission for noise and leaks
Check wheels for wear, damage and secure mounting
Check wheel bearings and mounting of wheels for wear and damage
<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
Check doors or covers for damage
Check the counterweight is securely attached
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

<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
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>
Electric steering and its components for function, wear and damage
Wheel adjustment indicator for function and plausibility
Check the mechanical parts of the steering column for wear and damage
Steering block 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

#### Load backrest

<b>Hydraulic operations</b>
Check the load backrest is secure and check for damage

#### Battery refill system

<b>Power supply</b>
Refill system for functionality and leaks

## SnapFit battery replacement system

### Power supply

Ensure safety labels are present and check for damage

Test locking mechanism and check for damage

### Fork positioner

#### Hydraulic operations

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

#### Hydraulic operations

Test acknowledgement button

Test hose pulley and check for leaks and damage

Test attachment and check for 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

Check cylinder seals for leaks and damage

Check cylinder rods and their bushings for wear and damage

### Side shift

#### Hydraulic operations

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

### Hydraulic operations

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

### Hydraulic operations

Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage

## Windscreen washing system

### Chassis/structure

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

### Belt lock monitoring

#### Chassis/structure

Test seat belt monitoring 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

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

## Automatic battery extraction

### Electrical system

Check microswitches and sensors are secure and function correctly, and check for damage

Check electrical wiring for damage (insulation damage, connections) and check whether the fuse ratings are correct

### Power supply

Ensure safety labels are present and check for damage

### Hydraulic operations

Check cylinders and piston rods are securely attached and check for damage

Test hydraulic system

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

## Lead-acid battery, international

### Power supply

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

Ensure safety labels are present and check for damage

## Lead-acid battery

### Power supply

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

### 1.2.3 Maintenance parts

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

#### 1.2.3.1 Standard equipment

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Gear oil	10000	
Hydraulic system breather filter	2000	12
Hydraulic oil	2000	12
Hydraulic oil filter	2000	12

#### 1.2.3.2 Optional Equipment

##### Cold store application

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Hydraulic oil	2000	12

## 2 Maintenance Contents EFG 316-320

Issued on: 2022-06-22 09:00

### 2.1 Owner

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

#### 2.1.1 Maintenance contents

##### 2.1.1.1 Standard equipment

<b>Brakes</b>
Test the brake.

<b>Hydraulic operations</b>
Lubricate the load chains.
Lubricate the contact surfaces of the mast.
Correct the hydraulic-oil level.

##### 2.1.1.2 Optional Equipment

###### Fork positioner

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

###### Clamping device

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

###### Side shift

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

###### Telescopic forks

<b>Hydraulic operations</b>
Clean and lubricate the attachment.

###### Windscreen washing system

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

###### Electrical heating

<b>Chassis/structure</b>
Clean heater breather filter.

## Automatic battery extraction

<b>Chassis/structure</b>
--------------------------

Clean and lubricate the contact surfaces
--

## Pneumatic tyres

<b>Travel</b>
---------------

Correct the tyre air pressure.
--------------------------------

## Lead-acid battery, international

<b>Power supply</b>
---------------------

Correct the battery-acid level using demineralised water.
---

## Lead-acid battery

<b>Power supply</b>
---------------------

Correct the battery-acid level using demineralised water.
---

## 2.1.2 Inspection contents

### 2.1.2.1 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>
Check battery and battery components for 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

<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

### 2.1.2.2 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 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
---

## 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
---

## 2.2 Customer Service

In accordance with the EFG 316-320 service interval, to be performed every 1000 service hours, but at least once a year.

### 2.2.1 Maintenance contents

#### 2.2.1.1 Standard equipment

<b>Brakes</b>
---------------

Test the brake.
-----------------

Measure the air gap of the magnetic brake.
--

Adjust and lubricate the brake mechanism.
---

<b>Electrical system</b>
Test key switch or alternative access system including the access rights.
Test the contactors and/or relays.
Clean the fan.
Perform insulation inspection.

<b>Travel</b>
Correct the transmission oil level or grease filling of the transmission.

<b>Hydraulic operations</b>
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.

<b>Agreed services</b>
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.

<b>Steering</b>
Correct the fill level of the hydraulic oil of the hydraulic steering.
Correct fill level of the electric/hydraulic steering.

## 2.2.1.2 Optional Equipment

### Fork positioner

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
Adjust the axial play of the front and rear rollers.
Clean and grease attachment bearings, guides and stops.

## Clamping device

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
Adjust the axial play of the front and rear rollers.
Check that the attachment and retainer to protect against accidental displacement and unhinging are present and function correctly.
Clean and grease attachment bearings, guides and stops.

## Side shift

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
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

<b>Hydraulic operations</b>
Adjust the attachment.
Clean and lubricate the attachment.
Clean and grease attachment bearings, guides and stops.
Adjust the pistons and piston rods.

## Windscreen washing system

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

## Radio data

<b>System components</b>
Clean the scanner and terminal.

## Video system

<b>System components</b>
Clean the camera.
Clean the display.

## Weigher sensors/switches

<b>Electrical system</b>
Test the weigher.

## Restraint system / HRS-E-DUO

<b>Chassis/structure</b>
--------------------------

Test the travel cut-off.
--------------------------

### Automatic battery extraction

<b>Chassis/structure</b>
--------------------------

Clean and lubricate the contact surfaces
--

### Pneumatic tyres

<b>Travel</b>
---------------

Correct the tyre air pressure.
--------------------------------

### Lead-acid battery, international

<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.
---

### 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.
---

## 2.2.2 Inspection contents

The following points must be checked:

### 2.2.2.1 Standard equipment

<b>Brakes</b>
Test brake mechanism and check for damage
<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
Contactors and/or relays for wear and 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>
Battery latch and battery attachment for correct function and damage
Battery connector for secure fit, functionality and damage
<b>Travel</b>
Drive system bearings for wear and damage
Transmission for noise and leaks
Check wheels for wear, damage and secure mounting
Check wheel bearings and mounting of wheels for wear and damage
<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
Check doors or covers for damage
Check the counterweight is securely attached
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

<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
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
Test the electric/hydraulic steering and its components and check for leaks and damage
Check the mechanical parts of the steering column for wear and damage

### 2.2.2.2 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

#### Load backrest

<b>Hydraulic operations</b>
Check the load backrest is secure and check for damage

## Battery refill system

### Power supply

Refill system for functionality and leaks

## SnapFit battery replacement system

### Power supply

Ensure safety labels are present and check for damage

Test locking mechanism and check for damage

## Fork positioner

### Hydraulic operations

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

### Hydraulic operations

Test acknowledgement button

Test hose pulley and check for leaks and damage

Test attachment and check for 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

Check cylinder seals for leaks and damage

Check cylinder rods and their bushings for wear and damage

## Side shift

### Hydraulic operations

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

**Hydraulic operations**

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****Hydraulic operations**

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****Hydraulic operations**

Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage

**Windscreen washing system****Chassis/structure**

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

## Belt lock monitoring

### Chassis/structure

Test seat belt monitoring 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

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

## Automatic battery extraction

### Electrical system

Check microswitches and sensors are secure and function correctly, and check for damage

Check electrical wiring for damage (insulation damage, connections) and check whether the fuse ratings are correct

### Power supply

Ensure safety labels are present and check for damage

### Hydraulic operations

Check cylinders and piston rods are securely attached and check for damage

Test hydraulic system

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

## Lead-acid battery, international

### Power supply

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

Ensure safety labels are present and check for damage

## Lead-acid battery

### Power supply

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

### 2.2.3 Maintenance parts

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

#### 2.2.3.1 Standard equipment

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Gear oil	10000	
Hydraulic system breather filter	2000	12
Hydraulic oil	2000	12
Hydraulic oil filter	2000	12
Oil from the electric/hydraulic steering	2000	12
Oil filter of the electric/hydraulic steering	2000	12

#### 2.2.3.2 Optional Equipment

##### Cold store application

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Hydraulic oil	1000	12