

# ETV Q20/Q25

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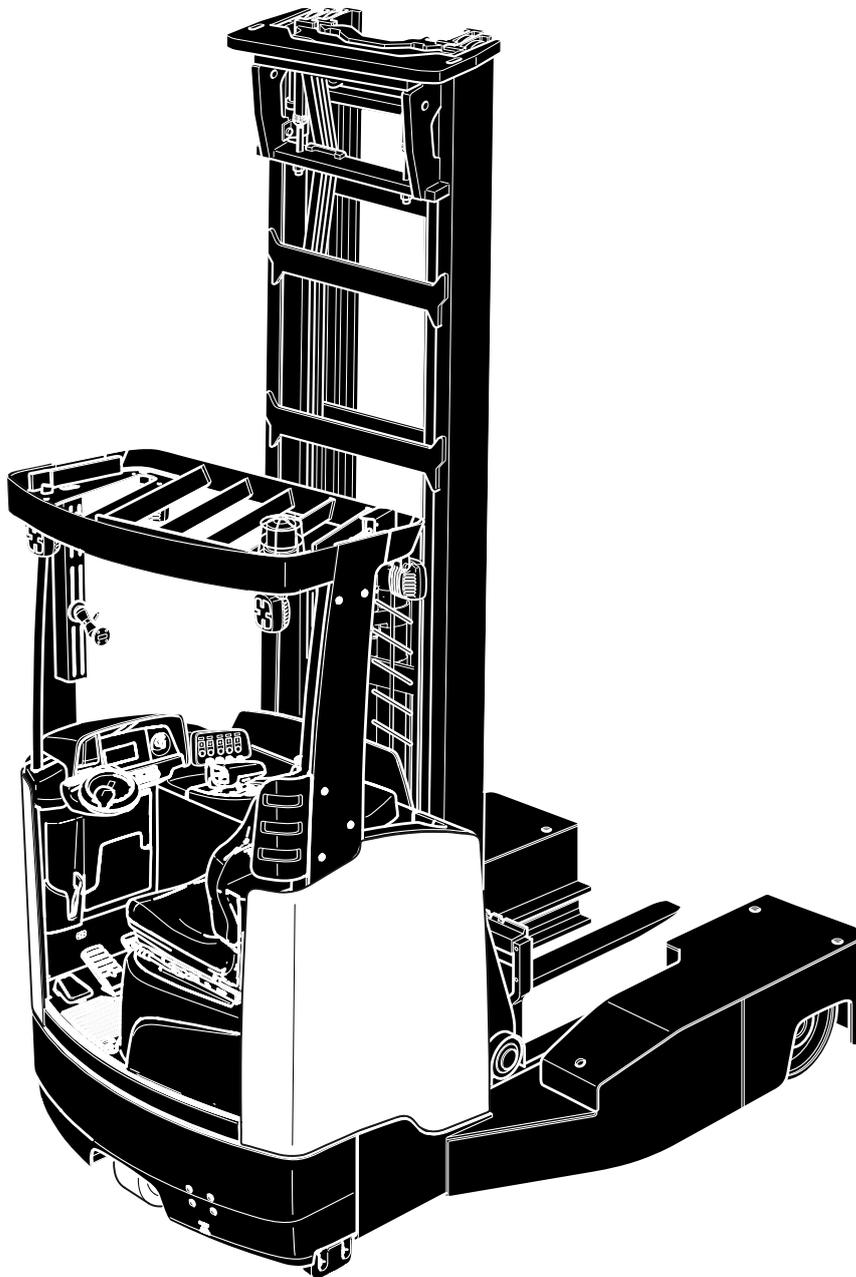
Operating instructions

en-GB

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ETV Q20  
ETV Q25



**JUNGHEINRICH**



# Declaration of Conformity



## Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

<b>Description</b>  Industrial truck
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Type	Option	Serial no.	Year of manufacture
ETV Q20 ETV Q25			

**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:** ETV Q20/Q25  
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**

# Foreword

## Notes on the operating instructions

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

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

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

## Safety notices and text mark-ups

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

### **DANGER!**

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

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### **WARNING!**

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

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### **CAUTION!**

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

---

### **NOTICE**

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

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 Used before notices and explanations.

	Indicates standard equipment
	Indicates optional equipment

## **Copyright**

Copyright of these operating instructions remains with JUNGHEINRICH AG.

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# A Correct Use and Application

## 1 General

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

## 2 Correct application

### NOTICE

The maximum 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 113.

### ⚠ WARNING!

#### Loss of operational stability can cause accidents

Extended mast sections when the truck is travelling with or without load will reduce the truck's operational stability.

▶ Always travel with the mast holder retracted, the mast tilted back, the load centre in the middle of the truck's longitudinal axis and the load handler lowered.

The following operations are permitted:

- Lifting and lowering loads.
- Transporting lowered loads.

The following operations are prohibited:

- Travelling with a raised load (during travel, the load must be raised to the smallest possible distance above the ground/the load wheels or the support arms)
- Transporting hanging loads. 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.
- Carrying and lifting passengers <sup>a)</sup>.
- Pushing or pulling load units on the floor.

a) Lifting passengers with a work cage may be permitted in some countries; this must be verified by the operating company.

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

→ 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!**

##### **Use under extreme conditions**

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

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

- Operation in industrial and commercial environments.
- Permissible temperature range -10°C to +40°C.
- Operation only on secure, level surfaces with sufficient capacity.
- Do not exceed the permissible surface and point load limits on the travel routes.
- Operation only on travel paths that are visible and approved by the operating company.
- Negotiating inclines up to a maximum of 15 %.
- Do not travel across or at an angle on inclines. Travel with the load facing uphill.

##### **Ground conditions**

The ground conditions must satisfy the following requirements:

- The supporting floor must comply with relevant regulations.
- The floor must be resistant to oil and grease.
- The floor insulation resistance RE must not exceed  $10^6 \Omega$  (in accordance with DIN EN1081).
- The capacity data indicated on the truck applies to floor surfaces that conform to DIN 18202 Table 3, Row 3.



For trucks with a lithium-ion battery (○), the permissible ambient temperature during operation changes to 0°C to +30°C. An ambient temperature of up to +35°C is permissible for a short period but no longer than 1 month per year. Longer periods of use reduce the expected service life of the lithium-ion battery.

## 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.

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

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

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

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

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

## 5 Proprietor responsibilities

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

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

### **NOTICE**

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

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## 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.

- When fitting an attachment, the corresponding sticker must be applied to the control element. The sticker can be obtained from the manufacturer's customer service department.

## 7 Removal of components

It is forbidden to modify or remove truck components, particularly protective and safety equipment.

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

# B Truck Description

## 1 Application

The ETV Q20/Q25 is a three-wheel electric side seat, clear view reach truck. It is designed to lift and transport goods on level surfaces. Open bottom pallets or pallets with transverse boards can be lifted inside or outside the area of the load wheels or roll cage. Loads can be stacked, unstacked and transported over long distances.

The ETV Q20/Q25 is designed to transport and pick goods on level surfaces in accordance with the VDMA guideline.

## 2 Truck models and rated capacity

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

### ETVQ20

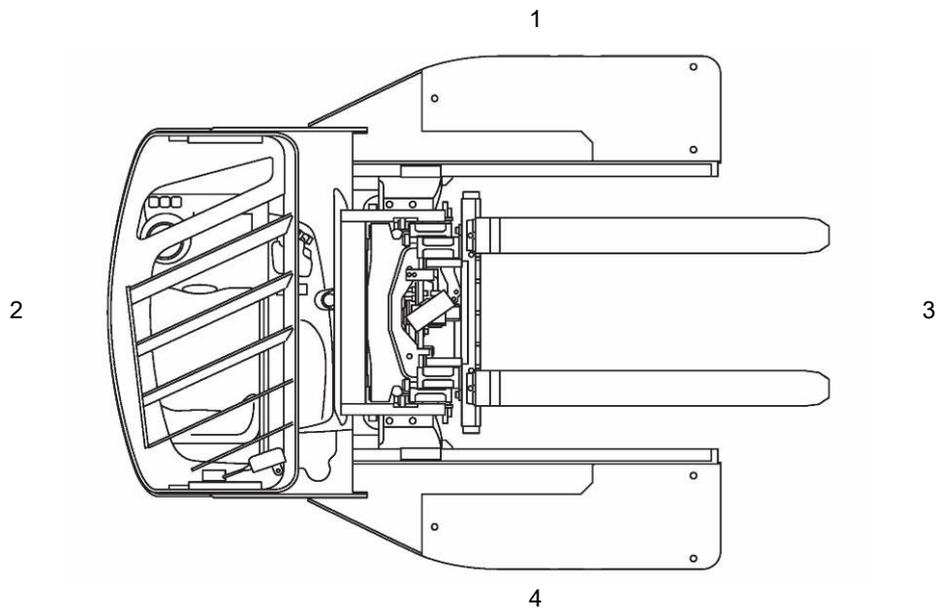
ETV	Model name
Q	Series
20	Rated capacity x 100 kg

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.

### 3 Travel Direction Definition

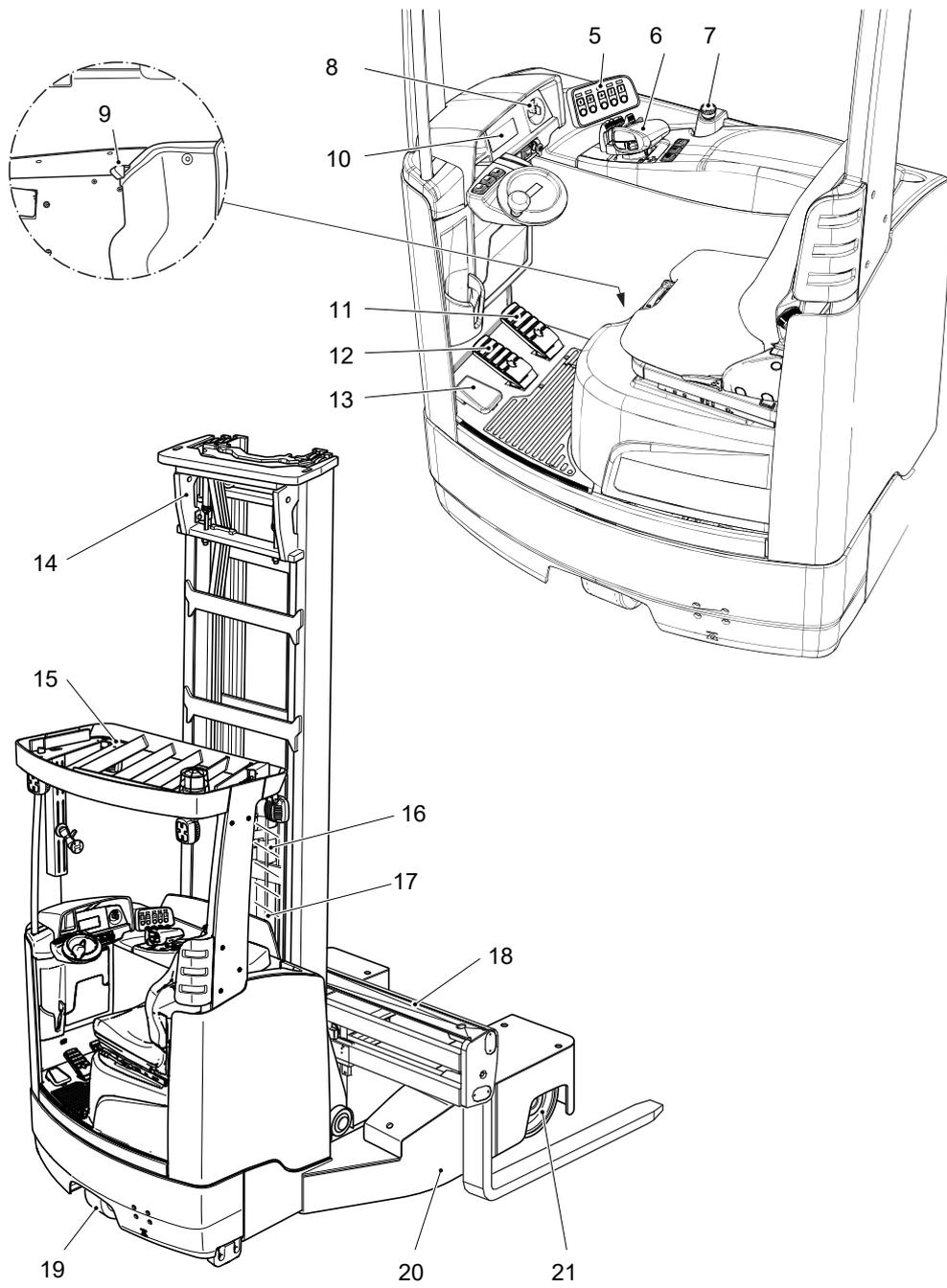
#### 3.1 Travel direction definition

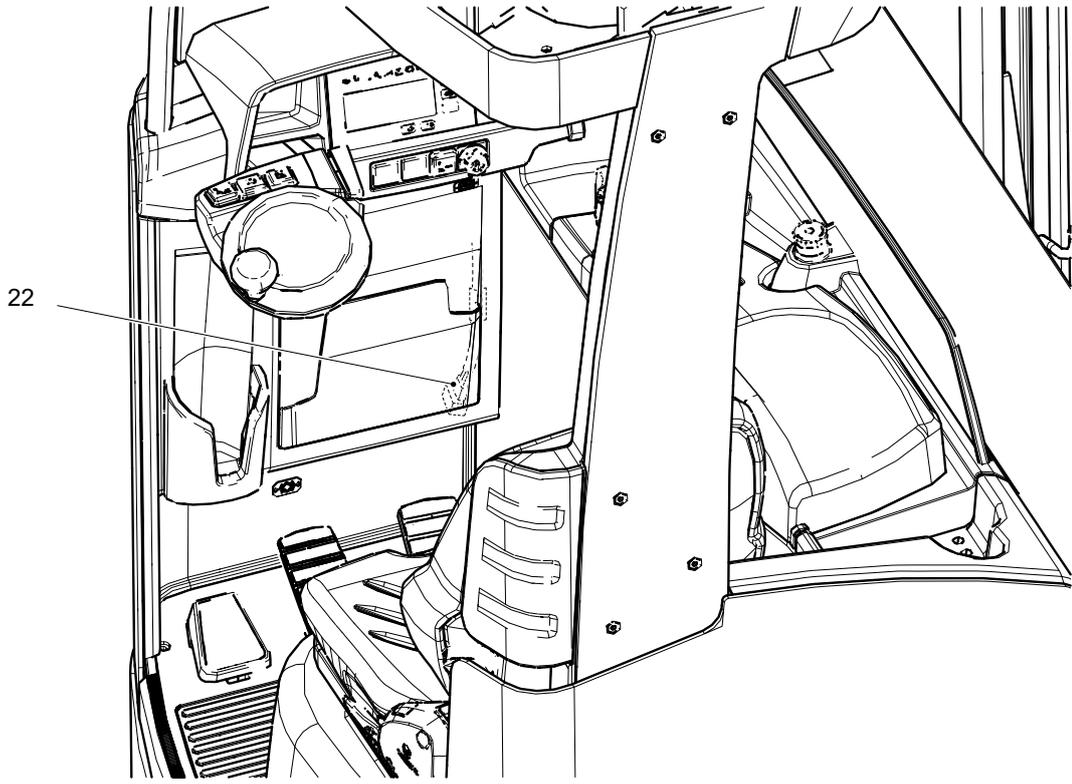
The following conventions have been agreed for travel direction specification:



Item	Travel direction
1	Left
2	Drive direction
3	Load direction
4	Right

## 4 Assembly description





Item		Description	Item		Description
5	●	Control unit	12	●	Brake pedal
6	●	soloPILOT	14	●	Mast
	○	multiPILOT	13	●	Deadman switch
7	●	Emergency disconnect switch	15	●	Overhead guard
8	●	Key switch	16	●	Free lift cylinder
	○	Keypad	17	○	Protective screen panel
	○	EasyAccess	18	○	Fork positioner
9	●	Battery trolley unlatch pedal	19	●	Drive wheel
10	●	Control and display unit	20	●	Support arms
11	●	Accelerator pedal	21	●	Load wheels
22	○	External power supply			
	●	Standard equipment		○	Optional equipment



## 5 Functional Description

### Safety mechanisms

An enclosed truck perimeter with rounded edges ensures safe handling of the ETV Q20/Q25. The driver is protected by the overhead guard (15). The drive wheel (19) and load wheels (21) are protected by a solid skirt.

→ A slight danger remains for third parties, even when a drive wheel cover is used.

Pressing the EMERGENCY DISCONNECT switch (7) rapidly disconnects all electrical functions in hazardous situations.

Line brake safety devices in the lift cylinders limit the load lowering speed in the event of a hydraulic system failure.

### Emergency Stop safety feature

If a fault is identified the Emergency Stop automatically brakes the truck until it comes to a halt. Control displays on the control and display unit indicate the Emergency Stop. Whenever the truck is switched on, the system performs a self-diagnosis which only releases the parking brake (emergency stop) if the functional test is positive.

### Deadman switch

The deadman switch (13) in the left leg well must be depressed to allow the driver to operate the truck. Lifting and travel are inhibited if the driver takes his foot off the deadman switch (13). Steering and braking remain enabled. The deadman switch can be adjusted so that when the deadman switch (13) is released the parking brake applies after a set time (prevents the truck from accidentally rolling away).

### Operator position

The operator position is ergonomically designed with ample legroom. To achieve the correct seated position, the driver's seat and steering head can be adjusted by the driver. The accelerator pedal and brake pedal (11, 12) are of "automotive" design.

### Drive system

The entire drive unit is bolted onto the chassis of the truck. A fixed AC threephase motor controls the drive wheel via a bevel spur gearbox. The electronic traction current controller ensures a smooth drive motor speed and as a result smooth start-up, powerful acceleration and electronically controlled braking with energy recovery.

### Curve Control

Automatic speed reduction for cornering. Curve Control limits the speed and acceleration when cornering. This reduces the risk of oscillations or tipovers.

### Controls and displays

Controls and displays are clearly arranged in the driver's cab. The logically designed SOLO-PILOT (6) enables single handed operation of travel direction, lift/lowering, forward / reverse reach, mast tilt, sideshift left or right and auxiliary hydraulics HF5 (○).

The Easy Access option with PIN code (○) allows the truck to be switched on via the control and display unit.

## **Displays**

Control and display unit (10) with integrated residual time display, battery discharge indicator, lift and travel profile setting and steer angle display. The battery discharge indicator and hour meter (10) are combined on the control and display unit. The discharge indicator is designed as a battery discharge monitor which disables lifting when the battery is discharged in order to avoid deep discharge.

In cold store application from -20°C, a delay of up to 3 minutes can be expected when switching on the display.

## **Braking system**

The electric braking system consists of up to three independent braking systems. Applying the brake pedal (12) results in inversion braking (plugging) in the drive motor. Where required, the load wheel brakes are applied via the brake control system.

The parking brake is electrically released and actuated through spring pressure. The parking brake acts on the drive system. It is also used for emergency braking. A warning indicator lights up when the parking brake is applied. Faults in the steering and brake systems (which trigger an emergency stop) are shown on the control and display unit.

## **Steering**

Electric all wheel steering, electronically controlled for various steer modes. The drive wheel (19) and load wheels (21) are steered individually by steer motors. An electronic control provides the ideal wheel positions for moving in confined areas. The steering modes and steering mode functional displays can be selected on the control unit (5). The adjustable steering wheel acts as a steering transmitter.

## **Steering with defined knob position**

When the truck is travelling straight ahead, the defined knob position always fixes the steering wheel knob at the "9 o'clock" position. The function is independent of the 180°/360° operating mode.

## **Electrical system**

48 volt, twin cable system. Standard electronic drive, lift and steering control system. The electronic drive controller provides infinite travel speed control and allows the truck to plug when changing direction. Travel and lift parameters can be set as required via the control and display unit (10). Warning displays, operator errors and service functions can also be shown on the control and display unit.

Battery types see page 53.

## **Mast**

The trucks are equipped with fork tilt devices or telescopic clear view masts positioned in the mast support. Adjustable side rollers and slide pieces take up the lateral pressure exerted on the fork carriage if the load is positioned on one side. The forks are fitted to the fork carriage and are adjustable. With the two-stage triplex

mast (DZ) a free lift cylinder (16) initially lifts the load carriage (free lift) without changing the overall height of the truck.

### **Hydraulic system**

The hydraulic system is driven by a pump unit with a three-phase motor and a quiet running precision high pressure pump. The hydraulic system is controlled via the Solo-Pilot (6).

### **Mast support**

The mast support is mounted on support rollers. A single telescopic reach cylinder extends and retracts the support. The mast support rails are bolted on to the outriggers (20).

### **Mast reach damping (○)/active mast vibration damping (○)**

Damping of the vibrations of the extended mast and reduction of the travel speed to slow travel when lifting the load beyond the free lift. The vibration-damping systems support the operator when stacking and retrieving loads with the mast extended in mast lift. Mast reach damping operates with a hydraulic damping cylinder, thus reducing mast vibrations. Active mast vibration damping suppresses vibration of the mast by actively controlling the hydraulic mast reach.

- ➔ The stopping distance may be extended when the reversing brake is used and the maximum speed may be restricted immediately after replacing a wheel.

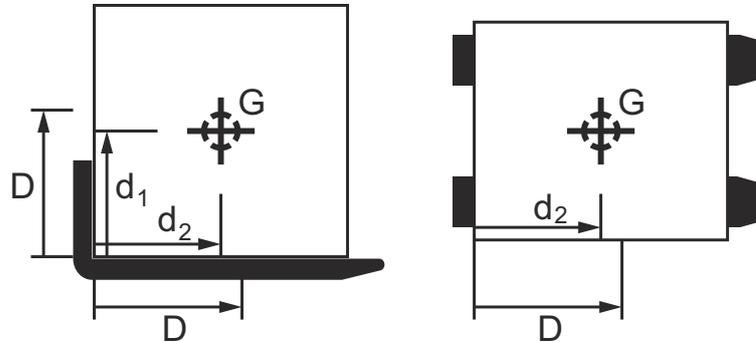
### **Attachments**

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

## 6 Technical Specifications

- 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.

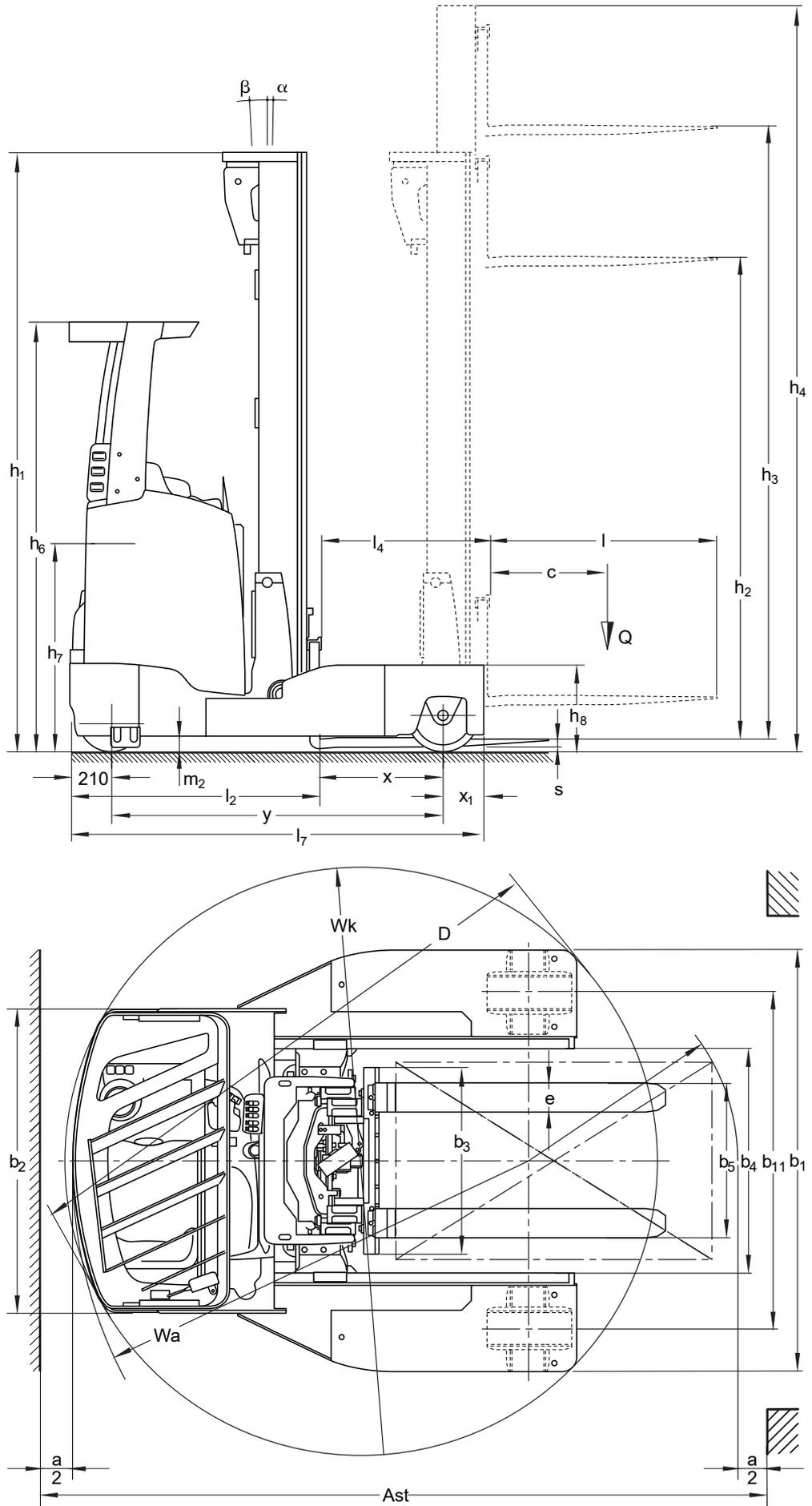
The distances  $d_1$  and  $d_2$  depicted in the illustration between the load handler and the actual centre of gravity  $G$  of the load must be smaller or equal to the load centre distance  $D$  ( $d_1 \leq D$  and  $d_2 \leq D$ ) to avoid the risk of overturning, see page 113.

## 6.1 Performance data

	Description	ETV Q20	ETV Q25	
Q	Capacity (where c = 600 mm)	2000	2500	kg
	Travel speed with/without load	14.0/14.0	14.0/14.0	km/h
	Lift speed with/without load	0.38/0.64	0.35/0.64	m/s (±10%)
	Lowering speed with/without load	0.55/0.55	0.55/0.55	m/s (-15%)
	Traverse speed with/without load a)	0.2/0.2	0.2/0.2	m/s
	Gradeability with/without load	7/11	6/11	%
	Max. gradeability (5 min. on-time rating) with/without load	10/15	10/15	%
	Acceleration with/without load	4.6/4.3	5.0/4.4	m/s
	Drive motor, output S2 60 min	8.5	8.5	kW
	Lift motor, output S3 15%	15.5	15.5	kW

a) Mast-dependent: over h3 = 6200 mm: 0.1 m/s, h3 = 8000 mm: 0.08 m/s

## 6.2 Dimensions



	Description	ETV Q20	ETV Q25	
s/e/l	Fork dimensions	50/140/1150	50/140/1150	mm
c	Load centre distance	600	600	mm
x	Load distance, mast retracted <sup>a)</sup>	380	503	mm
x <sub>1</sub>	Load distance, mast extended <sup>a)</sup>	230	230	mm
y	Wheelbase	1528	1683	mm
h <sub>6</sub>	Overhead guard height	2150	2150	mm
h <sub>7</sub>	Seat height/standing height	960	960	mm
h <sub>8</sub>	Support arm height	442	442	mm
l <sub>1</sub>	Overall length <sup>a)</sup>	2433	2518	mm
l <sub>2</sub>	Length incl. fork shank <sup>a)</sup>	1283	1368	mm
l <sub>4</sub>	Extend <sup>a)</sup>	664	721	mm
l <sub>7</sub>	Length across support arms	1957	2112	mm
b <sub>1</sub> /b <sub>2</sub>	Overall width	1760/1270		mm
b <sub>3</sub>	Fork carriage width	800		mm
b <sub>4</sub>	Width between support arms/ loading platforms	940		mm
b <sub>5</sub>	Width across forks (min./max.)	356/737		mm
b <sub>11</sub>	Rear track	1420		mm
Wa	Turning radius <sup>c)</sup>	1741	1893	mm
Ast	Aisle width <sup>a)</sup> for 1000 x 1200 pallets, lengthways	2763	2858	mm
Ast	Aisle width <sup>a)</sup> for 800 x 1200 pallets, traverse	2802	2878	mm
D	Truck diagonal <sup>c)</sup>	2277	2432	mm
m <sub>2</sub>	Ground clearance, centre wheelbase	95		mm
	Mast tilt $\alpha/\beta$ <sup>b)</sup>	1/5		°

- a) Values apply to battery size 48V/620Ah, other battery sizes will change these values
- b) Mast-dependent
- c) Turning radius on the spot: 1230 mm

### 6.2.1 Standard mast version dimensions

	Description	Triplex mast (DZ)	Duplex mast (DZ) reinforced	
h <sub>1</sub>	Mast height retracted	2400	2400	mm
h <sub>2</sub>	Free lift	1670	1670	mm
h <sub>3</sub>	Lift	5300	5300	mm
h <sub>4</sub>	Mast height extended	6046	6046	mm

### 6.3 Weights

	Model	Triplex mast (DZ)	Duplex mast (DZ) reinforced	
	Net weight incl. battery <sup>a)</sup>	4060	4150	kg
	Axle load, w.o. load front/rear	2310/1750	2490/1660	kg
	Axle loading forks fwd. w. load front/rear	670/5390	600/6050	kg
	Axle loading forks back w. load front/rear	1940/4120	2260/4390	kg

a) Values apply to battery size 48V/620Ah, other battery sizes and masts will change these values

## 6.4 Tyre type

	Description	ETV Q20	ETV Q25	
	Tyre type	Vulkollan		
	Tyre size, front (drive wheel)	343 x 140		mm
	Tyre size, rear (load wheels)	343 x 140		mm
	Wheels, number front / rear (x = driven)	1x/2		

## 6.5 Battery

Approved battery types see page 53.

## 6.6 Hydraulics

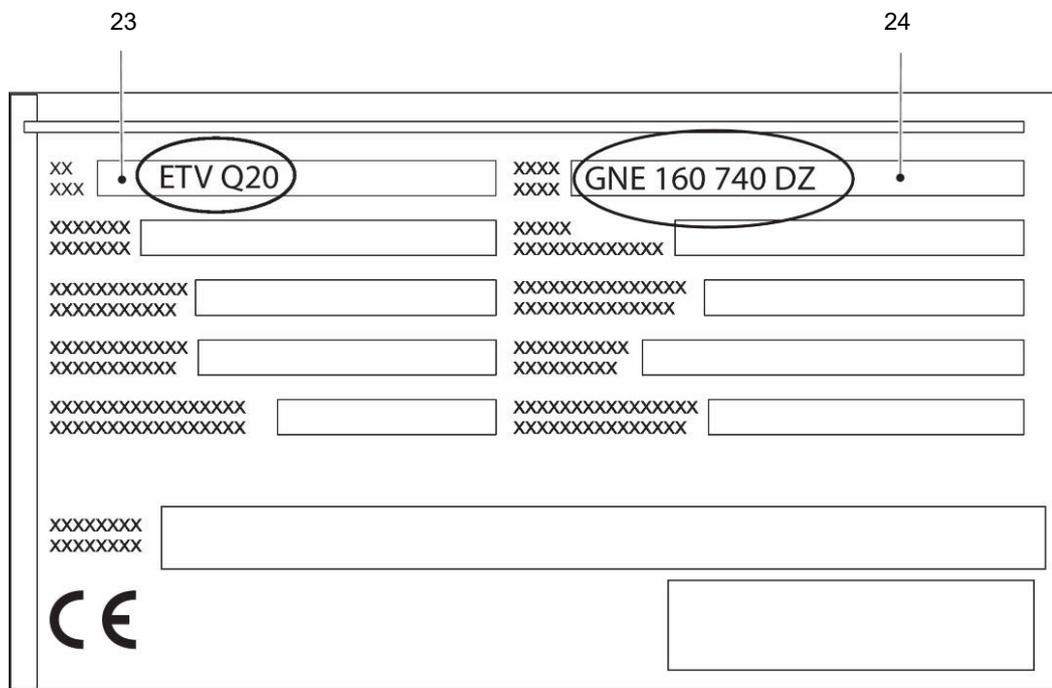
Forklift truck

Model	ETV Q20	ETV Q25	
Operating pressure for attachments	150	150	bar
Maximum operating pressure	250	250	bar
Oil flow for attachments	20	20	l/min

## 6.7 Mast weights

The weight of the mast can be calculated using the formulae given below. The necessary details such as truck name, model and length of the extended mast (lift height) can be taken from the data plate. The weight of the truck and the battery can be found on the data plate.

### 6.7.1 Example of determining the weight of a mast



- Truck name (23): ETV Q20
- Mast (24): GN E DZ
- Mast weight = 1.2 x lift height + 435 kg / 959 lb
- Mast weight = 1.2 x 740 kg / 1631 lb + 435 kg / 959 lb = 1323 kg / 2917 lb

### 6.7.2 Overview of the applicable formulas

Truck series	Design	Calculation
ETV Q20/Q25	GE DZ	Weight = 1.0 x lift height + 415 kg
ETV Q20/Q25	GNE DZ	Weight = 1.2 x lift height + 435 kg
ETV Q20/Q25	Fork positioner	Weight = 1.0 x lift height + 900 kg

<b>Truck series</b>	<b>Mast Design</b>	<b>Lift height</b>	<b>Weight calculation without fork arms</b>
ETV Q20/Q25	GE DZ	All	1.0 x lift height + 400 kg
ETV Q20/Q25	GNE DZ	$h_3 < 1000$	1.2 x lift height + 400 kg
ETV Q20/Q25	GNE DZ	$1000 \leq h_3 < 1300$	1.2 x lift height + 420 kg
ETV Q20/Q25	GNE DZ	$1300 \leq h_3$	1.1 x lift height + 620 kg
ETV Q20/Q25	Fork positioner		Weight = 1.0 x lift height + 900 kg

## 6.8 EN norms

### Continuous sound pressure level

- ETV Q20/Q25: 70 dB(A)

in accordance with EN 12053 as harmonised with ISO 4871.

- The continuous sound pressure level is calculated according to standard procedures and takes into account the sound pressure level when travelling, lifting and idling. The sound pressure level is measured at the operator's ear.

### Vibration

- ETV Q20/Q25 MSG 65: 0,31 m/s<sup>2</sup>

- The internal accuracy of the measuring chain for at 21°C at  $\pm 0,02$  m/s<sup>2</sup>. Further deviations may occur in particular through the positioning of the sensor and different driver weights.

### Electromagnetic compatibility (EMC)

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

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

### **WARNING!**

#### **Damage to medical equipment due to non-ionising radiation**

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

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

#### 6.8.1 **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
Telematics box basic 2G EU	2.4 GHz (Bluetooth)	< 20 mW
	900 MHz (2G)	< 2 W
	1800 MHz (2G)	< 1 W
Telematics box basic 3G/2G INT	2.4 GHz (Bluetooth)	< 20 mW
	850/ 900 MHz (2G)	< 2 W
	1800/ 1900 MHz (2G)	< 1 W
	800/ 850/ 900/ 1900/ 2100 MHz (3G)	< 250 mW
Telematics box basic 4G/2G EU	2.4 GHz (Bluetooth)	< 20 mW
	850/ 900 MHz (2G)	< 2 W
	1800/ 1900 MHz (2G)	< 1 W
	800/ 900/ 1800/ 2100 MHz (4G)	< 200 mW
Telematics box Plus 3G/2G INT	2.4 GHz (Bluetooth)	< 10 mW
	2.4 GHz (WLAN)	< 100 mW
	5 GHz (WLAN)	< 100 mW
	850/ 900 MHz (2G)	< 2 W
	1800/ 1900 MHz (2G)	< 1 W
	800/ 850/ 900/ 1900/ 2100 MHz (3G)	< 250 mW
Telematics box plus 4G/2G EU	2.4 GHz (Bluetooth)	< 10 mW
	2.4 GHz (WLAN)	< 100 mW
	5 GHz (WLAN)	< 100 mW
	850/ 900 MHz (2G)	< 2 W
	1800/ 1900 MHz (2G)	< 1 W
	800/ 900/ 1800/ 2100 MHz (4G)	< 200 mW
Telematics box Plus 4G/2G noWLAN EU	850/900 MHz (2G)	< 2 W
	1800/1900 MHz (2G)	< 1 W
	800/900/1800/2100 MHz (4G)	< 200 mW
Transponder reader	13.56 MHz	< 100 mW

## 6.9 Conditions of use

### Ambient temperature

– During operation -10°C to +40°C



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

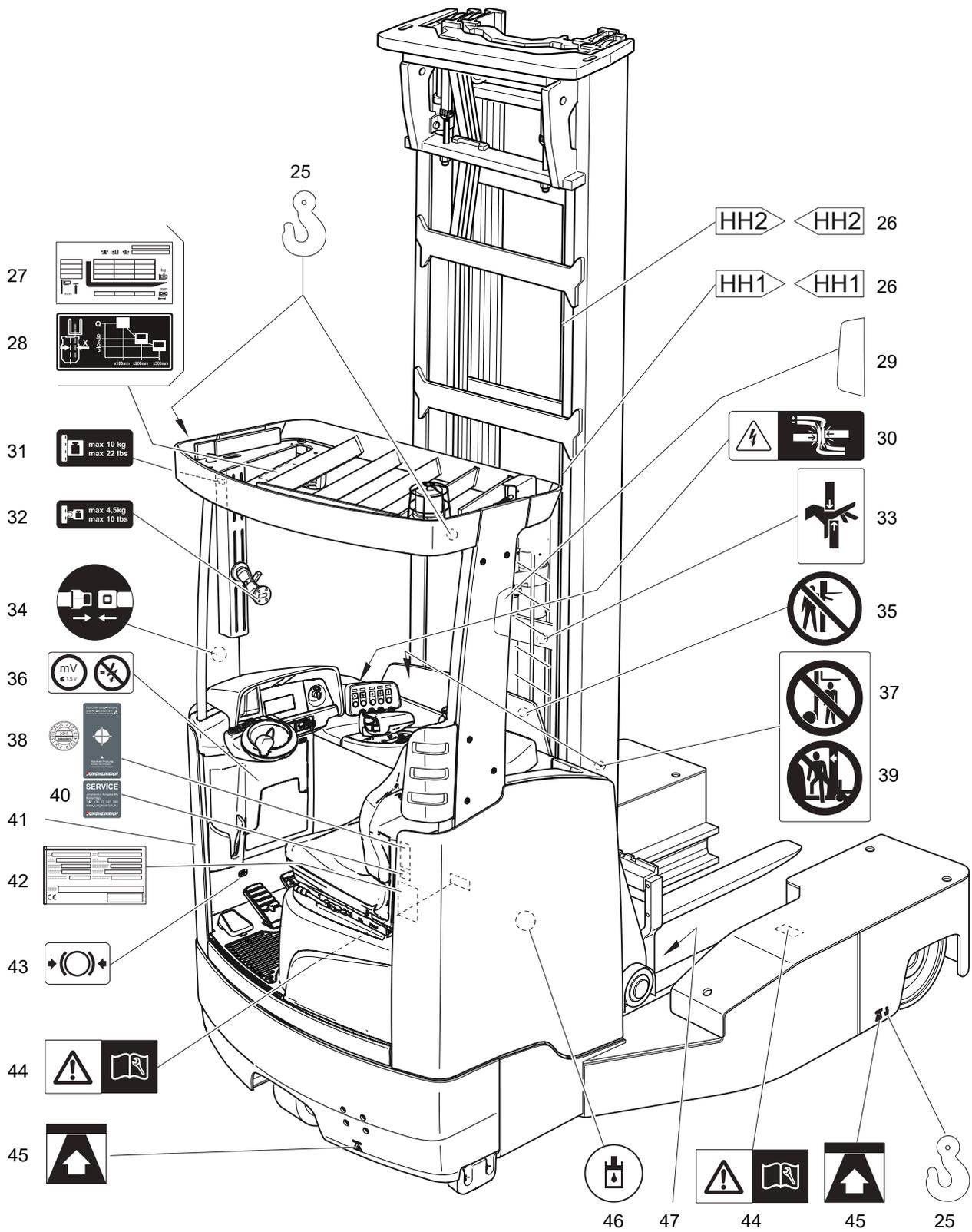
- For trucks with a lithium-ion battery (○), the permissible ambient temperature during operation changes to 0°C to +30°C. An ambient temperature of up to +35°C is permissible for a short period but no longer than 1 month per year. Longer periods of use reduce the expected service life of the lithium-ion battery.

## **6.10 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.

# 7 Identification points and data plates

## 7.1 Overview of marking points



31



32



### ⚠ CAUTION!

#### Overload through bolt-on components

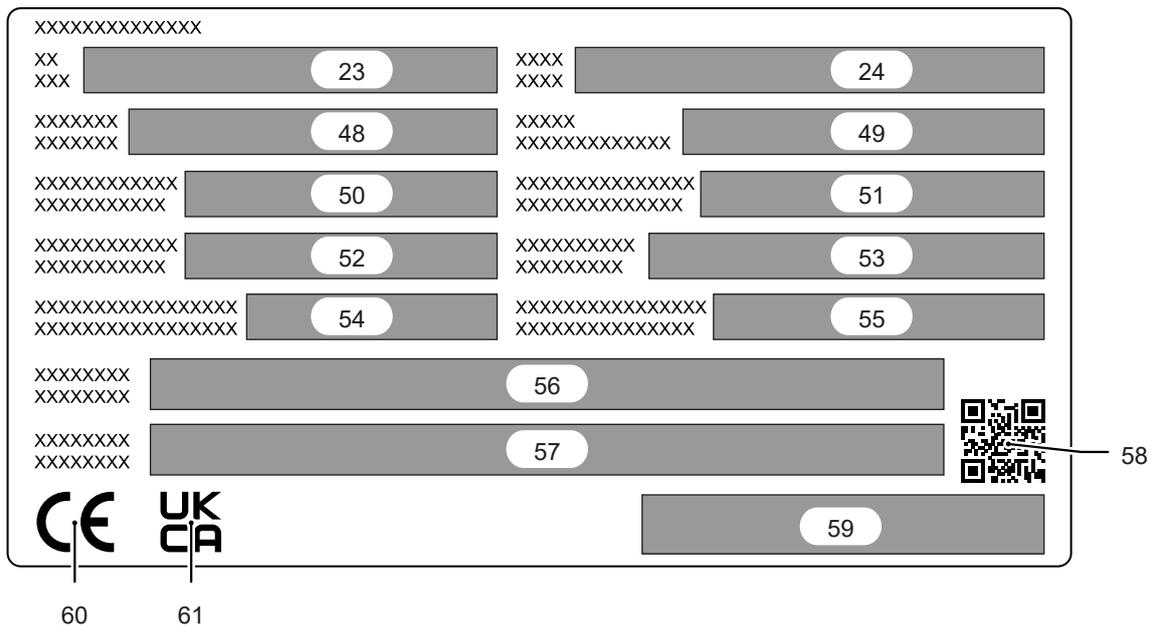
M device and universal joints can only withstand the weights indicated on the capacity plates.

► Note the maximum weights for M device (31) and universal joints (32).

Item	Description
25	Attachment points for loading by crane
26	Lift height limits
27	Capacity plate, capacity/load centre of gravity/forks
40	"Final inspection completed" label
28	Capacity plate, capacity/side shift
37	Prohibition plate: "No standing under the load handler"
31	"M device max. 10 kg (22 lb)" capacity warning notice (○)
29	Model description
32	"Universal joints max. 4.5 kg (10 lb)" capacity warning notice (○)
30	"Damaged battery cables are hazardous" warning notice
34	Wear seat belt
33	"Trapping hazard" warning notice
36	Warning notice: "Caution: low-voltage electronic system"
35	Prohibition plate: "Do not reach through the mast"
38	Inspection plaque (○)
39	"Do not step into the reach mechanism" warning
41	Overview of electronic component part numbers
42	Truck data plate
43	Brake pedal plate
44	Attention: Read operating instructions!
45	Jacking points
46	Hydraulic oil filler plug
47	Serial number

## 7.2 Data plate

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



Item	Description	Item	Description
23	Type	54	Net weight without battery [kg]
24	Option	55	Min./max. battery weight [kg]
48	Serial number	56	Manufacturer
49	Year of manufacture	57	Importer - imported by (○)
50	Rated capacity [kg]	58	QR code
51	Load centre distance [mm]	59	Manufacturer's logo
52	Battery voltage [V]	60	CE marking <sup>1)</sup>
53	Drive output [kW]	61	UKCA marking (○) <sup>2)</sup>

→ For queries regarding the truck or when ordering spare parts, always quote the truck serial number (48).

### QR code

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



### 7.2.1 Position of serial number

#### NOTICE

The truck serial number (48) is indicated on the data plate (42) and is stamped on the chassis (47) (see page 35).

<sup>1)</sup> Conformité Européenne

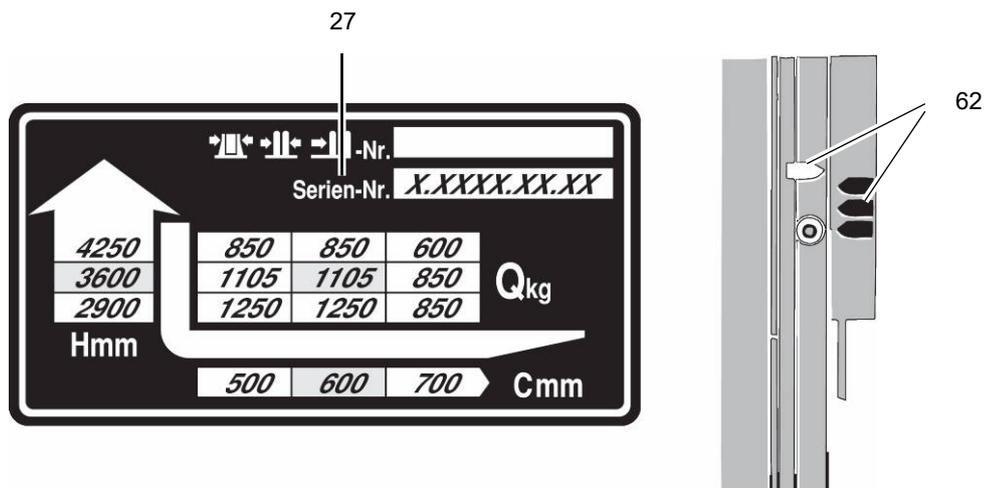
<sup>2)</sup> United Kingdom Conformity Assessed

## 7.3 Truck load chart

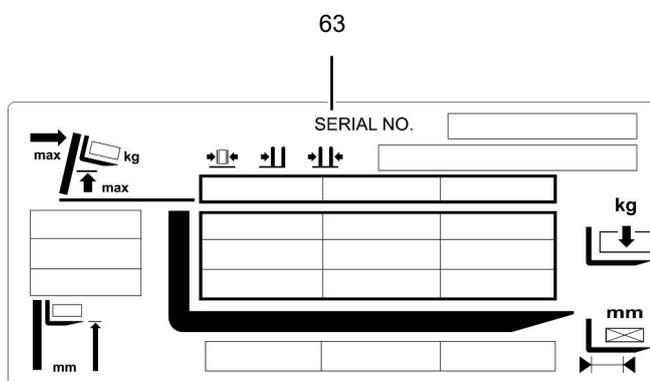
### 7.3.1 Capacity plate

The capacity plate (27) gives the capacity (Q) of the truck in kg for a vertical mast. The maximum capacity is shown as a table with a standard load centre of gravity distance \* C (in mm) and the required lift height H (in mm). The arrow shape markings (62) on the inner and outer masts show the driver when the specified lift limits have been reached.

\*) The standard load centre of gravity distance takes into account the width as well as the height of the load.



Capacity plate version in accordance with Australian guidelines (63)



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

With a load centre of gravity distance C of 600 mm and a maximum lift height H of 3600 mm the max. capacity Q is 1105 kg.

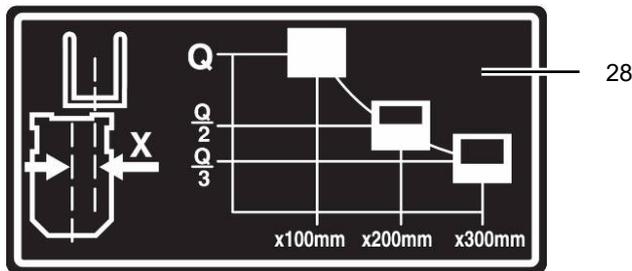
### 7.3.2 Attachment load chart

The attachment capacity plate is next to the truck's capacity plate and gives the truck's capacity Q (in kg) in conjunction with the respective attachment. The serial number for the attachment indicated on the capacity plate must match the data plate of the attachment.

- For loads with a centre of gravity above 600 mm (measured from the top of the forks), the capacities are reduced by the difference of the altered centre of gravity.

### 7.3.3 Capacity plate for side shift

The capacity plate (28) gives the reduced capacity Q (in kg) when the sideshift is extended.



### 7.3.4 Jacking points for jacks

The "Jack attachment point" decal (45) indicates where the truck may be lifted and jacked up (see page 197)



## 8 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.

Stability can also be affected by the following factors:

- Battery size and weight
- Tyre type
- Mast
- Attachment
- Transported load (size, weight and centre of gravity)
- Ground clearance, e.g. modification of the support columns
- Position of the mast holder stops

Changing the components can alter the stability.

Changes to the factory configuration of the truck are not permitted and can lead to material damage and personal injury.

This applies to the following, for example:

- Change to fork arms
- Telescopic forks
- Fork positioners
- Attachments with clamping function

Batteries that are pushed forward or unlocked can alter the stability.

If the ground conditions do not comply with DIN 18202 Table 3, Row 3, the truck capacity ratings (see page 12) may differ.

### 8.1 Wind loads

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

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

Stop the truck in both cases.

# C Transport and Commissioning

## 1 Transport

Depending on the height of the mast and local conditions, the truck can be transported in three different ways:

- Vertically, with the mast assembled (for low heights)
- Vertically, with the mast partially assembled and leaning against the overhead guard (for medium heights); hydraulic lines for the lift and auxiliary functions disconnected
- Horizontal, with the mast disassembled (for large heights); all mechanical connections and all hydraulic lines between the basic unit and the mast disconnected

### Safety instructions for assembly and commissioning

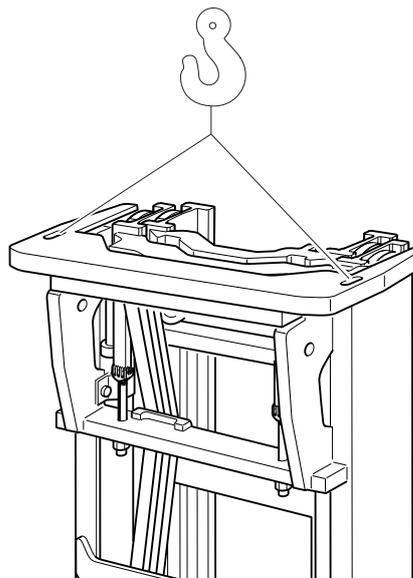
#### **⚠ WARNING!**

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

The hydraulic lines may only be connected to the basic truck / mast interface and the truck commissioned when the mast has been properly assembled.

- When fitting an attachment, the corresponding sticker must be applied to the control element. The sticker can be obtained from the manufacturer's customer service department.

### Attachment points for the mast assembly



## 2 Lifting by crane

### WARNING!

#### **Improper loading by crane can result in accidents**

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

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

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

## 2.1 Lifting the truck by crane

### **⚠ CAUTION!**

#### **The mast can get damaged**

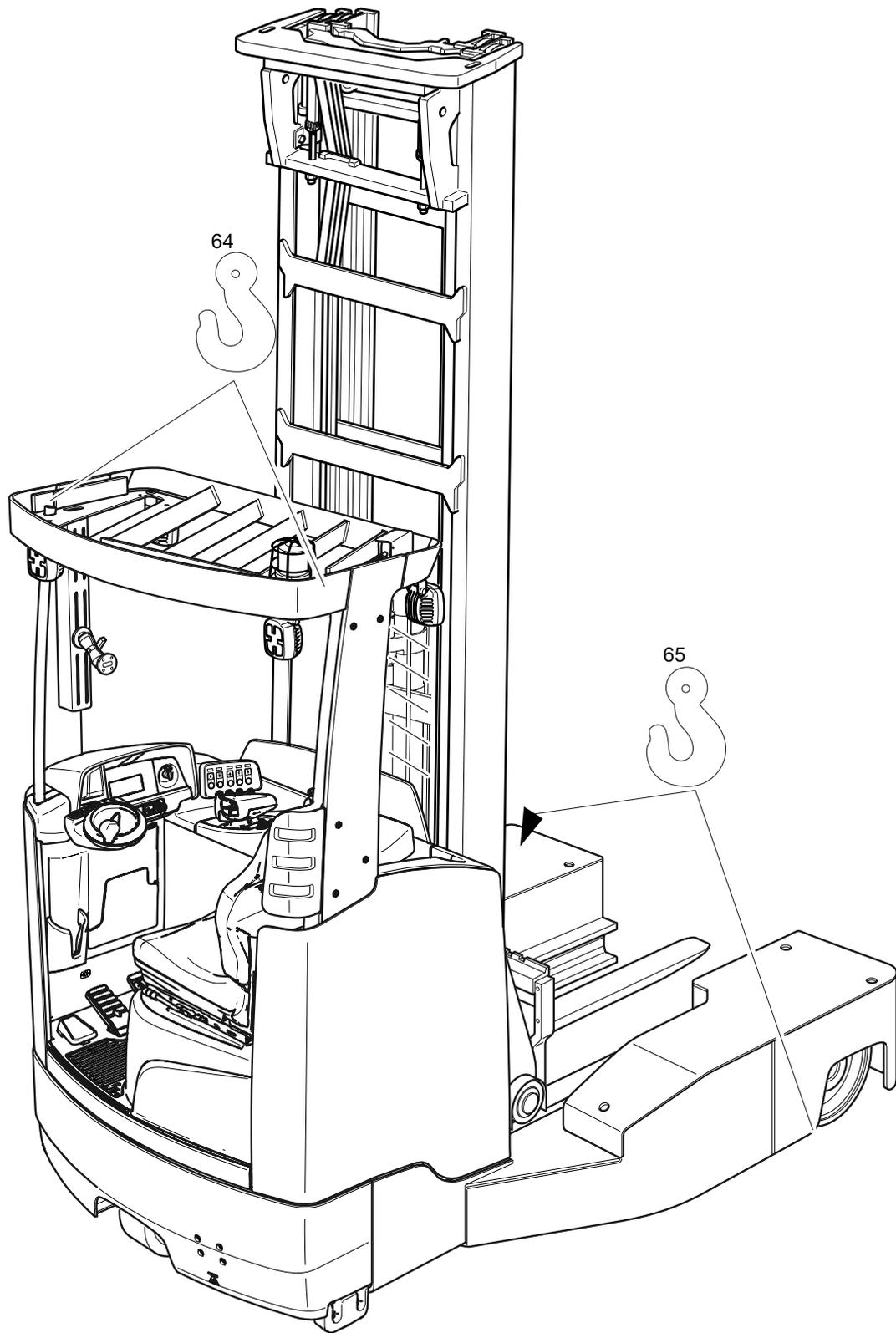
- ▶ Loading by crane is only intended for the initial transport before the truck is used for the first time.
  - ▶ Loading must be carried out by specially trained staff in accordance with recommendations contained in Guidelines VDI 2700 and VDI 2703
- 

### **⚠ DANGER!**

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

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

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



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

#### *Requirements*

- Truck parked securely, see page 127.

#### *Tools and Material Required*

- Crane lifting gear
- Lifting slings
- Wedges

*Procedure*

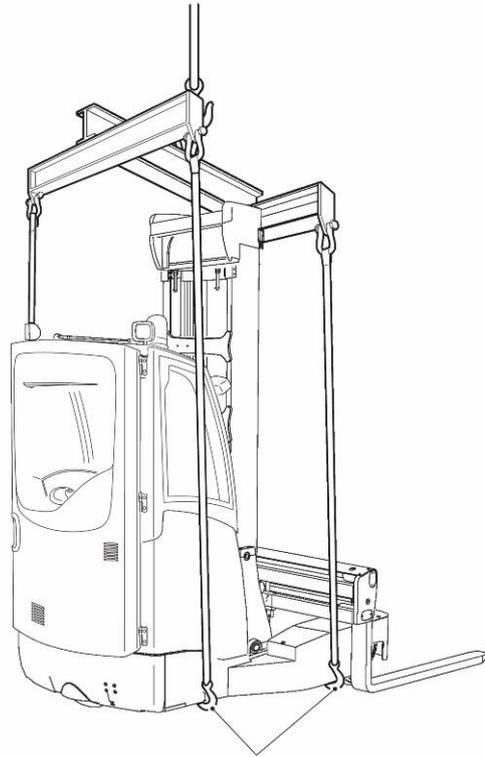
- Route rope slings around the two strap points (64) of the overhead guard strut.
- Attach crane lifting gear to the two attachment points (65) on the support arms.
- Load the truck.
- Park the truck securely – see page 127.
- Secure the truck with wedges to prevent it from rolling away.

*The truck is now loaded.*

## Lifting the truck and cabin by crane

### Requirements

–



66

Truck parked securely, see page 127.

### Tools and Material Required

- Sufficiently wide cross member
- Crane lifting gear with hook
- Wedges

### Procedure

- Secure the crane lifting gear to the attachment points (66).

→ Loading by crane with a weather-proof cab (○) is subject to restrictions. Because of the risk to the window, the crane lifting gear and rope slings must not pass over the front door.

- Load the truck.
- Park the truck securely, see page 127.
- Secure the truck with wedges to prevent it from rolling away.

*The truck is now loaded.*

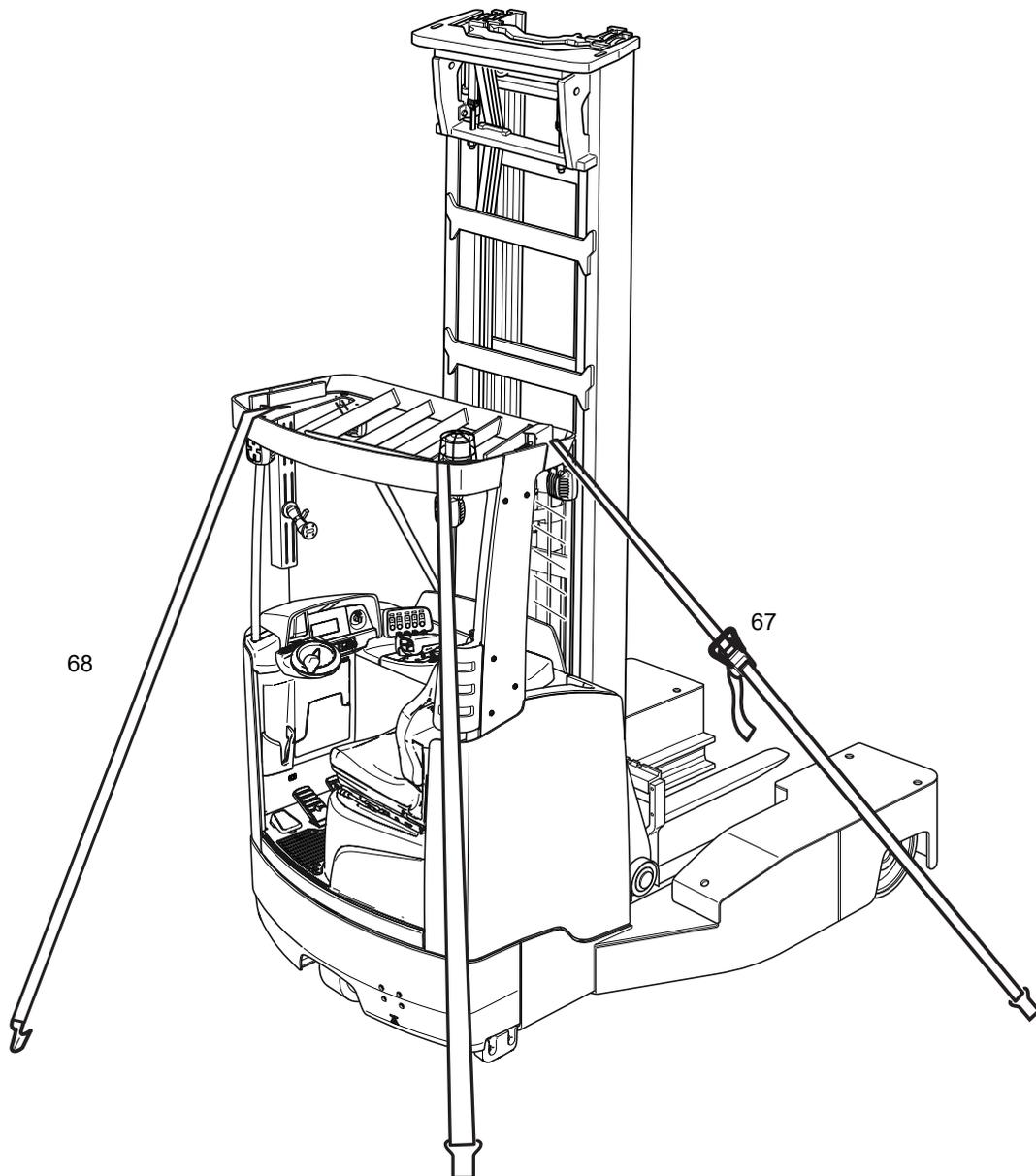
### 3 Securing the truck during transport

#### **⚠ 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.



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

### *Requirements*

- 2 tensioning belts

### *Procedure*

- Secure the fastening belts (68) through the guide on the overhead guard strut.
- Secure the fastening belts (68) to the fastening rings.
- Tighten the fastening belts (68) with the tensioner (67).

*The truck is now secured for transport.*

## 4 Using the Truck for the First Time

### **⚠ 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.

- ▶ The hydraulic lines may only be connected to the basic truck / mast interface when the mast has been properly assembled.
- ▶ Only then can the truck be started.
- ▶ If several trucks have been delivered, make sure that the serial numbers of the load handlers, masts and basic trucks always match.

### **⚠ 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>.

#### *Procedure*

- Check the equipment is complete.
- If necessary, install the battery, see page 60. Do not damage the battery cable.
- Charge the battery, see page 56.

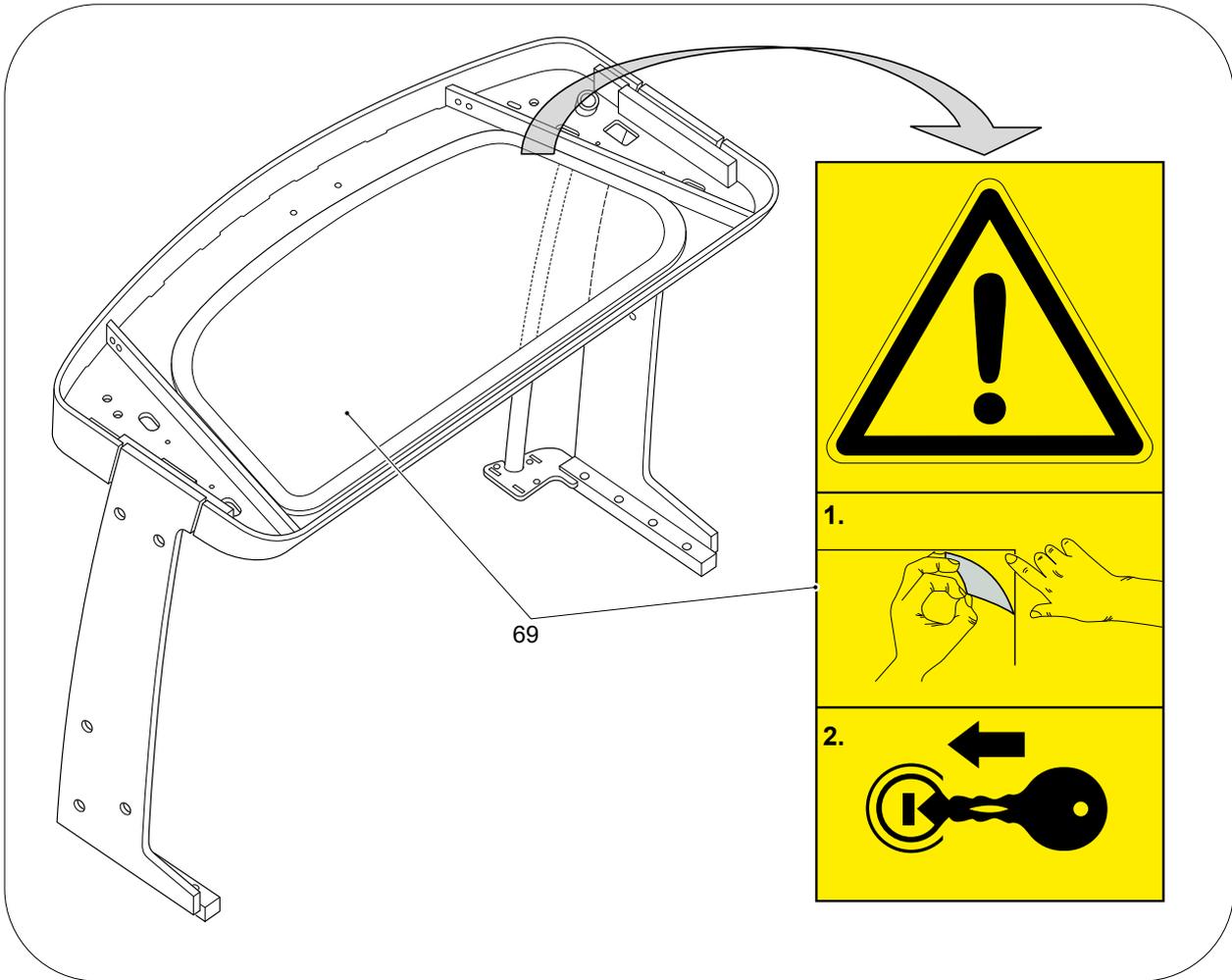
- ☞ The truck settings must match the battery model (if the customer is charging the battery).
- Check the hydraulic oil level and top up if necessary (see page 199).
- Start up the truck (see page 96).

*Truck is operational.*

#### **Wheel flattening**

If the truck has been parked for a long period, the wheel surfaces may tend to flatten. This flattening has a negative effect on the safety and stability of the truck. Once the truck has covered a certain distance, the flattening will disappear.

- ☞ When fitting an attachment, the corresponding sticker must be applied to the control element. The sticker can be obtained from the manufacturer's customer service department.



➔ With the optional panoramic window, the protective film (69) must be removed before initial commissioning of the truck.

# D Battery - Servicing, Recharging, Replacement

→ For use of lithium-ion batteries (○), see the manufacturer's operating instructions.

## 1 Safety instructions for handling lead-acid 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.

### 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.

---

## 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 General notes on handling 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.

#### **⚠ WARNING!**

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

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

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

The truck must be parked securely before all work on the batteries, see page 127.

## 2 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:

Battery base space <sup>1</sup>	C circuit
	ETV Q20/Q25
M	●
L	○
XL	○

<sup>1)</sup> For special configurations, the battery sizes deviate from the standard.

Battery type	Battery base space	Voltage [V]	Mass [kg] <sup>1</sup>
48 V - 4PzS	M	48	939
48 V - 5PzS	L	48	1119
48 V - 6PzS	XL	48	1309

<sup>1)</sup> Tolerance +/-5%

Battery type	Battery base space	Voltage [V] <sup>1</sup>	Mass [kg] <sup>2</sup>
Lithium-ion	M	51.1 to 51.8	939
Lithium-ion	L	51.1 to 51.8	1119
Lithium-ion	XL	51.1 to 51.8	1309

<sup>1)</sup> Values can deviate depending on battery manufacturer.

<sup>2)</sup> Tolerance +/-5%

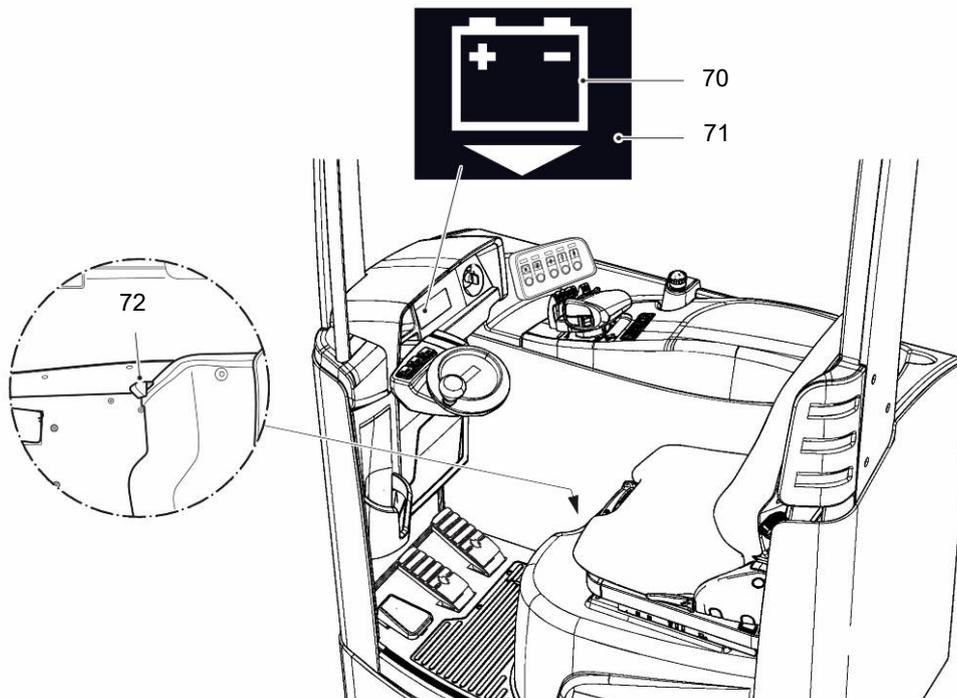
### 3 Exposing the battery

#### **⚠ CAUTION!**

#### **Moving parts can cause accidents**

The mast moves when the battery is exposed. This constitutes a risk of accidents and trapping in the hazardous area.

- ▶ Instruct any persons to leave the hazardous area.
- ▶ Make sure there is nothing between the battery and the mast holder when you move the mast holder.



#### **Exposing the battery**

##### *Requirements*

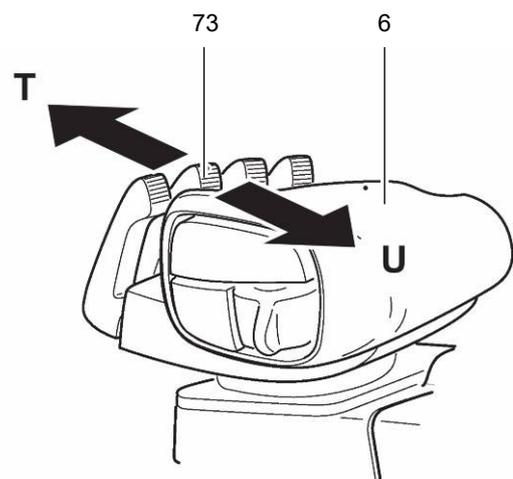
- Truck prepared for operation, see page 85.

##### *Procedure*

- Press the battery unlock button (71) until the battery trolley reaches its unlocking position.
- Release the battery unlock button pedal (71).
- Press the battery unlock pedal (72) with your right foot and hold it in this position.

➔ The “battery unlocked” button (70) lights up on the display unit.

- Move the lever (73) in the direction of the arrow (T) and extend the mast support with the coupled battery trolley until the battery is exposed for maintenance.



- Release the battery unlatch pedal (72).
- Turn off the emergency disconnect switch and key switch.

→ The battery unlatch safety switch only allows for travel at crawl speed if the battery trolley is unlatched and the indicator lamp (70) is still on. Before starting up the truck again, the battery trolley must be restored to its initial position in order to uncouple the battery trolley and the mast support. The indicator (70) must be off

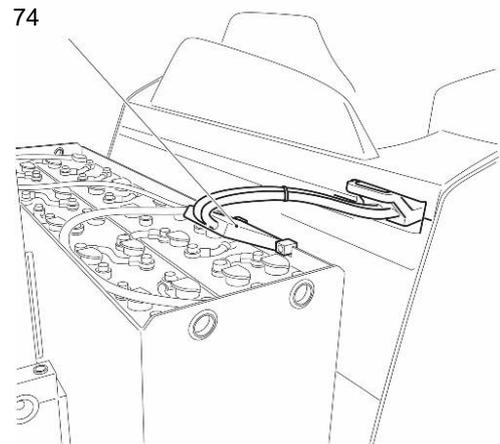
*The battery is exposed.*

## NOTICE

### Trapped battery cables can cause damage

When the battery is inserted the battery cable can be damaged if fitted without a cable duct.

- ▶ Always install the battery with a cable duct (74).
- ▶ The cable duct (74) must match the battery used. The battery cable length depends on the battery type.
- ▶ Contact the manufacturer's service department when replacing the factory-fitted battery.



### Inserting the battery

#### Requirements

- Truck prepared for operation, see page 85.
- Battery exposed.

#### Procedure

- Pull the lever (73) in the direction of the arrow (U) and retract the mast holder.

→ The "battery unlocked" (red graphic symbol) (70) goes out on the display unit.

→ The battery unlatch safety switch only allows for travel at crawl speed if the battery trolley is unlatched and the indicator lamp (70) is still on. Before starting up the truck again, the battery trolley must be restored to its initial position in order to uncouple the battery trolley and the mast support. The indicator (70) must be off

*The battery is now inserted.*

## 4 Charging the battery

### **⚠ WARNING!**

#### **The gases produced during charging can cause explosions**

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

- ▶ Switch the charging station and truck off first before connecting/disconnecting the charging cable of the battery-charging station to/from the battery connector.
- ▶ The charger must be adapted to the battery in terms of voltage and charge capacity.
- ▶ The battery charger must comply with national regulations.
- ▶ Before charging, check all cable connections and plug connections for visible signs of damage.
- ▶ Sufficiently ventilate the room in which the truck is being charged (observe national regulations).
- ▶ 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 inflammable 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 and charger station manufacturers.

### **⚠ 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.

#### **Charge the battery**

##### *Requirements*

- Battery exposed, see page 54.
- Remove any insulating mats from the battery.

##### *Procedure*

- Connect the charger lead of the battery charger station with the battery connector.
- Charge the battery in accordance with the battery and charging station manufacturers' instructions.

*Battery is charged.*

## **⚠ WARNING!**

### **Risk of accidents and injuries when handling lithium-ion batteries.**

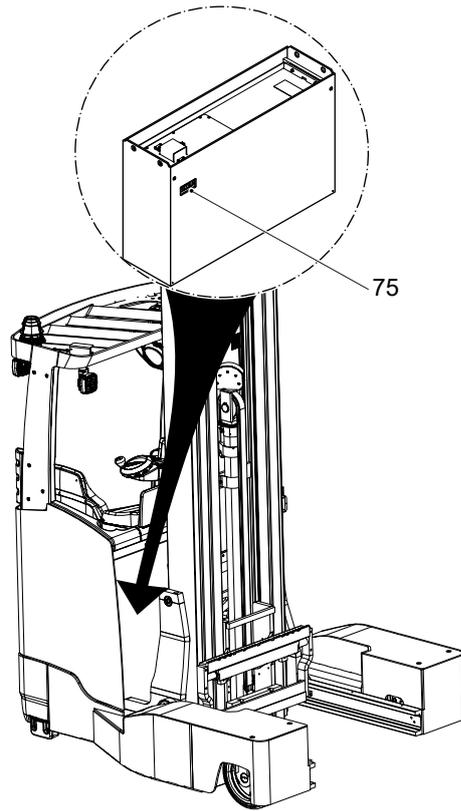
Improper use can result in overheating, fire or a battery explosion.

- ▶ Do not expose the lithium-ion battery for charging.
  - ▶ Observe the operating instructions for charging the lithium-ion battery.
  - ▶ Do not use the lithium-ion battery cable for charging. The battery cable is permanently connected to the truck.
  - ▶ Do not place any metallic objects on the lithium-ion battery.
  - ▶ The battery charger must comply with national regulations.
- 

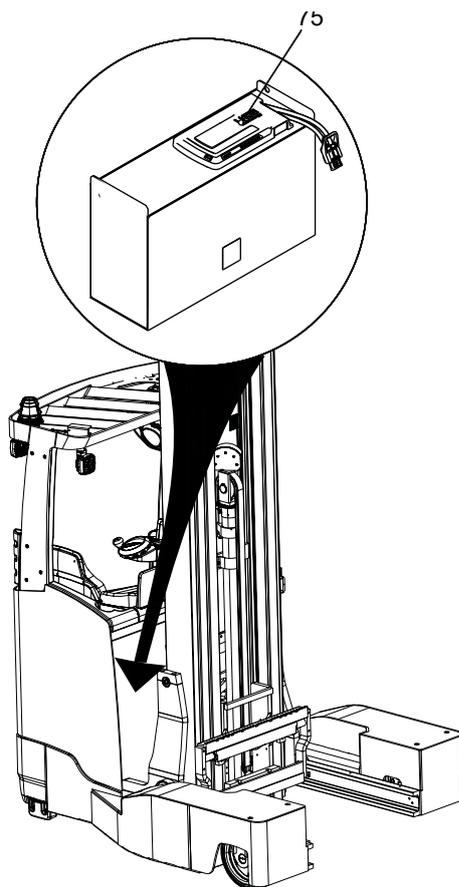
### *Procedure*

- Connect the charger cable of the deactivated charger to the battery connection (75).
- Switch on the battery charger.
- The lithium-ion battery is charged, see the manufacturer's operating instructions.  
*The battery is charging.*

EP 48460 CWT-R3-E / EP 48310 CWT-R2-E (○)



48 V LiB 360 MH / 48 V LiB 480 MH (○)



## 5 Removing or installing the battery

- After each replacement, check that the battery is properly secured by the battery lock.

### **⚠ 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.
- 

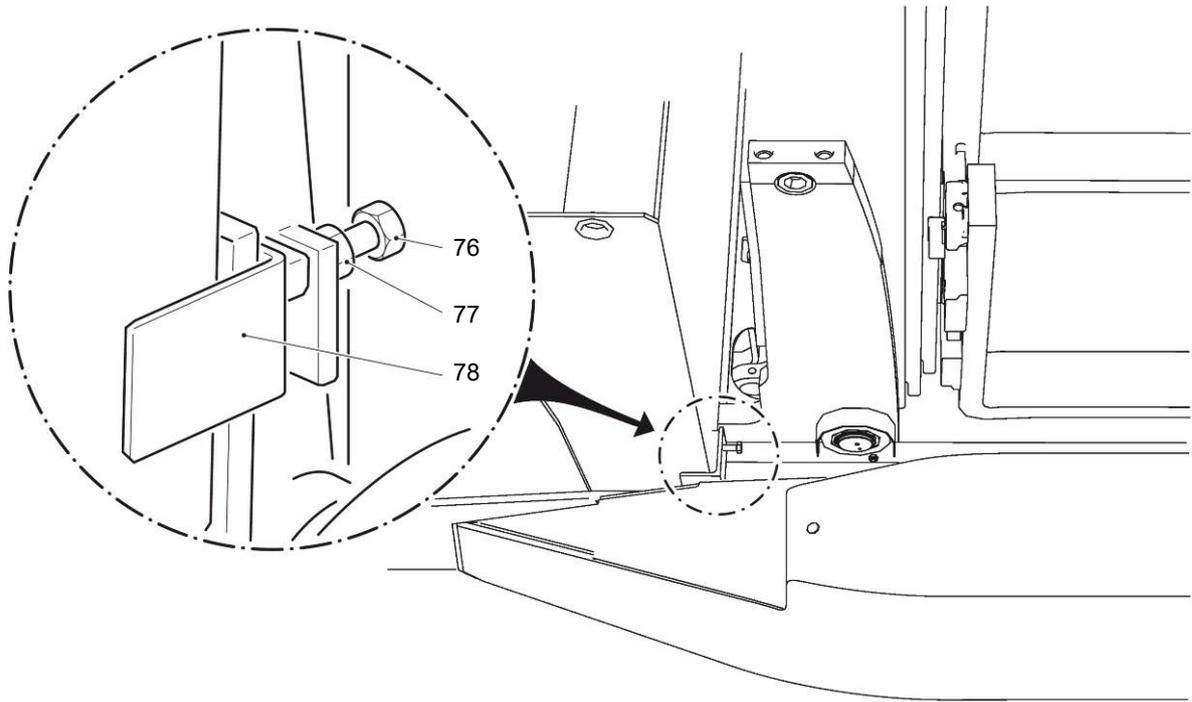
### **⚠ WARNING!**

#### **Risk of accidents and injury from electrical voltage**

When installing and removing the lithium-ion battery, there is a risk of accidents and injury from electrical voltages.

- ▶ The lithium-ion battery may only be installed and removed by authorised maintenance personnel.
-

## 5.1 Removing and Installing the Battery with Crane Lifting Gear



### **Removing the battery**

#### *Requirements*

- Battery exposed, see page 54.

#### *Tools and Material Required*

- Crane lifting gear

#### *Procedure*

- Loosen the jam nut (77) on the battery lock (78).
- Undo the retaining screw (76).
- Pull out the battery stop (78).
- Remove the battery cover.
- Strap the crane lifting gear to both sides of the battery container.

→ The hooks must be fitted in such a way that when the crane lifting gear is slackened, they do not fall onto the battery cells. The lifting gear must exert a vertical pull so that the battery container is not compressed.

- Lift the battery clear and move out to the side.

*The battery is now removed.*

## NOTICE

### Trapped battery cables can cause damage

When the battery is inserted the battery cable can be damaged if fitted without a cable duct.

- ▶ Always install the battery with a cable duct (74).
- ▶ The cable duct (74) must match the battery used. The battery cable length depends on the battery type.
- ▶ Contact the manufacturer's service department when replacing the factory-fitted battery.



### **Battery installation**

#### *Requirements*

- Battery removed.
- Battery cover removed.

#### *Tools and Material Required*

- Crane lifting gear

#### *Procedure*

- Strap the crane lifting gear to both sides of the battery container.
- Lift the battery with the crane lifting gear, lift it in from the side and lower it.
- Insert the battery stop (78).
- Tighten the retaining screw (76) and jam nut (77) or handle (251) on the battery stop (78).
- Attach the battery connector to the truck connector.
- Fit the battery cover.

*The battery is now assembled.*

# E Operation

## 1 Safety Regulations for the Operation of Forklift Trucks

### **Driver authorisation**

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

### **Operator's rights, 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.
- 

### **⚠ WARNING!**

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

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

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

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

Safety devices, warning signs (see page 35) and warning instructions in the present operating instructions must be strictly observed.

### **⚠ WARNING!**

#### **Accident risk due to removing or disabling of safety devices**

Removal or disabling of safety devices such as the Emergency Disconnect switch, deadman switch, horn, warning lights, gates, protective window, covers, etc. may result in accidents and injuries.

- ▶ 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.
- 

### **⚠ 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.
-

**⚠ WARNING!**

**Loss of operational stability can cause accidents**

Extended mast sections when the truck is travelling with or without load will reduce the truck's operational stability.

- ▶ Always travel with the mast holder retracted, the mast tilted back, the load centre in the middle of the truck's longitudinal axis and the load handler lowered.
- 

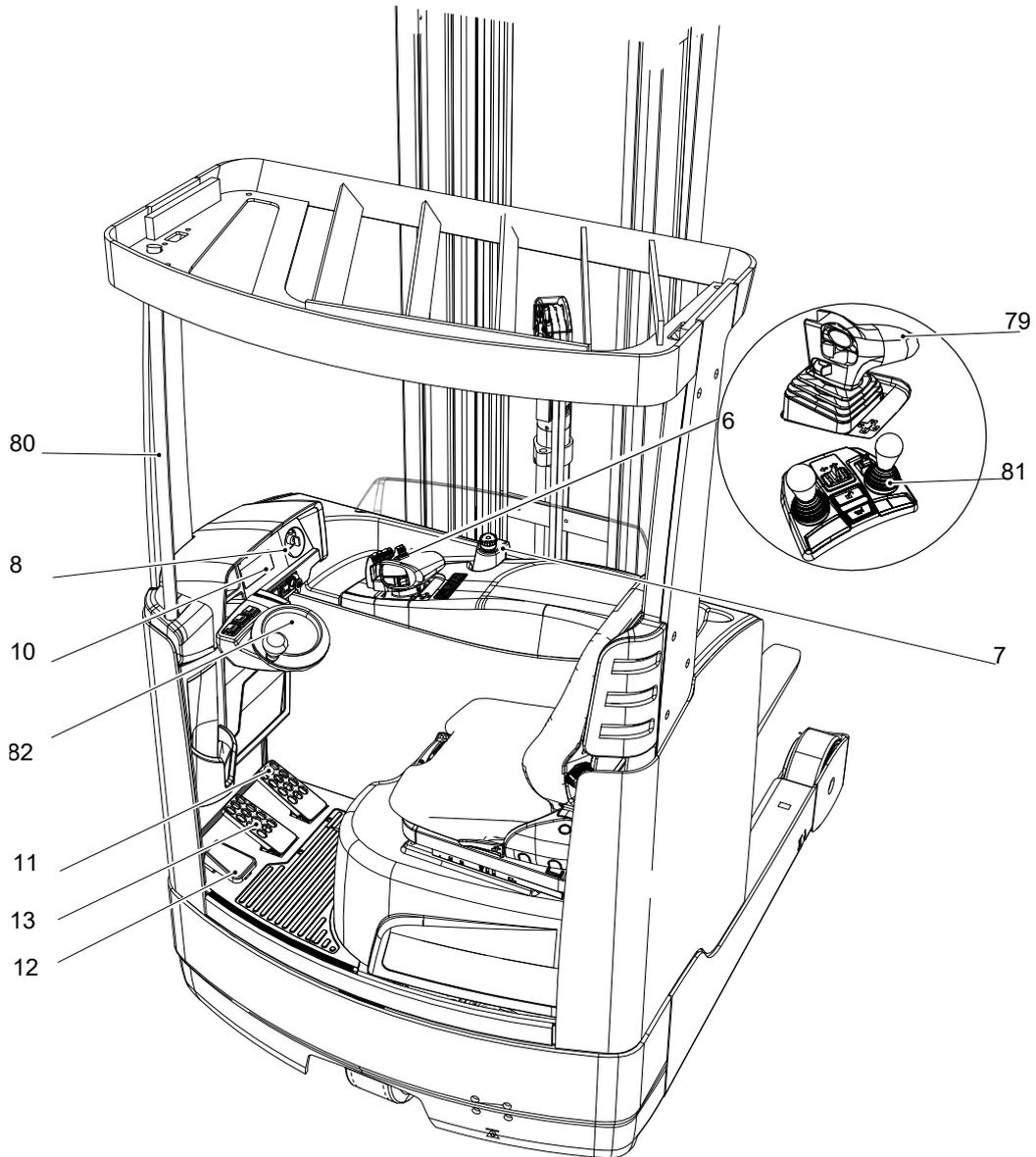
**⚠ CAUTION!**

**Risk of accident due to ceiling installations**

Ceiling installations such as cable raceways, piping and sprinkler systems are easy to overlook.

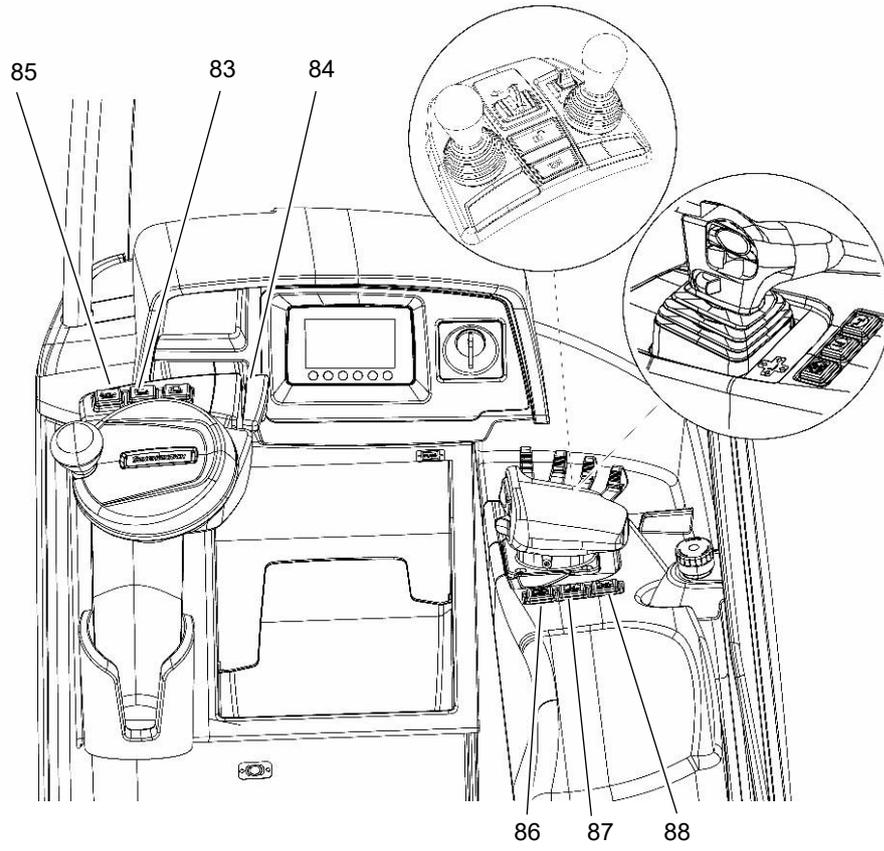
- ▶ Maintain a sufficient safety distance from ceiling installations.
-

## 2 Displays and Controls

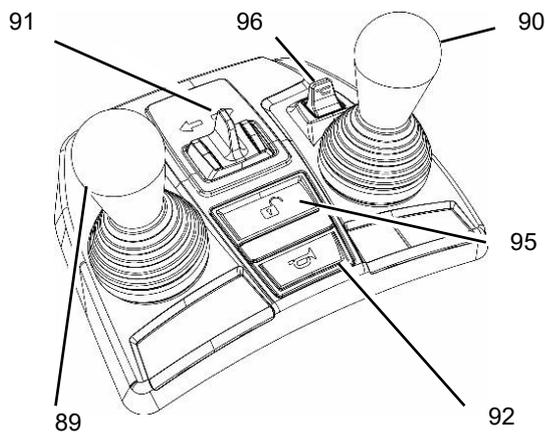
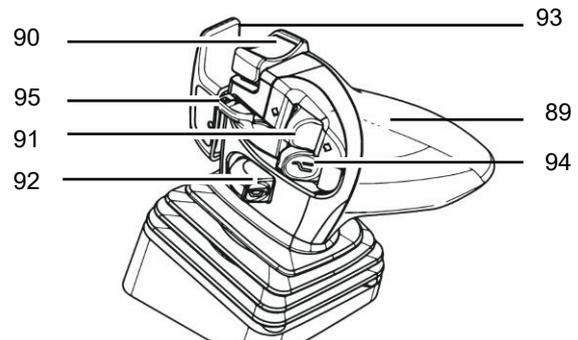
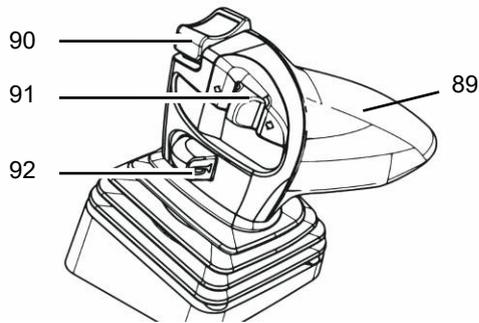
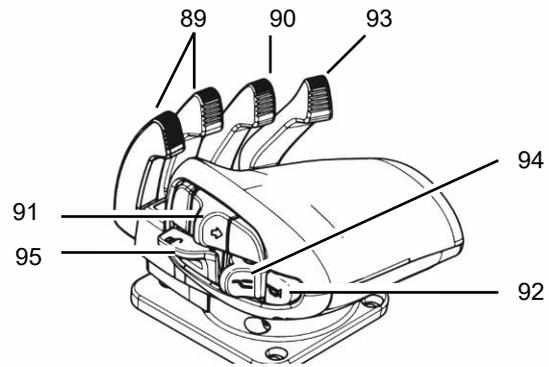
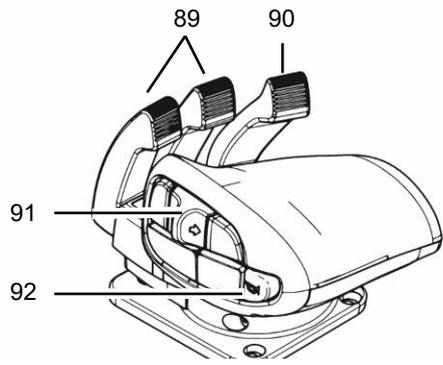


Item	Control and display item		Function
6	soloPILOT	●	Functions: – Fwd/rev. travel direction – Lifting/lowering load – Mast forward/reverse tilt – Horn button – Sideshift left / right – Auxiliary hydraulics (○) – Mast reach forward / reverse – Acknowledgement key (○)
79	multiPILOT	○	
81	duoPILOT		
80	Grab handle	●	Entry and exit

Item	Control and display item		Function
8	Key switch	●	Switches control current on and off. Removing the key prevents the truck from being switched on by unauthorised personnel.
	ISM access module	○	Switches the truck on
	Keypad		
	Transponder		
	EasyAccess storage compartment		
10	Control and display unit	●	Displays steering modes, warning indicators, incorrect operation notes and service displays
		○	Switches on the truck using EasyAccess with PinCode
7	Emergency disconnect switch	●	Switches the power supply on and off
82	Steering wheel	●	Sets the travel direction
11	Accelerator pedal	●	Provides infinitely variable travel speed control
13	Deadman switch	●	<ul style="list-style-type: none"> <li>– Not applied: Travel and hydraulic functions inhibited, truck decelerates</li> <li>– Applied: Travel and hydraulic functions enabled</li> </ul>
12	Brake pedal	●	Provides infinitely variable braking control.







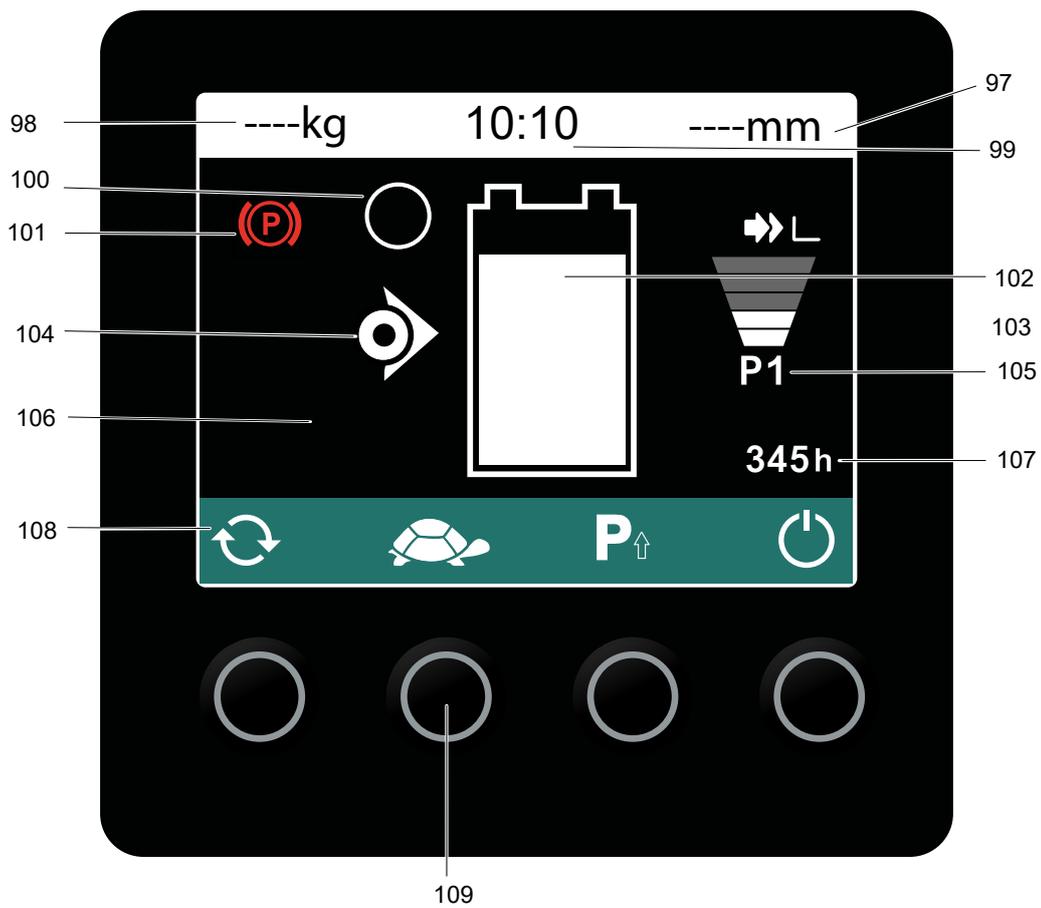
Item	Control and display element		Function
83	Weighing button	○	Weighs the load.
84	Steering column stop	●	
85	Limit switch system and lift height display override button	○	Prevents damage to the truck and the load.
86	Steering mode button	○	Switches the steering mode between 180° and 360°.
87	Side shift centre position button	○	Moves the side shift to the centre position.
88	Forks horizontal button	○	Allows the load handler to be aligned horizontally.
89	Basic hydraulic functions lever	●	Lever for operating the basic lift/mast reach hydraulic functions

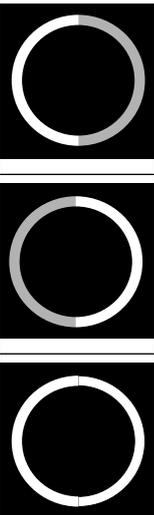
Item	Control and display element		Function
90	Side shift/auxiliary hydraulics 1 optional button/lever	●	Button for side shift or auxiliary hydraulics 1
91	Travel direction button	●	Selects travel direction/neutral position.
92	Horn button	●	Activates a signal
93	Fork positioner/auxiliary hydraulics 2 button/lever - optional	○	Button for fork positioner or auxiliary hydraulics 2
94	Side shift	○	Side shift operation
95	Acknowledgement button	○	Additional confirmation means for hydraulic functions requiring acknowledgement
96	Toggle switch	○	Switches to the second function of the respective lever / button

## 2.1 Display unit

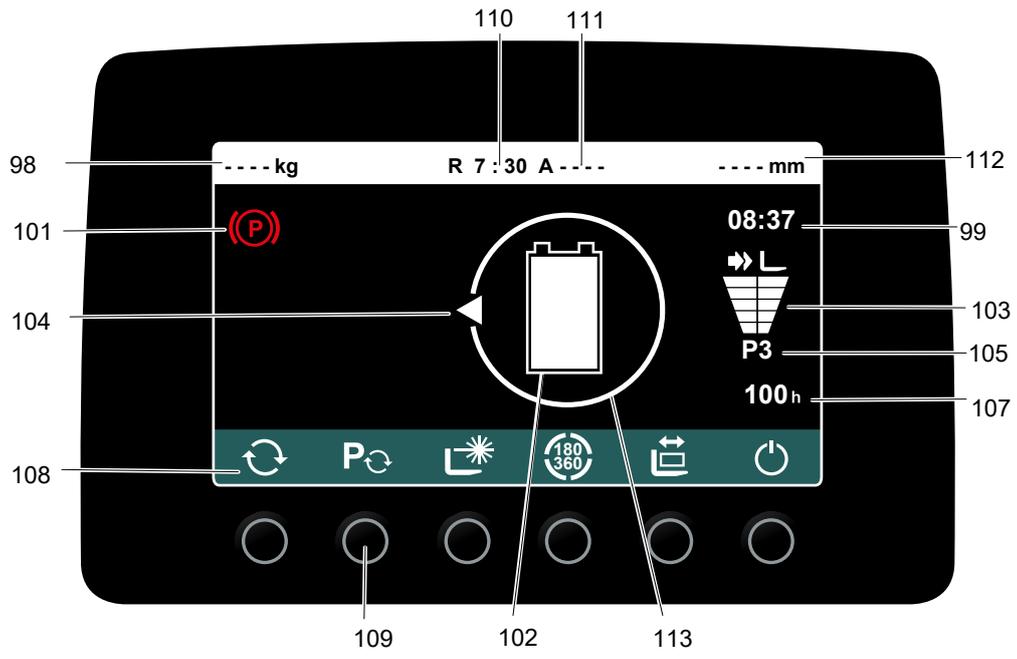
### 2.1.1 Display

#### 2.1.1.1 Display 2 inch



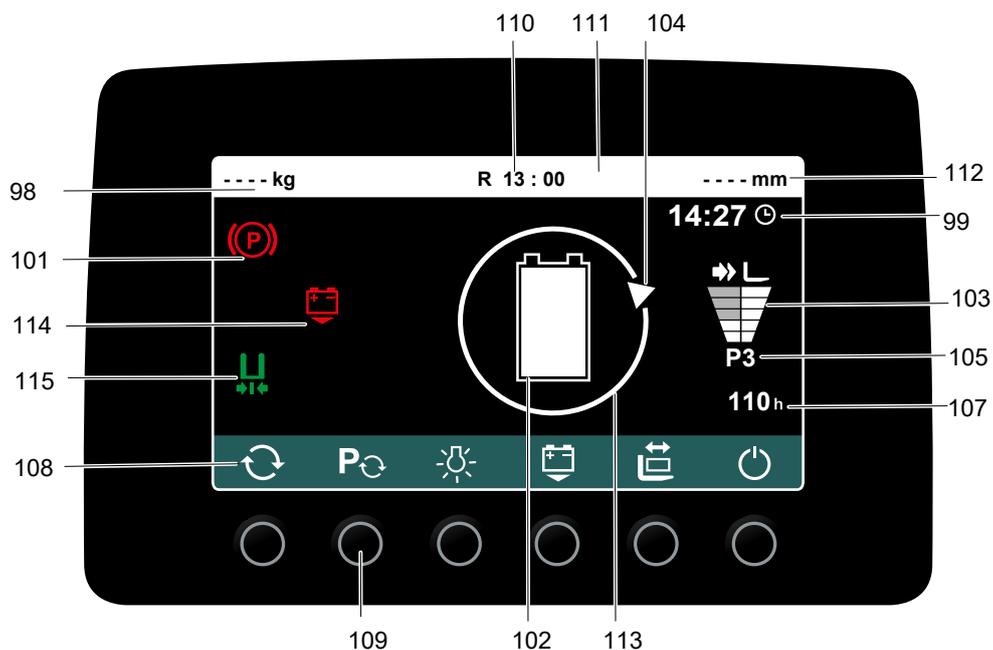
Item	Control and display item	Function
100	Steering mode	180° steering
		360° steering
104	Arrow to display the travel and steering directions	Shows the current travel direction of the truck and the current wheel position in 15° segments.
99	Time	Shows the time.
103	Power display	Shows the travel/lift speed as a bar value
105	Operating program	Shows the operating program selected.
107	Service hours	Shows the truck's service hours, see page 82.
108	Button allocation	see page 79.
109	Buttons	Selection buttons for the functions shown above them.
102	Battery capacity display	Battery discharge status
97	Lift height display	Shows the lift height
98	Load-weight display	Shows the weight of the raised load.

### 2.1.1.2 4-inch display (○)



Item	Control and display item	Function
113	Steering mode	180° steering
		360° steering
104	Arrow to display the travel and steering directions	Shows the current travel direction of the truck and the current wheel position in 15° segments.
99	Time	Shows the time.
103	Power display	Shows the travel/lift speed as a bar value
105	Operating program	Shows the operating program selected.
107	Service hours	Shows the truck's service hours, see page 82.
108	Button allocation	see page 79.
109	Buttons	Selection buttons for the functions shown above them.
102	Battery capacity display	Battery discharge status
110	Remaining running time	Shows the truck's remaining run time.
111	Load centre display	Shows the current load centre.
112	Lift height display	Shows the lift height
98	Load-weight display	Shows the weight of the raised load.

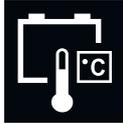
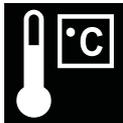
### 2.1.1.3 6-inch display (○)



Item	Control and display item	Function
113	Steering mode 	180° steering
		 360° steering
104	Arrow to display the travel and steering directions	Shows the current travel direction of the truck and the current wheel position in 15° segments.
99	Time	Shows the time.
103	Power display	Shows the travel/lift speed as a bar value
105	Operating program	Shows the operating program selected.
107	Service hours	Shows the truck's service hours, see page 82.
108	Button allocation	see page 79.
109	Buttons	Selection buttons for the functions shown above them.
102	Battery capacity display	Battery discharge status
110	Remaining running time	Shows the truck's remaining run time.
111	Load centre display	Shows the current load centre.
112	Lift height display	Shows the lift height
98	Load-weight display	Shows the weight of the raised load.

## 2.1.2 Symbols in the display

Symbol	Description	Colour	Function/meaning
	Parking brake	Red	Parking brake is activated
	Slow travel	Green	Slow travel is activated
	Service note	Yellow	Attention: SDO request read or write parameters
		Red	Execute service function line-rupture safety valve test
	Warning	Yellow	Operating error
		Red	Truck malfunction
	Stop notice	Red	Functions deactivated due to truck malfunction
	Shock display (ISM)	Yellow	Medium shock due to improper driver actions
		Red	Severe shock due to improper driver actions
	Deadman switch	Yellow	The yellow symbol illuminates when controls are actuated but the deadman switch is not.
	Overload	Red	The operational stability of the truck is at risk due to overload.
	Acknowledgement active	Green	Acknowledgement button active
	Acknowledgement feature malfunction	Yellow	Acknowledgement button malfunction
	Horizontal tilt	Green	Positioning of the forks in horizontal position

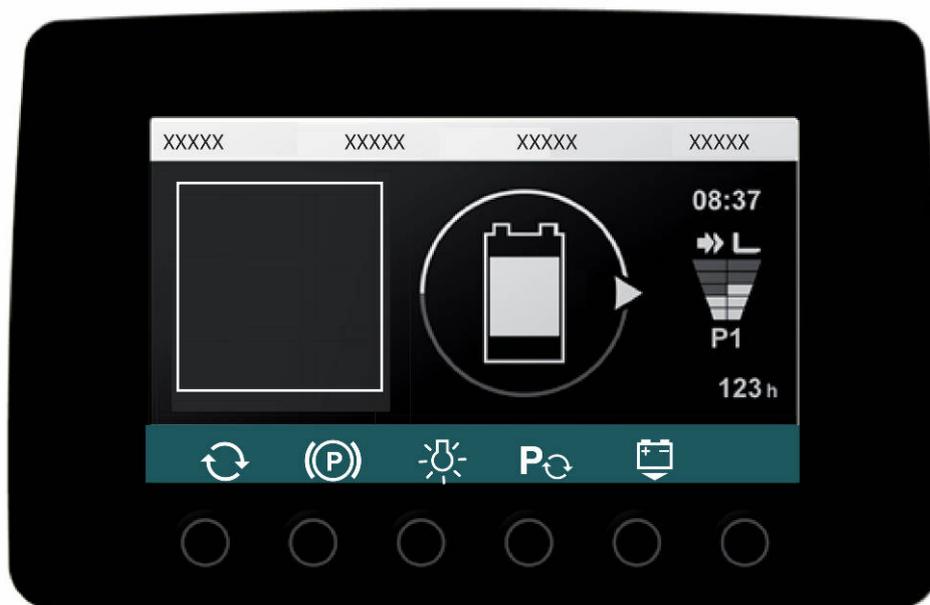
Symbol	Description	Colour	Function/meaning
	Lift cut-off	Yellow	Overriding the lift cut-off
	Lowering cut-off (limit switch system)	Green	Lowering cut-off is overridden
		Yellow	Lowering cut-off is initiated
	Side shift centred	Green	Positioning of the side shift in centre position
	Battery release	Red	Battery is released
	Battery charge status	Yellow	Battery charge status is between 1 and 12%.
		Red	Battery charge status is below 1%. Crawl speed and lift cut-off activated.
	Lighting	Green	Lighting on the truck is activated. → Lighting does not include the Floor-Spot option.
	Battery excess temperature	Yellow	Temperature of the lithium-ion battery is above 45°C.
		Red	Temperature of the lithium-ion battery is above 50°C.
	Battery low temperature	Yellow	Temperature of the lithium-ion battery is below 5°C.
		Red	Temperature of the lithium-ion battery is below 0°C.
	Lift deactivated	Yellow	Symbol illuminates when lifting functions are cut out due to insufficient battery capacity.
	operationCONT ROL	Red	Tilt limit reached
	Seat belt lock control system	Yellow	Seat belt lock not engaged
		Red	Incorrect operating sequence
	Overtemperature	Yellow	Performance reduction due to overtemperature
		Red	Function cut-off due to overtemperature

### 2.1.3 Soft keys (○)

Symbol	Meaning	Function
	Button assignment	Switches the operating level
	Slow travel	Switches to slow travel
	Travel programs menu	Switches to the travel program menu
	Travel program up	Switches the travel program up
	Line laser	Actuation of the line laser (○)
	Battery release	Releases the battery trolley
	Free-text display	Switches to the free-text display
	Settings	Settings for the time and access
	Shut-down	Shut-down (○): Allows the truck to be shut down
	operationCONTROL menu	Switches to the operationCONTROL menu (○)
	operationCONTROL load direction	Moves the load centre in the load direction (○)
	operationCONTROL drive direction	Moves the load centre in the drive direction (○)

Symbol	Meaning	Function
	Load chart A	Load centre for the current stacking operation (○)
	Load chart B	
	Load chart C	
	Light menu	Switches to the light menu (○)
	Fork work lights	Actuates the work lights on the fork (○)
	Drive direction work lights	Actuates the work lights in the drive direction on the overhead guard (○)
	Fork direction work lights	Actuates the work lights in the fork direction on the overhead guard (○)

## 2.1.4 Setting the time



### Setting the time

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

*The time is now set.*

### **2.1.5 Battery discharge indicator**

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. (see page 72)

- ➔ The standard setting for the battery discharge indicator (102) is based on a truck delivered with a standard battery.

### **2.1.6 Battery discharge monitor**

If the residual capacity falls below the required level, lifting is inhibited. An corresponding display appears. Lifting is only released when the battery connected is at least 70% charged.

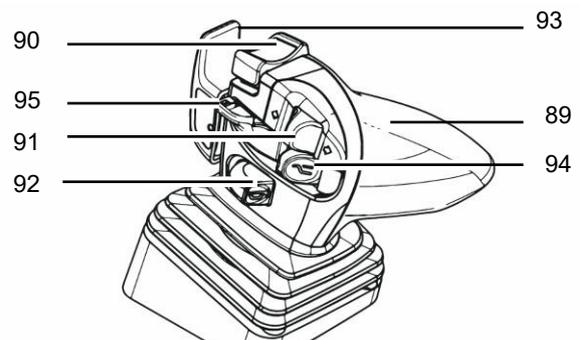
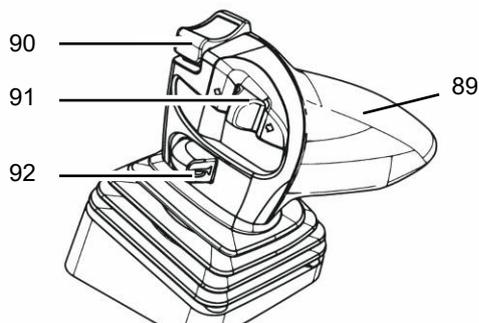
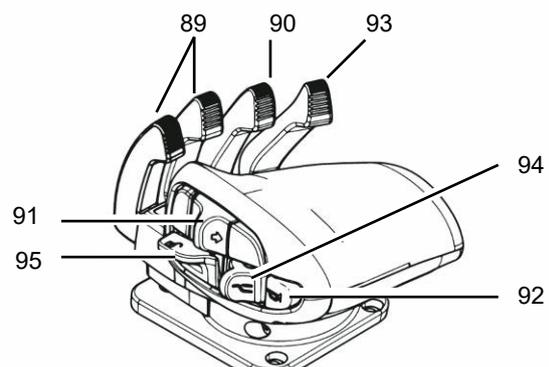
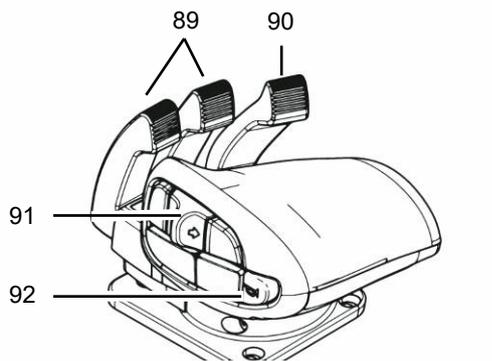
### **2.1.7 Hourmeter**

- ➔ Prepare the truck for operation, see page 85 or see page 135.

Service hours are counted while the truck is operational and the deadman button is pressed.

## 2.2 Pilots

Item	Control/display		Function
89	Basic hydraulic lever	●	Lever for operating the basic lift/mast reach hydraulic functions
90	Tilt button/lever	●	Forwards and backwards tilt of the mast
		○	Auxiliary hydraulics (ZH 1/ZH 2)
91	Travel direction button (not available with twin-pedal control)	●	Selects travel direction or neutral position
92	"Horn" button	●	Activates an audible warning signal.
93	Fork positioner auxiliary hydraulics 2 button/lever - optional	○	Button for fork positioner or auxiliary hydraulics 2
94	Side shift	○	Side shift operation
95	Acknowledgement button	○	Additional operating means for hydraulic functions requiring acknowledgement



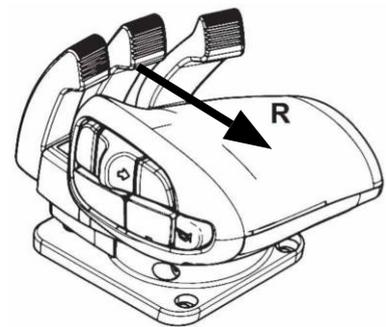
## 2.3 Function symbols for the Pilots

→ 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.

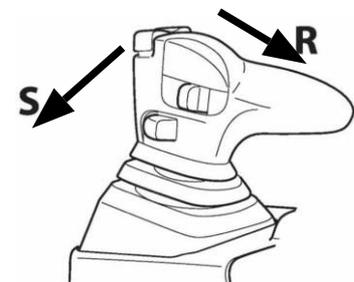
Symbol	Meaning
	Lift
	Tilt
	Side shift
	Fork positioner
	Reach fork
	Telescopic fork
	Adapters ZH1 to ZH4 (example symbol ZH1)

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 in 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.



## 3 Preparing the Truck for Operation

### 3.1 Checks and operations to be performed before starting daily operation

#### **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.

---

#### ***Checking the truck before daily operation***

##### *Procedure*

- Visually inspect the entire truck (in particular wheels and wheel bolts) for damage.
- Check the load handler for visible signs of damage such as cracks, bent or severely worn forks.
- Check the fork arm stop and fork retainer – see page 111.
- Check the fork arms for oil and dirt; clean if necessary.
- Visually inspect the hydraulic system in the visible area for damage and leaks.
- Make sure the driver's seat is locked in position.
- Check the horn and, if necessary, the reversing buzzer, Floor-Spot and strobe light / warning beacon (○) for correct function – see page 111.
- Check that the load chart and warning notices are legible.
- Test the controls and displays.
- Test the steering.
- Check the steer angle display, turn the steering wheel in both directions as far as the stop and check that the wheel position is displayed on the control panel.
- Make sure the load chains are evenly tensioned.
- Test the seat belt (○). The belt should jam if extracted suddenly.
- Check all hydraulic functions and, if applicable, the attachment hydraulic functions.
- Check that the mast protective screen panel (○) (17) is present.
- Visually inspect the battery attachment and cable connections.
- Check the battery connectors are secure.
- Check that the battery is positioned securely.
- Make sure the battery is locked.
- Check that the mounting screws (116) and (117) of the fork carriage are secure; tighten the screws if necessary. Torque: 169 Nm.

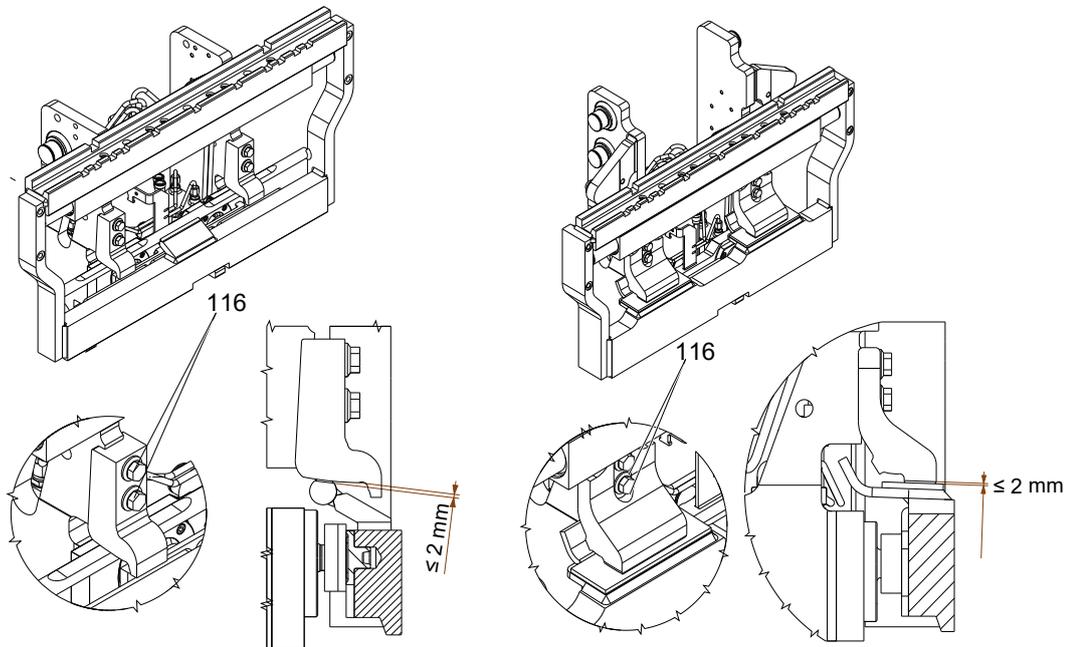
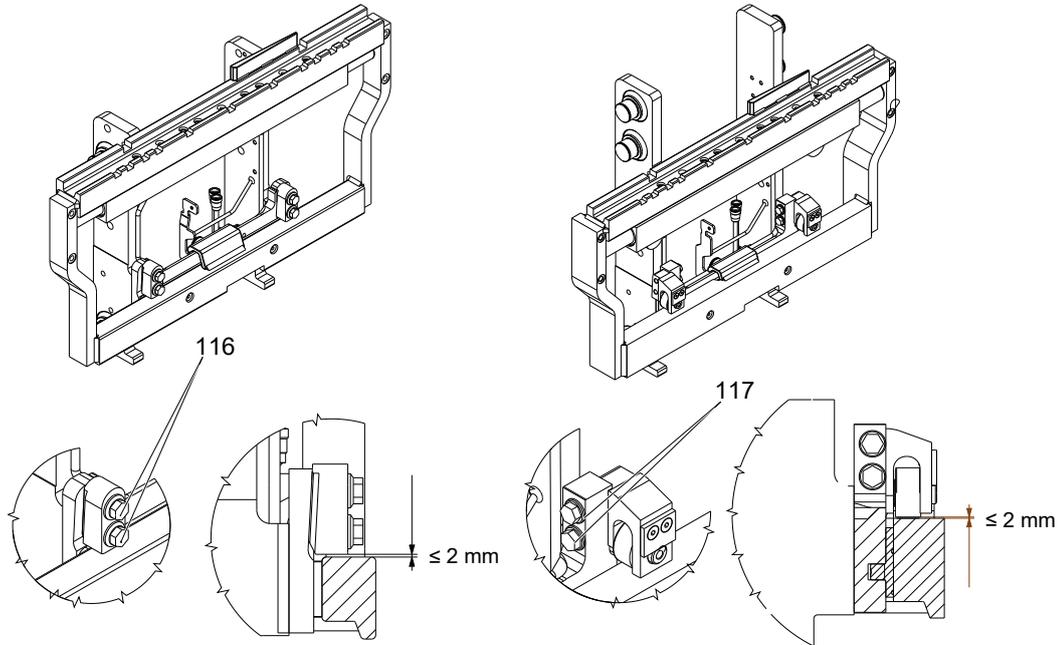


Torque (116): 169 Nm

Torque (117): 84 Nm

- The maximum clearance between the components of the restraint system must be no more than 2 mm.

*The truck is now checked.*



## 3.2 Entering or exiting

### *Entry and exit*

#### *Requirements*

- Truck braked to a halt.

#### *Procedure*

- To enter, take hold of the grab handle (80), see page 66.
- Enter or leave the truck.

### 3.3 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.

#### 3.3.1 Adjusting the Driver's Seat

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

#### **⚠ WARNING!**

#### **Risk of accidents and damage to health**

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

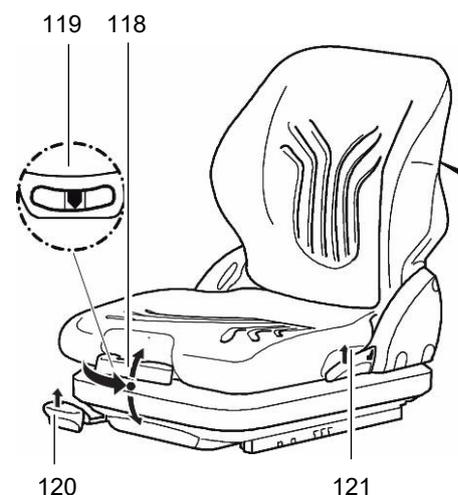
- ▶ Do not adjust the driver's seat while travelling.
- ▶ The driver's seat should lock in position after adjustment.
- ▶ Check and, if necessary, adjust the individual seat setting and driver's weight setting before starting up the truck.

#### ***Adjusting the seat position***

#### *Procedure*

- Sit on the driver's seat.
- Pull up the driver's seat locking lever (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.*



## Setting the driver's weight

### **WARNING!**

#### **Incorrectly adjusted seat cushioning can damage your health**

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

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

---

#### *Procedure*

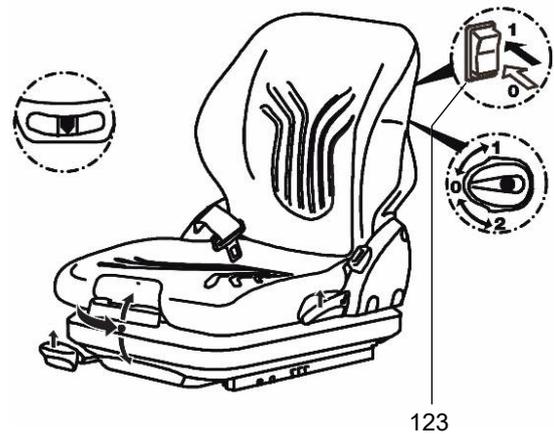
- Fold out the weight adjustment lever (118) as far as it will go in the arrow direction.
  - Move the weight adjustment lever (118) up and down to set the seat to a higher weight.
  - Move the weight adjustment lever (118) up and down to set the seat to a lower weight.
- ➔ The driver's weight is correct when the arrow is in the middle of the display window (119). The minimum or maximum weight setting is reached when you can feel a return stroke on the lever.
- After setting the weight, move the lever (118) back in full.

*The driver's weight is now set.*

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

#### **Procedure**

- Press the seat heating switch (123).  
Switch setting 1 = Seat heating on.  
Switch setting 0 = Seat heating off.

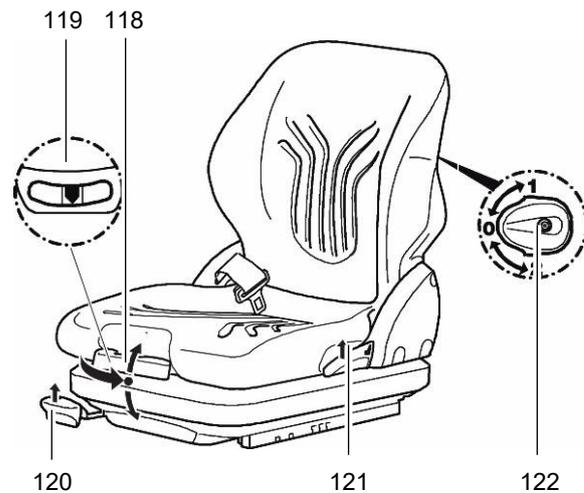


### **Adjusting the lumbar support (O)**

#### **Procedure**

- Turn the hand wheel (122) to the required position.  
Position 0 = no bending in lumbar area.  
Position 1 = increasing bending in upper lumbar area.  
Position 2 = increasing bending in lower lumbar area.

*The lumbar support is now adjusted.*



### **Adjusting the driver's weight automatically (O)**

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

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

### 3.3.2 Adjusting the driver's seat

#### **⚠ CAUTION!**

#### **Moving the driver's seat is a trapping hazard**

- ▶ Do not reach between the seat and the side wall or overhead guard when adjusting the seat.

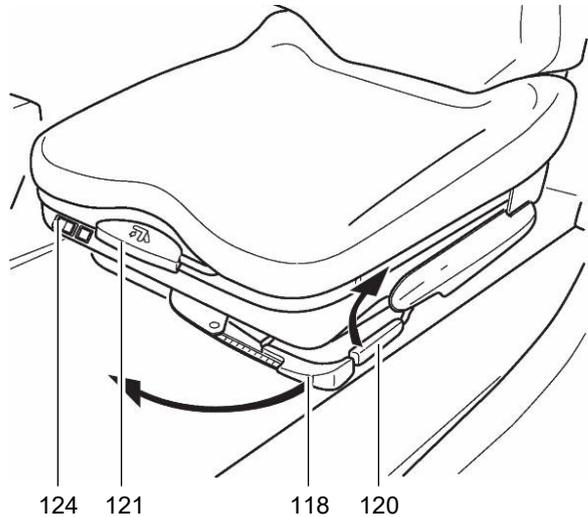
#### **Adjusting the driver's weight**

#### **NOTICE**

To achieve optimal seat cushioning the driver's seat must be set to the driver's weight.

Set the driver's weight when the seat is unoccupied.

Seat cushioning setting range: 50 - 130 Kg.



#### **Procedure**

- Pull the weight adjustment lever (118) in the direction of the arrow as far as the stop and then return it.  
The weight setting is set to a minimum value.
- Pull the weight adjustment lever (118) in the arrow direction until you reach the required weight on the scales.
- Restore the weight adjustment lever (118) to its original position.

*The driver's weight is now set.*

#### **Adjusting the backrest**

#### **Procedure**

- Sit on the driver's seat.
- Pull the lever (121) to adjust the backrest.
- Adjust the backrest tilt.
- Release the lever (121) again. The backrest is locked.

*The backrest is now set.*

#### **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.*

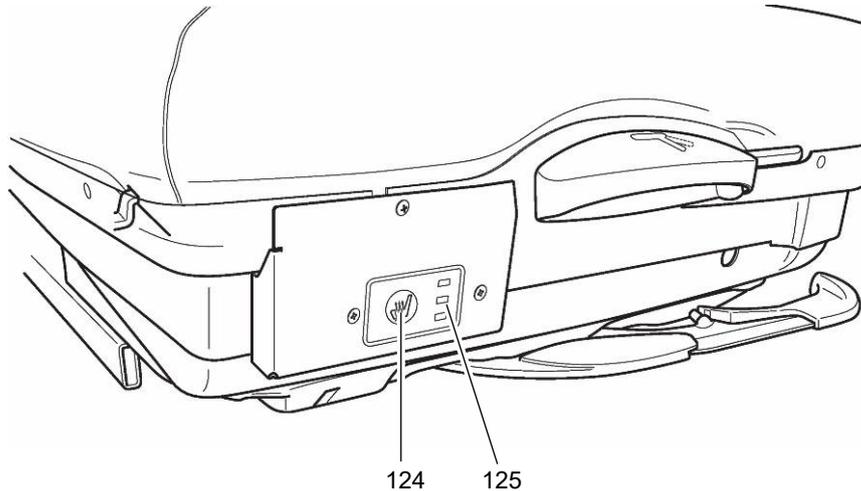
- The optional seat heating (124) is operated via the switch on the driver's seat.

***Adjust the seat heating (○)***

**NOTICE**

**Avoid prolonged contact of uncovered / unprotected skin with the heated seat.**

*Procedure*



- Press the seat heating button (124) a single time.  
The heating changes to heat mode level 3 (highest level), all LEDs (125) are permanently lit.
- Press the seat heating button (124) again.  
The heating changes to heat mode level 2.
- Press the seat heating button (124) again.  
The heating changes to heat mode level 1.
- Press the seat heating button (124) again.  
The heating changes to operational status (off).

*Seat heating set.*

- In the event of an error one or more LEDs (125) next to the switch are lit. Switch off the truck. Switch the truck on again. Call the service department if necessary.

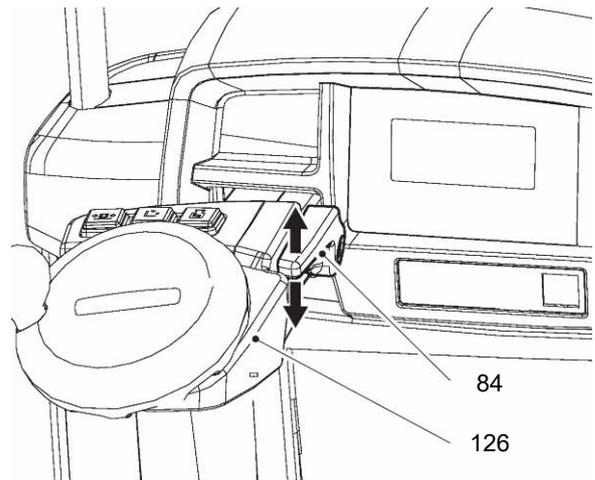
### 3.3.3 Adjusting the steering column

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

##### *Procedure*

- Release the steering column stop (84).
- Position the steering head (126).
- Fix the steering column stop (84) in position.

*The steering column is now positioned.*



### 3.3.4 Seat belt (○)

#### NOTICE

##### Seat belt optional equipment

On request from the customer, the truck can be fitted with a seat belt for special applications.

- ▶ Always put on the seat belt 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.
- 

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

##### **Checking the seat belt**

###### *Procedure*

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

##### **Check the automatic locking system**

###### *Procedure*

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

- The locking system should prevent the belt from coming out.

*The seat belt has now been checked.*

##### **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.

### ***Putting on the seat belt***

#### ***Procedure***

- Sit on the driver's seat so that your back is resting against the backrest.
- Pull the seat belt smoothly out of the retractor.
- Place the seat belt tight against your body. Take care not to twist it.
- Engage the lock tongue (128) in the lock (127).

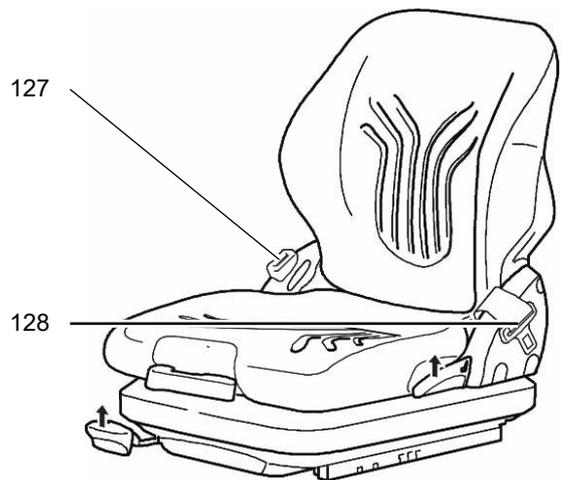
*The seat belt is now in place*

### ***Taking off the seat belt***

#### ***Procedure***

- Hold onto the lock tongue (128) with one hand.
- Press the red button on the lock (127).
- Guide the lock tongue (128) manually back into the reel.

*The seat belt is now removed.*



## 4 Starting up the truck

### 4.1 Safety regulations for travel mode

#### 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.

---

#### 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.

#### 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.

#### **DANGER!**

#### Danger of death from falling truck

In the event that the truck falls from a loading bridge or ramp, the operator is at risk of serious injuries and death.

- ▶ Do not jump off the truck if it falls.
  - ▶ Hold on with both hands.
  - ▶ Tilt your body in the opposite direction of the fall.
  - ▶ Do not remove the optional seat belt (○).
- 

 The operating company must take the necessary safety precautions and define special work instructions to prevent the danger of falls during operation. A seat belt (○) is recommended as an additional measure when using the truck on a ramp/load bridge.

## **⚠ WARNING!**

### **Electromagnetic influence can result in accidents**

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

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

### **Negotiating slopes and inclines**

Negotiating slopes and inclines up to 15 % is only permitted when they are recognised lanes. The slopes and inclines must be clean, have a non-slip surface, and negotiating them safely must be within the technical specifications of the truck. 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 or slopes. Inclines must only be negotiated at slow speed, with the driver ready to brake at any moment.

### **Negotiating lifts, loading ramps and docks**

Lifts may only be negotiated if they have sufficient capacity, are suitable for driving on and authorised for truck traffic by the 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.

## **⚠ WARNING!**

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

Extended mast sections when the truck is travelling with or without load will reduce the truck's operational stability.

- ▶ Always travel with the mast holder retracted, the mast tilted back, the load centre in the middle of the truck's longitudinal axis and the load handler lowered.
- 

### **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.
-

## 4.2 Preparing the truck for operation

- The truck carries out a self-test when it is switched on. Do not activate any controls, such as the deadman button, during the self-test.

### **Switching on the truck**

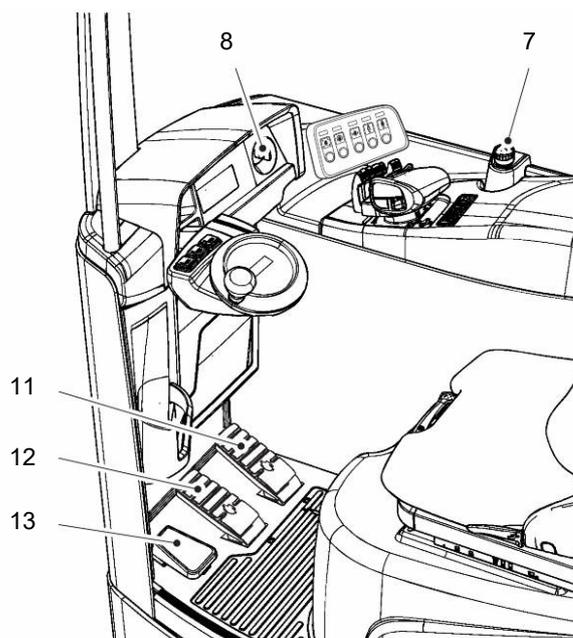
#### *Requirements*

- Checks and operations to be performed before starting daily work, see page 85.

#### *Procedure*

- Pull the emergency disconnect switch (7) to switch it on.
- Switch on the truck, to do this
  - Insert the key in the key switch (8) and turn it as far to the right as it will go, or
  - Enter the code in the code lock (○). Start PIN 1234 or
  - Hold the card or transponder in front of the ISM access module and, depending on the setting, press the green button on the ISM access module (○).
- Test the steering.
- Test the brakes (12).
- Test the warning signal button.
- Test the deadman switch (13).
- Test the accelerator pedal (11).
- Test lifting operations.

*The truck is operational*



## 4.3 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.

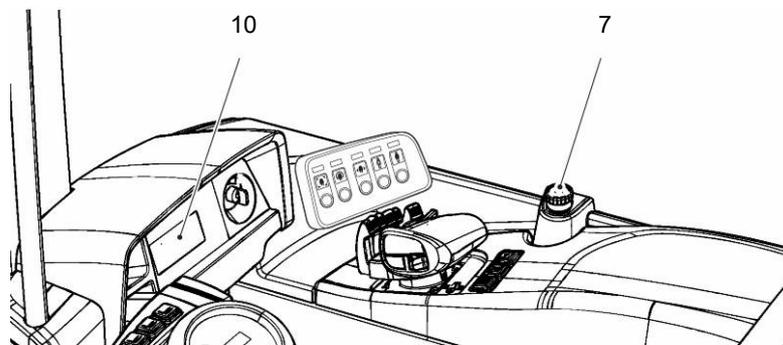
### ⚠ CAUTION!

#### **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.

→ Press the Emergency Disconnect switch on in emergencies.



#### **Applying the emergency disconnect switch**

##### *Procedure*

- Press the emergency disconnect switch (7).

*All electrical functions are deactivated. The truck brakes to a halt.*

#### **Releasing the emergency disconnect switch**

##### *Procedure*

- Pull or turn the emergency disconnect switch (7) to unlock it again.

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

*With ISM, transponder, keypad and Easy Access, the truck is still switched off.*

## 4.4 Emergency stop

The truck is fitted with an emergency stop device. If a system fault is detected, the truck automatically brakes until it comes to a halt. If a fault is detected in the steering or brake systems, an information message will appear on the display and control unit (10), see page 66.

### ***Re-setting the emergency stop***

#### *Procedure*

- Press the emergency disconnect switch (7).
- Pull or turn the emergency disconnect switch (7) to unlock it again.

*The emergency stop is reset.*



If the emergency stop is shown on the control and display unit (10) after repeatedly resetting the emergency stop, notify the manufacturer's service department.

## 4.5 Travel

### **⚠ WARNING!**

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

- ▶ Do not get up from the driver's seat during travel.
- ▶ Make sure that the travel area is clear.
- ▶ Adapt the travel speed to the conditions of the route, the work area and the load.
- ▶ Tilt the mast back and raise the fork carriage approx. 200 mm.
- ▶ Make sure you have enough visibility when reversing.

### **⚠ WARNING!**

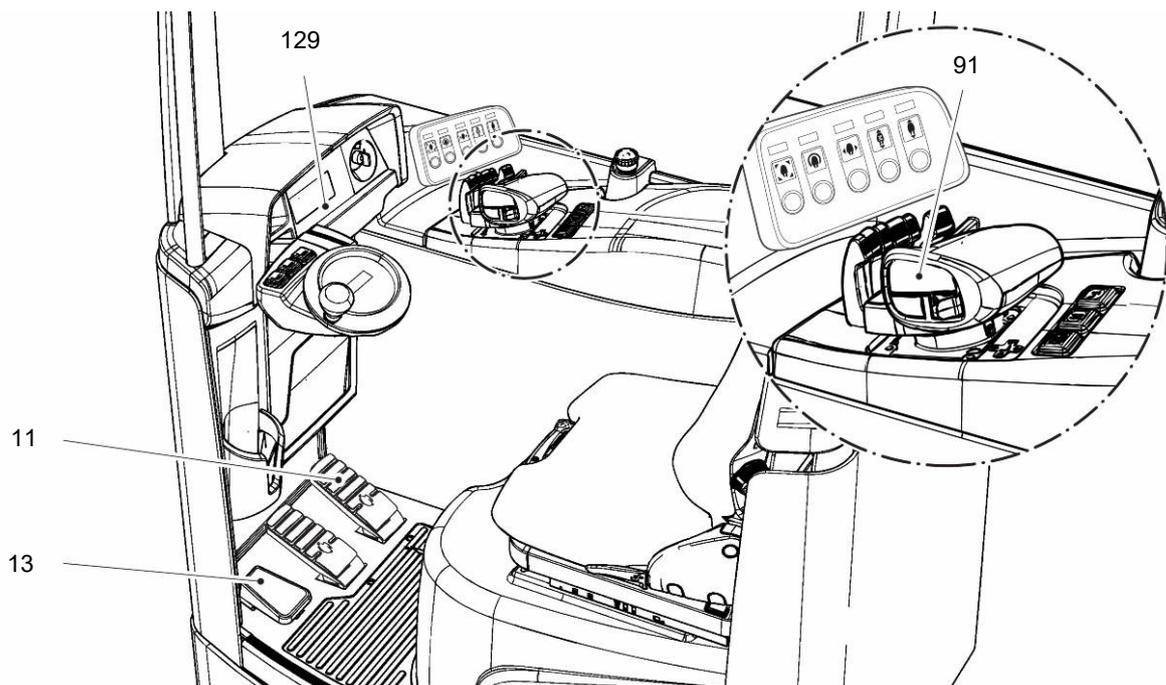
#### **Loss of operational stability can cause accidents**

Extended mast sections when the truck is travelling with or without load will reduce the truck's operational stability.

- ▶ Always travel with the mast holder retracted, the mast tilted back, the load centre in the middle of the truck's longitudinal axis and the load handler lowered.



Each time the truck is started the operation of the emergency stop safety switch is tested. The fault display is shown on the display unit for the duration of the safety check. Travel and steering are only enabled if the condition is satisfactory.



### **Travel**

#### **Requirements**

- Truck prepared for operation, see page 98.

### *Procedure*

- The parking brake is released automatically when starting up.
    - The parking brake is automatically applied when the truck comes to a standstill and the deadman button is released at the same time.
  - Select the travel direction; to do this
    - Push the direction button (91) up to select travel in the fork direction.
    - Push the direction button (91) down to select travel in the drive direction.
  - Press and hold down on the deadman button (13).
- The deadman button (13) ensures that the driver's feet do not extend beyond the geometry of the truck during travel. If it is not pressed, travel and lifting are inhibited with the exception of steering, the control and display unit and the horn. The truck coasts according to the coasting brake parameter setting and after a short time comes to a halt via the drive brake.
- If the deadman button (13) is not actuated for 5 seconds, the travel direction automatically switches to neutral.
- Apply the accelerator pedal (11).
- The travel speed is governed by the accelerator (11).

*The truck travels in the selected travel direction.*

## 4.6 Brakes

The truck's brake pattern depends largely on the ground conditions. The driver must take this into consideration when handling the truck.

The truck can brake in three different ways:

- With the service brake
- With the coasting brake
- With the reversing brake

### **WARNING!**

#### **Individual parameter settings can cause accidents**

If the truck is operated by several drivers (e.g. multi-shift operation) and the parameters are individually set, be aware of the different brake and travel patterns.

- ▶ Test the truck's response on start-up.
- 

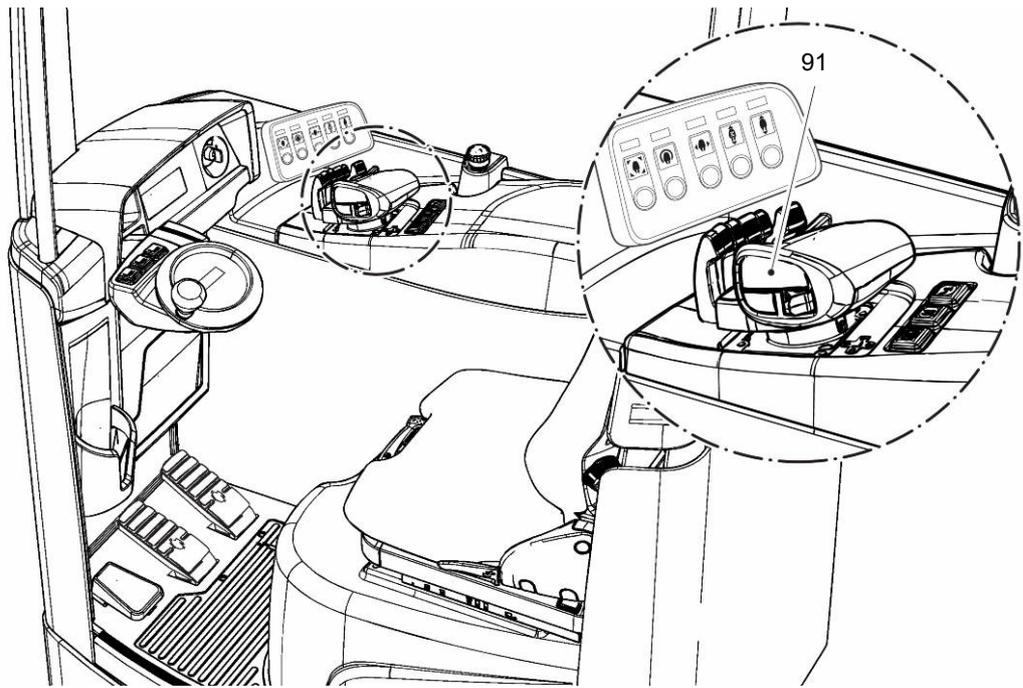
### **WARNING!**

#### **Accident risk**

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

- ▶ The driver must be aware of travel route conditions and them into account 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.
-

## 4.6.1 Braking with the reversing brake



### ***Braking with the reversing brake***

#### *Procedure*

- Set the travel direction switch (91) to the opposite direction while travelling.

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



This method reduces energy consumption. Energy is recovered, which is controlled by the traction current controller. The energy recovery is indicated on the control and display unit.

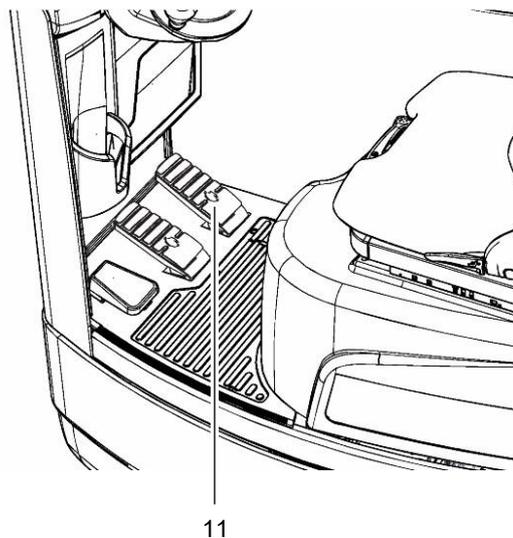
## 4.6.2 Braking with the coasting brake

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

#### *Procedure*

- Take your foot off the accelerator pedal (11).

*The truck decelerates.*



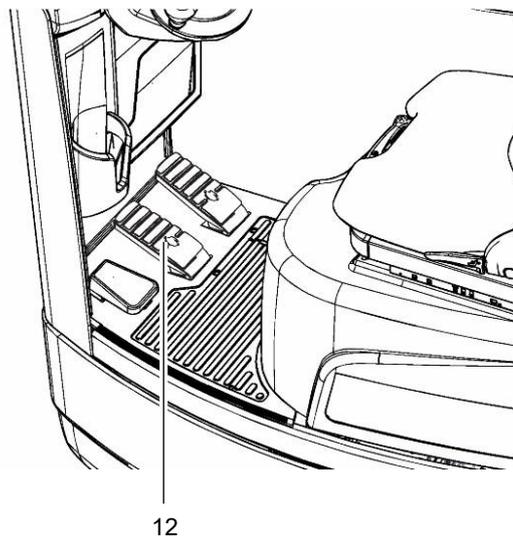
## 4.6.3 Braking with the service brake

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

#### *Procedure*

- Depress the brake pedal (12) until you feel the brake pressure.

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



- ➔ If the brake pedal is applied suddenly just before the truck stops, the drive brake also applies and is released when the brake pedal is released.

## 4.7 Steering

### 4.7.1 Steering type

#### Reverse steering

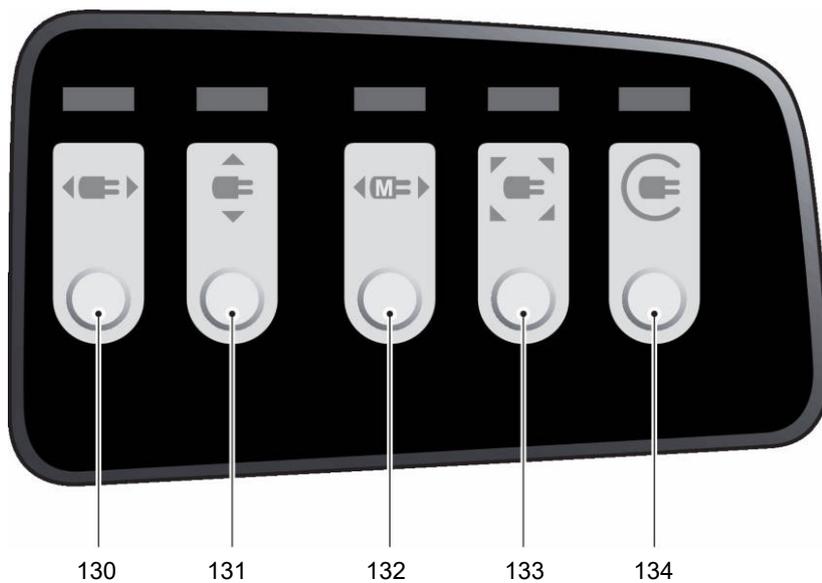
When travelling forward (travel in direction of entry = drive direction) steer left to turn into a left hand bend and right into a right hand bend. The drive wheel position is indicated on the driver's display.

### 4.7.2 Steering modes

- The directions "left" and "right" refer to the load handler when viewed from the operator position, see page 16.

When the truck is switched on the drive wheel and load wheels are set to home position of the most recently selected steering mode.

When selecting a steering mode, the drive wheel and load wheels are set to the home position for the steering mode selected. The wheel position changed by the steering wheel in the previous mode is not taken into account.



Item	Steering mode
130	Normal travel
131	Transverse travel
132	Modified normal travel
133	Parallel travel
134	Circular travel

### **Normal travel (130)**

- Home position: 0° to the truck's longitudinal direction.
- Steering: only with the drive wheel.
- Steer angle: +/- 90°
- 360° endless steering

### **Modified normal travel (132)**

- Home position: 0° to the truck's longitudinal direction.
- Steering: all wheel steering.
- Steer angle: The steer angles of the drive wheel and the load wheels are governed individually depending on the degree of turn of the steering wheel, to achieve maximum manoeuvrability in confined areas.
- Steer angle: +/- 90°
- 360° endless steering

### **Transverse travel (131)**

- Home position: drive wheel and load wheels are at a 90° angle to the truck's longitudinal direction. The electronic system decides whether the wheel changes position to the left or the right, depending on the travel direction and the current wheel position.
- Steering: only with the load wheels.
- Steer angle: differs depending on the truck's position relative to the centre of the bend.

### **Circular travel (134)**

- Home position: the wheels adjust themselves to allow for turning on the spot.
- Steering: the steering wheel is redundant in this steering mode.
- Steer angle: aligned with the circle around the centre point of the truck.



This steering mode is displayed by arrows moving in the direction of rotation.

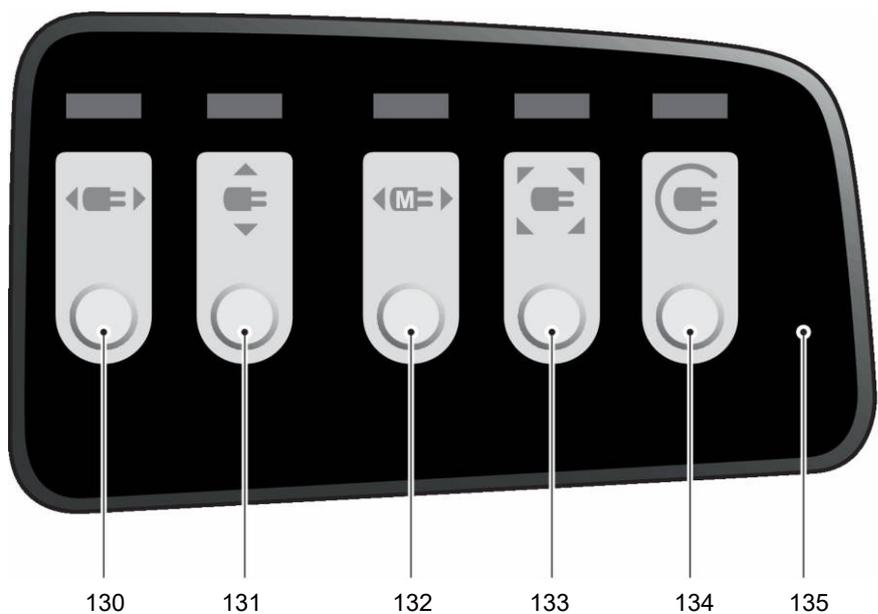
### **Parallel travel (133)**

- Home position: 0° to the truck's longitudinal direction.
- Steering: all-wheel steering.
- Steer angle: When steering, all three wheels turn at the same angle.
- The "parallel travel" steering mode allows the truck to move diagonally or transversely without turning the truck's longitudinal axis.
- Steer angle: +/- 90°
- 360° endless steering

### **360° endless steering**

With 360° endless steering the steer angle of the wheels can be endless. This function can be activated or deactivated by the steer angle button (86), see page 66. Endless steering can therefore be used to change travel direction.

### 4.7.3 Changing steering mode



The luminous bar above the button shows the current steering mode selected. Backlit (shown in white) travel modes can be selected from the current travel situation. Non-backlit (shown in grey) travel modes cannot be selected from the current travel situation.

#### Permissible steering mode changes

Permissible steering mode changes during travel are marked with an X.

	Normal travel / modified normal travel	Transverse travel	Parallel travel
Normal travel / modified normal travel		---	X
Transverse travel	---		X
Parallel travel	X	X	

#### Changing steering mode

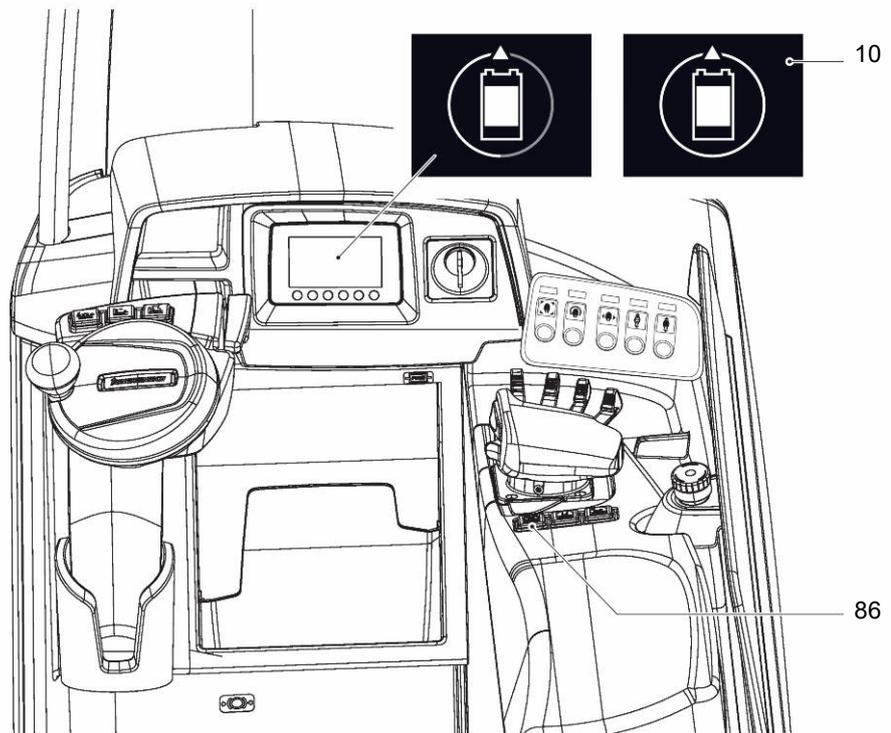
##### Procedure

- Select the steering mode by pressing a button on the travel mode control unit (135).
- ➔ When selecting the steering mode during travel the steering electronic system decides whether the change is permissible, based on the current steering mode.
- ➔ When the truck is idle you can select any steering mode by pressing the buttons on the travel mode control unit (135). The drive wheel and load wheels set themselves to the home position for the steering mode selected.

*The steering mode is now changed.*

#### 4.7.4 Adjusting the steer angle

Press the steer angle button (86) to change between 180° and 360° steering. The range selected is shown in the control and display unit (10).



#### ***Adjusting the steer angle***

##### *Procedure*

- Press the steer angle button (86).

*The steer angle is now set.*

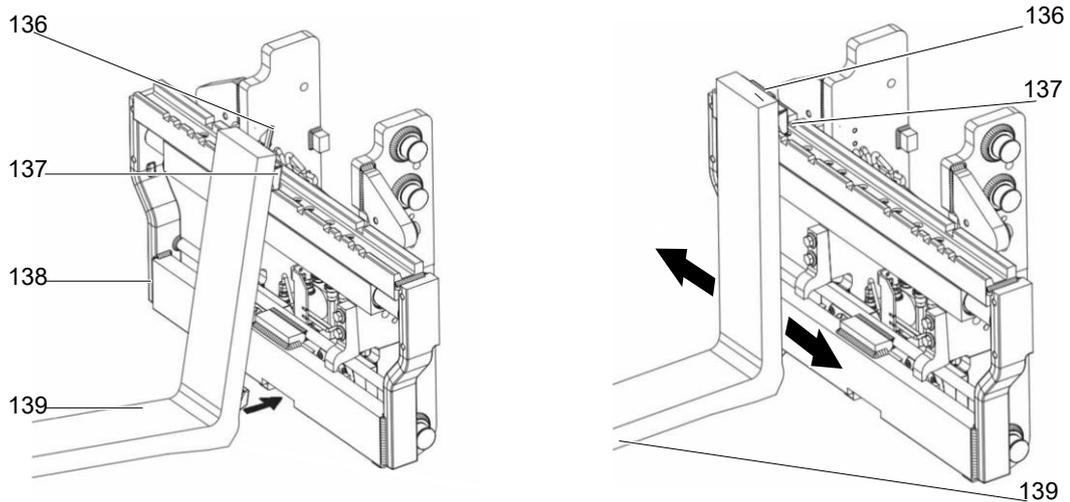
## 4.8 Forks

### **⚠ WARNING!**

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

You can injure your legs when replacing the forks.

- ▶ Never pull the forks 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.



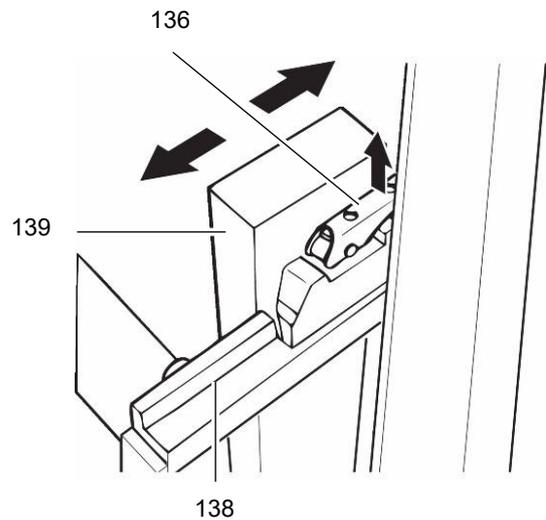
#### **Attaching and adjusting the fork arms**

##### *Requirements*

- Truck parked securely – see page 127.
- The fork arms are attached and detached at the centre of the fork carriage (138).

##### *Procedure*

- Lift up the locking lever (136).
- Move the fork arm (139) to the desired position.
- Swing the locking lever (136) down and adjust the fork arms (139) until the locking pin (136) engages in a slot.

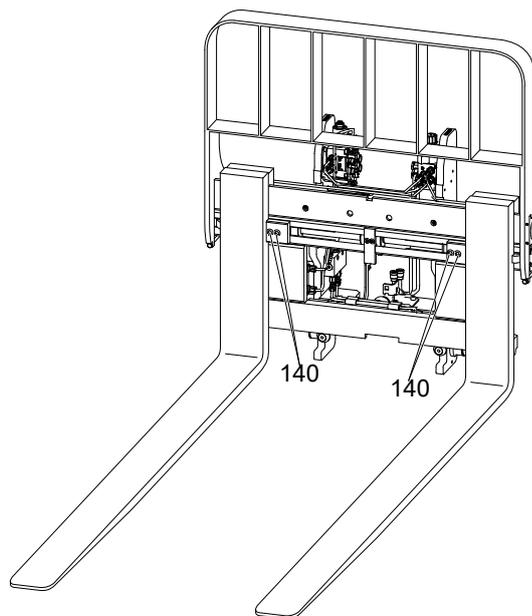


*The fork arms have been adjusted.*



*The truck must only be operated when the locking pin (136) is correctly engaged.*

## 4.8.1 Assembling/disassembling the fork arms



### ***Disassembling the fork arms***

#### *Requirements*

- Truck parked securely, see page 127.

#### *Procedure*

- Detach the fork arms from the cylinders of the fork positioner.
- Push the left fork into the centre of the front chassis by hand.
- Remove the left fork over the front of the load section.
- Push the right fork into the centre of the front chassis by hand.
- Remove the right fork over the front of the load section.

*The fork arms have been removed.*

### ***Assembling the fork arms***

#### *Requirements*

- Truck parked securely, see page 127.

#### *Procedure*

- Insert the right fork over the front of the load section into the centre of the front chassis.
- Push the right fork by hand to the right towards the cylinder of the fork positioner.
- Insert the left fork over the front of the load section into the centre of the front chassis.
- Push the left fork by hand to the left towards the cylinder of the fork positioner.
- Secure fork arms with M12 screws (140).
  - Tightening torque: 20 Nm
  - Use Loctite 243.

*The fork arms are mounted.*

## 4.9 Lifting, transporting and depositing loads

### **⚠ WARNING!**

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

Before lifting a load unit the driver must ensure that it has been correctly palletised and does not exceed the truck's capacity.

- ▶ Instruct other people to move out of the hazardous area of the industrial truck. Stop working with the truck if people do not leave the hazardous area.
- ▶ Only carry loads that have been correctly secured and positioned. Use suitable protection measure 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.
- ▶ Never exceed the maximum loads specified on the capacity chart.
- ▶ Never 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.
- ▶ Check the fork spread before lifting the load and adjust if necessary.
- ▶ Insert the forks as far as possible underneath the load.

### **⚠ WARNING!**

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

Extended mast sections when the truck is travelling with or without load will reduce the truck's operational stability.

- ▶ Always travel with the mast holder retracted, the mast tilted back, the load centre in the middle of the truck's longitudinal axis and the load handler lowered.

### **NOTICE**

#### **Risk of component damage when lifting at full lift speed**

Frequent lifting at maximum speed against the end stops of the lift mechanism can cause damage to the truck.

- ▶ Reduce the lift speed before reaching the end stop.



On trucks with lift height sensors, the end positions are only reached by operating the control element again. This behaviour can be adjusted by the manufacturer's customer service department.

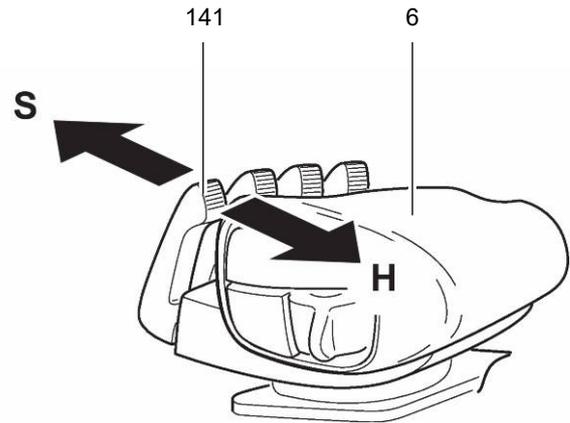
## **Lifting and lowering with the SOLO-PILOT**

### **Procedure**

- Pull the SOLO-PILOT lever (141) in direction H to raise the load unit.
- Push the SOLO-PILOT lever (141) in direction S to lower the load unit.
- Apply the SOLO-PILOT lever (141) until you reach the required lift height.

- The lift/lower speed is determined by the inclination of the control lever.
- When you reach the limit position return the control lever to its home position.

*The load unit is now raised or lowered.*



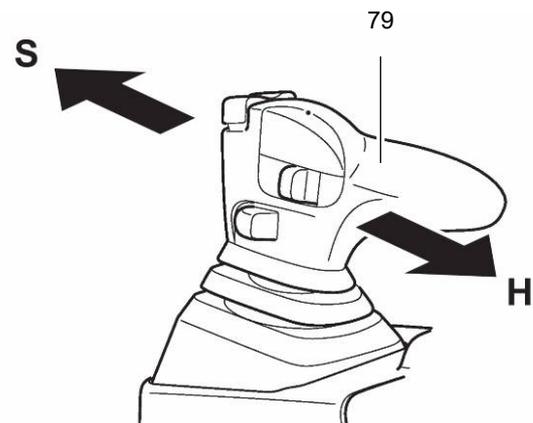
## **Lifting and lowering with the Multi-Pilot (O)**

### **Procedure**

- Pull the Multi-Pilot (79) in direction H to raise the load unit.
- Push the Multi-Pilot (79) in direction S to lower the load unit.
- Apply the Multi-Pilot until you reach the required lift height.

- The lift/lower speed is determined by the inclination of the control lever.
- When you reach the limit stop the pressure relief valve makes a noise. Set the control lever immediately to the home position.

*The load unit is now raised or lowered.*



## Mast lift speed reduction (○)

The mast lift speed reduction safety feature prevents the truck from accelerating accidentally if the load is beyond the free lift range.

After the safety switch has applied, the truck can only operate at crawl speed.

### ***Deactivating the speed reduction***

#### *Procedure*

- Lower the load handler.
- Set the accelerator pedal to the zero (home) position.

*This deactivates the speed reduction and releases normal travel.*

## **⚠ CAUTION!**

### **Risk of trapping from moving parts!**

When the mast holder moves you can get trapped between the mast and battery tray.

▶ Do not reach between the mast and the battery tray.

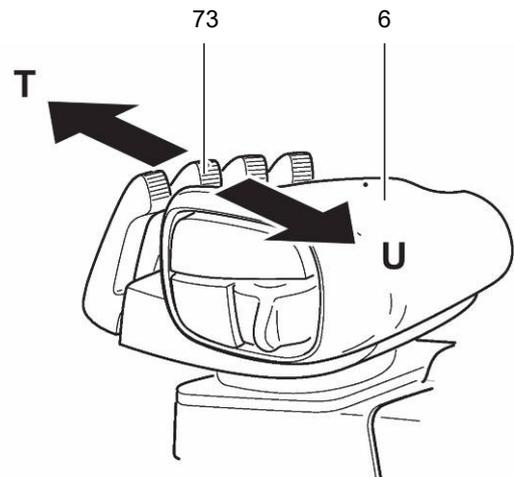
---

### ***Moving the mast holder with the SOLO-PILOT***

#### *Procedure*

- Push the SOLO-PILOT (73) in direction (T) to extend the mast holder forward.
- Pull the SOLO-PILOT (73) in direction (U) to retract it.

*The mast holder is now extended.*

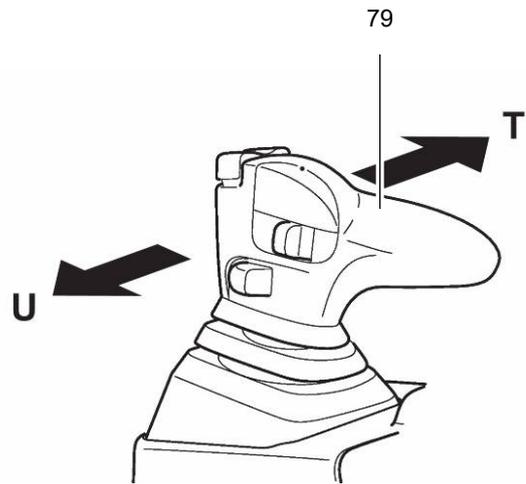


### **Moving the mast holder with the MULTI-PILOT**

#### *Procedure*

- Push the MULTI-PILOT (79) in direction (T) to extend the mast holder forward.
- Pull the MULTI-PILOT (79) in direction (U) to retract it.

*The mast holder is now extended.*

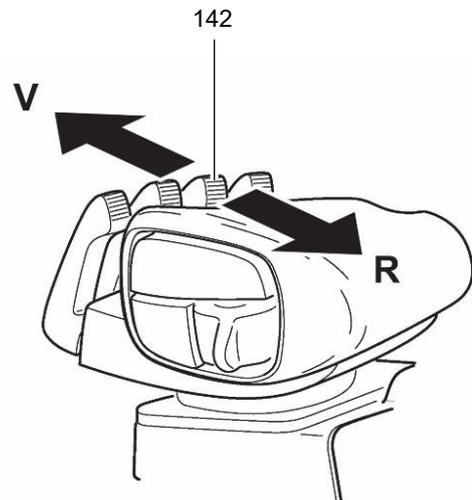


### **Tilting the mast / fork carriage with the SOLO-PILOT**

#### *Procedure*

- Push the SOLO-PILOT lever (142) in direction (V) to tilt the mast holder forward.
- Pull the SOLO-PILOT lever (142) in direction (R) to retract it.

*The mast / fork carriage is tilted.*

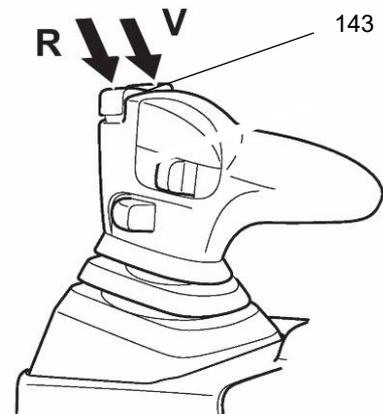


### **Tilting the mast / fork carriage with the MULTI-PILOT**

#### *Procedure*

- To tilt forward, push the MULTI-PILOT (143) in direction (V).
- To tilt back, push the MULTI-PILOT (143) in direction (R).

*The mast / fork carriage is tilted.*



## ***Lifting load units***

### ***Requirements***

- Load unit correctly palletised.
- Fork spread for the pallet checked and adjusted if necessary.
- Load unit 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.
- Extend the mast holder.
- Raise the forks to the correct height.
- Slowly insert the forks into the pallet until the fork shank touches the pallet.
- Raise the load handler.
- Tilt the mast back.
- Retract the mast holder.
- Reverse carefully and slowly until the load unit is outside the storage area. Make sure you have a clear route when travelling in the forks direction.

*Load unit raised.*

## **Transporting loads**

### *Requirements*

- Load raised correctly.
- Position the fork arms under the load with the maximum possible spacing.
- Mast and load section tilted back fully.

### *Procedure*

- Lower the load into transport position.
- Accelerate and decelerate the truck carefully.
- 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.
- You must use a lookout at blind spots.
- On slopes and inclines, always carry the load facing uphill; never approach at an angle or turn.

## **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.

---

## **Depositing load units**

### *Requirements*

- Storage location suitable for storing the load.

### *Procedure*

- Set the mast vertical.
- Drive carefully up to the storage location.
- Raise the load unit to the correct height.
- Extend the mast holder.
- 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.
- Retract the mast holder. Carefully remove the forks from the pallet.

*The load unit is lowered.*

## 4.10 Operating attachments

### 4.10.1 Safety instructions for operating additional attachments

- Optionally, trucks can be fitted with one or more auxiliary hydraulic functions to operate attachments. The auxiliary hydraulics are indicated with HF4 and HF5. Auxiliary hydraulic functions for exchangeable equipment are fitted with replacement couplings on the fork carriage. To fit exchangeable equipment see page 125.

#### **⚠ 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.

## **⚠ 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.
- 



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 side shifter and fork adjuster attachments**

## **⚠ WARNING!**

When using multi fork adjusters (multi pallet clamps), restricted visibility and reduced lateral tilt resistance can result in accidents.

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

### **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 HF4, HF5 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 125.
  - ▶ 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!**

#### **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 85, 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 85, check the fork extension lock.
  - ▶ Mark any fork extensions with an incomplete or faulty lock and take them out of service.
  - ▶ Do not use trucks with an incomplete or faulty fork extension lock. Replace the fork extension.
  - ▶ Only restore the fork extension to service when the fault has been rectified.
  - ▶ Use only fork extensions which are free of dirt and foreign bodies near the entry opening point. Clean the fork extensions as required.
- 



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

### **⚠ WARNING!**

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

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

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

## 4.10.2 Integral sideshifter (SOLO-PILOT)

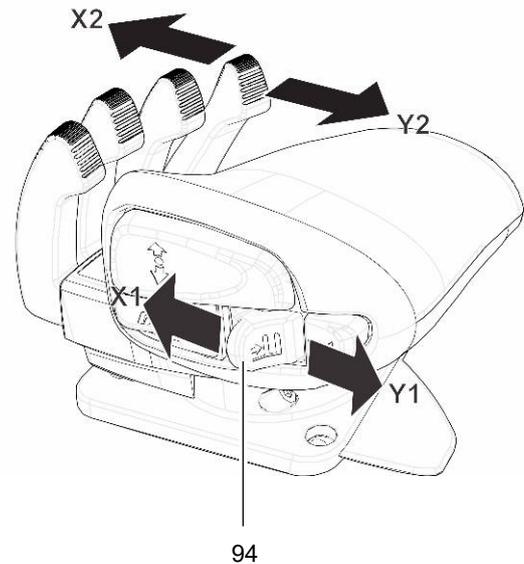
- The directions "left" and "right" refer to the load handler when viewed from the operator position.
- On trucks without integrated side shift and HF4 connection, the lever 90 may have a different assignment.

### **Moving the side shift**

#### *Procedure*

- Press the button (94) in direction (X1). The side shift moves to the left.
- Press the button (94) in direction (Y1). The side shift moves to the right.

- Note the capacity reduces when traversing.



*The side shift has now been moved.*

### 4.10.2.1 Operating additional attachments with soloPILOT

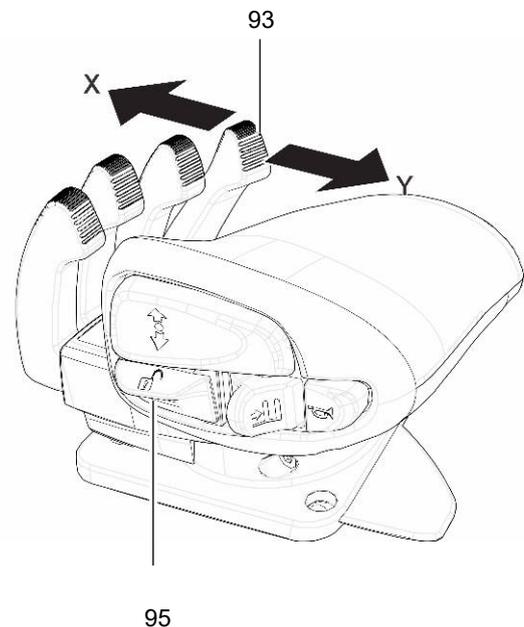
The control lever (93) has functions (X2) and (Y2) to operate hydraulic attachments connected to the terminal HF5 (see manufacturer's operating instructions).

#### **Controlling the auxiliary hydraulic function using the acknowledgement button (95)**

#### *Procedure*

- Press the acknowledgement button (95)
- Within 1.5 seconds, move the lever (93) in direction X or Y

*The attachment performs its function*



### 4.10.3 Integral sideshifter (MULTI-PILOT)

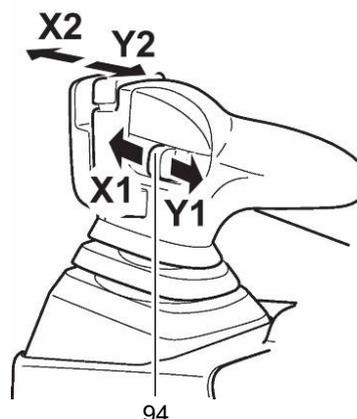
- The directions "left" and "right" refer to the load handler when viewed from the operator position.

#### **Moving the side shift**

##### *Procedure*

- Press the lever (94) in direction (X1). The side shift moves to the left.
- Press the lever (94) in direction (Y1). The side shift moves to the right.

- Note the capacity reduces when traversing.



*The side shift has now been moved.*

- On trucks without integrated side shift and HF4 connection, the lever 90 may have a different assignment.

### 4.10.3.1 Operating additional attachments with multiPILOT

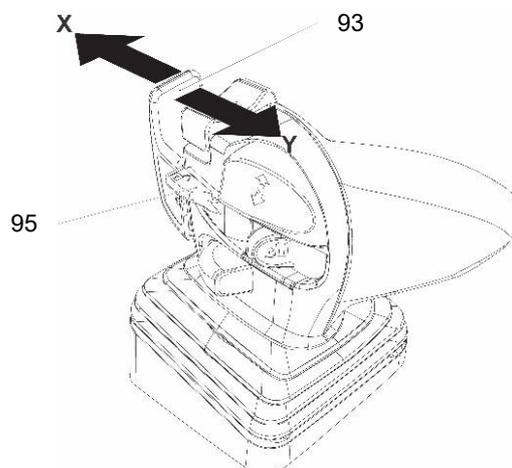
The control lever (93) has functions (X2) and (Y2) to operate hydraulic attachments connected to the terminal HF5 (see manufacturer's operating instructions).

#### **Controlling the auxiliary hydraulic function using the acknowledgement button (O)**

##### *Procedure*

- Press the acknowledgement button (95)
- Within 1.5 seconds, move the lever (93) in direction X or Y

*The attachment performs its function*



## 4.11 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.

---

#### ***Connecting attachments hydraulically***

##### *Requirements*

- Non-pressurised hydraulic hoses.
- The exchange ports on the truck are marked HF4 and HF5.
- Attachment directions of movement defined to match the controls' direction of movement.

##### *Procedure*

- Non-pressurised hydraulic hoses
  - Switch off the truck and wait a few minutes.
- Attach the plug connector and engage it in position.
- Mark the controls with symbols that indicate their function.

*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.

## 4.12 Emergency lowering

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

### **⚠ WARNING!**

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

- ▶ Instruct other people to move out of the hazardous area of the truck during emergency lowering.
- ▶ Never step or stand underneath a raised load handler.
- ▶ Only operate the emergency lowering valve when standing next to the truck.
- ▶ When the load handler is in the racking, emergency lowering is not permitted.
- ▶ Report any defects immediately to your supervisor.
- ▶ Mark defective truck and take out of service.
- ▶ Do not return the industrial truck to service until you have identified and rectified the fault.

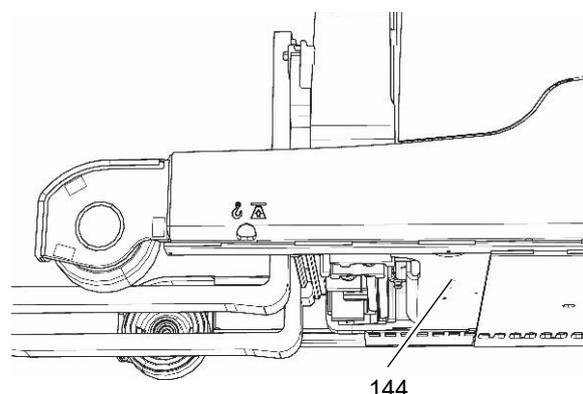
#### **Mast emergency lowering**

##### *Requirements*

- Load handler is not in the rack.
- Turn the Emergency Disconnect switch and key switch off.
- Disconnect the battery.

##### *Procedure*

- Release the emergency lowering valve (144) underneath the truck by max. 1/2 a turn anti-clockwise with the 4 mm Allen screw.
- The mast and load handler will lower slowly. If necessary the lowering speed can be reduced by turning clockwise or the load can be stopped.
- When the load has been lowered, close the emergency lowering valve with a torque of 2,5 Nm.



*The mast is now lowered.*

### **⚠ WARNING!**

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

## 4.13 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*

- Fully lower the load handler and tilt it forward.
- Retract the mast holder fully.
- Switch off the truck. To do this:
  - For a key switch, turn the key in the key switch to the left as far as the stop and remove the key.
  - Keyless access systems (○), see page 135.
- Press the emergency disconnect switch.

*The truck is parked.*

## 5 Troubleshooting

### 5.1 Recovering the truck

- If the truck has to be moved without its own power supply (in the event of a breakdown), the emergency stop device for the drive system must be deactivated as they are applied without power.

#### **⚠ CAUTION!**

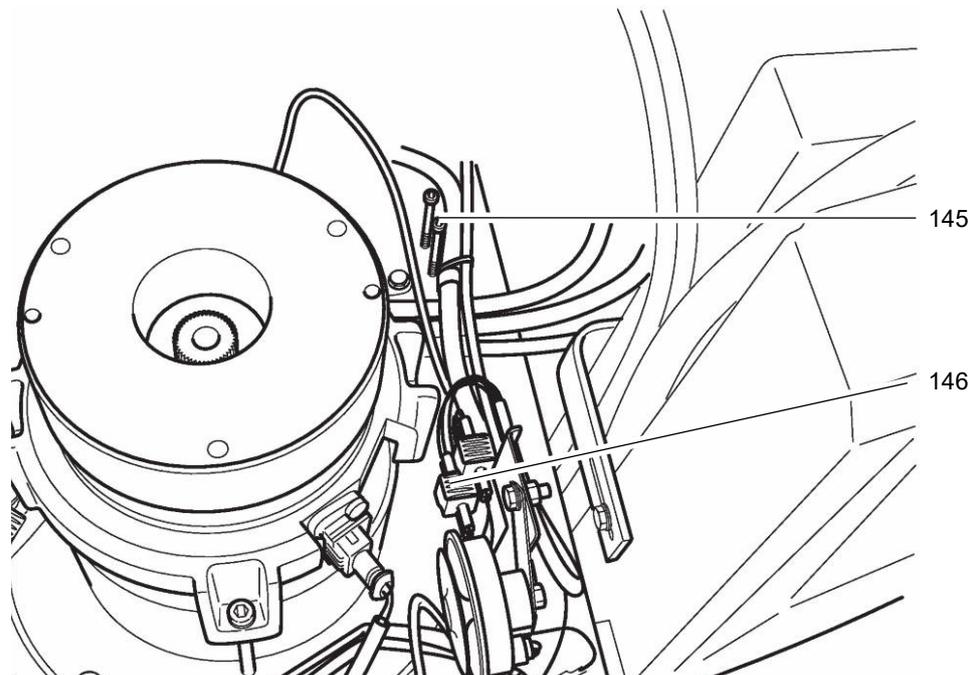
This operation must only be performed by suitably trained maintenance personnel. When the brakes are de-activated the truck must be parked on a level surface, since the brakes are no longer effective.

#### ***Preparing to move the truck without its own drive system***

##### *Procedure*

- Turn the Emergency Disconnect switch and key switch off.
- Disconnect the battery.
- Prevent the truck from rolling away.
- Remove the seat panel, see page 198.

*Truck prepared.*



#### ***Releasing the magnetic brake***

##### *Tools and Material Required*

- Screws (2 x M6) (145)
- Allen key

##### *Procedure*

- Disconnect the two-pin connector (146) from the magnetic brake.
- Remove the screws (2 x M6) (145) from the drive plate and insert them in the magnetic brake holes.

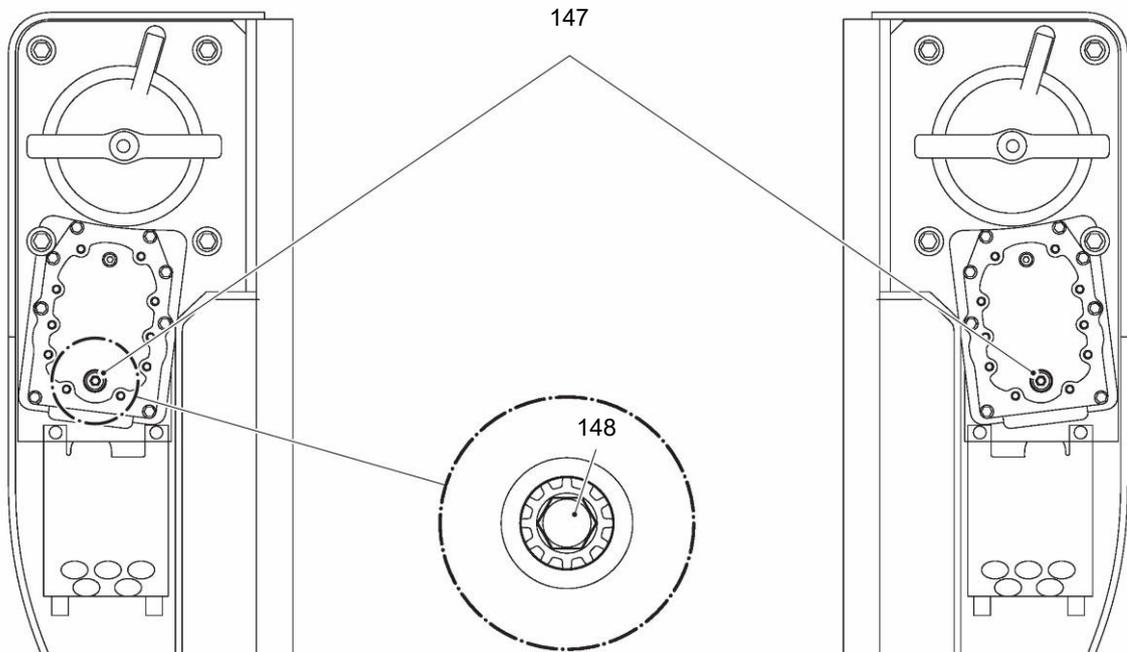
*The magnetic brake is now released.*

## ***Aligning the position of the load wheels***

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

- AF 8 deep socket
- AF 10 deep socket
- AF 10 Allen key

### ***Procedure***



- Remove the cover from the load wheels.
- Remove the screw (147).
- Apply the deep socket to the hex bolt (148) and rotate the load wheel to the desired position.
- Repeat this procedure for the second load wheel.
- Insert bolt (147) and tighten.
- Fit the cover onto the load wheels.

- ➔ The load wheels must be aligned identically.
- ➔ Only adjust the steer wheel position when the truck is stationary.

*The load wheels are aligned.*

## Aligning the drive wheel

### Procedure

- Remove the protective cap over the centre screw.

### **⚠ CAUTION!**

#### **Tensioned tyres can cause accidents**

When steering in the standing position the driving wheel band is under tension. Releasing the Allen key or steering crank can create a correcting moment.

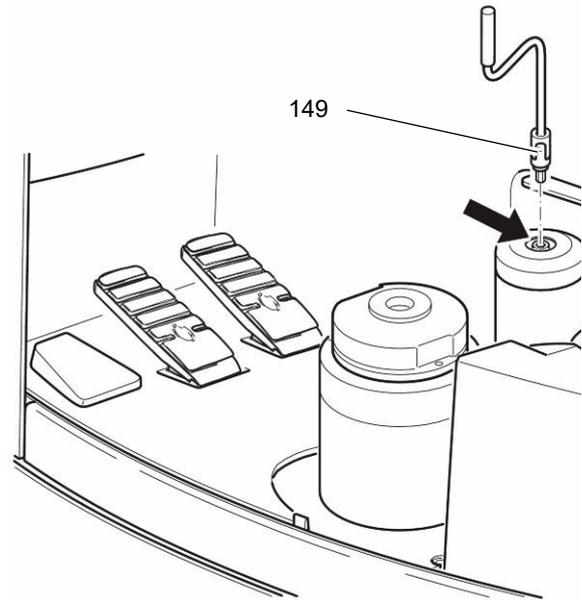
- ▶ Release the Allen key or steering crank carefully.

- ➔ Only adjust the steer wheel position when the truck is stationary.

Place the Allen key or steering crank (149) on the steering transmission and turn the drive wheel to the required steering position.

*The drive wheel is now aligned.*

- ➔ The steering wheel setting can only be adjusted when the truck is stationary.



## ***Towing the truck***

### **⚠ WARNING!**

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

Parking the truck on an incline, without the brakes applied or with a raised load or load handler is dangerous and is strictly prohibited.

- ▶ Park the truck on a level surface. In special cases the truck may need to be secured with wedges.
  - ▶ Fully lower the load handler.
  - ▶ Select a place to park where no other people are at risk of injury from the lowered load handler.
  - ▶ If the brakes are not working, place wedges underneath the wheels of the truck to prevent it from moving.
- 

### **⚠ WARNING!**

#### **Accident risk**

Other people can be injured if the truck is towed incorrectly.

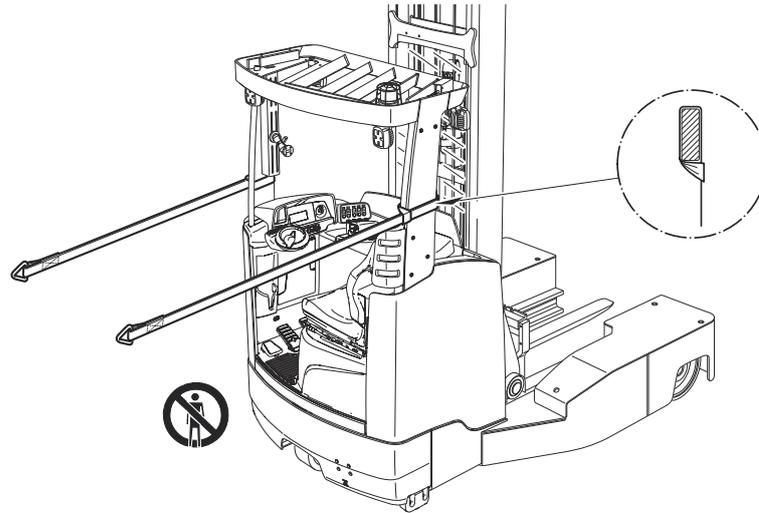
- ▶ Only use vehicles to tow the truck which have sufficient tow and brake forces for the trailer load without its own braking system.
  - ▶ Always tow the truck at walking pace.
  - ▶ Do not park the truck with the parking brake released.
-

### *Tools and Material Required*

- Tow rope, drawbar pull >5 to.

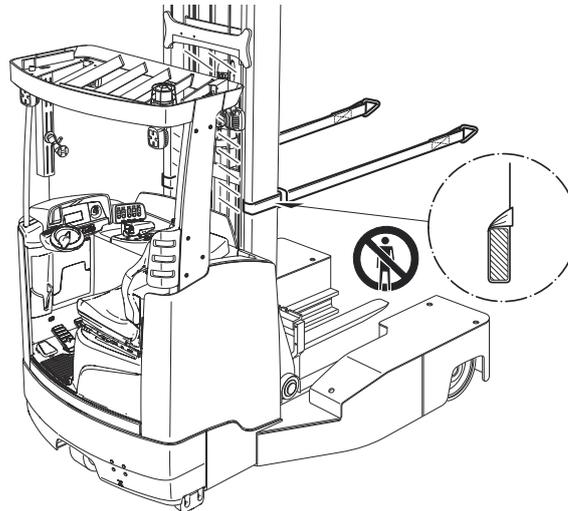
### *Procedure*

•



Guide the tow rope around the entry grab handles on the overhead guard as shown in the diagram to tow the truck in the drive direction.

•



Guide the tow rope around the mast as shown in the diagram to tow the truck in the forks direction.

- Tow the truck carefully and slowly.
- When the truck reaches its destination, restore the braking system to its operating condition.

*The truck has now been towed.*

## ***Activating the magnetic brake***

### *Tools and Material Required*

- Screws 2 x M6
- Allen key

### *Procedure*

- Remove the screws (2 x M6) from their holes in the magnetic brake and insert them in the drive plate.
- Connect the two-pin connector to the magnetic brake.

*Magnetic brake is activated.*

## 5.2 Warning messages

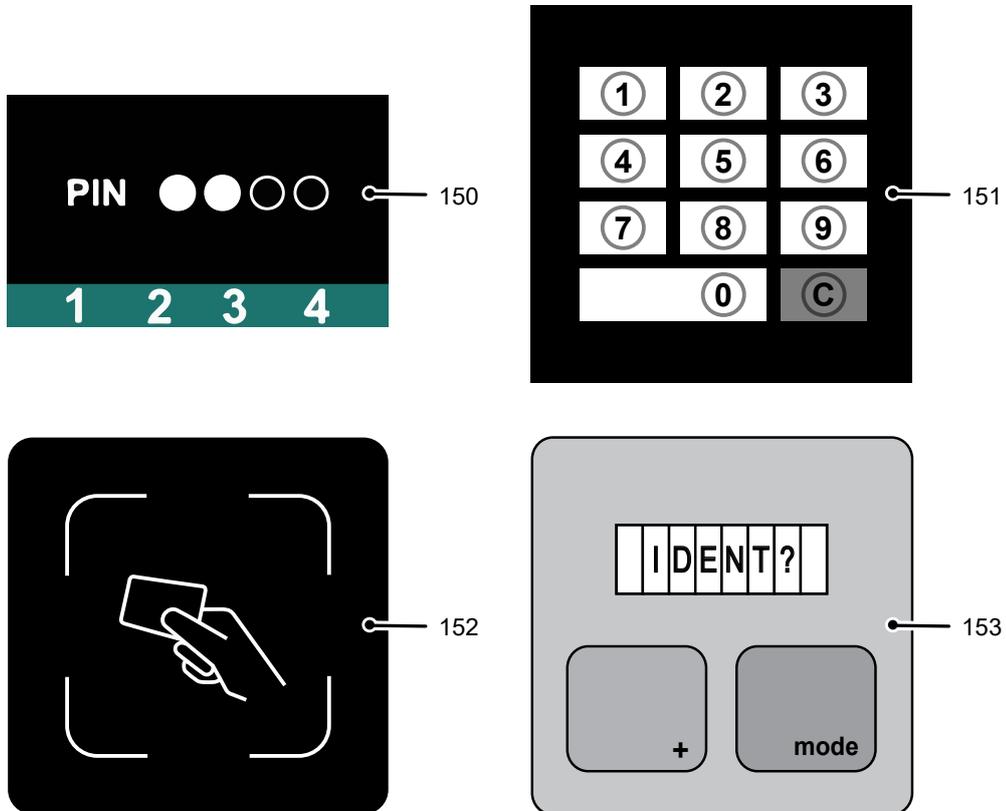
Display	Cause	Action
1901	During system start-up, the accelerator pedal zero position could not be determined.	Do not press the accelerator pedal during system start-up.
1904	Accelerator pedal pressed, but no travel direction selected.	Take your foot off the accelerator pedal, select a travel direction and set off.
1909	Accelerator pedal pressed and parking brake not released via parking brake button.	Release the parking brake by pressing the parking brake button.
1917	Accelerator and brake pedals pressed simultaneously.	Press one pedal at a time only.
2951	PILOT pressed during system start-up. No zero position sensing possible.	Do not apply the multi/soloPILOT during system start-up. <ul style="list-style-type: none"> <li>– Switch the truck off.</li> <li>– Switch the truck on again.</li> <li>– Call the service department if necessary.</li> </ul>
1952	Travel direction switch pressed during system start-up.	Do not press the travel direction switch during system start-up
9961	ISM (option) has detected a shock event in the vertical direction	Obtain acknowledgement from authorised person (warehouse manager) and arrange for the truck to be started up again
9962	ISM (option) has detected a shock event in the horizontal direction	Obtain acknowledgement from authorised person (warehouse manager) and arrange for the truck to be started up again
5990	The electrolyte level sensor check (battery-management option) on the battery has detected a lack of electrolyte	Add electrolyte.
5992	After switching on the truck, no radio network could be established with the battery management	<ul style="list-style-type: none"> <li>– Switch off the truck.</li> <li>– Switch the truck on again.</li> <li>– Check battery management connection.</li> <li>– Call service department.</li> </ul>
5408/ 5409	Lithium-ion battery overtemperature	Stop work.
5413	Lithium-ion battery low temperature	Move truck to warm environment.

→ For all other warning messages switch the truck off and on again. If the warning message appears again call the service department.

## 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
150	Display unit (EasyAccess Softkey): <ul style="list-style-type: none"> <li>– Description see page 139</li> <li>– Entry of 4-digit set-up and access codes</li> <li>– Up to 10 access codes can be stored</li> <li>– For set-up and access codes with the numbers 1 to 4</li> </ul>
151	Keypad (EasyAccess PinCode): <ul style="list-style-type: none"> <li>– Consists of the keys 0 to 9 and C (clear)</li> <li>– Entry of 4-digit set-up and access codes</li> <li>– Up to 100 access codes can be stored</li> </ul>
152	Transponder reader (EasyAccess Transponder): <ul style="list-style-type: none"> <li>– Up to 100 transponders can be saved</li> </ul>
153	ISM Online: <ul style="list-style-type: none"> <li>– For equipment with JH fleet management system – see "JH fleet management systems" operating instructions.</li> </ul>

### 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.

**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

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 99.
- Enter the default code 1-2-3-4 using the keys below the display unit (150).

*The truck is switched on.*

- Press the key below the "Settings" symbol (154).
- Press the key below the "Change set-up code" symbol (155).
- Enter the set-up code 2-4-1-2 using the keypad (151).

*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 (156).

*The set-up code is deleted.*

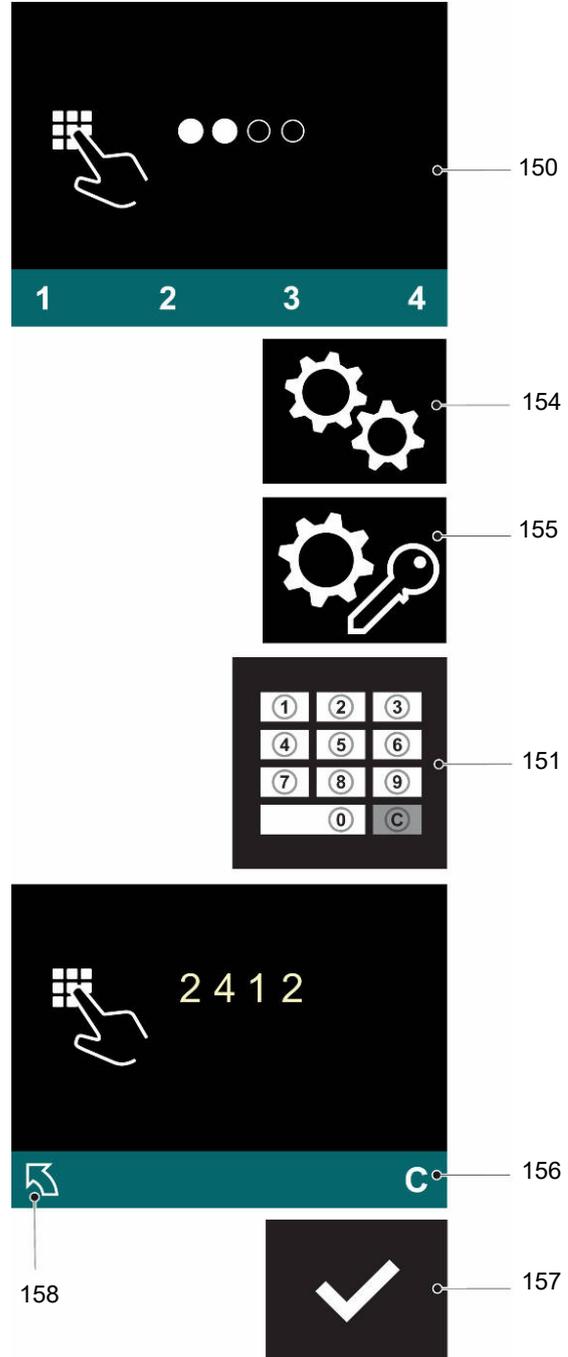
- Enter the new set-up code using the keypad (151).
- Press the key below the "Confirm" symbol (157).

*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 (156).

- To return to the main menu, press the key below the "Back" symbol (158).
- Delete the default code, see page 142.
- Create access codes, see page 141.

*The keypad is active.*



## 6.3.2 Activating the transponder reader

### Procedure

- Release the emergency disconnect switch, see page 99.
- Enter the default code 1-2-3-4 using the keys below the display unit (150).

*The truck is switched on.*

- Press the key below the "Settings" symbol (154).
- Press the key below the "Change set-up code" symbol (155).
- Enter the set-up code 2-4-1-2 using the keys below the display unit (150).

*The set-up code entered is displayed.*

- Press the key below the "Delete" symbol (156).

*The set-up code is deleted.*

- Hold a transponder in front of the transponder reader (152).

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

- Press the key below the "Confirm" symbol (157).

*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 (156).*

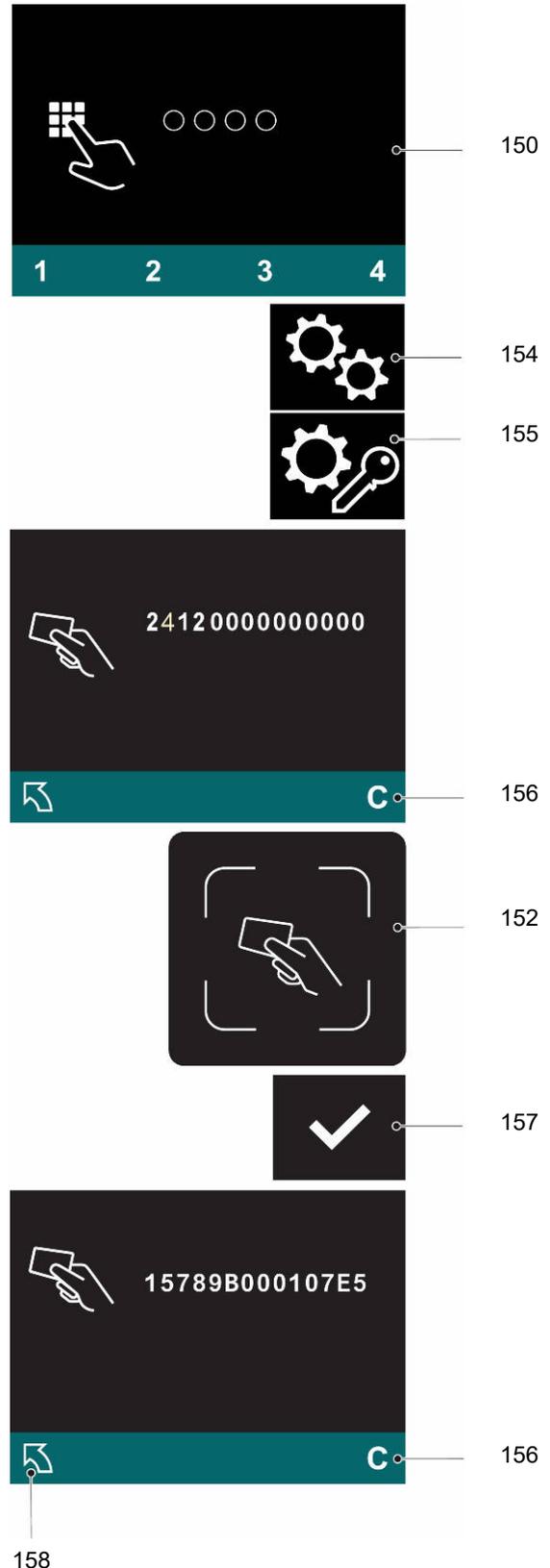
- To return to the main menu, press the key below the "Back" symbol (158).

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

Delete the default code, see page 142.

- Add new transponders, see page 141.

*The transponder reader is now active.*



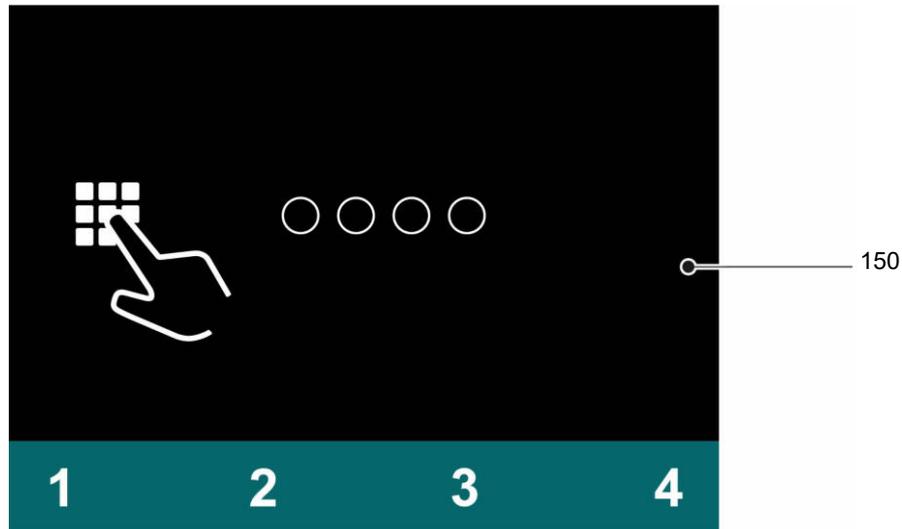
## 6.4 Using the Display:

### 6.4.1 Switching on the truck with an access code

#### Procedure

- Release the emergency disconnect switch, see page 99.
- Enter the access code with the buttons below the display (150).

*The truck is switched on.*

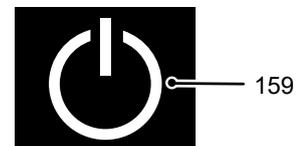


### 6.4.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (159) in the display unit.
- Press the Emergency Disconnect switch, see page 99.

*The truck is switched off.*



### 6.4.3 Changing the set-up code

#### Requirements

- The truck is switched on, see page 139.

#### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Change set-up code" symbol (155).
- Enter the set-up code using the keys below the display unit (150).

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

- Press the key below the "Delete" symbol (156).

*The set-up code is deleted.*

- Enter the new set-up code using the keys below the display unit (150).

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

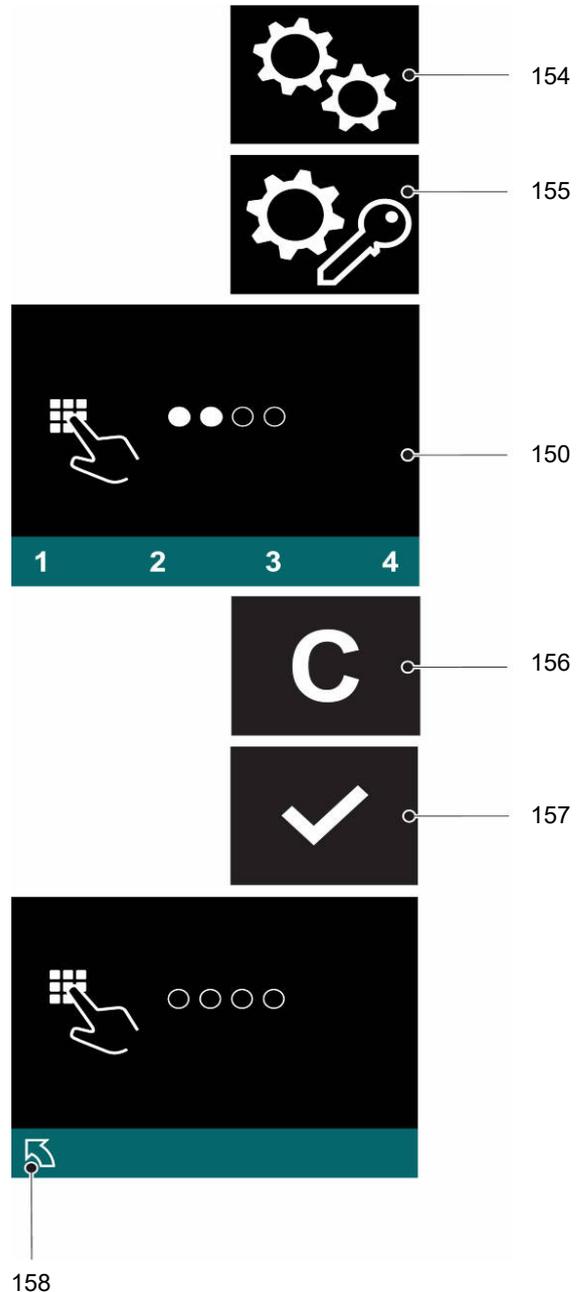
- Press the key below the "Confirm" symbol (157).

*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 (158).

*The set-up code has been changed.*



## 6.4.4 Adding a new access code

### Requirements

- The truck is switched on, see page 139.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Edit access code" symbol (160).

*The set-up code is requested.*

- Enter the set-up code using the keys below the display unit (150).

*All the access codes are displayed.*

- Press the key below the "Add" symbol (161).
- Enter the new access code using the keys below the display unit (150).

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

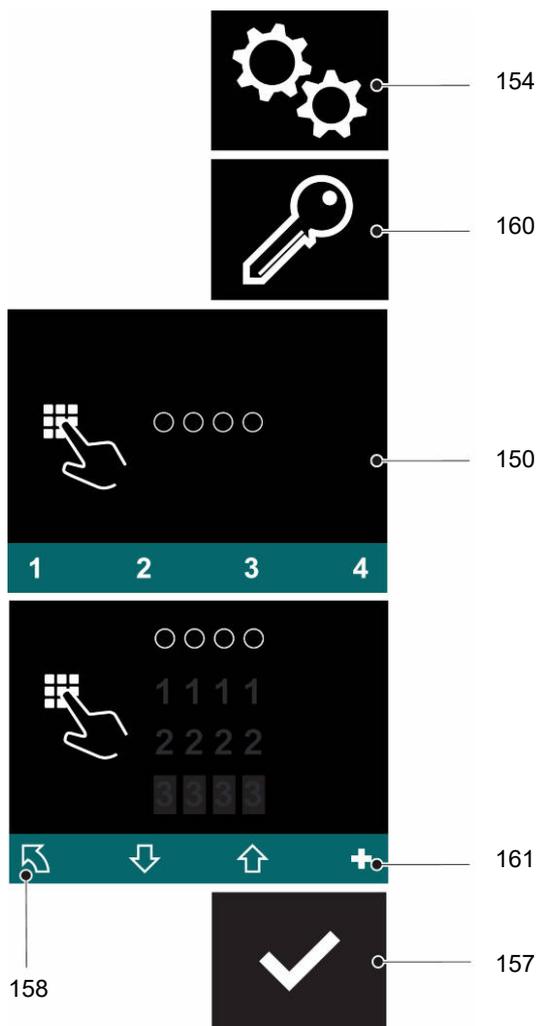
- Press the key below the "Confirm" symbol (157).

*The new access code is displayed.*

→ If the new access code has been entered incorrectly, delete it, see page 142, and add an access code again.

To return to the main menu, press the key below the "Back" symbol (158).

*A new access code has been added.*



## 6.4.5 Deleting an access code

### Requirements

- The truck is switched on, see page 139.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Edit access code" symbol (160).

*The set-up code is requested.*

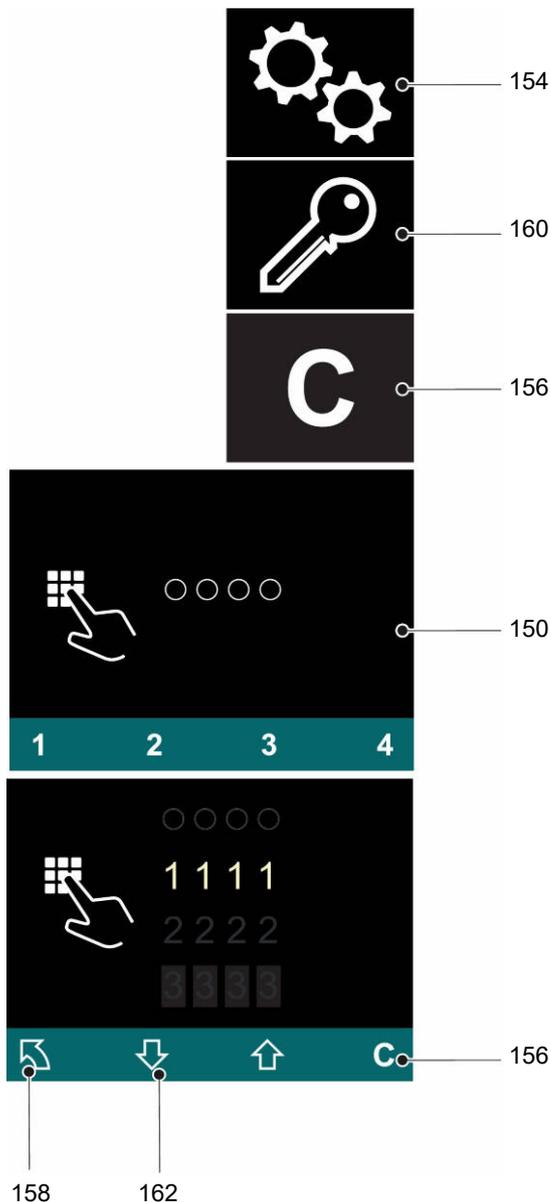
- Enter the set-up code using the keys below the display unit (150).

*All the access codes are displayed.*

- Select the access code to be deleted using the key below the "Down selection" symbol (162).
- Press the key below the "Delete" symbol (156).

*The access code has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (158).



## 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 139.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Log-in process" symbol (163).
- Enter the set-up code using the keys below the display unit (150).

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

- To scroll forward, press the button under the "Down selection" symbol (162) as many times as necessary.

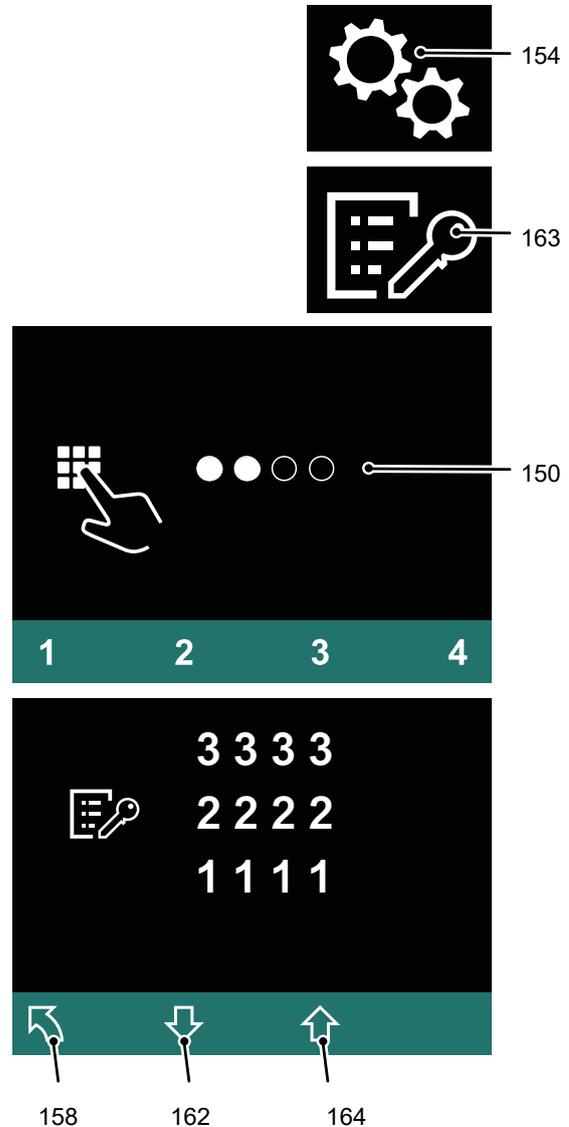
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (164) 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 (158).

*The log-in process is displayed.*



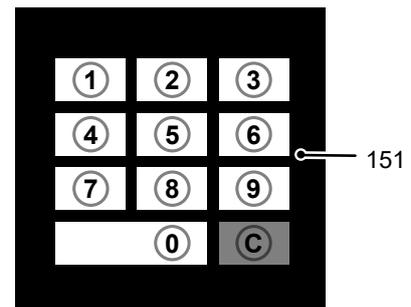
## 6.5 Using the Keypad

### 6.5.1 Switching on the truck with an access code

#### Procedure

- Release the emergency disconnect switch, see page 99.
- Enter the access code with the keypad (151).

*The truck is switched on.*

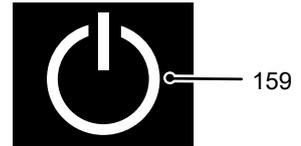


## 6.5.2 Switching off the truck

### *Procedure*

- Press the key under the "Switch off" symbol (159) in the display unit.
- Press the Emergency Disconnect switch, see page 99.

*The truck is switched off.*



### 6.5.3 Changing the set-up code

#### Requirements

- The truck is switched on, see page 143.

#### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Change set-up code" symbol (155).
- Enter the set-up code using the keypad (151).

*The set-up code entered is shown in the display unit (150) as filled-in circles.*

- Press the key below the "Delete" symbol (156).

*The set-up code is deleted.*

- Enter the new set-up code using the keypad (151).

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

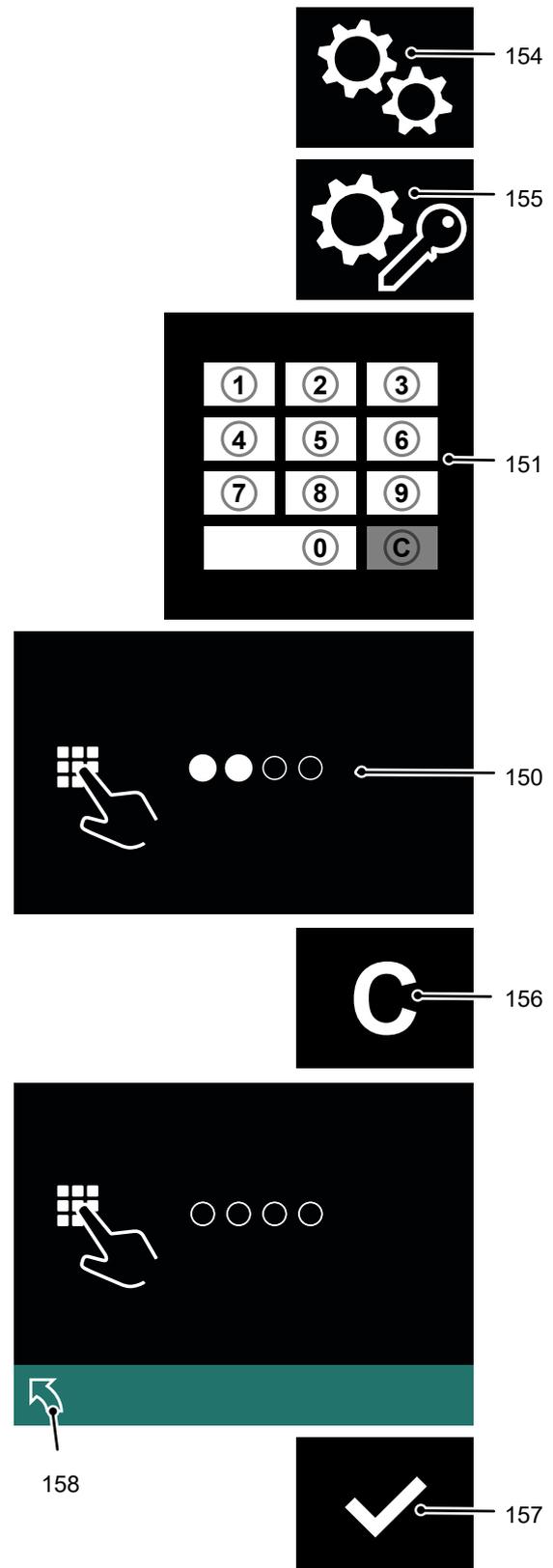
- Press the key below the "Confirm" symbol (157).

*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 (158).

*The set-up code has been changed.*



## 6.5.4 Adding a new access code

### Requirements

- The truck is switched on, see page 143.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Edit access code" symbol (160).

*The set-up code is requested.*

- Enter the set-up code using the keypad (151).

*All access codes are shown on the display unit (150).*

- Press the key below the "Add" symbol (161).
- Enter a new access code using the keypad (151).

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

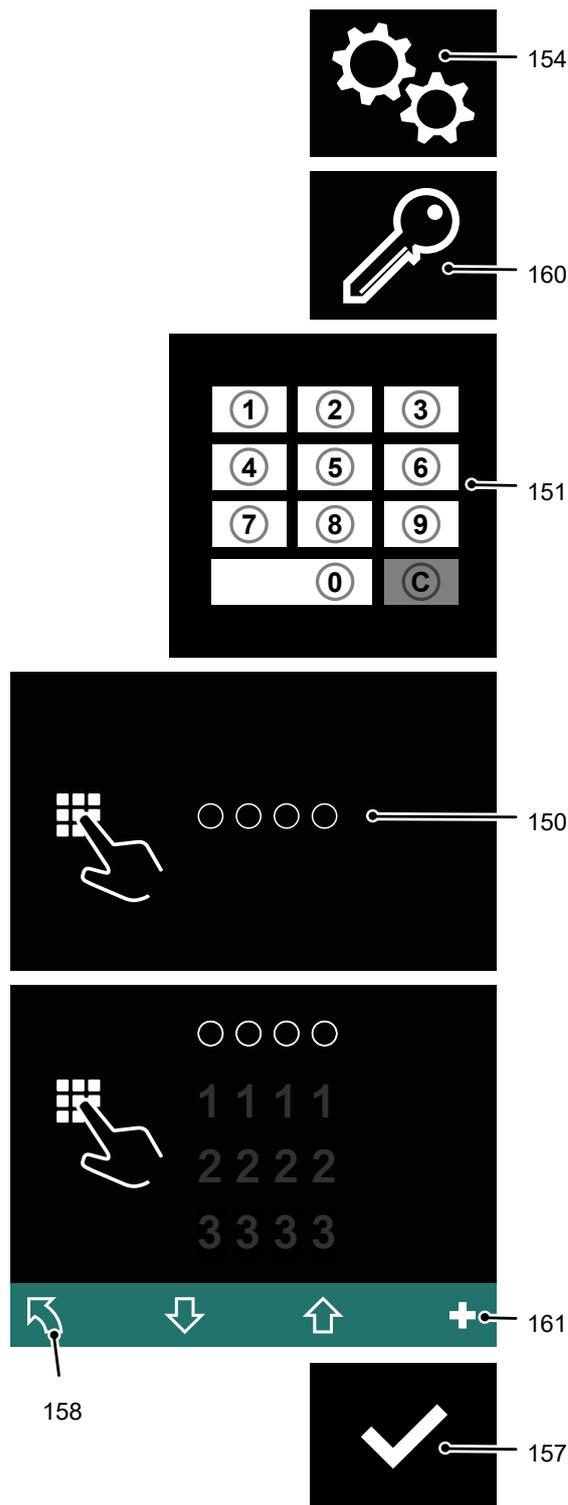
- Press the key below the "Confirm" symbol (157).

*The new access code is shown on the display unit (150).*

→ If the new access code has been entered incorrectly, delete it, see page 147, and enter the correct access code.

To return to the main menu, press the key below the "Back" symbol (158).

*A new access code has been added.*



## 6.5.5 Deleting an access code

### Requirements

- The truck is switched on, see page 143.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Edit access code" symbol (160).

*The set-up code is requested.*

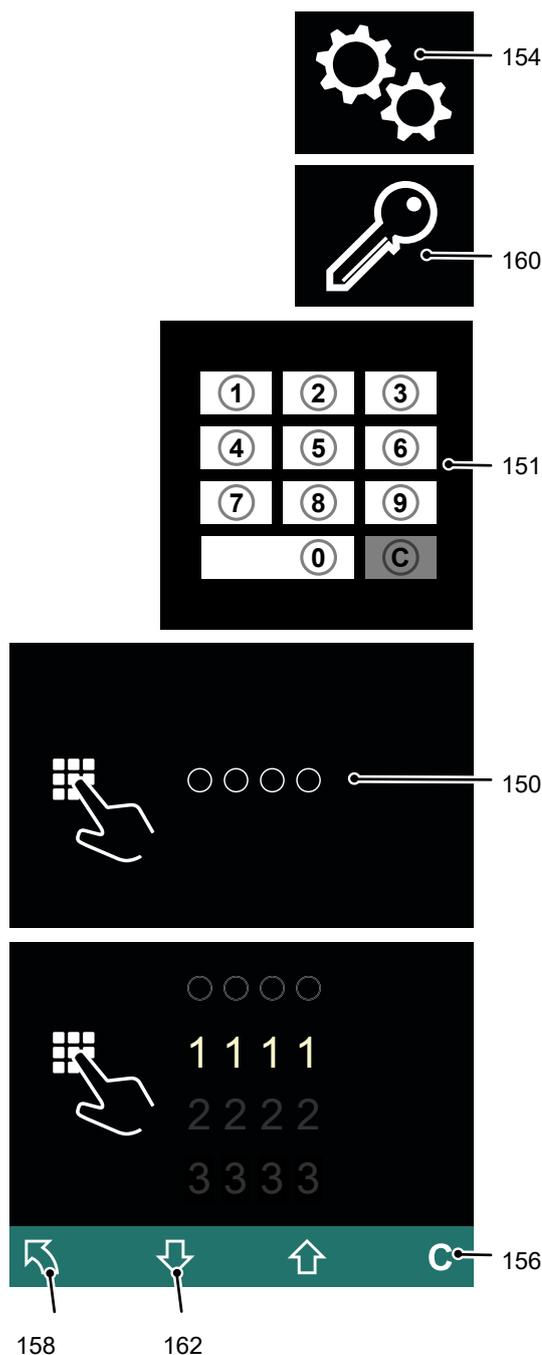
- Enter the set-up code using the keypad (151).

*All access codes are shown on the display unit (150).*

- Select the access code to be deleted using the key below the "Down selection" symbol (162).
- Press the key below the "Delete" symbol (156).

*The access code has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (158).



## 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 143.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Log-in process" symbol (163).
- Enter the set-up code using the keypad (151).

*The set-up code entered is shown in the display unit (150) as filled-in circles.*

- To scroll forward, press the button under the "Down selection" symbol (162) as many times as necessary.

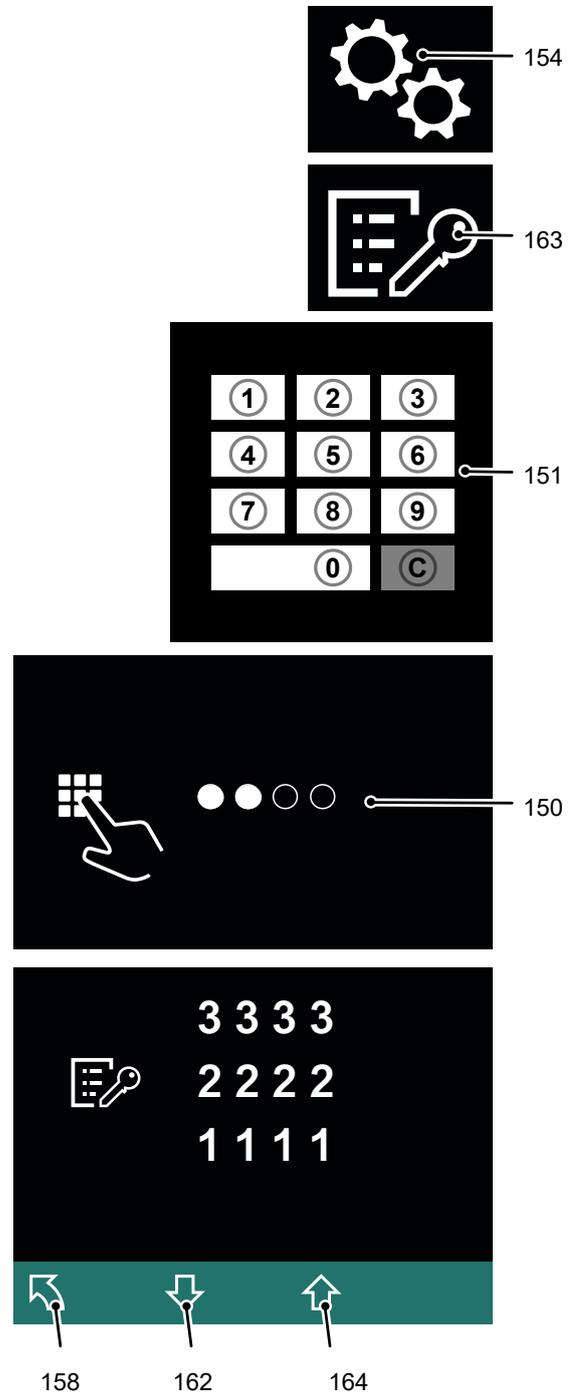
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (164) 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 (158).

*The log-in process is displayed.*



## 6.6 Operating the 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

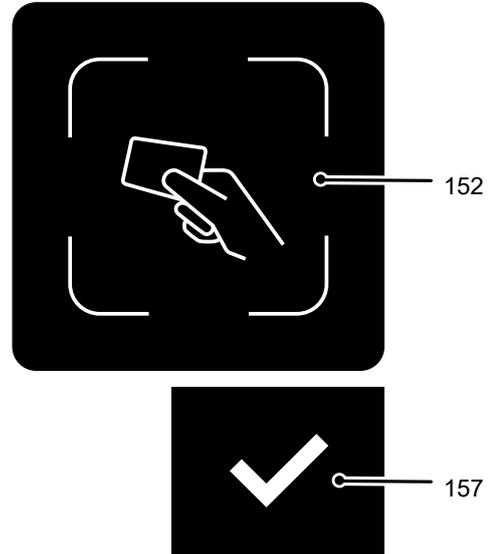
#### Procedure

- Release the Emergency Disconnect switch, see page 99.
- Hold the transponder in front of the transponder reader (152).

*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 (157).

*The truck is switched on.*

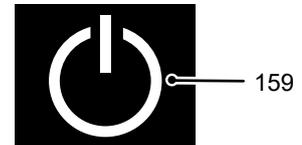


### 6.6.2 Switching off the truck

#### Procedure

- Press the key under the "Switch off" symbol (159) in the display unit.
- Press the Emergency Disconnect switch, see page 99.

*The truck is switched off.*



### 6.6.3 Changing the set-up transponder

#### Requirements

- The truck is switched on, see page 149.

#### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Change set-up code" symbol (155).
- Place the set-up transponder on the transponder reader (152).

*The code of the set-up transponder is shown on the display unit (150).*

- Press the key below the "Delete" symbol (156).

*A dashed line is shown.*

- Place the new set-up transponder on the transponder reader (152).

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

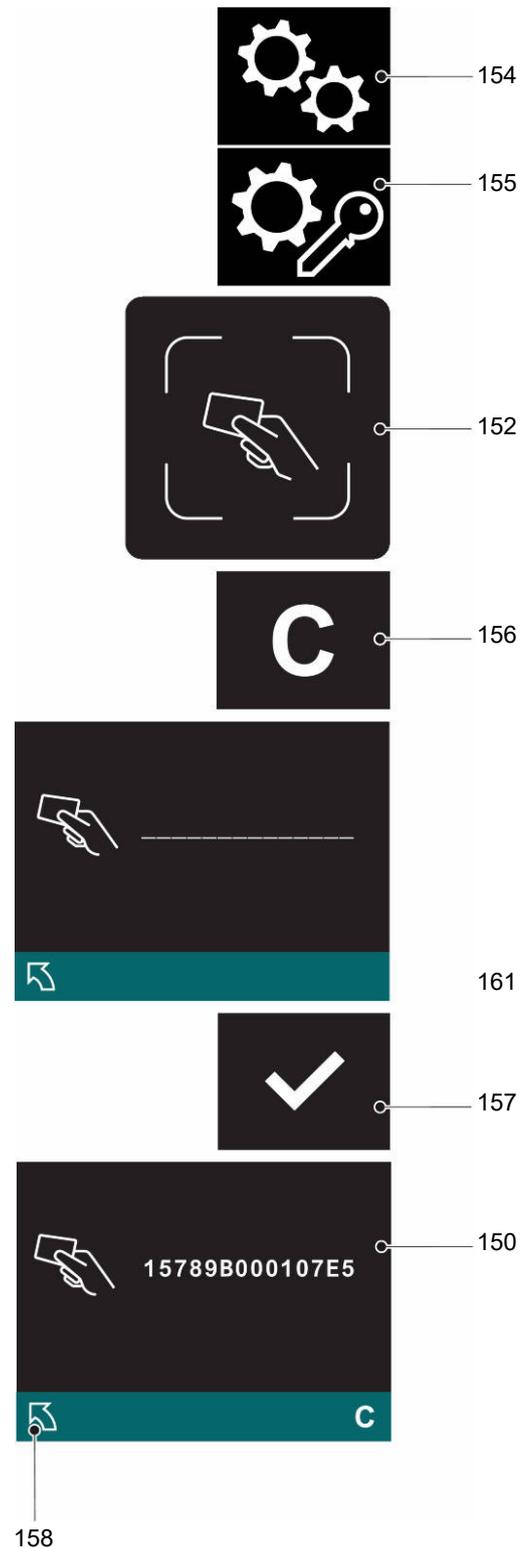
- Press the key below the "Confirm" symbol (157).

*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 (156).

To return to the main menu, press the key below the "Back" symbol (158).

*The set-up transponder has been changed.*



## 6.6.4 Adding a new transponder

### Requirements

- The truck is switched on, see page 149.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Edit transponder" symbol (160).

*The set-up transponder is requested.*

- Place the set-up transponder on the transponder reader (152).

*All transponder codes are shown on the display unit (150).*

- Press the key below the "Add" symbol (161).
- Place the new transponder on the transponder reader (152).

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

- Press the key below the "Confirm" symbol (157).

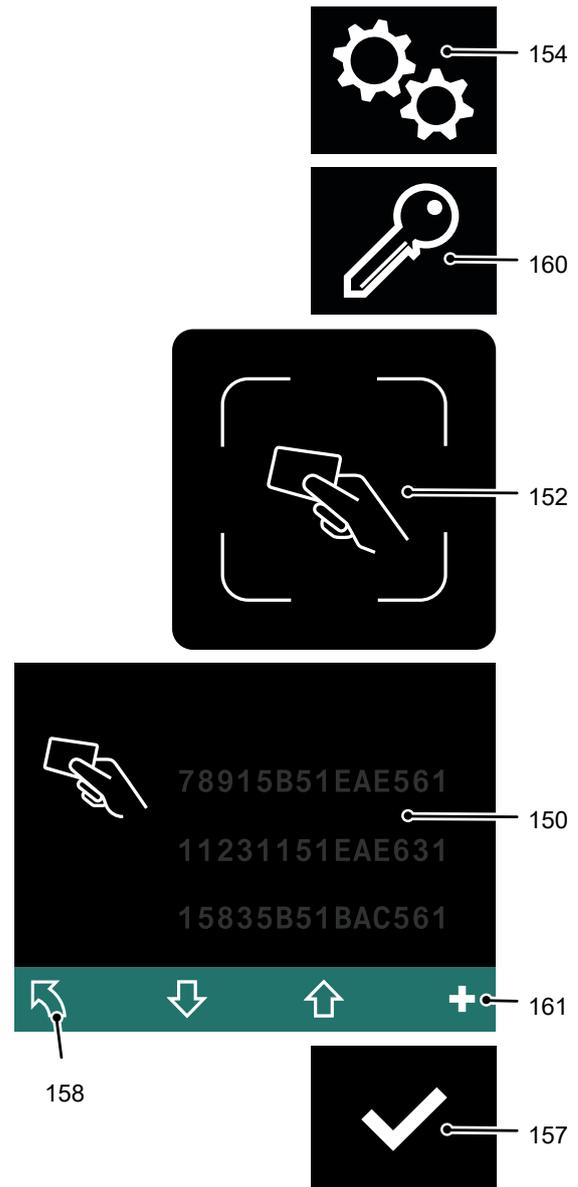
*The new transponder code is displayed.*

→ If the wrong transponder has been used, delete it, see page 152, and add a correct transponder.

To return to the main menu, press the key below the "Back" symbol (158).

*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 149.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Edit transponder" symbol (160).

*The set-up transponder is requested.*

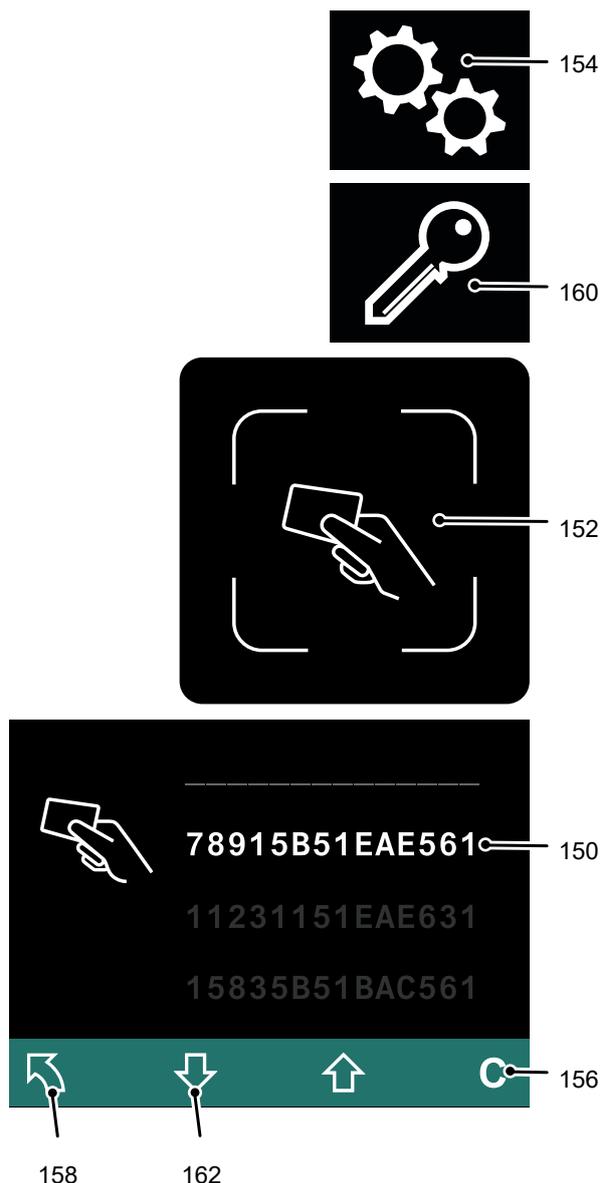
- Place the set-up transponder on the transponder reader (152).

*All transponder codes are shown on the display unit (150).*

- Select the transponder code to be deleted using the key below the "Down selection" symbol (162).
- Press the key below the "Delete" symbol (156).

*The transponder has been deleted.*

- To return to the main menu, press the key below the "Back" symbol (158).



## 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 149.

### Procedure

- Press the key below the "Settings" symbol (154).
- Press the key below the "Log-in process" symbol (163).
- Place the set-up transponder on the transponder reader (152).
- To scroll forward, press the button under the "Down selection" symbol (162) as many times as necessary.

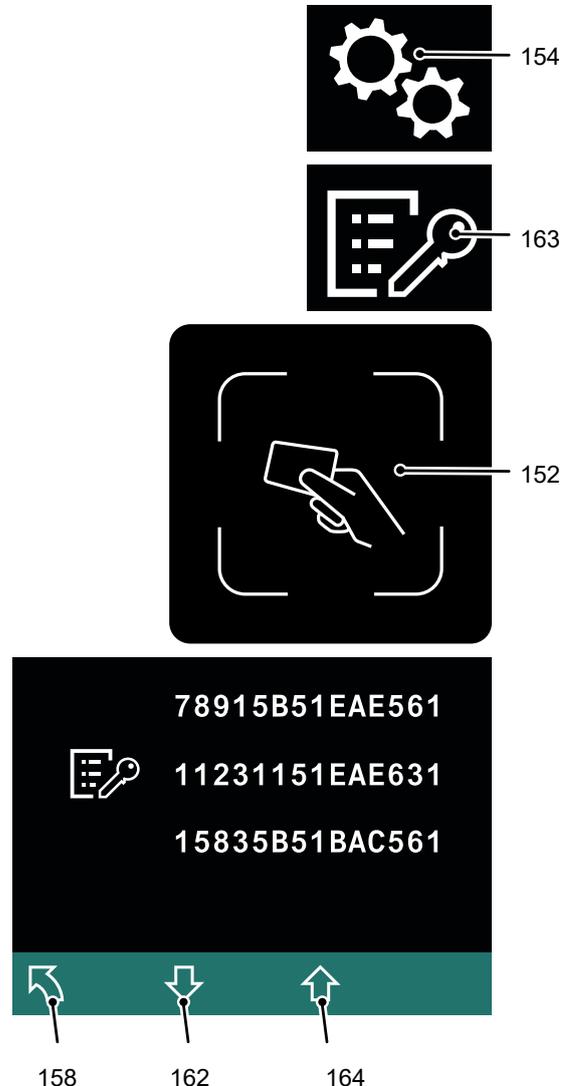
*The display area moves: Additional earlier log-ins are displayed.*

- To scroll back, press the button under the "Up selection" symbol (164) 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 (158).

*The log-in process is displayed.*



## 6.7 Assistance systems

The assistance system must be used, operated and maintained in accordance with these operating instructions. Any other type of use is beyond the scope of application and can result in accidents and personal injury as well as damage to forklift trucks or property.

The Jungheinrich assistance system supports the operator, but does not release him from his responsibility:

When using the assistance system, responsibility for the safe operation of the truck lies with the operator. The operator must also be familiar with the system amenities, as well as potential hazards in the event of a failure. The operator remains obligated to monitor the environment and control the truck 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.

#### 6.7.1 accessCONTROL

The truck is only released after switch-on via the key switch (transponder ○ / keypad ○) if the activation sequence is observed:

1. The operator is occupying the seat.
2. The seat belt is fastened.
3. The deadman switch is actuated.

→ 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 system	Yellow	Seat belt lock not engaged
		Red	Wrong activation sequence of seat switch, seat belt lock and deadman switch

## **⚠ WARNING!**

### **Risk of accidents due to malfunctions or overfamiliarity when operating the forklift truck**

Faults or malfunctions of the truck or the assistance system can result in the assistance system or other functions no longer being performed correctly. Operating the forklift truck with a poor view of the operating and working area or a lack of attention due to overfamiliarity can lead to dangerous situations, collisions with persons and objects or injuries.

- ▶ Check the condition and function of the assistance system when switching on the truck.
  - ▶ Trucks with a faulty or malfunctioning assistance system must no longer be operated within the overall system. Contact the manufacturer's customer service department.
  - ▶ Increased attention is required during travel and hydraulic operations in order to avoid collisions.
  - ▶ When operating the forklift truck, check the visible operating and work area even if the assistance system is functioning correctly to avoid lack of attention caused by overfamiliarity.
  - ▶ Adjust your travel speed and load handling according to the visibility conditions.
- 

#### **6.7.2 driveCONTROL (○)**

The driveCONTROL option activates slow travel automatically after the transition from free lift to mast lift. This limits both the maximum travel speed and the acceleration.

- ☞ The reduced travel speed can be set within a range of 0,4 m/s to 1,9 m/s.

#### **6.7.3 liftCONTROL**

The liftCONTROL option maximises the speeds for the mast traverse function depending on the lift height and the load weight.

#### **6.7.4 ISM access module (○)**

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

#### **6.7.5 Warehouse Control System**

The Warehouse Control System option acts as an interface to the WMS (Warehouse Management System)

- Order entry via WMS
- Querying the status of an order
- Querying truck statuses

## 6.7.6 reachCONTROL

### **WARNING!**

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

In the case of incorrect use of the reachCONTROL option, an increased risk of tipover exists since attachments can reduce the operational stability of the truck – see page 40. 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.

- ▶ The reachCONTROL option must only be used up to a fork length of max. 1300 mm.
  - ▶ No front-mounted attachments must be used with the reachCONTROL option (HF5).
- 

The reachCONTROL option maximises the speeds for the mast traverse function depending on the lift height and the load weight – see page 111.

-  The reachCONTROL option is only permitted for trucks with a fork length of up to 1300 mm.

## 6.7.7 positionCONTROL (○)

-  If the truck is equipped with positionCONTROL, refer to the "Rack Height Select" operating instructions.

## 6.7.8 operationCONTROL

Operation Control is an assistance system. It maps the truck's capacity plates and informs the operator when the truck's capacity limit has been reached.

### **⚠ CAUTION!**

Operation Control is an assistance system that only works within tolerance levels. The capacity plate data is always binding for the operator.

---

### **Operation**

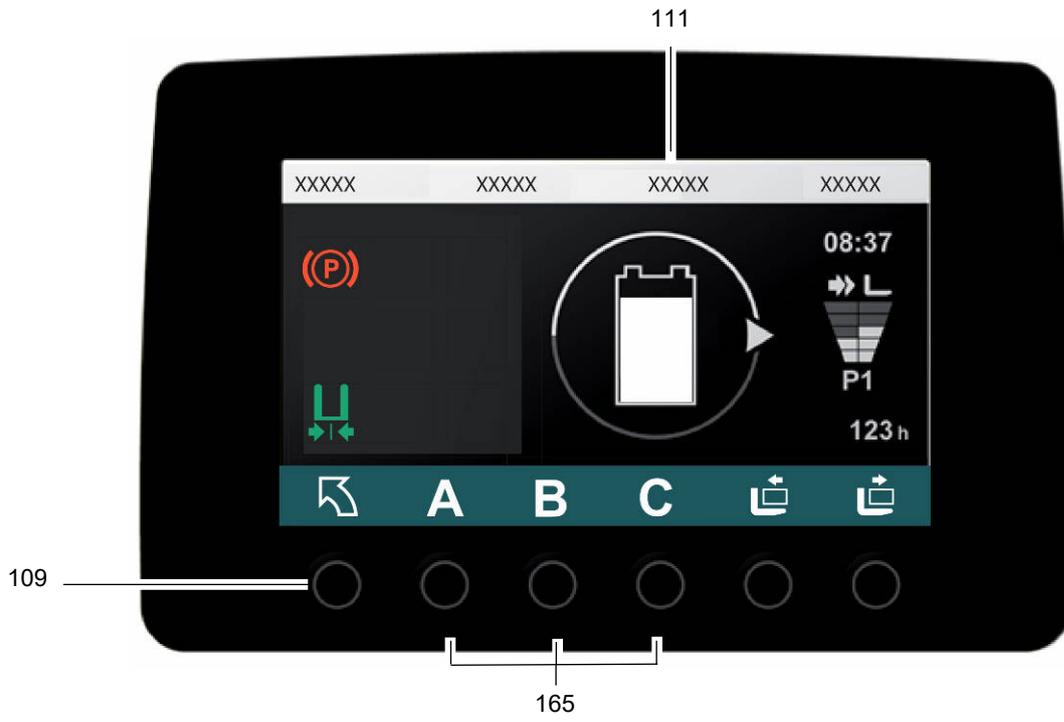
During lifting, when the load comes within less than 1000 mm of the maximum lift height indicated on the capacity plate, the "tip limit reached" symbol (167) flashes on the display and an audible signal sounds. As the load continues towards the maximum lift height, the interval of the audible signal reduces and the "tip limit reached" symbol (167) flashes more rapidly.

The load centre selected appears on the "load centre" display (111). Each capacity plate covers different load centres. Up to 3 load charts may be attached to the truck at the factory, e.g. basic truck capacity, attachment capacity and min./max. capacity when using telescopic forks. The load charts are marked with corresponding letters (165).

→ Loads with a weight < 100 kg cannot be reliably detected by the system.

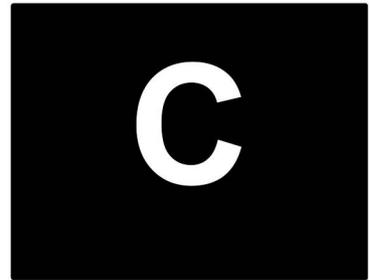
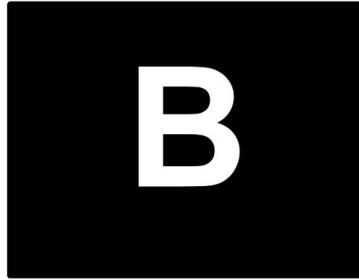
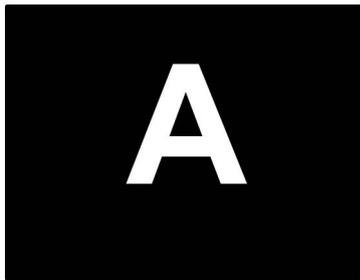
The load centre is moved in the load direction or the drive direction using the softkeys listed here.

	Operation Control menu	Switches to the Operation Control menu
	Operation Control Load direction	Moves the load centre in the load direction
	Operation Control Drive direction	Moves the load centre in the drive direction

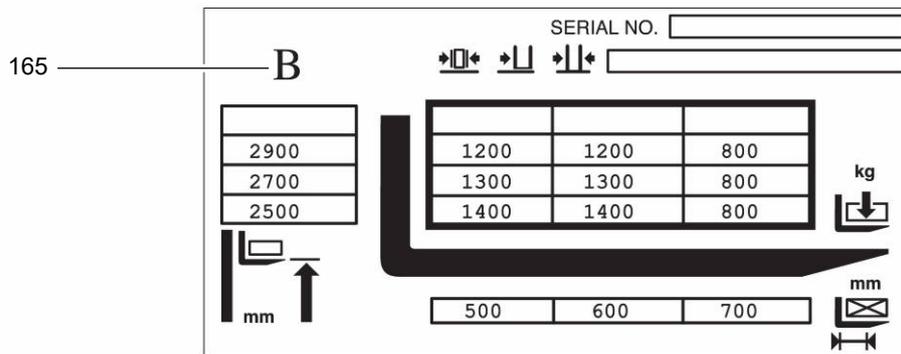
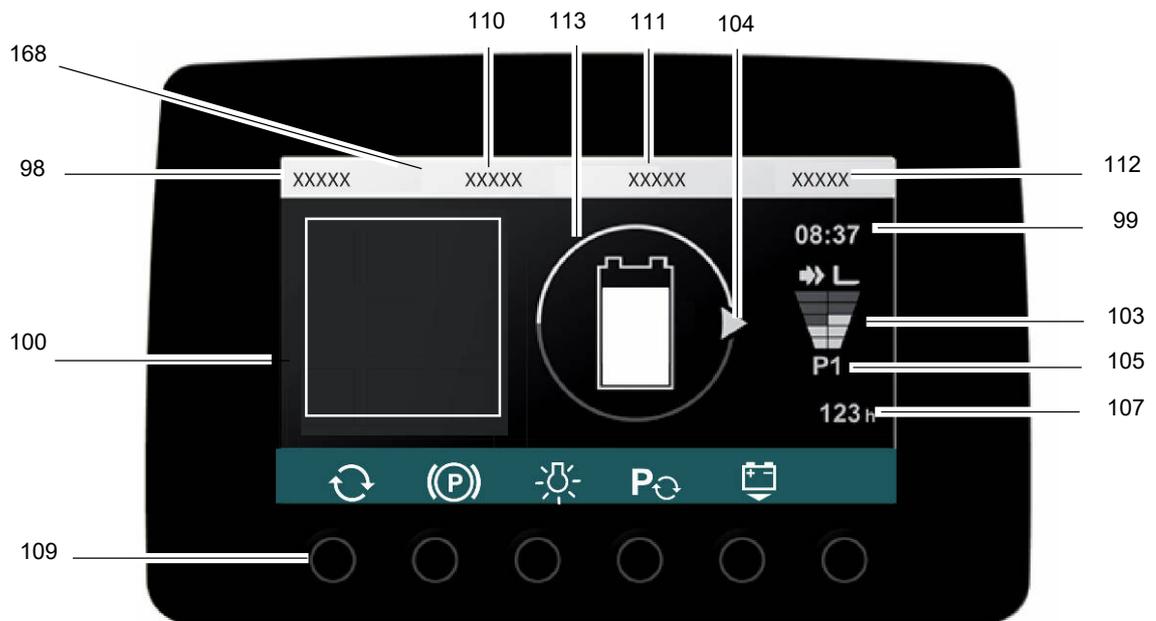




167



165



## Setting the load centre

### DANGER!

#### **An incorrectly set load centre poses a risk of tipover**

If the load centre is set too low, the warning will not sound in time. This may endanger the operational stability of the truck, causing it to tip over.

► Set the correct load centre.

---

#### *Procedure*

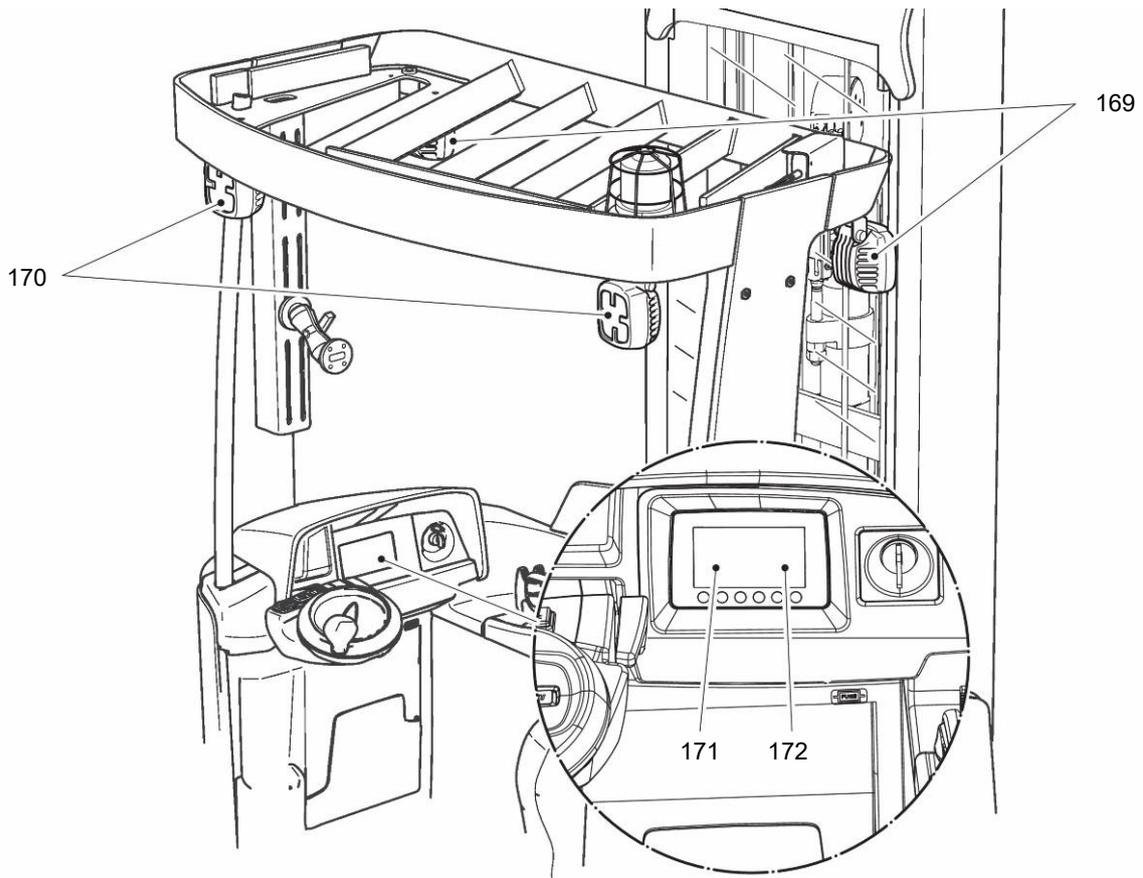
- Record the letters of the capacity plate according to the attachment.
- Select the load centre that is relevant to the current stacking operation. To do this:
  - Press the program key (109).
  - Press the Operation Control menu (166).
  - Press program button A, B or C (165).
- The load centre selected appears in the "load centre" display (111).

*The load centre is set.*

#### **Troubleshooting**

Failure of the lift height sensor or the pressure sensor and calculation inconsistencies can cause the Operation Control assistance system to fail. If the Operation Control assistance system fails, the load distance symbol and "-----" are shown instead of the load centre on the driver's display. An event message is displayed.

## 6.8 Work lights



Item	Description
169	Load direction work lights
170	Drive direction work lights
171	Work lights ON/OFF button for item 170
172	Work lights ON/OFF button for item 169

- ➔ The work lights are fitted with a pivot that can swivel in all directions.
- ➔ As an option, the work lights can be controlled as a function of the travel direction.

### **Switching the work lights on and off**

#### *Procedure*

- Press the work light button (172, 171).

*The work lights are switched on / off.*

## 6.9 Camera system

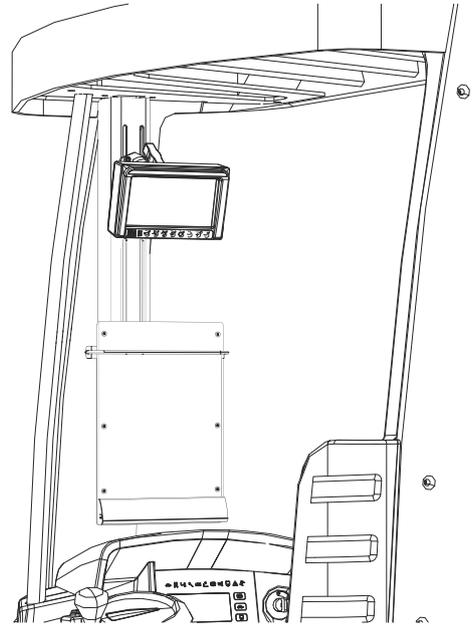
### ⚠ CAUTION!

#### 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.

The fork camera is attached to the inside of the right fork. The camera image is displayed via a monitor fitted to the overhead guard. If a fork positioner is attached, the camera system will be equipped with a wide angle camera.

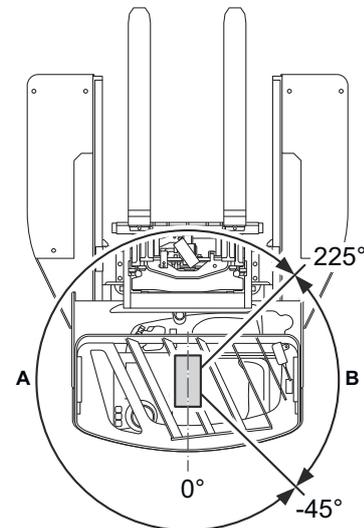
The reverse travel camera is attached to the overhead guard.



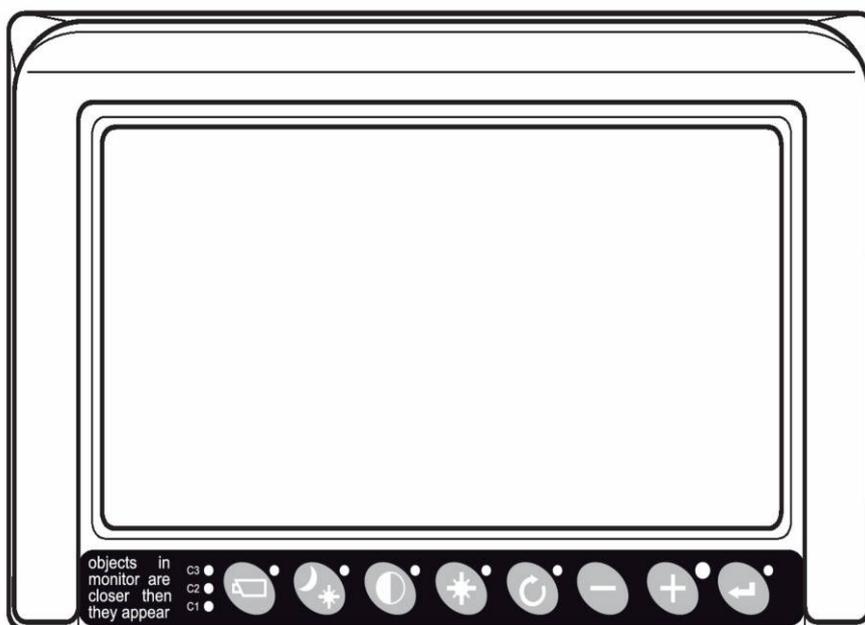
If only the reverse travel camera is present, the image will be permanently displayed on the monitor.

When equipped with a fork and reverse travel camera, the corresponding image will be displayed on the monitor in the free lift area according to the travel program.

- Transverse travel, steer wheel side: fork camera
- Transverse travel, seat side: reverse travel camera
- Circular travel in clockwise direction: reverse travel camera
- Circular travel in anti-clockwise direction: reverse travel camera
- Parallel travel/normal travel/modified normal travel (depending on steer angle of drive wheel):
  - Drive wheel steer angle, area A: fork camera
  - Drive wheel steer angle, area B: reverse travel camera



You can switch between cameras at any time by pressing the button on the monitor.



Item		Component	Function
173		Camera selection	Selects a camera manually. The LED next to the key indicates that camera selection is activated. Press the key again to switch the camera display.
174		Day/night setting	Press the key to change between ABC mode, day and night setting.
175		Contrast	Press the key to activate the setting module. The desired contrast can be set with the plus and minus keys.
176		Brightness	Press the key to activate the setting module. The desired brightness can be set with the plus and minus keys.
175+ 176		Saturation	Press the contrast and brightness keys simultaneously to activate the setting mode. The saturation can be set with the plus and minus keys.
177		Previous menu	When you press the key the monitor shows the previous menu item.
178		Minus	Press the key to change to the next menu item or to move left in the selection.
179		Plus	Press the key to change to the previous menu item or to move right in the selection.
180		Enter	When you press the key the system switches to standby or the option selected in the menu is activated.

## 6.9.1 Service Menu

### ***Opening the service menu***

#### *Procedure*

- Press the (173), (178), (179) keys simultaneously.

## 6.9.2 Camera settings

### ***Opens the camera settings***

#### *Requirements*

- The service panel is open.

#### *Procedure*

- Open the camera settings with the (173) key.
- Select the camera settings with the (178) and (179) keys.
- Confirm with the (180) key.
- Select the digit to be changed with the (178) and (179) keys.
- Switch digit or change the digit with the (180) key. If necessary set the desired digit with the (178) and (179) keys.

## 6.9.3 System settings

### ***Opens the system settings***

#### *Requirements*

- The service panel is open.

#### *Procedure*

- Select the system settings with the (178) and (179) keys.
- Confirm with the (180) key.

## 6.9.4 Keypad block

### ***Deactivates the keypad***

#### *Requirements*

- System settings are open.

#### *Procedure*

- Select the keypad with the (178) and (179) keys and confirm with (180).
- Select the keypad block with the (178) and (179) keys and confirm with (180).
- In the settings menu select the required keypad block.

## 6.9.5 User menu

### ***Opens the user menu***

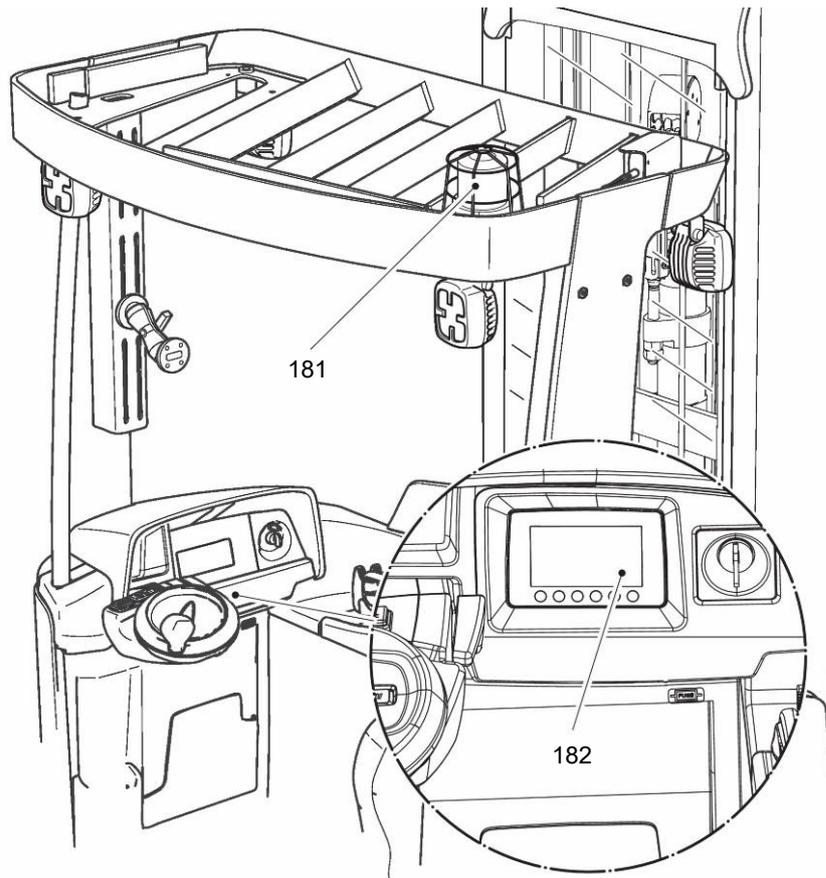
#### *Requirements*

- The keypad block is deactivated.

#### *Procedure*

- Press the (178) and (179) keys simultaneously.

## 6.10 Beacon



Item	Description
181	Warning beacon
182	Warning-beacon switch ON/OFF

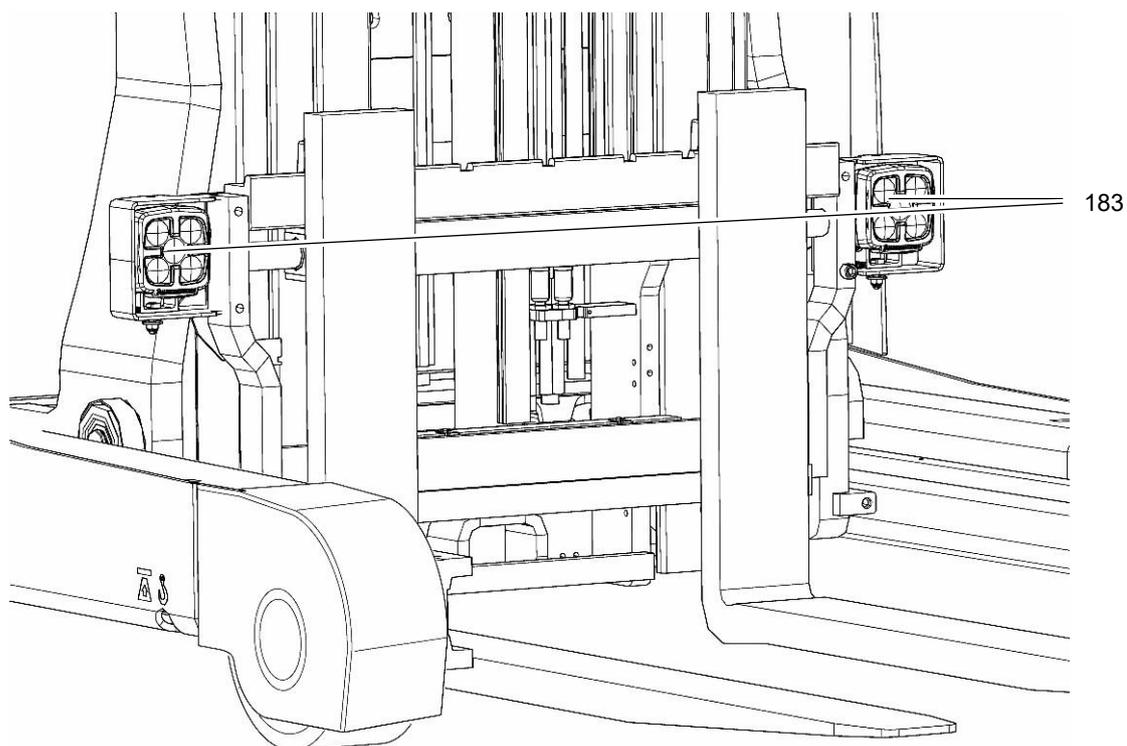
### ***Switching the beacon on and off***

#### *Procedure*

- Press the beacon button (182).

*The beacon (181) is switched on or off.*

## 6.11 LED work lights on load handler



Item	Component
183	Load handler work lights LED

→ Load handler work lights LEDs are available for trucks that work with a sideshifter.

The LED work lights on the load handler are

- switched on automatically when a hydraulic function is activated and the travel speed is less than 5 mph (8 km/h).
- switched off when no hydraulic function is active and the travel speed is greater than 2.5 mph (4 km/h) for  $t > 2$  s.
- switched off when no hydraulic function is active for  $t > 5$  min.

## 6.12 Height cut out

The lift height cut-off is an electrical lift limit for restricting the maximum lift height in the mast lift range. The pump motor is deactivated when the set lift height is reached.

The lift function is blocked.

- The magnetic switch on the mast is not present with the rack height select option (○) or the operationCONTROL option (○).

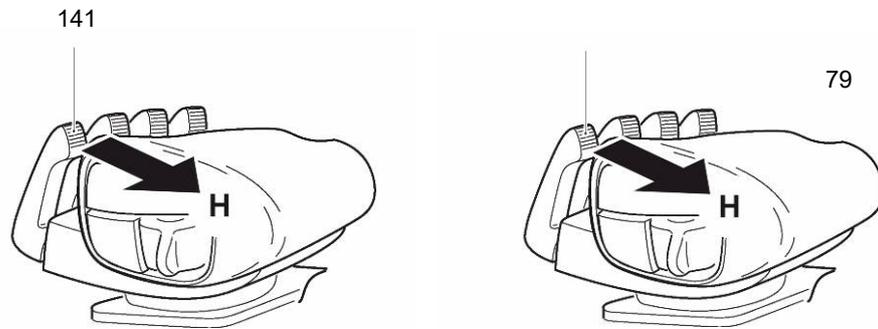
### **Overriding the lift limit cut-off without the override button**

#### *Procedure*

- Set the soloPILOT lever (141) or multiPILOT (79) to neutral.
- Pull the soloPILOT lever (141) or multiPILOT (79) in direction H

*The lift limit cut-off is now overridden.*

*Lifting can now be performed at reduced lifting speed.*



### **Overriding the lift limit cut-off with the override button**

#### *Procedure*

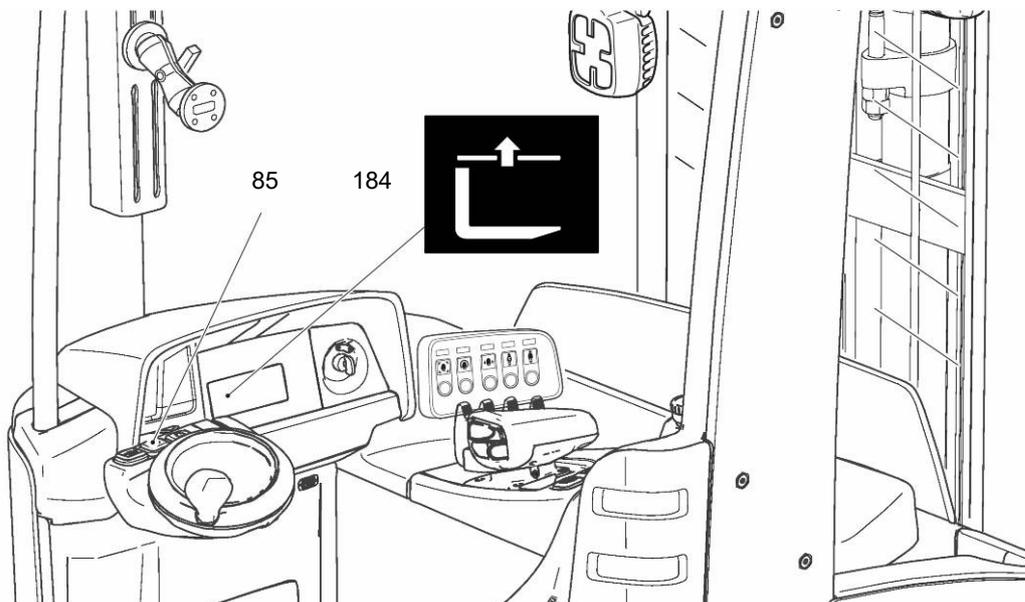
- Press the lift limit override button (85) while simultaneously pulling the soloPILOT lever (141) or multiPILOT (79) in direction H.

*The lift limit cut-off is now overridden.*

*Lifting can now be performed at reduced lifting speed.*

## 6.13 Electric lift limit

The lift limit system comes in versions 1, 2 and 3. The aim of the lift limit system is to prevent damage to the truck and the load near the wheel arms due to incorrect operation.



Item	Description
184	Side shift display
85	Lift limit override button

### 6.13.1 Lift limit 1

→ Lift limit 1 is only available for trucks with an integrated side shift.

#### Operation

Lift limit 1 determines the position of the mast and fork carriage via sensors in the mast. If the mast is fully extended or if the fork carriage is outside the safety range (500 - 600 mm above the wheel arms), Lift Limit 1 releases all hydraulic functions.

If the mast is not fully extended or if the load is near the wheel arms, sideshift, mast reach, lower and hydraulic auxiliary functions are disabled.

If the mast is fully extended and the load is near the wheel arms, only mast reach is inhibited - the mast cannot be retracted.

Lifting and tilting are never disabled.

The disabled hydraulic functions are released automatically without user input.

Automatic centring release allows

- the mast reach to move automatically in the wheel arm area when the sideshift is centred.
- the load to be lowered to the ground when the sideshift is centred.
- the centre position on the control and display unit to be shown via an indicator (184)

## 6.13.2 Lift limit 2

- Lift limit 2 is available for trucks with an integrated side shift and various attachments, such as fork positioner and ball clamps.

### Operation

Lift limit 2 determines the position of the mast and forks via sensors in the mast. If the mast is fully extended or if the forks are outside the safety range (500 - 600 mm above the wheel arms), Lift Limit 2 releases all hydraulic functions.

Sideshift, mast reach, lowering and the hydraulic accessory functions are deactivated if the mast is not fully extended or if the load is near the wheel arms. If the mast is fully extended and the load is near the wheel arms, only mast reach is inhibited, the mast cannot be retracted. Lifting and tilting are never inhibited.

### **Releasing hydraulic functions with the override button**

#### *Requirements*

- The function selected is inhibited. The mast or forks are in the safety range.

#### *Procedure*

- Press the Lift Limit override button (85) while simultaneously performing the selected function.

*The hydraulic functions are released for as long as the button is pressed.*

### **Releasing hydraulic functions without the override button**

#### *Requirements*

- The function selected is inhibited. The mast or forks are in the safety range.

#### *Procedure*

- Set the control (SOLO-PILOT or MULTI-PILOT) to neutral.
- Set the control (SOLO-PILOT or MULTI-PILOT) back to its original direction.

- Only the originally applied function is released, at reduced speed.
- Repeat this procedure separately for each function.

*The hydraulic function is released.*

### 6.13.3 Lift limit 3

- Lift limit 3 is only available for trucks with tilting forks in conjunction with a fork positioner.

#### Operation

Lift limit 3 determines the position of the mast and forks via sensors in the mast. If the mast is fully extended or if the forks are outside the safety range (500 - 600 mm above the wheel arms), Lift Limit 3 releases all hydraulic functions.

Sideshift, mast reach, lowering and the hydraulic accessory functions are deactivated if the mast is not fully extended or if the load is near the wheel arms.

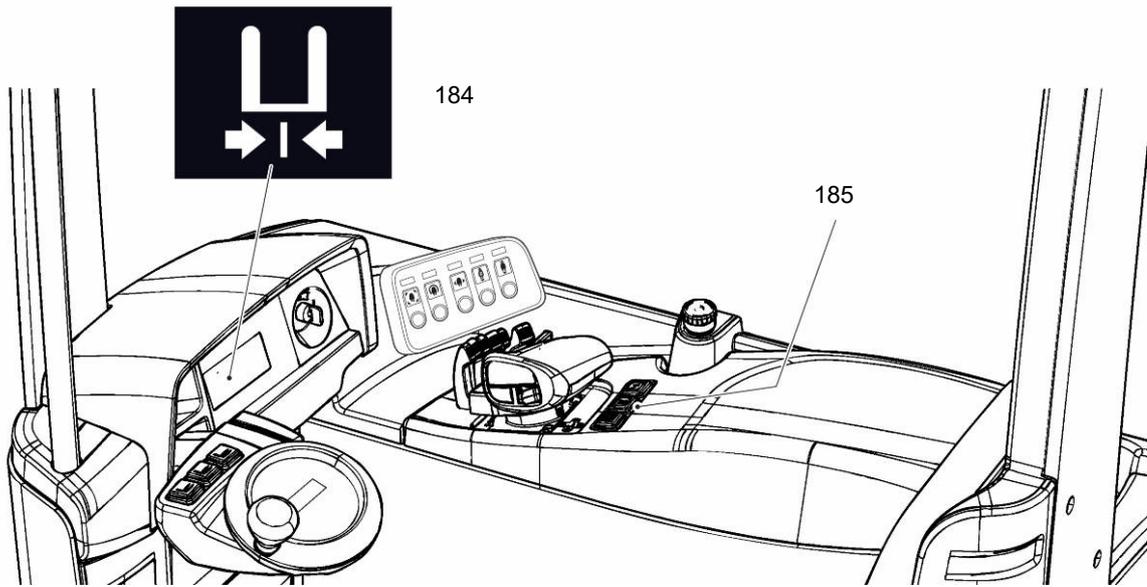
If the mast is fully extended and the load is near the wheel arms, only mast reach is inhibited, the mast cannot be retracted.

Lifting and tilting are never inhibited.

Lift limit 3 also checks that the forks cannot collide with the wheel arms and are free of the load. If both criteria are met, mast reach and lower are enabled. Sideshift and hydraulic auxiliary functions remain inhibited.

- Loads with a weight < 100 kg cannot be reliably detected by the system.

## 6.14 Sideshifter Centre Position



Item	Description
185	"Side shift centre position" button
184	"Side shift centre position" display

Pressing the "sideshift centre position" button (185) allows the side shifter to be centrally positioned during storage and retrieval operations.

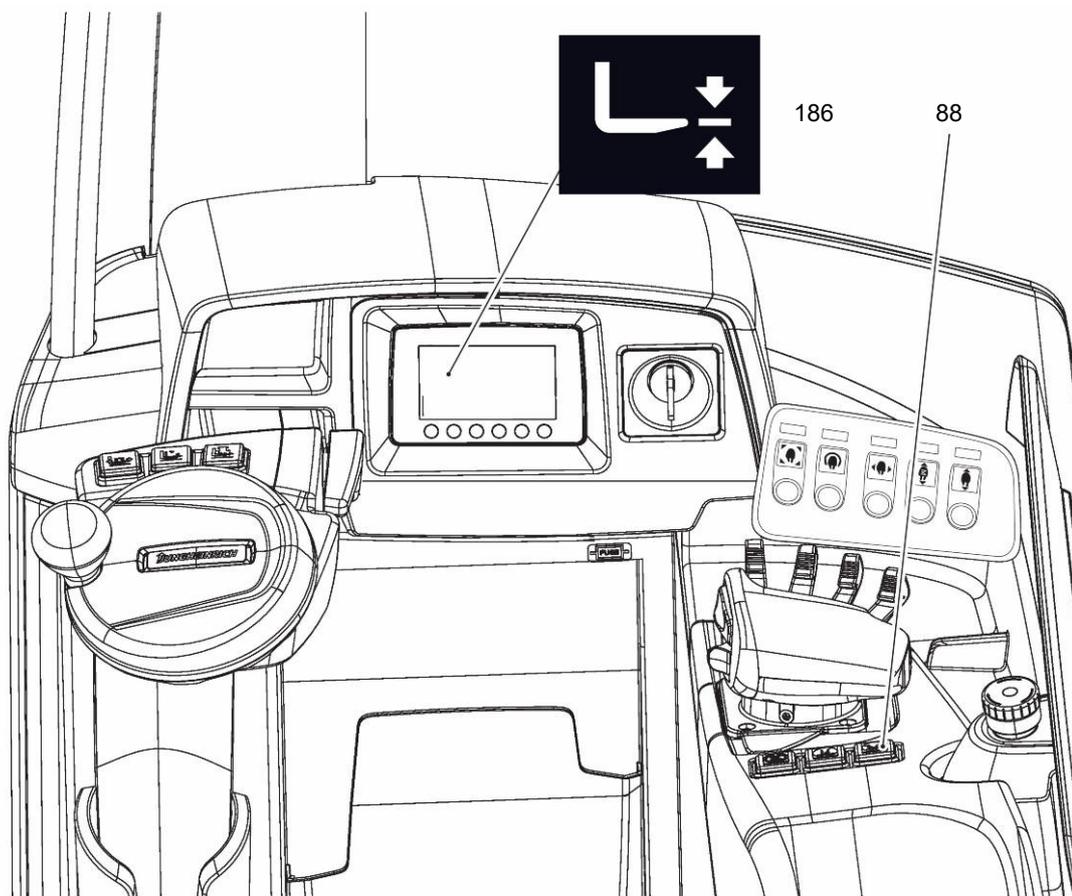
### ***Positioning the sideshifter centrally***

#### ***Procedure***

- Press the "sideshift centre position" button (185) until the sideshifter is centrally positioned. During this procedure all other hydraulic functions are disabled and the display shows "sideshift centre position" (184).

*The sideshifter is now centrally positioned.*

## 6.15 Forks horizontal button



Item	Description
88	"Forks horizontal" button
186	"Forks horizontal" display

The forks horizontal button (88) allows the load handler to be aligned horizontally

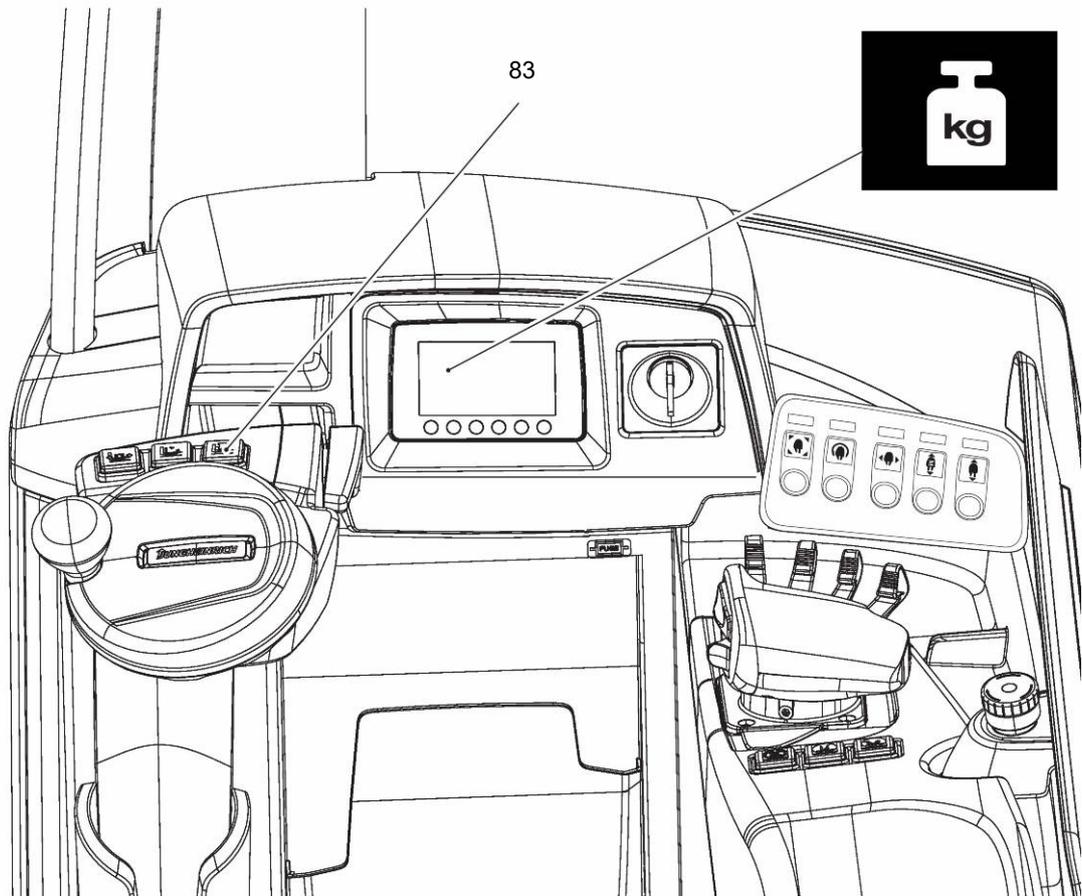
### ***Aligning the load handler horizontally***

#### ***Procedure***

- Press the forks horizontal button (88) until the load handler is aligned horizontally. During this procedure all other hydraulic functions are disabled and the display shows "forks horizontal" (186).

*The load handler is aligned horizontally.*

## 6.16 Weigher



Item	Description
83	"Weigher" button

While the weigher button (83) is pressed, the load is raised approx. 10 cm and then lowered again. This process determines the load weight which is then shown on the driver's display. The weigher function is not a substitute for a calibrated weigher. The weigher function must not be used to lift the load freely. All other hydraulic operations are inhibited during weighing.

### ***Weighing the load***

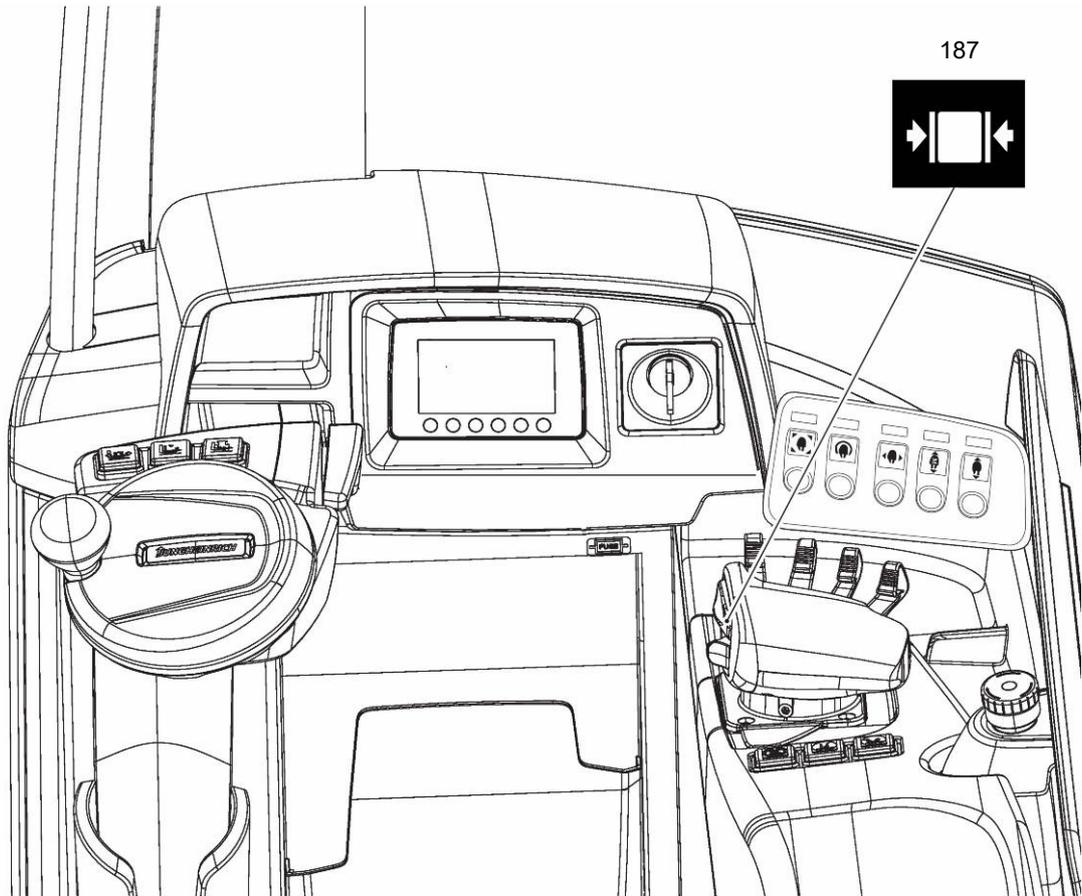
#### ***Procedure***

- Press and hold down on the weigher button (83) until weighing is completed.

➔ If the button is released before weighing is completed, the weighing procedure is interrupted and no valid readings are obtained. The display shows "- - - kg".

*The load is weighed and shown on the display.*

## 6.17 “Clamp function release” button



Item	Description
187	"Clamp function release" button

When the "Clamp function release" button is pressed and the corresponding hydraulic function applied simultaneously, the clamp function is activated.

- The auxiliary hydraulic function must be actuated within 1.5 seconds of the acknowledgement button being pressed.  
(see page 123)

## 6.18 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.

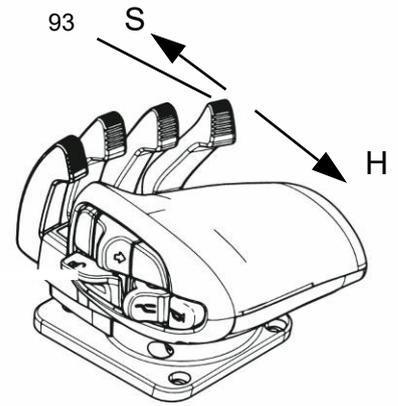
### *Requirements*

- Truck prepared for operation see page 98.

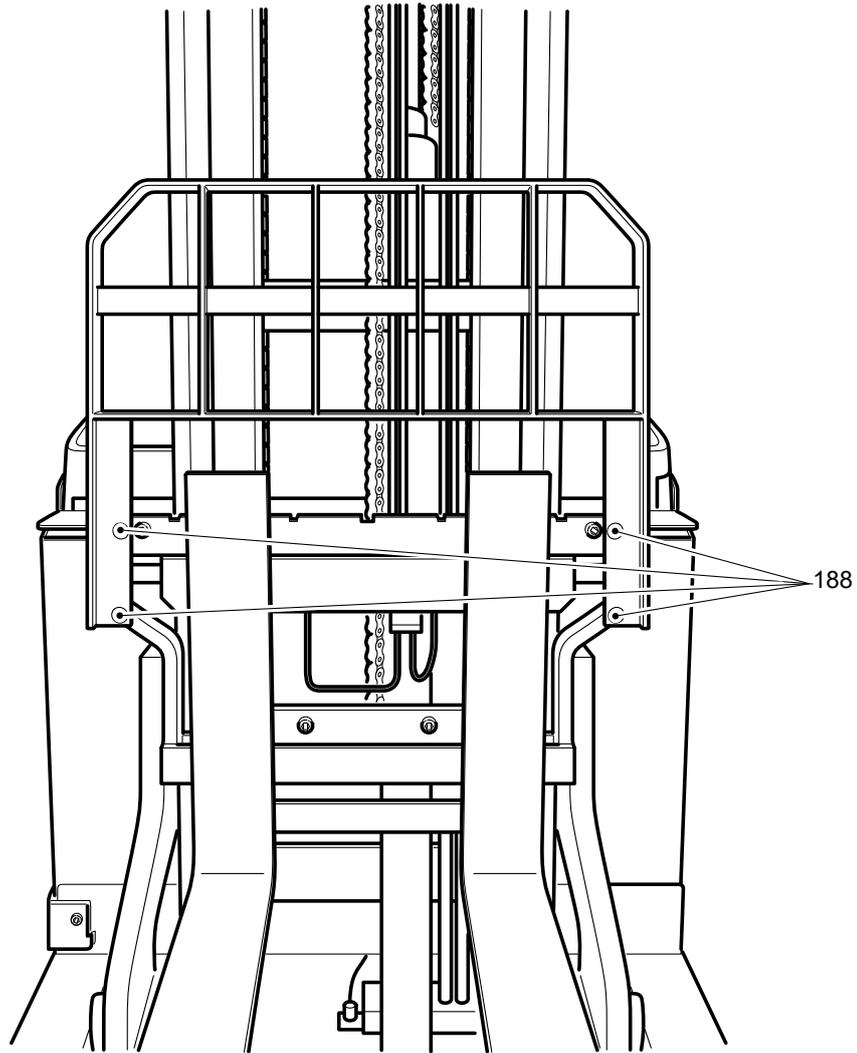
### *Procedure*

- Pull the lever (93) in direction H, the forks move together.
- Push the lever (93) in direction S, the forks move apart.

*The forks are now positioned.*



## 6.19 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 (188).
- 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

## 6.20 Floor-Spot

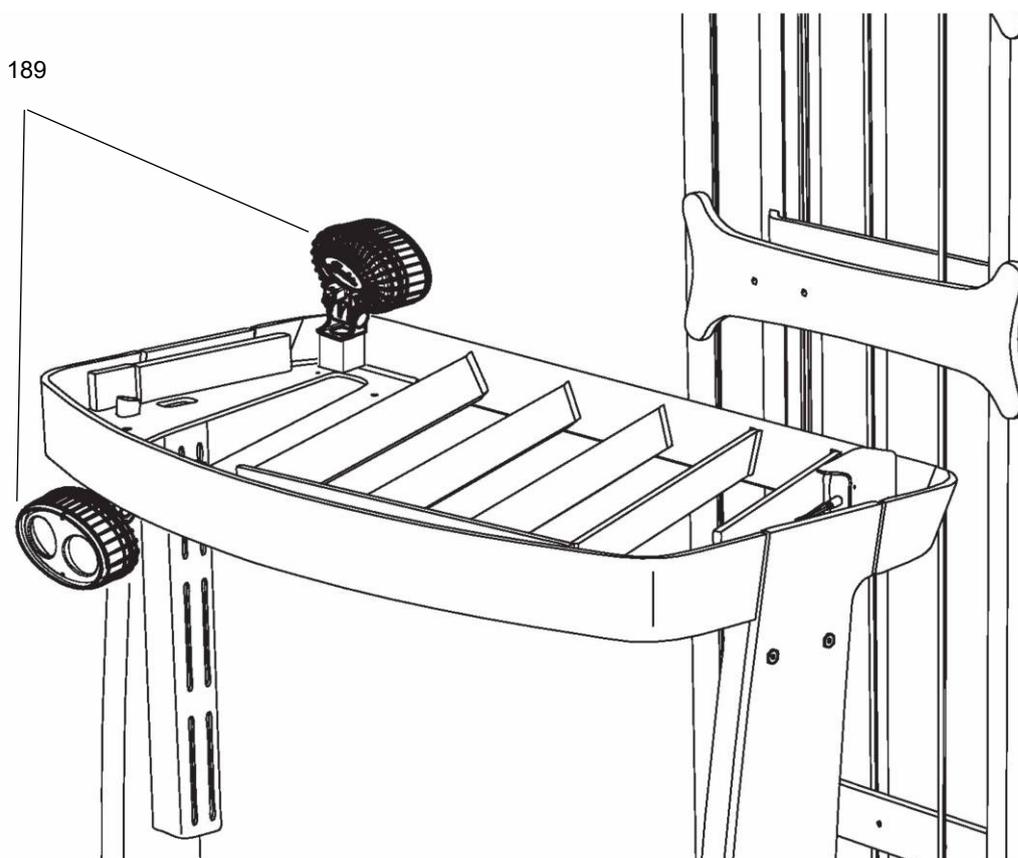
The floor spot serves as an auxiliary device and, with the travel direction switch engaged, projects a coloured dot on the floor at a distance of 4,5 m / 4 m. When the truck travels forward, the coloured dot is in front of the truck. When reversing, it is behind the truck.

### **⚠ CAUTION!**

#### **Risk of accident due to restricted view**

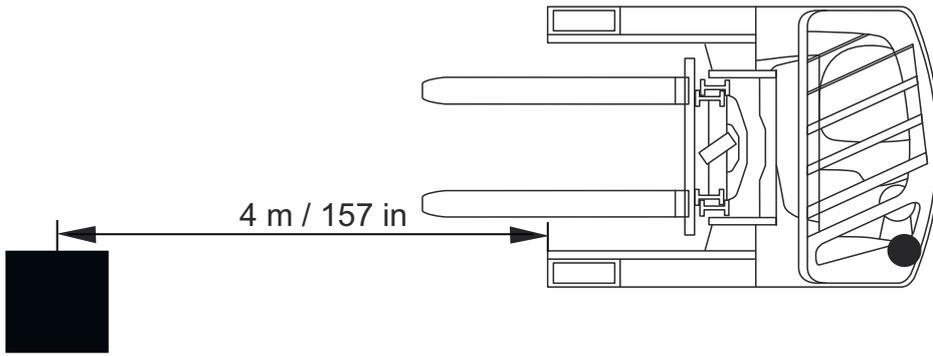
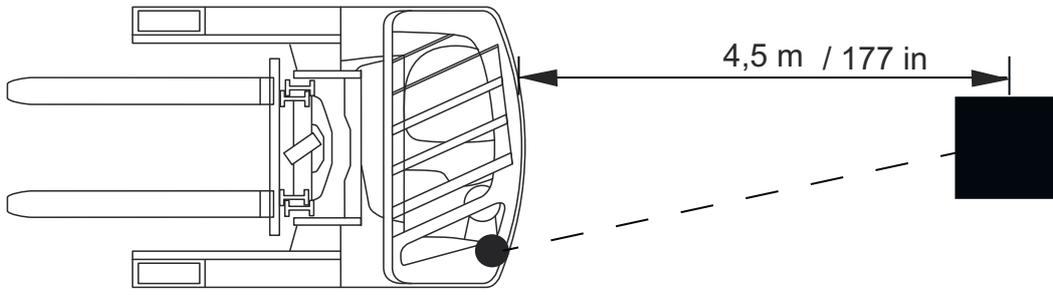
Looking directly at the LED light can dazzle and temporarily impair eyesight.

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



The floor spot (189) is available both in the drive direction underneath the overhead guard and in the load direction above the overhead guard.

The position of the projected spot is preset in the factory.



## 6.20.1 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 accident due to dazzling**

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

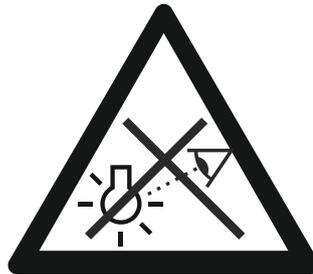
- ▶ Do not look directly into the light beam of the Floor-Spot.
  - ▶ Do not adjust the position and alignment of the Floor-Spot on the truck.
- 

### **⚠ 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.
- 

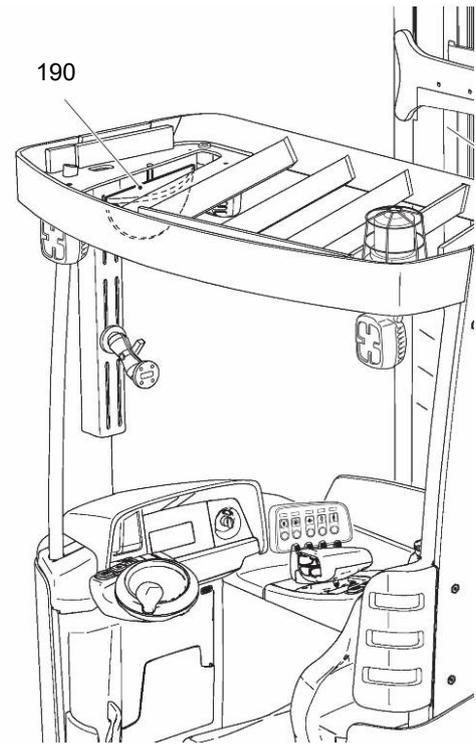


- The warning notice "Caution! Potentially dangerous optical radiation" is attached to the side of the chassis or to the overhead guard. Small warning notices are attached to the side of the Floor-Spot.

## 6.21 Parabolic mirror

Item	Designation
190	Parabolic mirror (adjustable)

The panoramic mirror (190) is equipped with a pivoting joint. This allows the driver to adjust the panoramic mirror (190) to his individual needs.



# 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 37.



## 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 209.

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 209.

### **WARNING!**

#### **Risk of accidents and damage to components**

Any modification to the truck, in particular the safety mechanisms, is prohibited. Do not alter the truck's operating speeds under any circumstances.  
Do not bond the front window with adhesive.

---

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

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

### **NOTICE**

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

For safety reasons, only components which have been specially agreed by the manufacturer for this truck may be installed near the computer, controllers and wire guidance sensors (antennae). These components (computers, controllers, wire guidance sensors (antennae)) must therefore not be replaced by similar components from other trucks of the same series.

---



On completion of inspection and service work, carry out the operations listed in the "Recommissioning the truck after cleaning or maintenance work section, see page 205.

### **WARNING!**

#### **Fire hazard**

Welding operations on the truck can damage or ignite components.

- ▶ Do not performing welding operations on the truck.
-

## 3 Maintenance Safety Regulations

### Maintenance personnel

The truck should only be serviced and repaired by the manufacturer's specialist customer service personnel who have been trained to do this. We therefore recommend that you enter into a maintenance contract with the manufacturer's local sales office.

### 3.1 Cleaning

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

#### **⚠ CAUTION!**

##### **Risk of fire due to use of flammable cleaning agents**

Using flammable cleaning agents increases the risk of fire.

- ▶ Do not use any flammable cleaning agents when cleaning.
- ▶ Disconnect the battery before starting cleaning work.
- ▶ Before cleaning, take necessary safety measures to prevent spark formation (e.g. due to short circuits).

#### **NOTICE**

##### **Risk of 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.

#### **NOTICE**

##### **Risk of component damage when cleaning the truck**

Cleaning with a high-pressure cleaner can result in malfunctions due to humidity.

- ▶ Cover all electronic system assemblies (controls, sensors, motors etc.) before cleaning the truck with a high-pressure cleaner.
- ▶ Do not hold the jet of the high-pressure cleaner at marking points to avoid damaging them – see page 35.
- ▶ Do not clean the truck with a steam jet.

- After cleaning, carry out the operations detailed in "Restoring the truck to service after maintenance and repairs" (see page 205).

## 3.2 Working on the electrical system

### **⚠ WARNING!**

#### **Risk of accidents due to electrical current**

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

Before starting maintenance on the electrical system:

- ▶ Only suitably trained electricians may operate on the truck's electrical system.
  - ▶ Before working on the electrical system, take all precautionary measures to avoid electric shocks.
  - ▶ Park the truck securely (see page 127).
  - ▶ Disconnect the battery connector.
  - ▶ Remove any rings, metal wristbands etc.
- 

## 3.3 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.
- 

## 3.4 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.

### 3.4.1 Replacing the drive wheel

→ The drive wheel must only be replaced by the manufacturer's authorised customer service department.

### 3.4.2 Replacing the load wheels

- Load wheels must only be replaced by the manufacturer's authorised customer service department.

## 3.5 Lift Chains

### **⚠ WARNING!**

#### **Non-lubricated and incorrectly cleaned lift chains can cause accidents**

Lift chains are safety-critical parts. They must not contain any serious contamination. Lift chains and pivot pins must always be clean and well lubricated.

- ▶ Lift chains should only be cleaned with paraffin derivatives e.g. petroleum or diesel fuels.
  - ▶ Do not clean lift chains with high pressure jets or chemical cleaning agents.
  - ▶ Immediately after cleaning, dry the lift chain with compressed air and apply a chain spray.
  - ▶ Always lubricate a chain when it is discharged.
  - ▶ Lubricate a lift chain with particular care around the pulleys.
- 

## 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.

- The manufacturer's customer service department is specially trained to carry out this task.

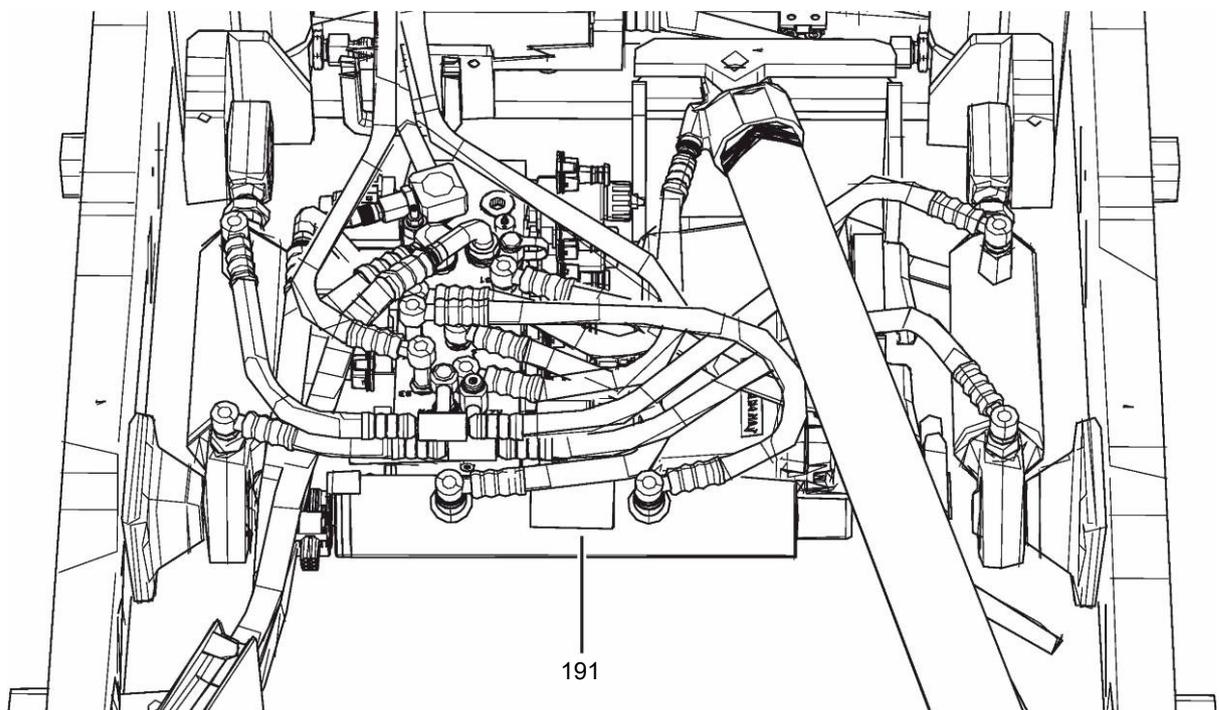
## 3.7 Energy saving components

### ⚠ CAUTION!

#### A high pre-tension can cause accidents

The mast reach damping cylinder (191) contains highly pre-tensioned compression springs. Risk of injury if opened incorrectly.

- ▶ The mast reach damping cylinder (○) must not be opened.



## 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!**

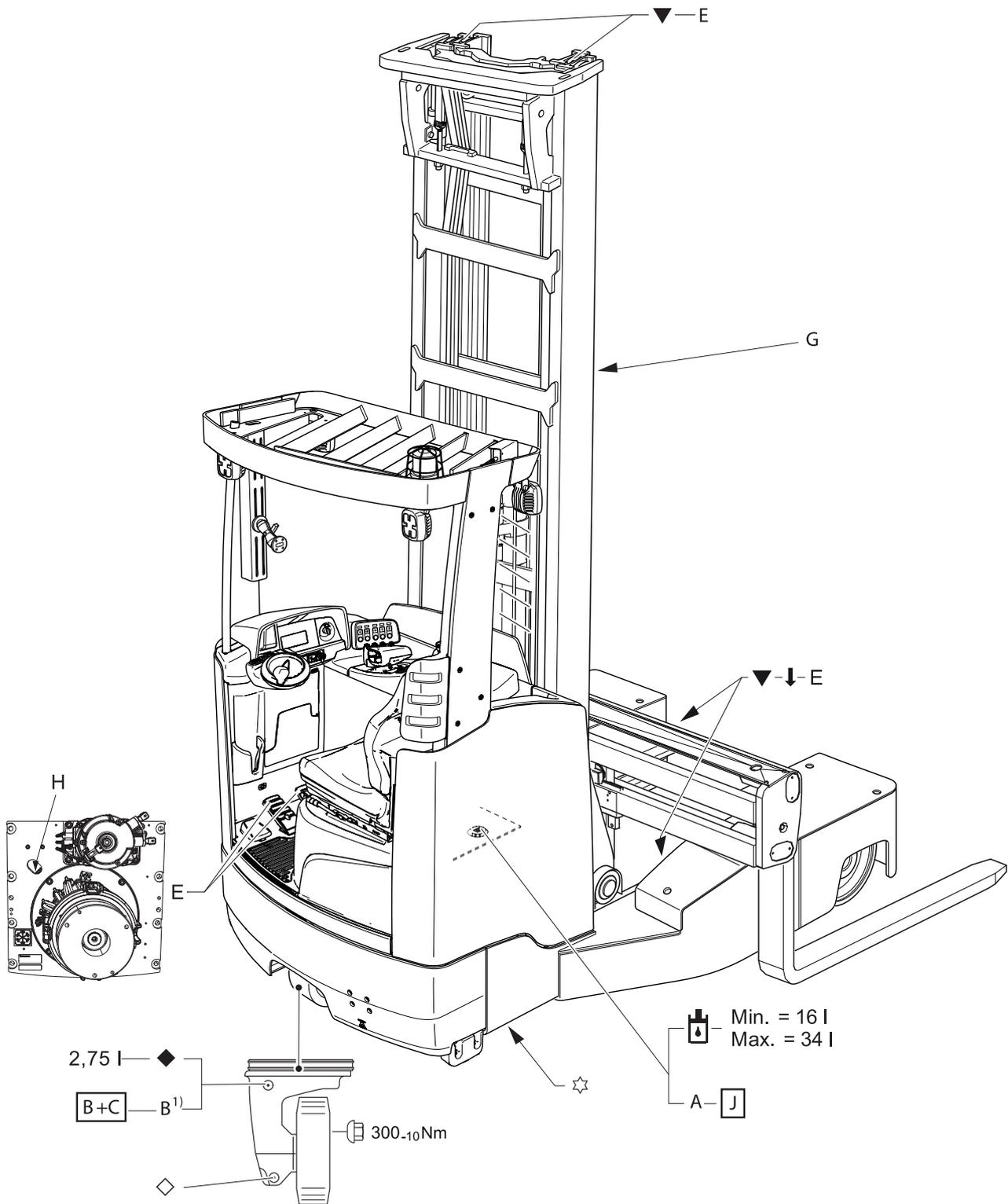
**Consumables and used parts are an environmental hazard**

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.

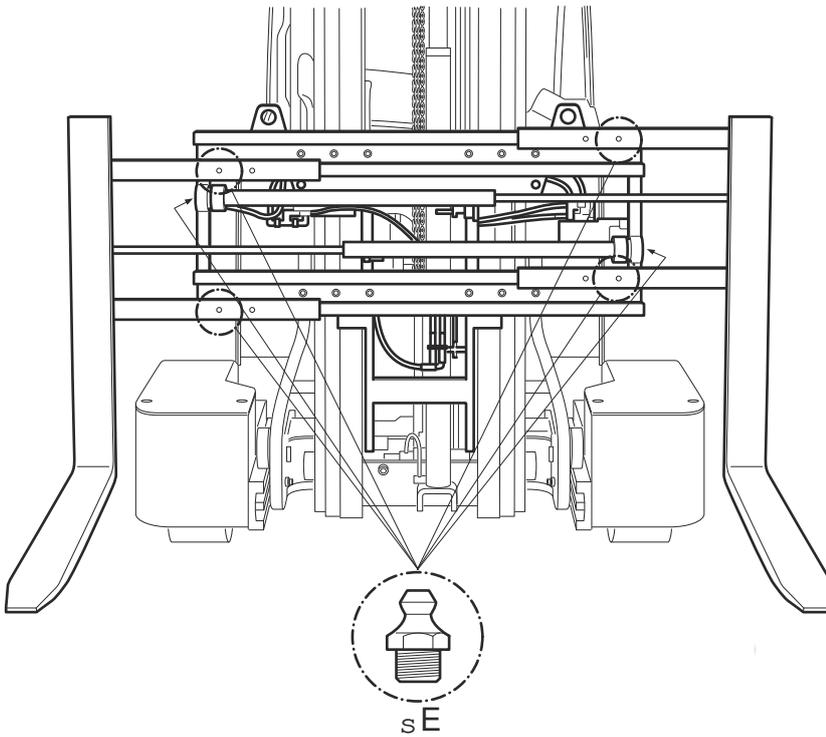
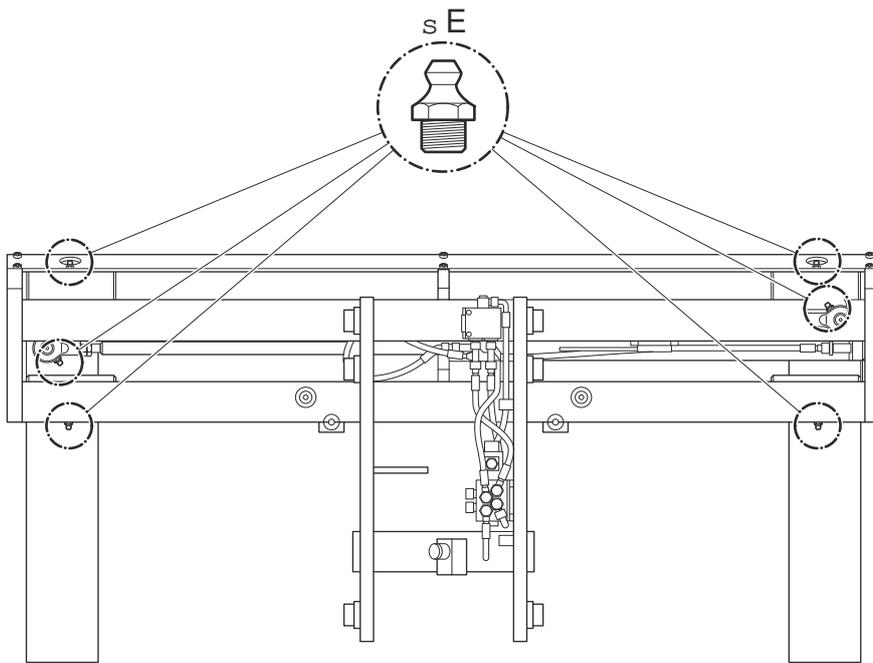
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## 4.2 Lubrication Schedule

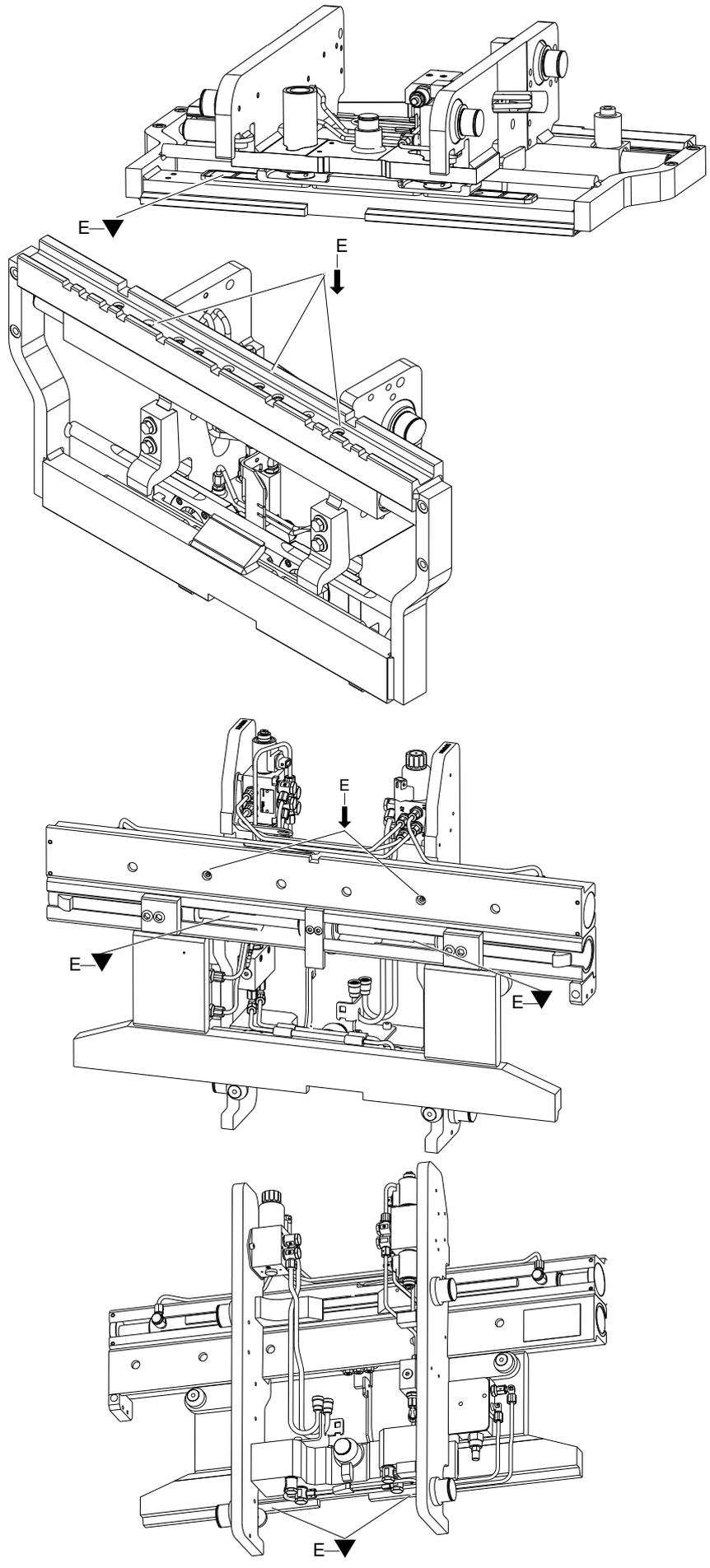


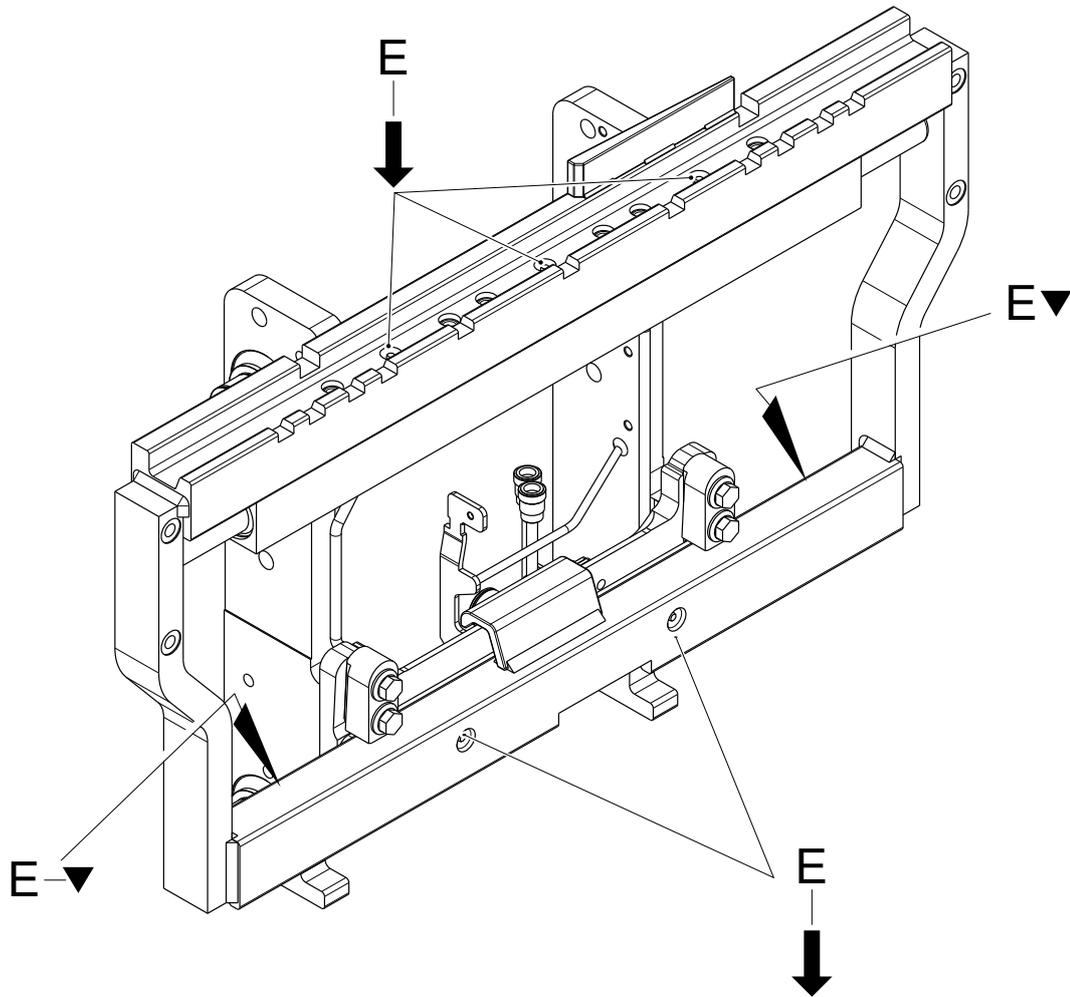
▼	Contact surfaces	☆	Hydraulic oil drain plug
↓	Grease nipple	◆	Transmission oil filler neck
🛢️	Hydraulic oil filler neck	◇	Transmission oil drain plug

# Fork positioner lubrication chart



↓	Grease nipple		
---	---------------	--	--





▼	Contact surfaces	☆	Hydraulic oil drain plug
↓	Grease nipple	◆	Transmission oil filler neck
⬇	Hydraulic oil filler neck	◇	Transmission oil drain plug

- 1 Compound ratio for cold store usage 1:1
- 2 Capacity, see page 199.

### 4.3 Consumables

Cod e	Order no.	Quantity	Description	Used for
A	50 449 669	5.0 l	H-LP 46, DIN 51524	Hydraulic system
	51 132 827*	5.0 l	Jungheinrich hydraulic oil	
B	29 200 680	5.0 l	CLP 100 DIN 51517	Transmission
E	29 201 430	1.0 kg	Grease, DIN 51825	Lubrication
G	29 201 280	400 ml	Chain spray	Chains
H	50 002 004	400 ml	Contact spray	Teeth

- \* The trucks are factory-equipped with a special hydraulic oil (the Jungheinrich hydraulic oil with a blue colouration). The Jungheinrich hydraulic oil is available only from the Jungheinrich service department. The use of named alternative hydraulic oils is not prohibited, but may lead to a decline in functionality. The Jungheinrich hydraulic oil may be mixed with one of the named alternative hydraulic oils.
- When filling the hydraulic reservoir add hydraulic oil up the V mark.

#### 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 repair work. The following preparations must be made:

#### *Procedure*

- Park the truck on a level surface.
- Fully lower the main and auxiliary lift.
- Park the truck securely, see page 127.
- Switch off the truck. To do this:
  - Turn the key in the key switch left as far as the stop and remove the key, or
  - Press the red button on the ISM access module (○).
- Press the emergency disconnect switch.
- Disconnect the battery to prevent the truck from being switched on accidentally.
- When working under a raised truck, secure it to prevent it from lowering, tipping or sliding away.

#### **⚠ WARNING!**

#### **Risk of accidents when working under the load handler, driver's cab and lift truck**

- ▶ When working under a raised load handler, driver's cab or a raised truck, secure them to prevent the truck from lowering, tipping or sliding away.
  - ▶ When raising the truck, follow the instructions, see page 41. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with wedges).
-

## 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 sufficient capacity.
  - ▶ 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 196).

##### *Tools and Material Required*

- Jack
- Hard wooden blocks

##### *Procedure*

- Place the jack against the contact point.

 Jack contact point, see page 39.

- 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.

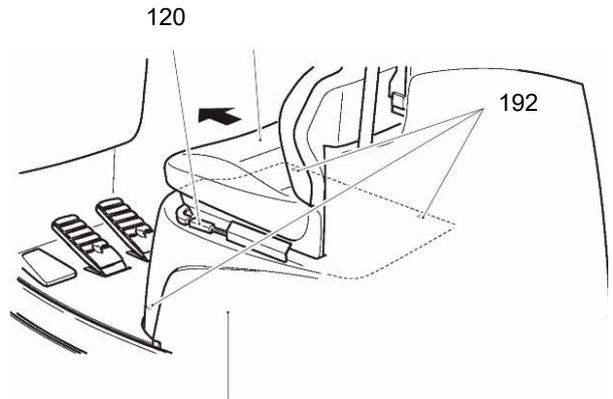
## 5.3 Removing or installing the seat cover

- The drive unit and hydraulic aggregate can be made accessible for service by removing the seat panel.

### **Removing the seat panel**

#### *Procedure*

- Pull seat locking lever (120) up and pull the seat towards the steering wheel and take it off.
- Disconnect the fan.
- Undo the screws (192) and remove the seat panel (250).
- Assembly is the reverse order.



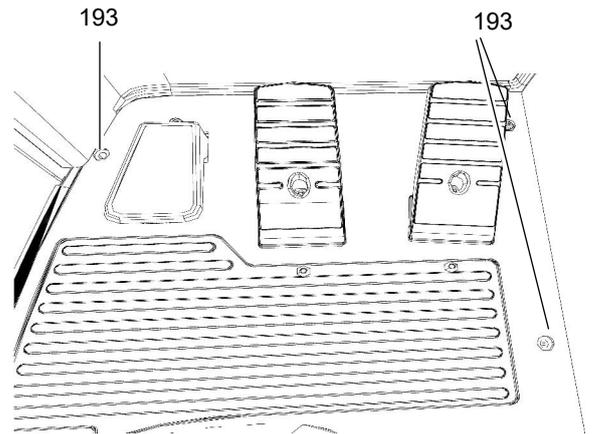
*The seat panel is now removed.*

## 5.4 Removing the floor plate

### **Removing the floor plate**

#### *Procedure*

- Loosen and remove the 3 screws (193).
- Open the lock with the Allen key.
- Raise the floor plate carefully.
- Remove the plug connections from the pedal.
- Store the floor plate in a safe place.



*Floor plate removed.*

## 5.5 Checking the hydraulic oil level

### **⚠ 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.

### **Check the hydraulic oil level**

#### *Requirements*

- Truck prepared for maintenance and repairs, see page 196.

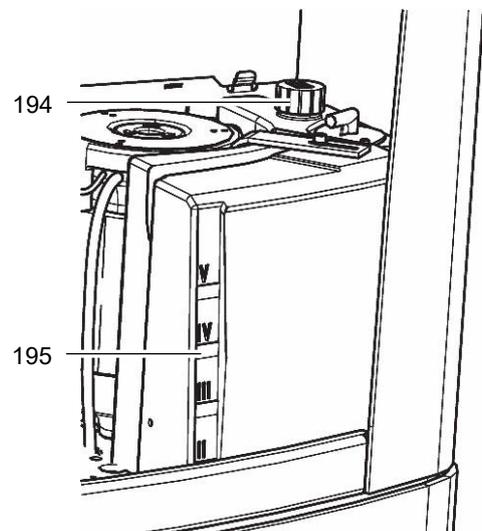
#### *Procedure*

- Push the driver's seat forward.
- Check oil level in hydraulic reservoir (195).

➔ The oil level should only be checked on the hydraulic reservoir (195) or the dipstick (194) when the load handler is fully lowered.

- If necessary add hydraulic oil of the correct grade in the filler neck.
- Push the seat back into position and engage the locking lever.

*The hydraulic oil level is now checked.*



<b>Mast height<sup>1</sup></b>	<b>ETV</b>
400 - 499	Approx. separating joint
500 - 599	Approx. mark I
600 - 699	Approx. mark I
700 - 799	Between marks I and II
800 - 899	Between marks I and II
900 - 999	Approx. mark II
1000 - 1099	Approx. mark II
1100 - 1202	Approx. mark III
1203 - 1300	Approx. mark III
<sup>1)</sup> <i>DZ mast, max. lift height in cm.</i>	

## 5.6 Checking the electrical fuses

### Removing the safety cover

#### Procedure

**⚠ CAUTION!**

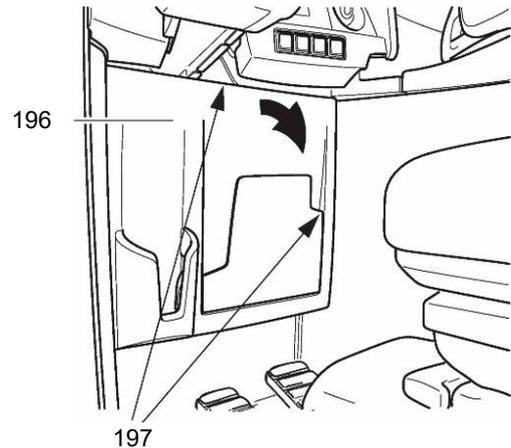
#### Trapping hazard

- ▶ Carefully pull off the cover.

Forcibly pull off the safety cover (196) from the (197) points at the top left and bottom right and place them to one side.

- Assembly is in the reverse order.

*Safety cover removed.*



### Removing the instrument panel cover

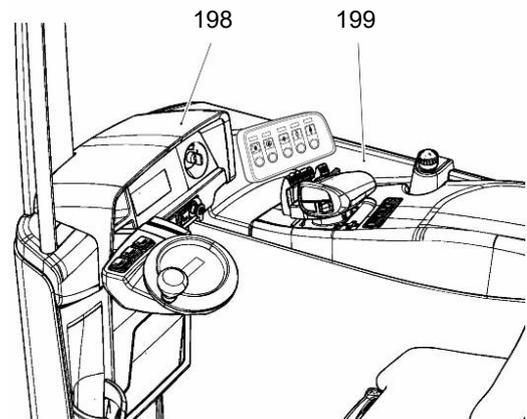
#### Procedure

- Push the steering wheel towards the seat (outermost position).
- Remove the instrument panel cover (198).
- Remove the side instrument panel (199).

→ The main fuses are located underneath the side instrument panel (199).

- Assembly is in the reverse order.

*Instrument panel cover removed.*



### Checking electrical fuses

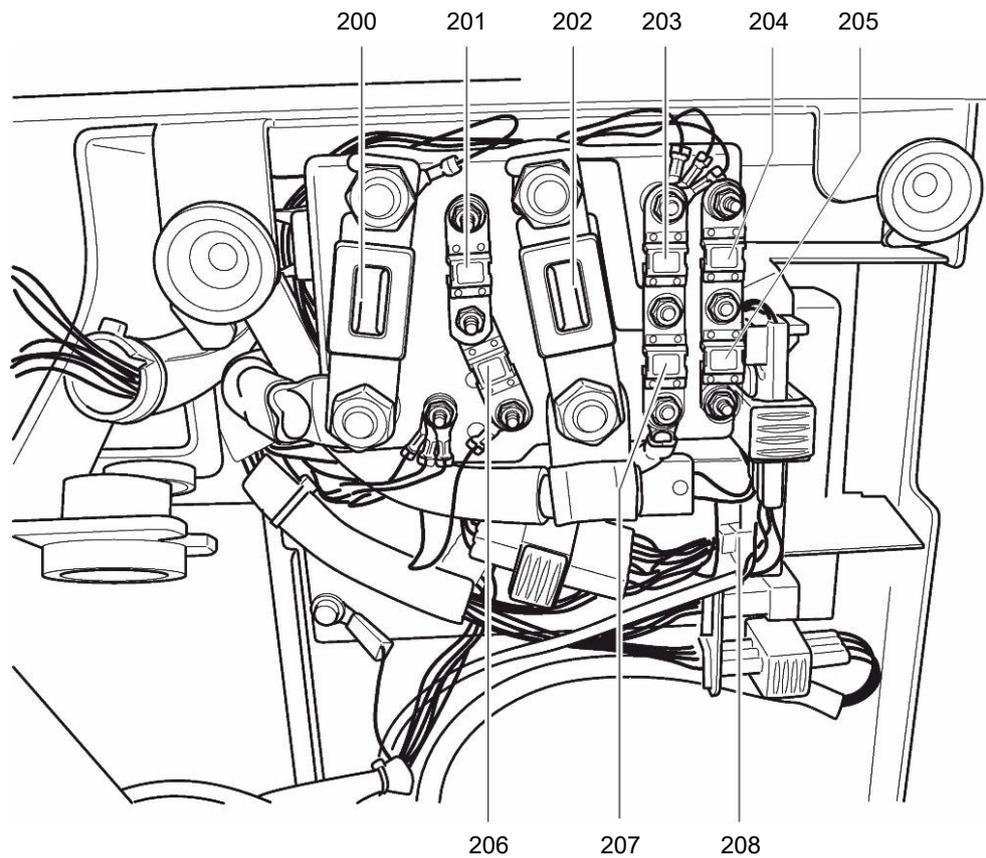
#### Requirements

- Safety cover removed.
- Instrument panel cover removed.

#### Procedure

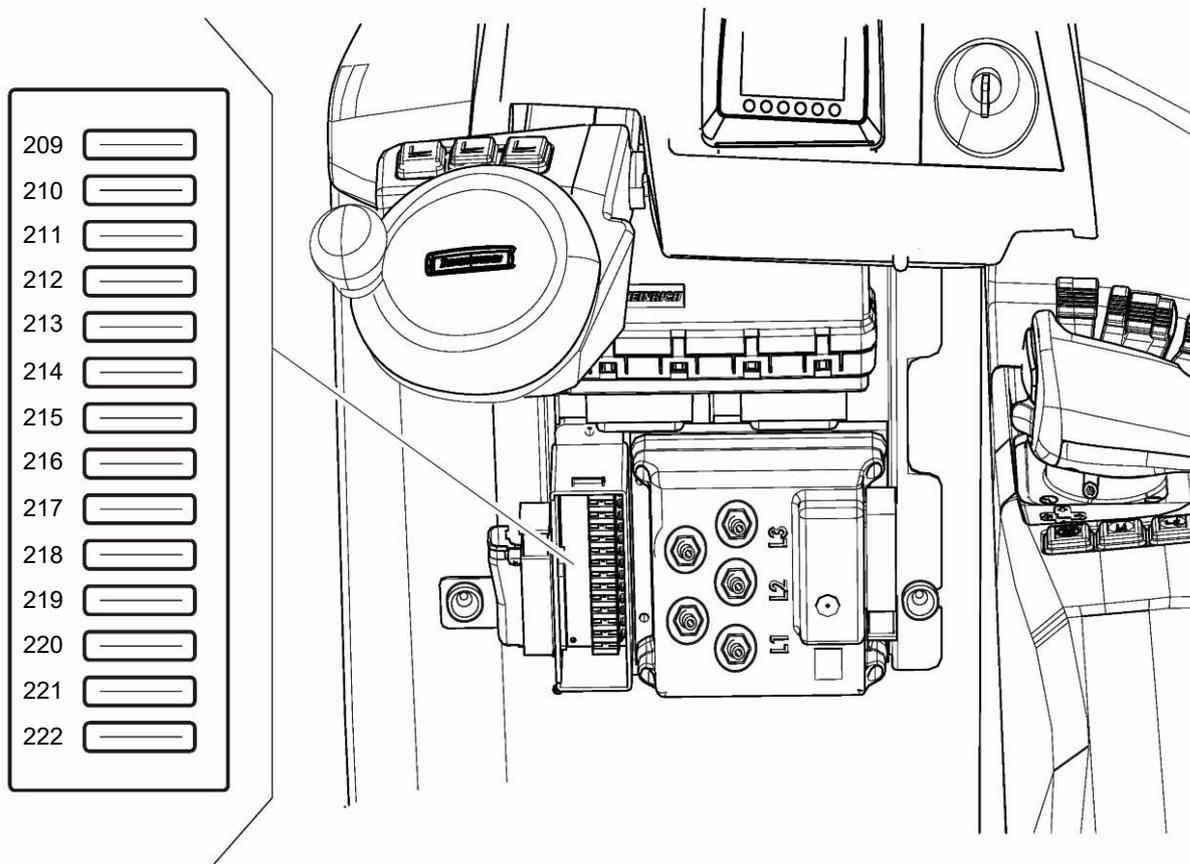
- Check rating of the fuses in accordance with the table and replace if necessary.

*The electrical fuses are now checked.*



### Fuse ratings

Item	Description	Application	Rating [A]
200	F8	Main fuse	425
201	5F6	Cabin	30 <sup>1)</sup>
202	F15	Pump motor	355
203	F26	48 V after main contactor	30
204	3F7	Left load wheel steer motor	30
205	3F8	Right load wheel steer motor	30
206	F1	Control fuse	30
207	3F6	Drive wheel steering	30
208	F4	Main contactor	2
1)	<i>Depend ing on cabin version</i>		



### Fuse ratings

Item	Description	Application	Rating [A]
209	F17	Radio data	5
210	4F15	Access control	2
211	F27	Travel/lift control	2
212	5F2	DC/DC converter	7.5
213	9F2	Seat heater	7.5
214	3F11	Drive wheel steering	2
215	4F8	Display and control unit	3
216	3F13	Left load wheel steering controller	5
217	3F14	Left load wheel steering controller	5
218	2F17	MFC hydraulics	2
219	1F13	MFC travel/brake control fuse	7.5
220	1F14	MFC travel/brake control fuse	5
221	2F18	MFC hydraulics	10
222	1F14	MFC travel/braking	10

## 5.7 Checking the wheel attachments.

### Tightening Torques

Load wheels (1x centre cylinder screw)	120 Nm
Drive wheel	300 -10 Nm

### ***Checking the wheel attachment***

#### *Requirements*

- Truck prepared for maintenance and repairs, see page 196.

#### *Tools and Material Required*

- Torque wrench

#### *Procedure*

- Tighten the wheel bolts crosswise with a torque wrench.

➔ For torque see table:

*The wheel attachment is now checked.*

## 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 197.

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

### 6.1 Prior to decommissioning

#### *Procedure*

- Thoroughly clean the truck – see page 185.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see page 189.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication diagram, see page 191.
- Charge the battery, see page 56.
- 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.

### 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 56.

### 6.3 Restoring the truck to service after decommissioning

#### *Procedure*

- Thoroughly clean the truck – see page 185.
- Lubricate the forklift truck according to the lubrication schedule – see page 191.
- Equipment with lead-acid battery (●):  
Clean the battery, grease the battery terminal screws with terminal grease and connect the battery.
- Equipped with lithium-ion battery (○) without interface converter on the battery:  
Insert the truck-side control line into the connection on the battery trough.

- Equipped with lithium-ion battery (○) with interface converter on the battery:
  - Pull the battery forward.
  - Insert the control line into the battery connection at the top of the battery or the inside of the trough.
  - Slide the battery back in.
  - Connect the battery to the truck.
  - Close the battery connector lock: Tighten the bolted bar.
  - Insert the truck control line into the interface converter on the battery.
- Charge the battery – see page 56.
- Commission the forklift truck – see page 85.

## **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!**

### **Lack of maintenance can result in accidents**

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

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

## **NOTICE**

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

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

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

## **1 Maintenance Contents ETV Q 20-25**

Issued on: --

### **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.
Correct the hydraulic-oil level.

## 1.1.1.2 Optional Equipment

### Fork positioner

<b>Hydraulic operations</b>
-----------------------------

Clean and grease attachment bearings, guides and stops.
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### Telescopic forks

<b>Hydraulic operations</b>
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Clean and lubricate the attachment.
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### Windscreen washing system

<b>Chassis/structure</b>
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Correct the fill level of the windscreen washer reservoir.
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### Lead-acid battery, international

<b>Power supply</b>
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Correct the battery-acid level using demineralised water.
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### Lead-acid battery

<b>Power supply</b>
---------------------

Correct the battery-acid level using demineralised water.
---

## 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 and battery cable guide 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
--

Supports / tilt safety devices for presence and damage
--

Check the overhead guard and/or the driver's cab for secure attachment and damage
---

<b>Hydraulic operations</b>
-----------------------------

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:

#### Fork positioner

<b>Hydraulic operations</b>
-----------------------------

Fork positioner for functionality and damage
--

#### Windscreen washing system

<b>Chassis/structure</b>
--------------------------

Check windscreen washer reservoir for leaks and damage
--

#### Work lights

<b>Electrical system</b>
--------------------------

Test lighting and check for damage
------------------------------------

#### Weather protection

<b>Chassis/structure</b>
--------------------------

Test doors and check for damage
---------------------------------

#### Restraint system

<b>Chassis/structure</b>
--------------------------

Test driver's seat restraint system 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

### Power supply

Check the battery cable connections for secure attachment

## 1.2 Customer Service

In accordance with the ETV Q 20-25 service interval, to be performed every 1000 service hours, but at least once a year.

### 1.2.1 Maintenance contents

#### 1.2.1.1 Standard equipment

##### Brakes

Test the brake.

Measure the air gap of the magnetic brake.

Test the emergency stop brake.

##### Electrical system

Test the contactors and/or relays.

Perform insulation inspection.

##### Travel

Correct the transmission oil level or grease filling of the transmission.

##### Chassis/structure

Note: Check the torques of the seat frame.

Adjust the battery trolley lock.

Check that the panels and covers as well as the floor plate with mounting brackets are secure. Ensure they function correctly and are safe.

Grease the rails.

Measure the height-related and capacity-related settings.

##### Hydraulic operations

Adjust the slide pieces.

Adjust the load chains.

Lubricate the load chains.

Test emergency lowering.

Correct the hydraulic-oil level.

Test and adjust the pressure relief valve.

Test the side shift adjustment.

Where two tilt cylinders with the same stroke are used, measure their relative adjustment.

<b>Agreed services</b>
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Carry out a test run with the rated capacity or a customer-specific load.
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Lubricate the truck according to the lubrication schedule.
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Demonstration after maintenance.
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<b>Steering</b>
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Lubricate steering gears or steering chain.
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### 1.2.1.2 Optional Equipment

#### Fork positioner

<b>Hydraulic operations</b>
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Adjust the axial play of the front and rear rollers.
--

Clean and grease attachment bearings, guides and stops.
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#### Clamping device

<b>Hydraulic operations</b>
-----------------------------

Adjust the attachment.
------------------------

Adjust the axial play of the front and rear rollers.
--

Clean and grease attachment bearings, guides and stops.
---

#### 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.
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#### Windscreen washing system

<b>Chassis/structure</b>
--------------------------

Correct the fill level of the windscreen washer reservoir.
--

#### Rack height select

<b>System components</b>
--------------------------

Test rack height select.
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#### Lift cut-off

<b>Hydraulic operations</b>
-----------------------------

Test the lift-limit cut-off/lift cut-off.
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## Radio data

### System components

Clean the scanner and terminal.

## Video system

### System components

Clean the camera.

Clean the display.

## Weigher sensors/switches

### Electrical system

Test the weigher.

## Seat switch

### Chassis/structure

Test the seat switch.

## Automatic crawl speed

### Travel

Clean sensors/switches.

## liftCONTROL

### Hydraulic operations

Test "liftCONTROL" and check plausibility.

## 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.

<b>Power supply</b>
Clean the battery.
Clean and grease the battery terminals.
Measure acid density and battery voltage.
Correct the battery-acid level using demineralised water.

## 1.2.2 Inspection contents

The following points must be checked:

### 1.2.2.1 Standard equipment

<b>Brakes</b>
Brake linings for wear and 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 emergency disconnect switch and check for damage
Contactors and/or relays for wear and damage
Check electrical wiring for damage (insulation damage, connections) and check whether the fuse ratings are correct

<b>Power supply</b>
Battery latch and battery attachment for correct function and damage
Battery cable guide for damage
Battery connector for secure fit, functionality and damage

<b>Travel</b>
Deadman switch for function and damage
Drive system bearings for wear and damage
Drive support plate for secure fit 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
Battery trolley lock for functionality and 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

<b>Chassis/structure</b>
Check mast is securely attached
Check mast bearings for wear
Rails for wear and damage
Mechanism to protect against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Supports / tilt safety devices for presence and damage
Check the overhead guard and/or the driver's cab for secure attachment and damage

<b>Hydraulic operations</b>
Test hydraulic controls and check their labels for legibility, completeness and plausibility
Lift mechanism for wear, functionality and damage
Check cylinders and piston rods are securely attached and check for damage
Lift cylinder clamps for wear and 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
Test hydraulic system
Check sliding blocks for completeness, wear and damage
Check fork arms or load handler for wear and damage
Side shift for functionality and damage
Check cylinder seals for leaks and damage
Check cylinder rods and their bushings for wear and damage
Check the hoses, pipes and connections are securely attached and check for wear, leaks, damage, blisters and kinks
Check piston rod screw depth and counter-fixing/clamping
Check tilt cylinders and mounting for leaks, wear and damage
Mast holder guide rollers for wear and damage

<b>Steering</b>
Electric steering and its components for function, wear and damage
Steering bearings, steering play and steering gear teeth or steering chain for wear and damage
Steering block for wear and damage

## 1.2.2.2 Optional Equipment

### Electrolyte recirculation

<b>Power supply</b>
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Hose connections and pump for correct function
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### Aquamatic

<b>Power supply</b>
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Aquamatic plug, hose connections and float for functionality and sealing
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Flow indicator for functionality and sealing
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### Battery refill system

<b>Power supply</b>
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Refill system for functionality and leaks
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### Fork positioner

<b>Hydraulic operations</b>
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Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage
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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
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### Clamping device

<b>Hydraulic operations</b>
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Test acknowledgement button
-----------------------------

Test attachment and check for damage
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Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and damage
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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
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## 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 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

## Lift cut-off

### Hydraulic operations

Lift-limit cut-off/lift cut-off for secure fit and 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

## 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

## Weather protection

### Electrical system

Fuses for correct ratings

### Chassis/structure

Test window heating and check for damage

Test doors and check for damage

## Optional electrical equipment

### Electrical system

Test optional electrical equipment and check for damage

## Restraint system

### Chassis/structure

Test driver's seat restraint system and check for damage

## Side shift centre function

### Hydraulic operations

Test side shift centre function

## Strobe light/warning beacon

### Electrical system

Test strobe light/warning beacon and check for damage

## Mast reach damping

### Hydraulic operations

Mast reach damping and its components for functionality and 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

## Lift height display

### System components

Lift height display and its components for functionality and damage

## Belt lock monitoring

### Chassis/structure

Test seat belt monitoring and check for damage

## Automatic crawl speed

### Travel

Sensors/switches for secure fit, functionality and damage

## Discharge strap

### Electrical system

Check presence of electrostatic discharge strap or chain and check for damage

## Lead-acid battery, international

### Power supply

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

Ensure safety labels are present and check for damage

## Lead-acid battery

### Power supply

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

### 1.2.3 Maintenance parts

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

#### 1.2.3.1 Standard equipment

<b>maintenance part</b>	<b>service hours</b>	<b>months</b>
Gear oil	2000	12
Hydraulic system breather filter	2000	12
Hydraulic oil	2000	12
Hydraulic oil filter	2000	12