ESE 220/320

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Operating instructions

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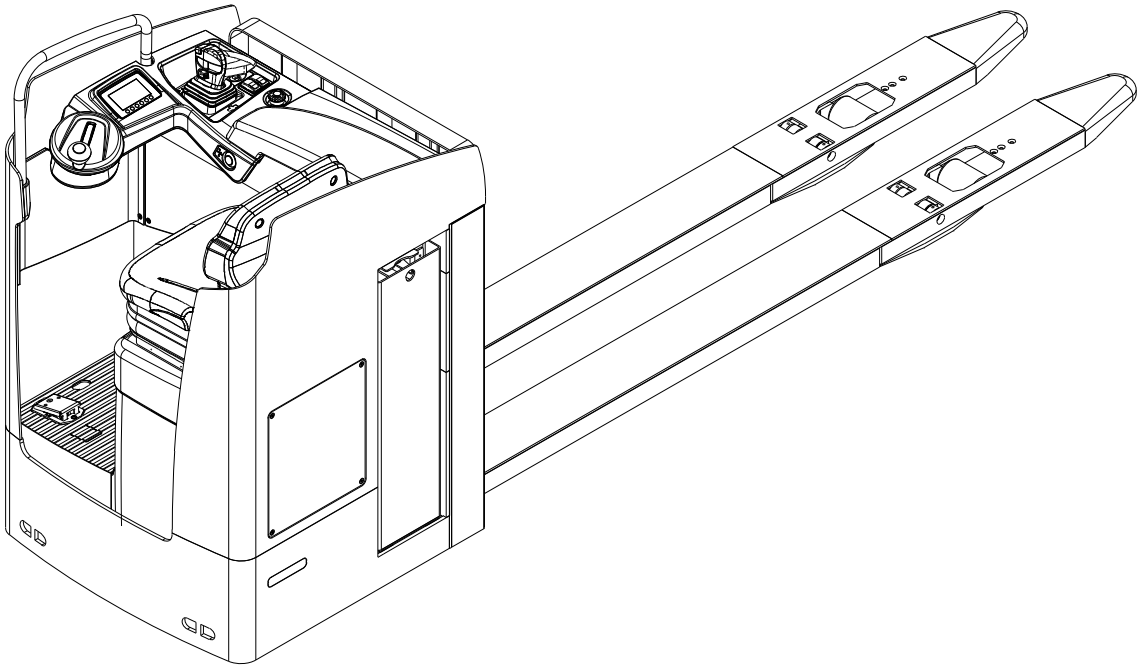
ESE 220
ESE 320



JUNGHEINRICH

Declaration of Conformity

CE

Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

Description
Industrial truck

Type	Option	Serial no.	Year of manufacture
ESE 220 ESE 320			

On behalf of

Date

EU DECLARATION OF CONFORMITY

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

UK CA

JUNGHEINRICH

Declaration of Conformity (○)

Product:	ESE 220/320 Serial number/type number
Manufacturer:	Jungheinrich Aktiengesellschaft 22039 Hamburg, Germany
UK representative:	Jungheinrich UK Ltd Sherbourne House Sherbourne Drive Tilbrook Milton Keynes MK7 8HX

Authorised to compile documentation:

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

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

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

Supply of Machinery (Safety) Regulations 2008 No. 1597

and

Electromagnetic Compatibility Regulations 2016 No. 1091

Signed for and on behalf of:

Jungheinrich Aktiengesellschaft

11.22 en-GB

Foreword

Notes on the operating instructions

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

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

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

Safety notices and text mark-ups

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

⚠ DANGER!

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

⚠ WARNING!

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

⚠ CAUTION!

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

NOTICE

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

➔ Used before notices and explanations.

●	Indicates standard equipment
○	Indicates optional equipment

Jungheinrich Aktiengesellschaft

Friedrich-Ebert-Damm 129
22047 Hamburg - Germany

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

www.jungheinrich.com

11.22 en-GB

Contents

A Correct Use and Application

1 General

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

2 Correct application

NOTICE

The maximum load and load distance are indicated on the capacity plate and must not be exceeded.
The load must rest on the load handler or be lifted by an attachment approved by the manufacturer.
The load must be fully raised, see page 115.

The following operations are in accordance with regulations and are permitted:
– Lifting and lowering loads.
– Transporting lowered loads.

The following operations are prohibited:
– Carrying and lifting passengers.
– Pushing or pulling loads.

3 Approved application conditions

⚠ WARNING!

Use under extreme conditions

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

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

Ground conditions

The condition of the ground on which the truck is used must satisfy the following requirements:

- The ground must be level, secure and have sufficient capacity.
- The ground must be free from oil and grease.
- In accordance with EN 1081, the earthing resistance of the ground must not exceed 1 MΩ.
- The following also applies for stacking:
  - The capacity data specified on the truck applies to horizontal ground that meets the specifications in the table below.

Limit values for deviations from level

Reference	**Limit values (mm) for measuring point distances (m)** [1]				
Finished floors e.g. screed on its own, screed for accommodating floor coverings, floor coverings, tile coverings, smoothed and bonded surfaces	≤ 0.1 m	1 m	4 m	10 m	≥15 m
	2 mm	4 mm	10 mm	12 mm	15 mm
[1)] *Specifications in accordance with DIN 18202:2019-07 - Table 3 - row 3 - limit values for deviations from level*					

- Operation in industrial and commercial environments.
- Permissible temperature range – see page 15 and following.
- Operation only on secure, level surfaces with sufficient capacity.
- Do not exceed the permissible surface and point loading limits on the travel paths.
- Operation only on routes that are visible and approved by the operating company.
- Negotiating slopes up to a maximum of 13 %.
- Do not travel across or at an angle on slopes. Travel with the load facing uphill.
- Use in non-public transport.
- Permissible altitude during operation up to 2000 m above the average sea level.

Changing the application areas and thawing

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

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

3.1 Instructions for trucks with lithium-ion batteries

⚠ WARNING!

Danger of accidents due to regenerative braking fault

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

▶ Keep all persons out of the hazardous area during travel operations.

▶ Instruct other people to move out of the hazardous area of the truck. Stop working with the truck if people do not leave the hazardous area.

▶ In emergencies, use the service brake for braking.

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

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

A notification symbol appears on the display unit when the temperature of the lithium-ion battery is outside the permissible range – see page 82.

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

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

– Use in a cold store (below -10 °C) is prohibited.

3.2.1 Truck in General

Operating and ambient conditions	
Permissible temperature range	-10 °C to +40 °C
Temperature range for secure parking	+5 °C to +40 °C
Maximum relative air humidity	95% non-condensing

3.2.2 Trucks with Lead-Acid Battery

Operating and ambient conditions	
Permissible temperature range	-10 °C to +40 °C
Minimum temperature for charging	+5 °C
Maximum relative air humidity	95% non-condensing

3.2.3 Integrated Modular Lithium-Ion Battery

Operating and ambient conditions	
Permissible temperature range	-10 °C to +40 °C
Minimum temperature for charging	+5 °C
Maximum relative air humidity	95% non-condensing

3.3 Internal Operation in Cold Stores with Cold Store Equipment (○)

NOTICE

Cold store trucks

▶ Trucks designed for use in cold stores have a cold store hydraulic oil and a protective frame instead of a mast guard on the mast.

▶ If a truck with cold store oil is used outside the cold store, the lowering speeds may increase.

NOTICE

Battery damage at low state of charge and at low temperatures

A low state of charge and increasing cooling can damage the battery. To avoid damage, observe the following:

▶ If the battery charge is low, do ***not*** use the truck in temperatures from -28 °C to -5 °C.

▶ If the battery charge is low, avoid using the truck in temperatures from -5 °C to +5 °C ***where possible***.

▶ Charge the battery – see page 55.

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

– In cold store areas below -10 °C, the truck must be operated **continuously** and must not be parked securely for more than 15 minutes.

3.3.1 Truck in General

Operating and ambient conditions	
Permissible temperature range	-28 °C to +25 °C
Temperature range for secure parking	+5 °C to +40 °C
Maximum relative air humidity	95% non-condensing

3.3.2 Trucks with Lead-Acid Battery

Operating and ambient conditions	
Permissible temperature range	-28 °C to +25 °C
Minimum temperature for charging	+5 °C
Maximum relative air humidity	95% non-condensing

3.3.3 Integrated Modular Lithium-Ion Battery

Operating and ambient conditions	
Permissible temperature range	-28 °C to +25 °C
Minimum temperature for charging	+5 °C
Maximum relative air humidity	95% non-condensing

3.4 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.

4 Proprietor responsibilities

For the purposes of the present operating instructions the “operating company” is defined as any natural or legal person who either uses the industrial truck himself, or on whose behalf it is used. In special cases (e.g. leasing or renting) the 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.

5 Adding attachments and/or optional equipment

The mounting or installation of additional equipment which affects or enhances the performance of the industrial truck requires the written permission of the manufacturer. Local authority approval may also need to be obtained.
Local authority approval however does not constitute the manufacturer’s approval.

6 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 ESE 220/320 is a four-wheel, electric side-seated pallet truck with a driver's seat equipped with an electric steering wheel system.
The ESE 220/320 is designed to transport goods on level surfaces. The truck can lift open bottom or diagonal board pallets beyond the area of the load wheels as well as roll cages. It can transport low stacked loads over long distances. The capacity is shown on the load chart, Qmax.

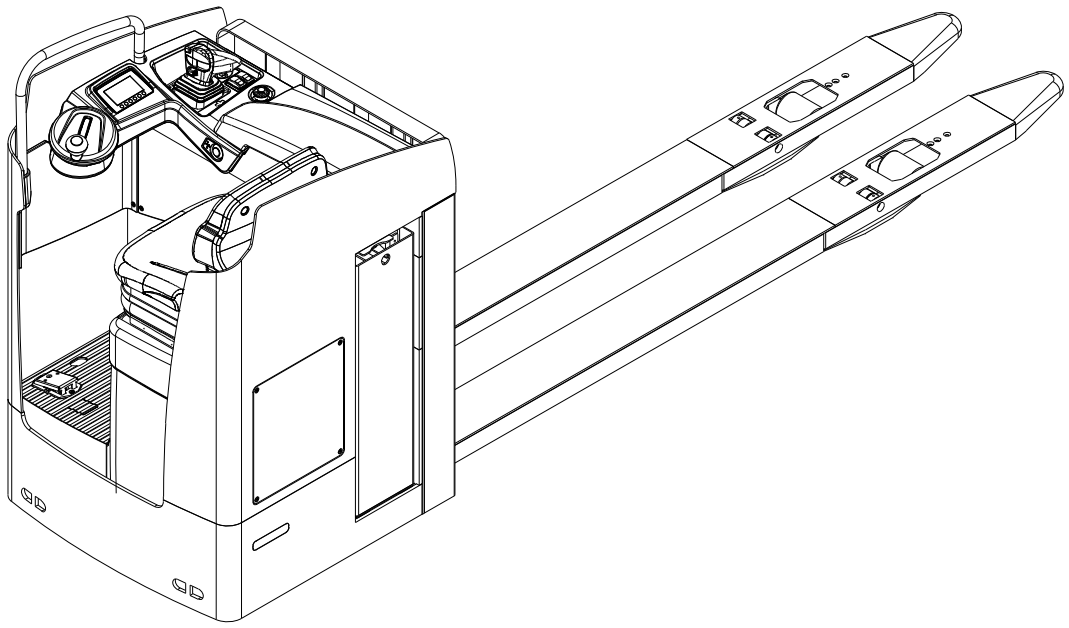
1.1 Truck models and rated capacity

The rated capacity depends on the model and can be derived from the type designation.

ESE 220

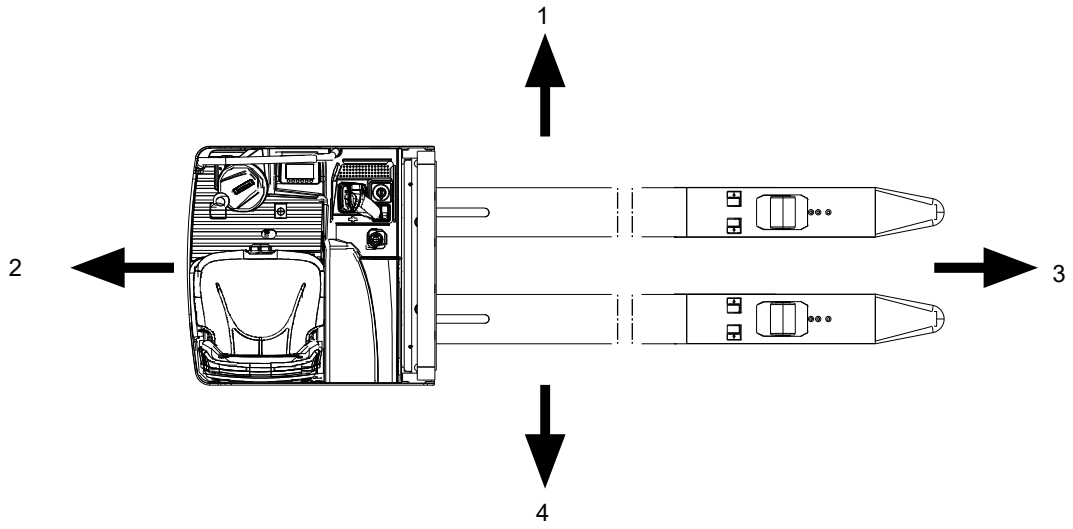
ESE	Type designation
2	Series
20	Rated capacity x 100

The rated capacity Qmax is indicated on the data plate or the capacity plate.



2 Travel direction definition

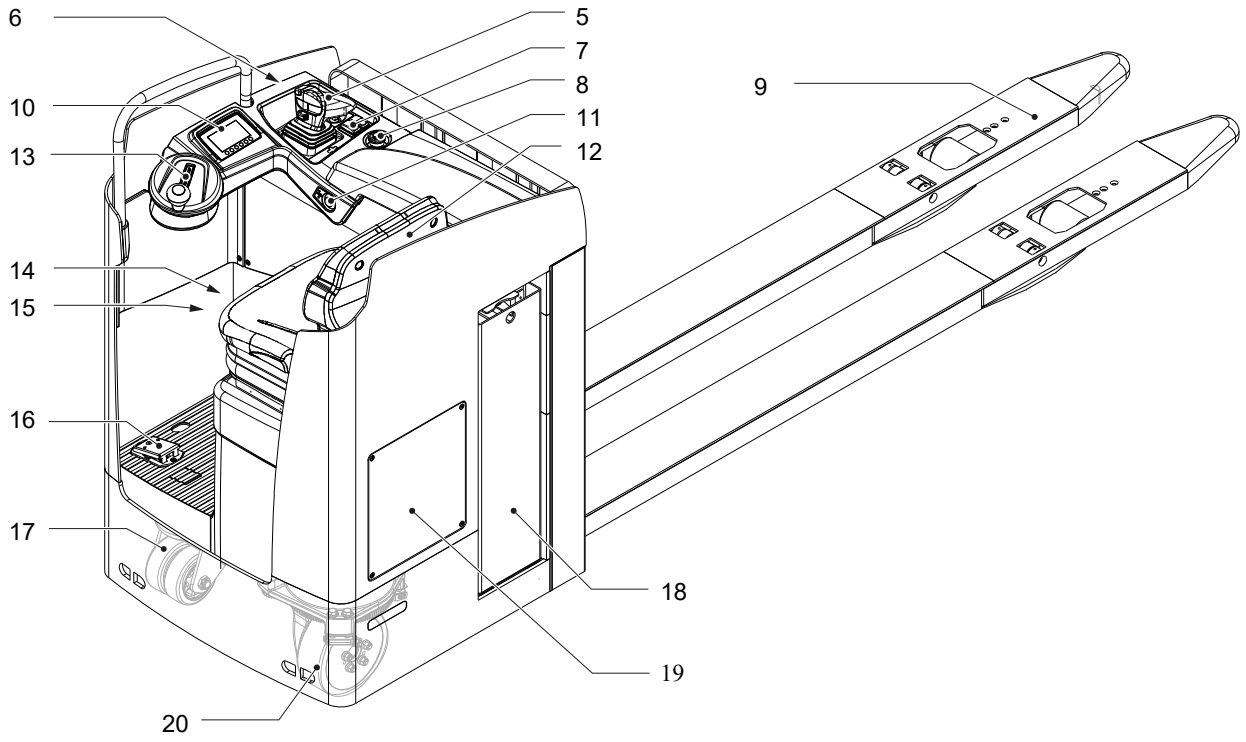
The following determinations have been made for travel direction specification:



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

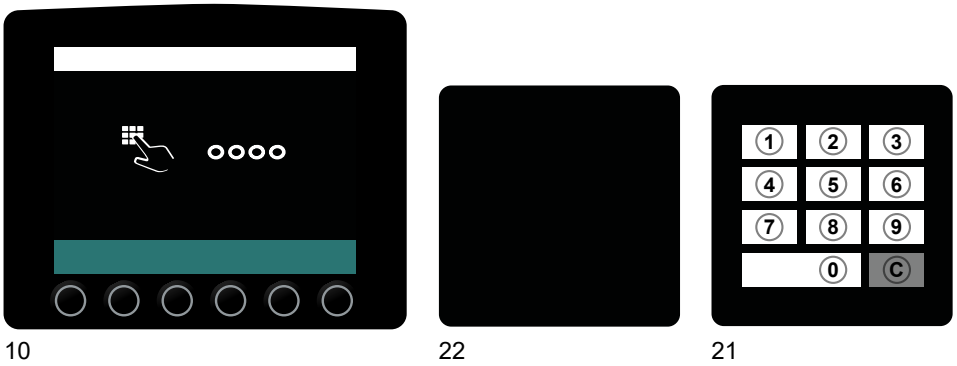
3 Assemblies and Functional Description

3.1 Assembly Overview



Item		Description
5	●	multiPILOT
6	●	Access systems
7	○	Seat heating switch
8	●	Emergency disconnect switch
9	●	Load fork
10	●	Display unit (4-inch display)
11	●	Floor-plate height adjuster
12	●	Driver's seat
13	●	Steering wheel
14	●	Seat adjustment lever
15	●	Seat cushioning adjusting wheel
16	●	Deadman button
17	●	Support wheel
18	●	Battery
19	●	Service flap
20	●	Drive wheel

3.1.1 Access systems



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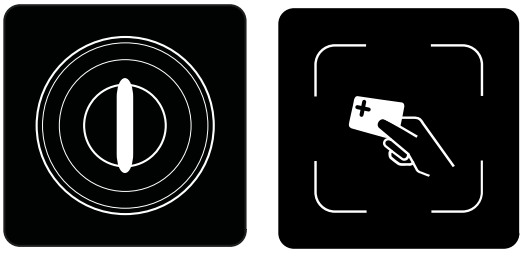
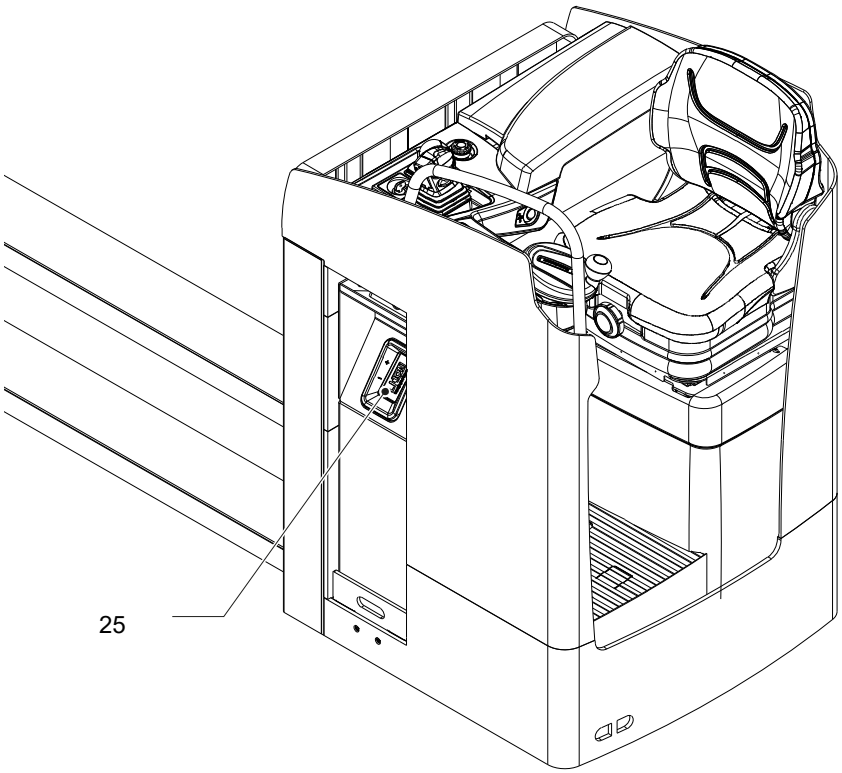


23 24

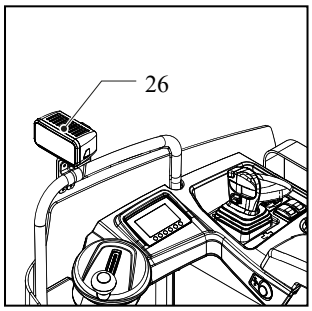
Item		Description
10	●	Display unit with 4-inch display
21	○	Keypad
22	●	Panel
23	○	Key switch
24	○	Transponder reader Plus

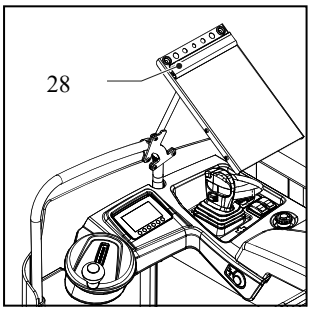
3.1.2 Comfort Charging Socket for the Lithium-Ion Battery

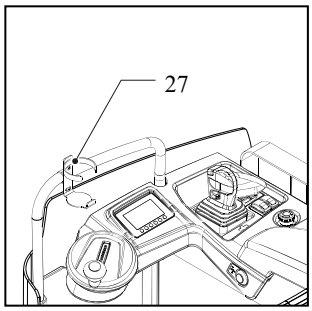


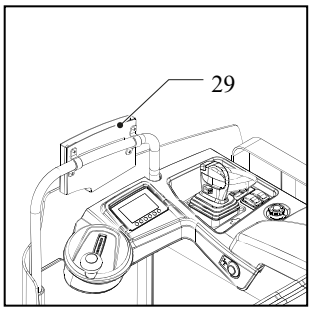
Item		Description
25	●	Comfort charging socket

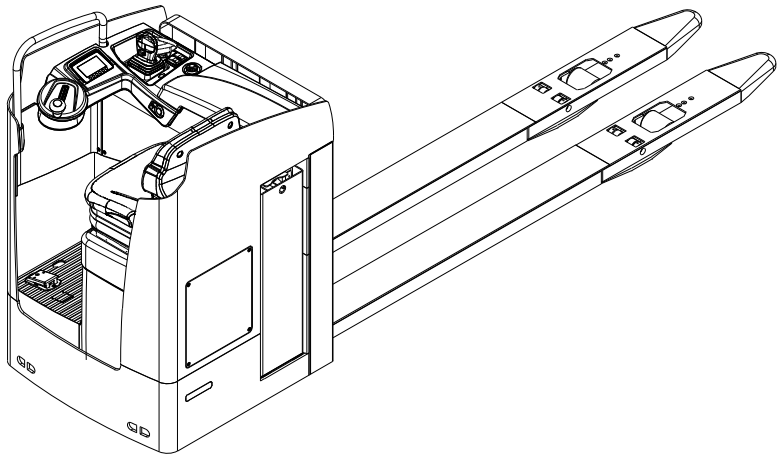
3.1.3 Options











Item		Description
26	○	Red or blue LED light (Floor-Spot)
27	○	Cup holder
28	○	Writing board
29	○	A4 storage facility

3.2 Functional Description

Safety equipment

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

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

Emergency Stop safety feature

The emergency stop is controlled by the traction controllers. The steering controllers send a system status signal which is monitored by the traction controllers. If the signal fails to appear or a fault is identified the truck automatically brakes to a halt. Control displays on the driver’s display indicate the emergency stop. Each time the truck is switched on the system performed a self diagnosis. The parking brake is only released once the functional test has been passed. The parking brake must then be released by pressing a button.

Emergency stop reset

An emergency stop reset is carried out by turning the key switch off and on and by switching the emergency disconnect switch off and on.

Operator position

The driver's seat and floor plate can be adjusted to suit different sized operators. All travel and lift operations can be performed sensitively without having to reach. The ergonomic steering wheel provides secure control of the truck.

Deadman switch

The deadman switch ensures that the driver's feet do not extend outside the truck during travel. The deadman switch in the foot compartment must be depressed to enable the driver to operate the truck. Lifting and travel are inhibited if the operator takes his foot off the deadman switch. Steering and braking remain enabled.

Hydraulic system

When lifting is activated, the pump unit starts to operate, supplying hydraulic oil from the oil reservoir to the lift cylinder.

When the lift button is pressed, the support arms are raised at an even speed; when the lower button is pressed, the support arms are lowered.

Drive system

A fixed AC three-phase motor actuates the drive wheel via a bevel spur gearbox. The electronic traction controller ensures smooth drive-motor-speed control and hence smooth starting, powerful acceleration and electrically controlled braking with energy regeneration. The driver can choose from 3 travel programs depending on the load and the environment: from high-performance to energy-saving.

Steering

The operator steers with an ergonomically inclined steering wheel. The steering motion is transmitted from the steering controller via a steer motor directly to the ring gear of the pivoted drive system. The drive wheel can be rotated ± 90°.

Electrical system

The truck is equipped with an electronic traction, lift and steering controller. The truck electrical system operates with a rated operating voltage of 24 V.

Controls and displays

Controls and displays are clearly arranged in the operator position. The controls on the multiPILOT (5) enable the travel direction, lifting/lowering and the transmitter to be controlled with one hand. Display unit (104) with large LC display as well as integrated hour meter, battery discharge indicator and speed display.

Load backrest (○)

A load backrest is recommended as an additional protective mechanism to move low or small item loads. The load backrest is mounted on the load handler and protects the operator and truck against falling loads.

➔ The extended mast height (h4) increases according to the load backrest mounted on the load handler.

Floor-Spot (○)

The activated Floor-Spot forewarns people of the truck travel path by projecting a coloured light dot onto the floor at the set distance.

The Floor-Spot is available in two versions:

– With blue light dot
– With red light dot

➔ Further information: see page 42 and see page 136.

zoneCONTROL (○)

zoneCONTROL is a radio-based assistance system. It comprises a stationary radio anchor, a mobile component on the truck including display and a module for personnel. As well as warnings about trucks and personnel in blind spots, transport hubs can also be regulated such that a high level of truck traffic in this area causes the maximum speed to be reduced to slow travel.

The same radio anchor can also be connected to the control unit of a hall gate so that it opens when an authorised truck approaches and remains closed to unauthorised trucks.

➔ Further information: see page 137.

curveCONTROL

The curveCONTROL assistance system helps the operator to operate the truck safely. When cornering, the maximum travel speed is reduced according to the steer angle.

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

3.2.1 Hourmeter

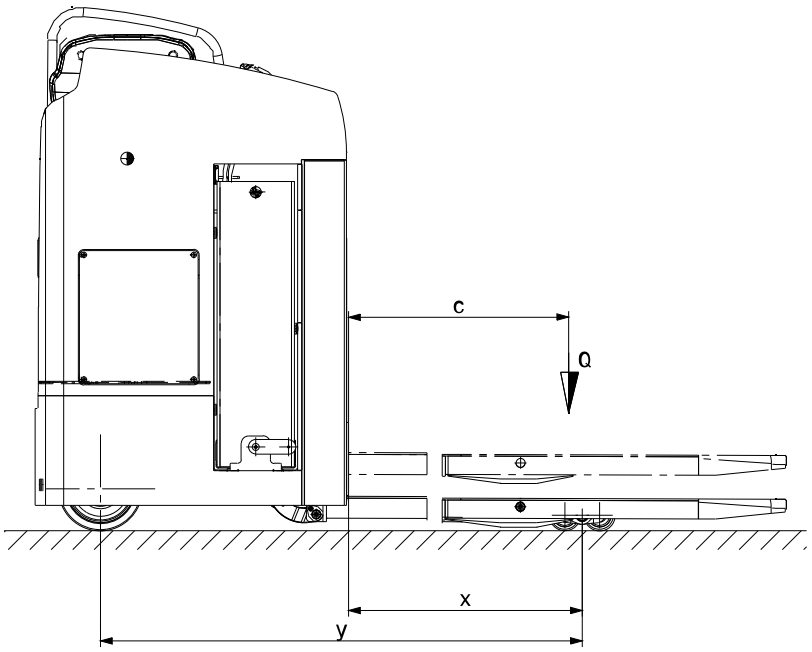
Service hours are counted while the truck is operational and the deadman button is pressed.

4 Technical Specifications

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

4.1 ESE 220

4.1.1 Characteristics



			ESE 220
Manufacturer (short designation)			Jungheinrich
Manufacturer's type designation			ESE 220
Drive system			Electric
Operation			Seat
Capacity/load	Q	kg	2000
Rated capacity/load for mast lift	c	kg	600
Load distance	x	mm	868
Wheelbase	y	mm	1548

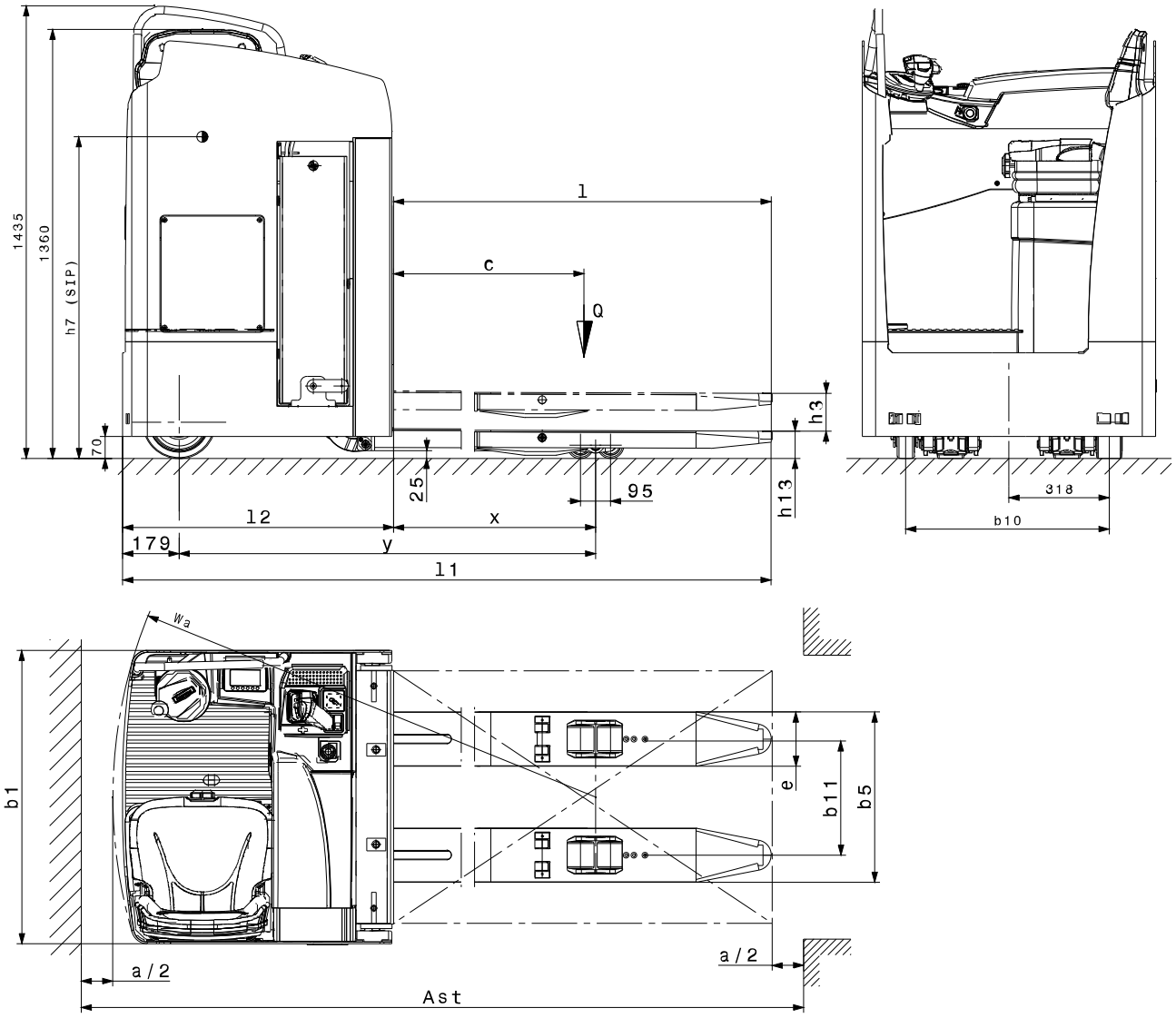
4.1.2 Weights

		ESE 220
Net weight (incl. battery)	kg	1062
Axle load with load front/rear	kg	1896 / 1142
Axle load without load front/rear	kg	258 / 808

4.1.3 Wheels/Chassis

			ESE 220
Tyres			Polyurethane (PU)
Tyre size, front			Ø 230 x 78
Tyre size, rear			Ø 85 x 85
Additional wheels			Ø 140 x 54
Wheels, number front / rear (x = driven)			2 + 1x/4
Track width, front	b_{10}	mm	544
Track width, rear	b_{11}	mm	380

4.1.4 Basic Dimensions



			ESE 220
Lift (h3)	h_3	mm	125
Seat height / standing height	h_7	mm	1020
Lowered height	h_{13}	mm	90
Overall length	l_1	mm	2009
Length to fork shank	l_2	mm	859
Overall width	b_1	mm	820
Fork-arm dimensions	s/e/l	mm	60 x 172 x 1150
Width across forks	b_5	mm	540
Ground clearance, centre of wheelbase	m_2	mm	25
Aisle width (pallet 800x1200 lengthways)	Ast	mm	2259
Turning radius	W_a	mm	1739

4.1.5 Performance data

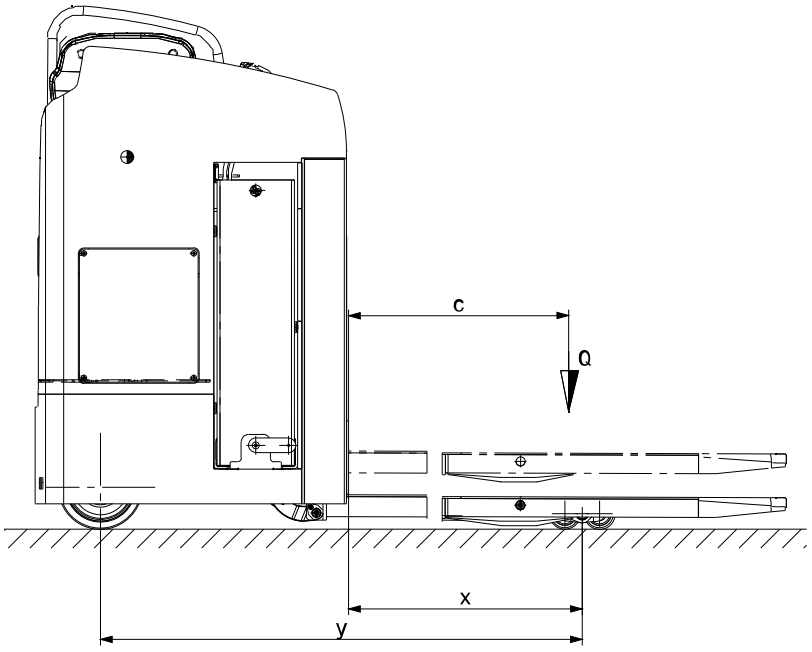
		ESE 220
Travel speed with/without load	km/h	10 / 12.5
Lift speed with/without load	m/s	0.06 / 0.07
Lowering speed with/without load	m/s	0.06 / 0.05
Max. gradeability with/without load	%	8 / 13
Service brake		Electric

4.1.6 Electric Motor

		ESE 220
Drive motor, output S2 60 min	kW	2.8
Lift motor, output at S3	kW	2.2
Battery according to DIN 43531/35/36		No
Battery voltage/nominal capacity	V/Ah	24 / 465
Battery weight	kg	380
Energy consumption according to EN cycle	kWh/h	0.41
CO2 equivalent according to EN 16796	kg/h	0.2

4.2 ESE 320

4.2.1 Characteristics



			ESE 320
Manufacturer (short designation)			Jungheinrich
Manufacturer's type designation			ESE 320
Drive system			Electric
Operation			Seat
Capacity/load	Q	kg	2000
Rated capacity/load for mast lift	c	kg	600
Load distance	x	mm	868
Wheelbase	y	mm	1548

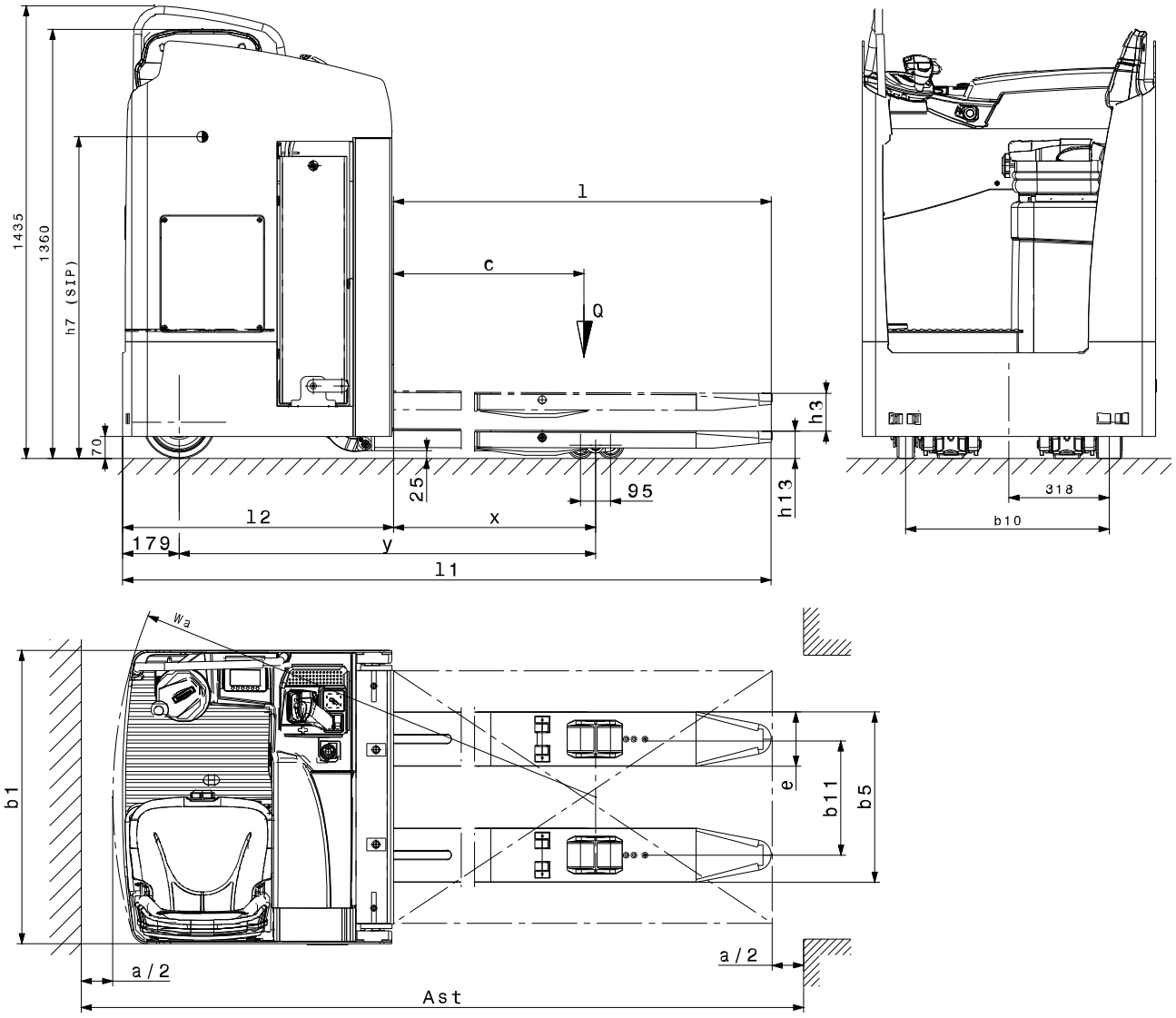
4.2.2 Weights

		ESE 320
Net weight (incl. battery)	kg	1074
Axle load with load front/rear	kg	1902 / 1182
Axle load without load front/rear	kg	264 / 816

4.2.3 Wheels/Chassis

			ESE 320
Tyres			Polyurethane (PU)
Tyre size, front			Ø 230 x 78
Tyre size, rear			Ø 85 x 85
Additional wheels			Ø 140 x 54
Wheels, number front / rear (x = driven)			2-1x/4
Track width, front	b_{10}	mm	645
Track width, rear	b_{11}	mm	385

4.2.4 Basic Dimensions



			ESE 320
Lift (h3)	h_3	mm	125
Seat height / standing height	h_7	mm	1020
Lowered height	h_{13}	mm	90
Overall length	l_1	mm	2009
Length to fork shank	l_2	mm	859
Overall width	b_1	mm	930
Fork-arm dimensions	s/e/l	mm	60 x 172 x 1150
Width across forks	b_5	mm	540
Ground clearance, centre of wheelbase	m_2	mm	25
Aisle width (pallet 800x1200 lengthways)	Ast	mm	2259
Turning radius	W_a	mm	1751

4.2.5 Performance data

		ESE 320
Travel speed with/without load	km/h	10 / 12.5
Lift speed with/without load	m/s	0.06 / 0.07
Lowering speed with/without load	m/s	0.06 / 0.05
Max. gradeability with/without load	%	8 / 13
Service brake		Electric

4.2.6 Electric Motor

		ESE 320
Drive motor, output S2 60 min	kW	2.8
Lift motor, output at S3	kW	2.2
Battery according to DIN 43531/35/36		No
Battery voltage/nominal capacity	V/Ah	24 / 465
Battery weight	kg	380
Energy consumption according to EN cycle	kWh/h	0.43
CO2 equivalent according to EN 16796	kg/h	0.2

4.3 EN norms

Continuous sound pressure level

– ESE 220/320: 73 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

– ESE 220: 0,42 m/s²

in accordance with EN 13059.

The vibration acceleration acting on the body in its operating position is the linearly integrated, weighted acceleration in the vertical axis according to the standard. It is calculated when travelling over thresholds at constant speed (standard truck version). These recordings were taken on a single occasion for the truck and must not be confused with the human vibrations of the operator directive. The manufacturer offers a special service to measure these human vibrations, see page 160.

Electromagnetic compatibility (EMC)

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

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

⚠ WARNING!

Damage to medical equipment due to non-ionising radiation

Electrical equipment on the truck carrier emitting non-ionising radiation (e.g. wireless data transmission) can affect operators' medical equipment (pacemakers, hearing aids Etc.) and result in malfunctions. Consult a doctor or the manufacturer of the medical equipment to clarify whether it can be used near the industrial truck.

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

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

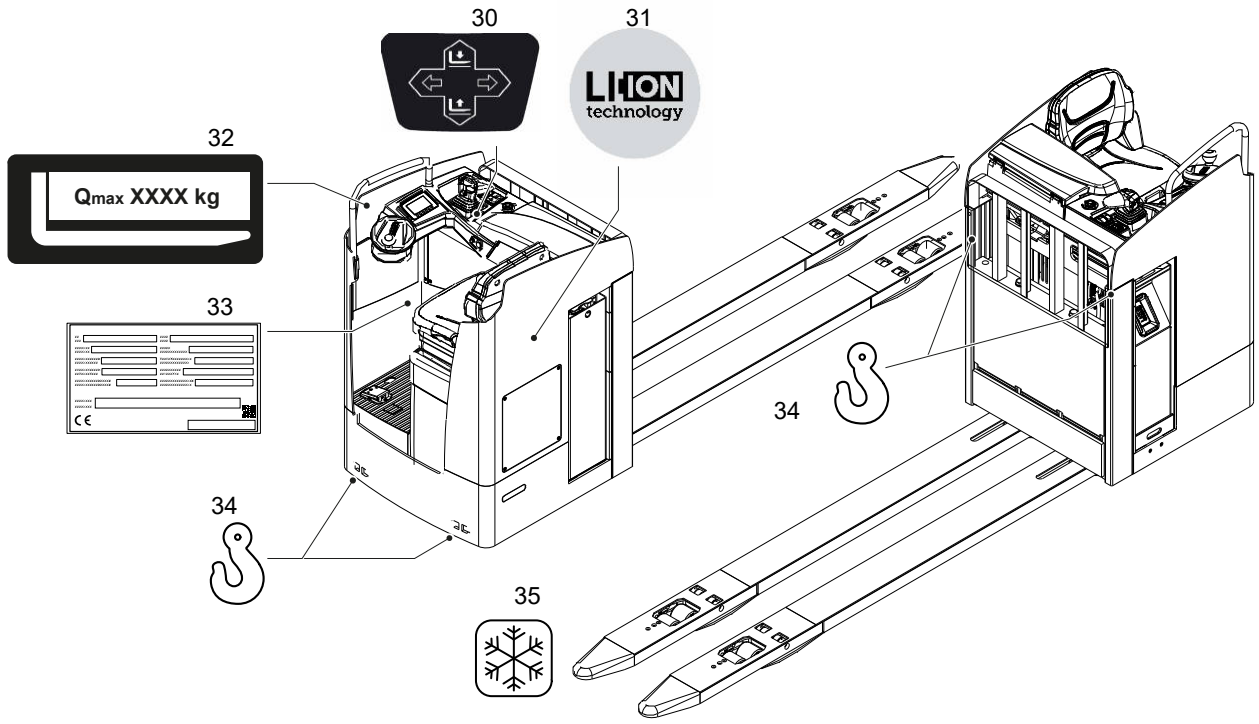
Component	Frequency range	Transmission power
WMT 110	13.56 MHz	< 100 mW
WMT 110	2.4 GHz	10 mW
WMT 110	2.4 GHz (Bluetooth)	≤10 mW
WMT 110	2.4 GHz (WLAN)	≤100 mW
WMT 110	5 GHz	≤100 mW
WMT 115	13.56 MHz	< 100 mW
WMT 115	2.4 GHz	10 mW
WMT 115	2.4 GHz (Bluetooth)	≤10 mW
WMT 115	2.4 GHz (WLAN)	≤100 mW
Transponder reader	13.56 MHz	< 100 mW
Transponder reader Plus	125 kHz	< 500 mW
	13.56 MHz	< 500 mW
Telematics box basic 2G EU	2.4 GHz (Bluetooth)	< 20 mW
	900 MHz (2G)	< 2 W
	1800 MHz (2G)	< 1 W
Telematics Box Basic	2.4 GHz	< 20 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 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 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 (3G)	< 200 mW

Component	Frequency range	Transmission power
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
zoneCONTROL (PULSE)	3649.6 MHz - 4337.6 MHz	0.037 mW
zoneCONTROL (PHASE)	2480 MHz ISM band	100 mW, adjustable

4.5 Electrical Requirements

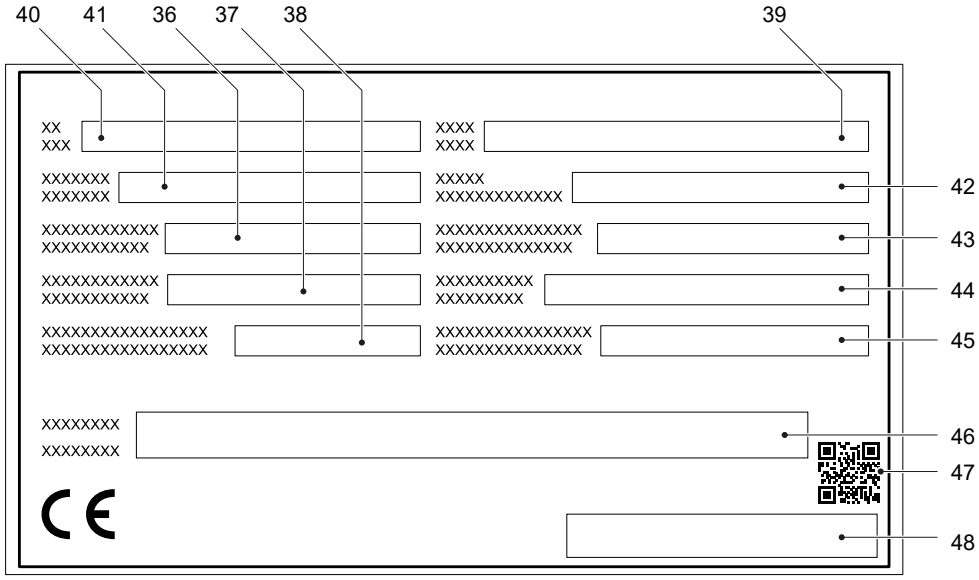
The manufacturer certifies compliance with the requirements for the design and manufacture of electrical equipment, according to EN 1175 "Industrial Truck Safety - Electrical Requirements", provided the truck is used according to its purpose.

5 Identification Points and Data Plates



Item		Description
30	●	"multiPILOT operation" plate
31	○	"Lithium-ion battery" plate
33	●	Data plate
34	●	Attachment point for loading by crane
35	○	"Cold-store equipment" plate
49	●	Truck capacity plate

5.1 Data plate



Item	Description	Item	Description
36	Rated capacity (kg)	43	Load centre distance (mm)
37	Battery voltage (V)	44	Output (kW)
38	Net weight without battery (kg)	45	Min./max. battery weight (kg)
39	Option	46	Manufacturer
40	Type	47	QR code
41	Serial number	48	Manufacturer's logo
42	Year of manufacture		

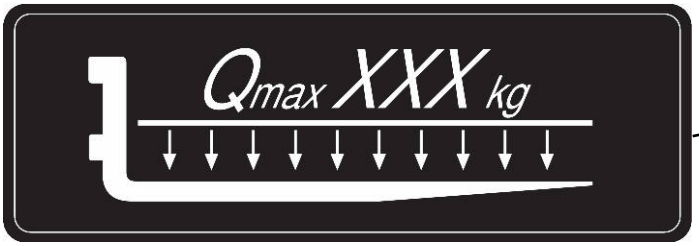
For queries regarding the truck or when ordering spare parts, always quote the truck serial number (41).

QR code

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

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

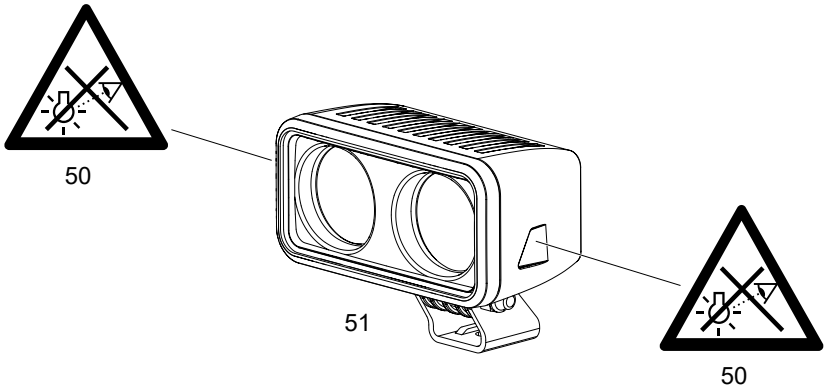
5.2 Truck capacity plate



49

The capacity plate (49) gives the maximum load-bearing capacity (Q) of the truck in kg assuming the load on the load handler is evenly distributed.

5.3 Equipment-dependent marking points



Item		Description
51	○	Revised Floor-Spot version from 2022
50	○	Warning notice: "Danger! Optical radiation" (on trucks with blue Floor-Spot)

C Transport and Commissioning

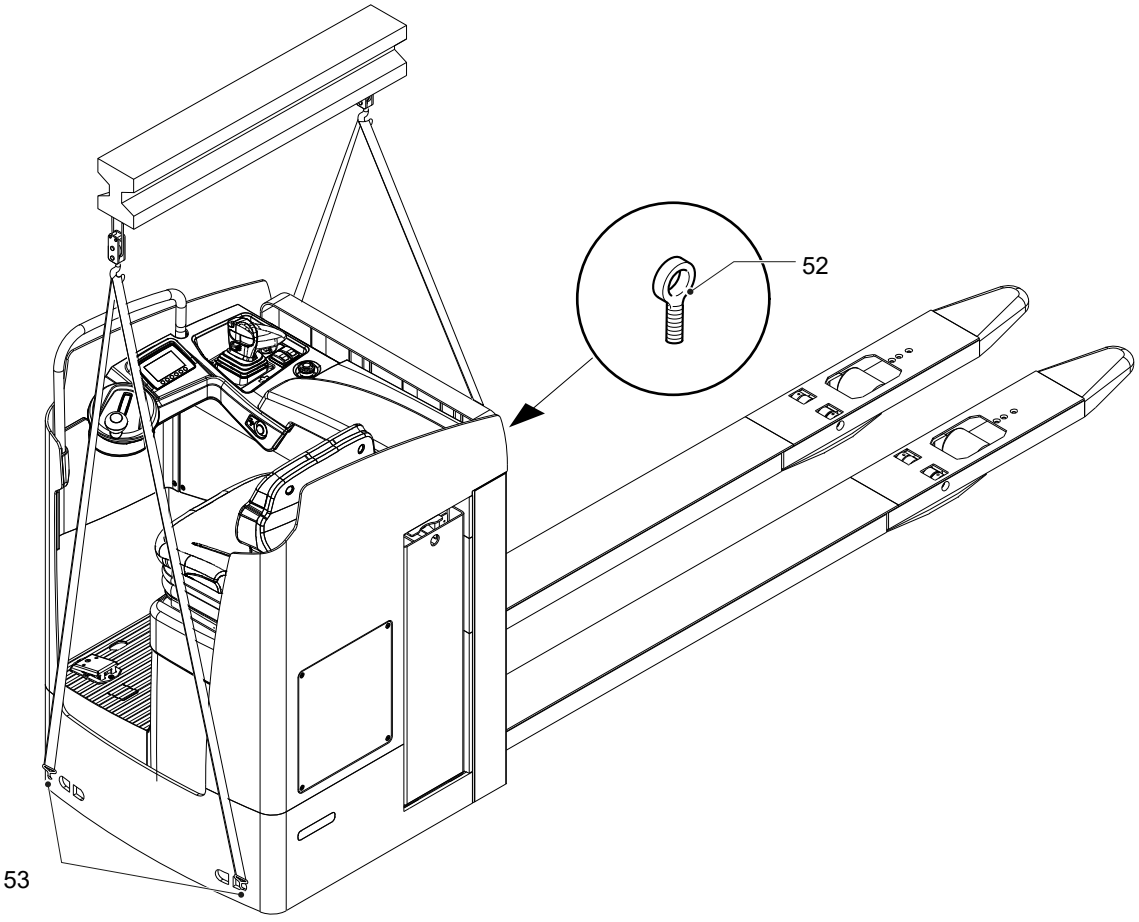
1 Lifting by crane

⚠ WARNING!

Improper loading by crane can result in accidents

Improper use or use of unsuitable lifting gear can cause the truck to fall 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.
- ▶ Loading by crane may only be performed by persons who have been trained in the use of the lifting accessories.
- ▶ Wear personal protective equipment (e.g. safety shoes, hard hat, hi-vis jacket, protective gloves) when loading by crane.
- ▶ Do not stand under suspended loads.
- ▶ Do not enter or stand in the hazardous area.
- ▶ Always use lifting gear with sufficient capacity (observed truck weight in accordance with truck data plate – see page 40).
- ▶ Always secure crane lifting gear to the prescribed attachment points and prevent it from slipping.
- ▶ Use the lifting accessories only in the prescribed load direction.
- ▶ Lifting slings should be fastened in such a way that they do not come into contact with any attachments when lifting.



Lifting the truck by crane

Requirements

– Truck parked securely, see page 97.

Tools and Material Required

– Two ring screws, for capacity details refer to the truck data plate.
– Crane slings, for capacity details refer to the truck data plate.

Procedure

- Remove the dummy plugs from the load section and screw in the two ring screws (52).
- Insert load hooks on either side of the ring screws.
- Secure the load hooks to the strap points (53).
- Raise and load the truck.
- Lower and deposit the truck carefully (see page 97).
- Secure the truck with wedges to prevent it from rolling away.
- Remove the load hooks and unscrew the ring screws.

This concludes the loading by crane.

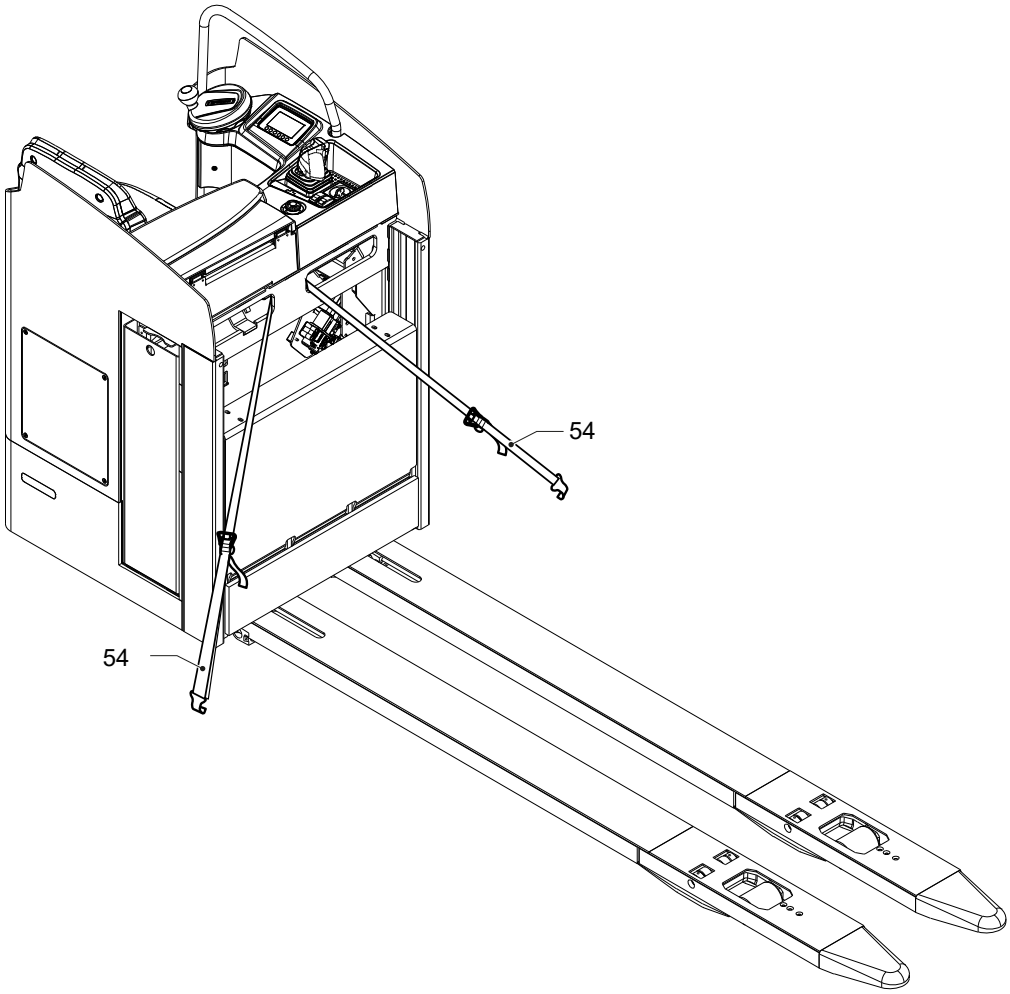
2 Transport

⚠ WARNING!

Uncontrolled movement during transport

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

- ▶ Loading is only to be carried out by specially trained staff. The specialist personnel must be instructed in the securing of loads on road vehicles and in the use of load-securing equipment. When securing the truck, the appropriate measures must be determined and applied for each individual case.
- ▶ The truck must be securely fastened when transported on a lorry or a trailer.
- ▶ The lorry or trailer must have lashing rings.
- ▶ Use wedges to prevent the truck from moving.
- ▶ Use only lashing straps with sufficient load rating.
- ▶ Use anti-slip material to secure loading aids (pallets, wedges,...), e. g. anti-slip mats.



Securing the truck for transport

Requirements

– Load the truck.
– Truck parked securely, see page 97.

Tools and Material Required

– Lashing straps
– Edge protectors
– Wooden beam or pallet

Procedure

- Position the wooden beam or pallet between the front of the transport vehicle and the load handler to ensure a positive fit between the front of the transport vehicle and the load handler.
- Lay the lashing straps (54) over the truck, attach to the transport vehicle and tension sufficiently.

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

The truck can now be transported.

3 Using the Truck for the First Time

⚠ WARNING!

The use of unsuitable energy sources can be hazardous

Rectified AC current will damage the assemblies (controllers, sensors, motors etc.) of the electronic system.
Unsuitable cable connections (too long, insufficient wire cross-section) to the battery (tow cables) can overheat, setting the truck and battery on fire.

▶ The truck must only be operated with battery current.

▶ Cable connections to the battery (tow leads) must be less than 6 m long and have a minimum cross-section of 50 mm².

NOTICE

Do not lift loads if the truck is operated via a tow lead with an external battery.

NOTICE

Cold store trucks

▶ Trucks designed for use in cold stores have a cold store hydraulic oil.

▶ If a truck with cold store oil is used outside the cold store, the lowering speeds may increase.

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

Procedure

- Check the equipment is complete.
- If necessary, install the battery, see page 59. Do not damage the battery cable.
- Charge the battery, see page 55.

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 143).
- Start up the truck (see page 95).

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.

D Battery - Servicing, Recharging, Replacement

1 Notes on types of battery technology

Lead-acid battery

The truck is fitted with a lead-acid battery as standard.

Integrated modular lithium-ion battery (○)

The truck is optionally fitted with an integrated modular lithium-ion battery. All notes and information concerning lithium-ion batteries can be found in these operating instructions.

2 General safety regulations for batteries

⚠ WARNING!

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

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

- ▶ Only Jungheinrich-approved batteries may be used on the truck.
- ▶ Battery equipment may only be replaced with the agreement of Jungheinrich.
- ▶ When replacing/installing the battery, make sure the battery is securely located in the battery compartment of the truck.
- ▶ When replacing or installing the battery and placing the battery cable on the battery, make sure that there will be no damage to the battery cable by pinching, squeezing, twisting or rubbing after closing the battery panel.
- ▶ Do not use batteries that have not been approved by the manufacturer.

- – Do not physically machine or modify the battery.
- – Do not open, damage, penetrate the battery or similar.
- – Keep the battery away from radiant sources and strong heat sources.
- – Observe the specified charging, operating and storage temperature ranges.

Failure to observe these safety instructions can result in fire.

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.

3 Lead-acid battery

3.1 Safety instructions for handling lead-acid batteries

⚠ WARNING!

Risk of accidents and injuries when handling acid batteries

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

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

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 lead-acid 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.

General condition of the battery

The battery cell covers must be kept dry and clean. The terminals and cable lugs must be clean, secure and have a light coating of dielectric grease.

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.

3.2 Battery types

NOTICE

The batteries of this truck are equipped with special battery trays to use with the battery retainer used in the truck.

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

Designation	Voltage/capacity	Dimensions
3PZS10	24 V / 465 Ah	798 x 212 x 784 mm

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

3.3 Exposing the battery

⚠ WARNING!

An unsecured truck can cause accidents

It is hazardous and prohibited to park the truck on inclines, with a raised operator's position or load handler.

- ▶ Park the truck on a level surface. In special cases the truck may need to be secured with wedges.
- ▶ Fully lower the operator's position and 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.

⚠ CAUTION!

Short circuits can result in fire

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

- ▶ Before closing the battery cover make sure that the battery cables are not damaged.
- ▶ Report any defects immediately to your supervisor.
- ▶ Mark defective truck and take out of service.
- ▶ Do not return the industrial truck to service until you have identified and rectified the fault

⚠ CAUTION!

Trapping hazard

There is a risk of trapping when you close the battery cover.

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

NOTICE

The truck must not be parked on transport or escape routes, in front of safety installations, or in front of factory equipment that must be accessible at all times.

Requirements

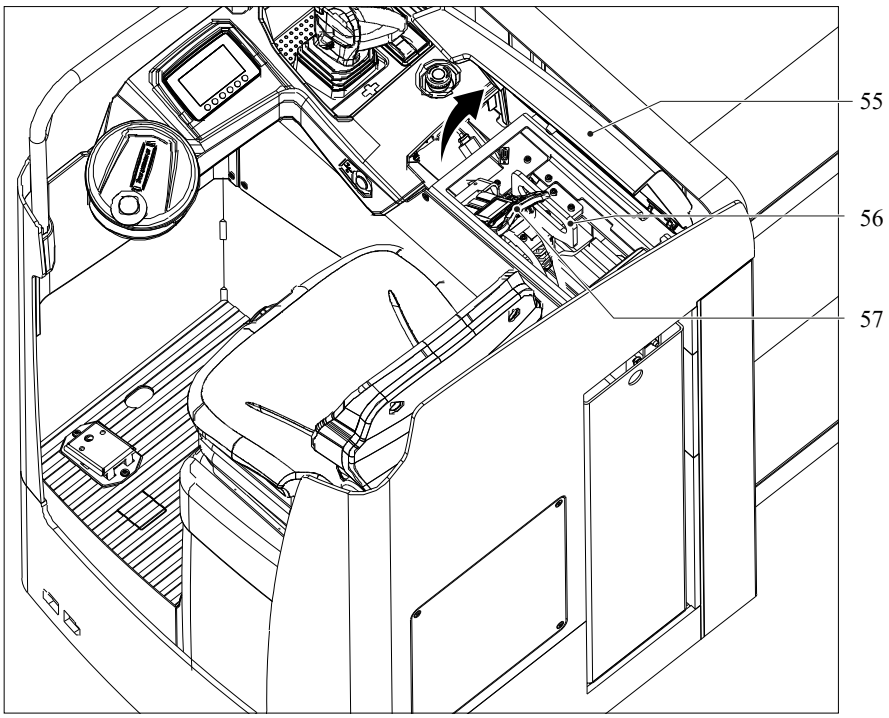
– Truck parked securely – see page 97.

Procedure

➔ The armrest also serves as a battery panel.

Fold up the arm rest (55).

The battery connector (57) and battery latch (56) can be accessed.



3.4 Charging the battery

⚠ WARNING!

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

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

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

⚠ WARNING!

The gases produced during charging can cause explosions

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

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

NOTICE

Risk of fire and risk of material damage

The battery charger must be calibrated for the battery in terms of voltage and charge capacity. Always follow the safety regulations of the battery manufacturer and the charging station manufacturer.

Charging the battery

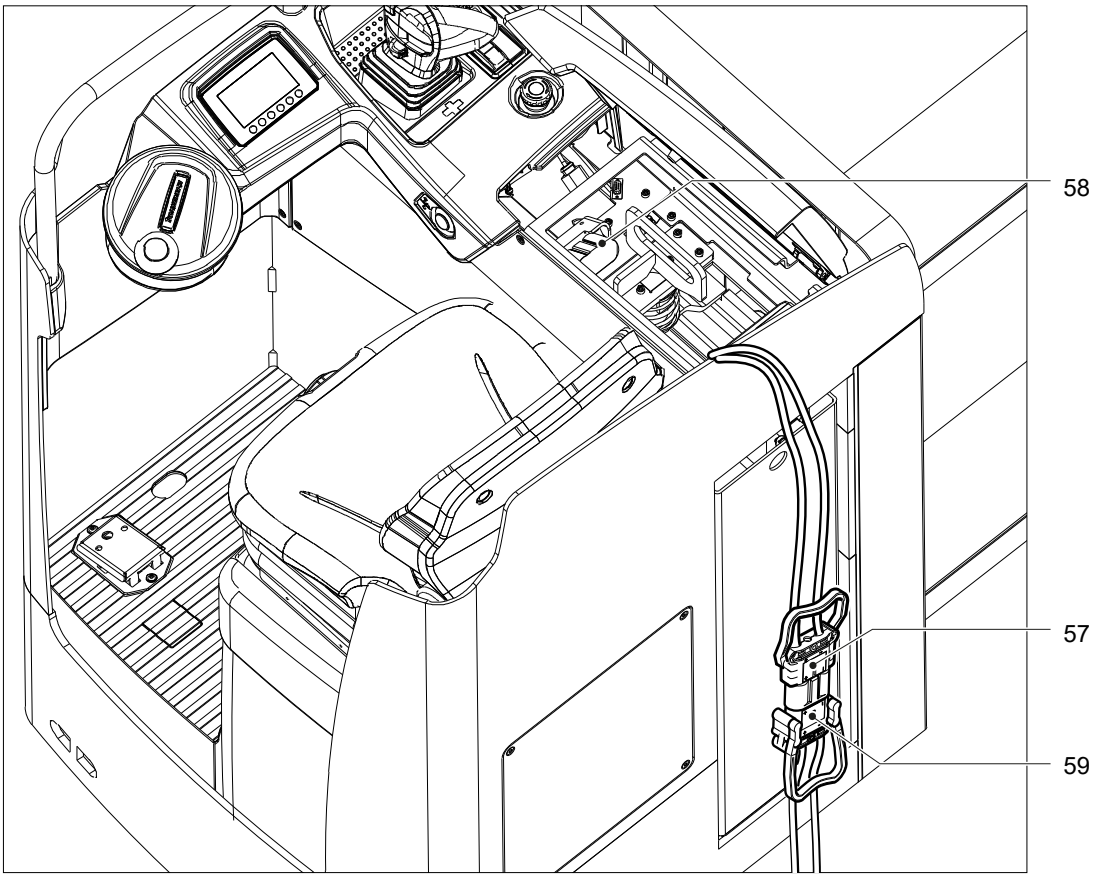
Requirements

– Expose the battery, see page 53.
– Correct charging program set on charger.

Procedure

- Remove the battery connector (57) from the truck plug (58).
- Remove any insulating mats from the battery.
- Connect the battery connector (57) to the charging cable (59) of the stationary charger.
- Start charging in accordance with the charger operating instructions.
- Switch on the charger / charging begins automatically.

The battery is now charged.



Checking the battery acid level

Requirements

– Park the truck securely, see page 97.
– Expose the battery, see page 53.

Procedure

- Remove the battery connector (57) from the truck.
- Place the battery connector (57) on the battery (61).
- Pull the battery lock (56) up.

⚠ CAUTION!

Unsecured battery

An unsecured battery can result in trapping and injury

▶Wear safety shoes when removing and installing the battery.

▶Do not reach between the battery and the chassis.

- Pull the battery (61) half way out of the truck.
- Release the battery lock (56).
- Keep pulling the battery (61) out of the truck until the lock engages on the battery again.
- Check the acid level of the battery (61).
  All indicators should show sufficient acid level, if necessary add battery water, see the operating instructions for the traction battery.
- Pull the battery lock (56) up.

⚠ CAUTION!

Unsecured battery

An unsecured battery can result in trapping and injury

▶Wear safety shoes when removing and installing the battery.

▶Do not reach between the battery and the chassis.

- Push the battery (61) into the truck.
- Release the battery lock (56).
- Keep pushing the battery (61) into the truck until the lock engages on the battery again.

The acid level has now been checked.

NOTICE

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

Completing the battery charge

Requirements

– The battery is fully charged.

Procedure

- Complete charging in accordance with the battery charger operating instructions.
- Remove the battery connector (57) from the charger cable (59) of the stationary battery charger.
- Attach the battery connector (57) to the industrial truck.

Battery charging is complete.

3.5 Removing or installing the battery

⚠ WARNING!

Accident risk during battery removal and installation

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

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

⚠ CAUTION!

Unsecured battery

An unsecured battery can result in trapping and injury

- ▶ Wear safety shoes when removing and installing the battery.
- ▶ Do not reach between the battery and the chassis.

⚠ CAUTION!

Trapping hazard

Trapping hazard when removing and installing the battery.

▶When removing and installing the battery do not put your hands between the battery and the chassis.

Removing the battery

Requirements

– Park the truck securely, see page 97.
– Expose the battery, see page 53.

Tools and Material Required

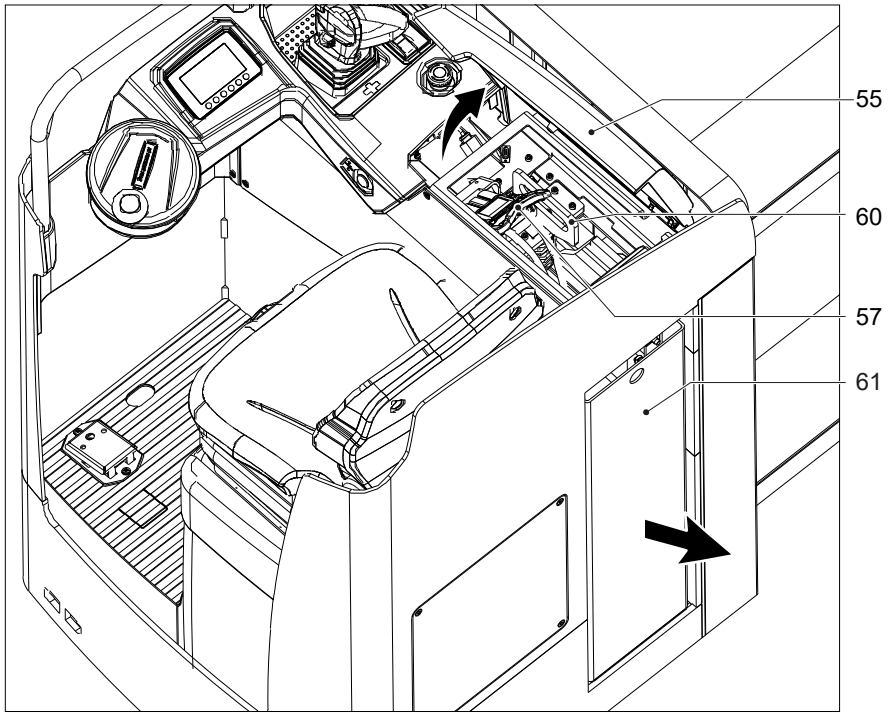
– Battery replacement trolley (○)

Procedure

- Remove the battery connector (57) from the truck.
- Place the battery connector (57) on the battery (61).
- Pull the battery lock (56) up and anti-clockwise as far as it will go
- Pull the battery (61) off the truck.

➔ Observe the battery replacement trolley operating instructions.

The battery is now removed.



Installation is carried out in the reverse order.

⚠ CAUTION!

Trapping hazard

Trapping hazard when removing and installing the battery.

▶When removing and installing the battery do not put your hands between the battery and the chassis.

4 Integrated Modular Lithium-Ion Battery

General information

The truck is optionally fitted with an integrated modular lithium-ion battery. All notes and information concerning lithium-ion batteries can be found in these operating instructions.

The Jungheinrich lithium-ion batteries are maintenance-free batteries with rechargeable high-performance energy cells. The batteries' daily operating time can be extended through intermediate charges.

Battery management system

The lithium-ion battery is continually monitored by the battery management system. The battery management system checks such things as the cell temperature, the voltage and the charge status of the cells, as well as enabling charge and discharge processes.

Faults or messages warning of approaching critical values are displayed, and the truck is switched off if necessary.

The battery management system is attached to the truck via an interface connector.

→ The battery management system data can be checked by the manufacturer's customer service department.

4.1 Safety regulations for handling lithium-ion batteries

4.1.1 Correct application

⚠ WARNING!

Do not open the battery!

If external influences (e.g. force, fire, flooding) cause unusual conditions or situations, the following instructions must be observed:

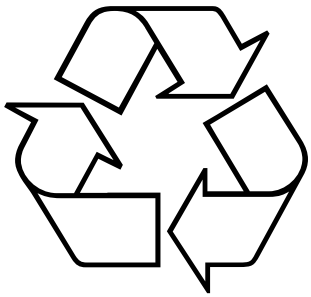
– The battery cells inside the lithium-ion battery contain substances that can be flammable if they come into contact with oxygen or water.
– The substances can escape if the battery cells are exposed to high pressure, an external fire or are mechanically damaged by force.
– The amount of these substances is so small that caution is only required in the immediate vicinity of the battery.

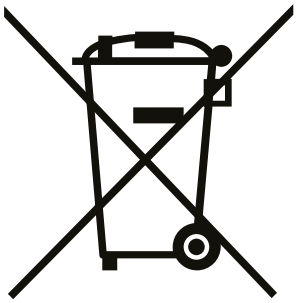
4.1.2 Disposal

NOTICE

Lithium-ion batteries must be disposed of in accordance with the relevant national environmental protection regulations.

▶ For lithium-ion battery disposal, contact the manufacturer's customer service department.





Used lithium-ion batteries are recyclable commodities. These batteries must be treated as hazardous waste.

Lithium-ion batteries marked with the recycling symbol and the sign showing a crossed-out waste bin must not be disposed of with ordinary household waste.

Return or recycling of batteries must be ensured, for example, in accordance with the Battery Directive 2006/66/EG. Buy-back terms and the manner of recycling must be agreed with the manufacturer.

4.1.3 Shipping information

The Jungheinrich lithium-ion battery is a hazardous material. The applicable ADR regulations must be observed during transport.

➔ ADR = Accord européen relatif au transport international des marchandises Dangereuses par Route.

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

A modular lithium-ion battery integrated into the truck can be transported with the truck without special precautions.

4.1.4 Battery lifetime and maintenance

NOTICE

Damage to the lithium-ion battery due to discharge

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

- ▶ Fully charge the battery before extended downtimes.
- ▶ To ensure a long service life of the lithium-ion battery, it must be fully charged every 4 weeks when not in use.

Maintenance

The lithium-ion battery is wear-free.
The components are maintenance-free, and therefore no maintenance intervals are defined for this battery.
The battery is continually monitored by the battery management system.

4.1.5 Measures for fire fighting

Fire-fighting measures may only be carried out on a burning lithium-ion battery by trained and specially equipped fire-fighting personnel (e.g. by a member of the fire brigade).

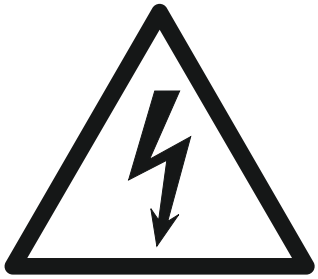
4.1.6 Touch voltage hazard

⚠ WARNING!

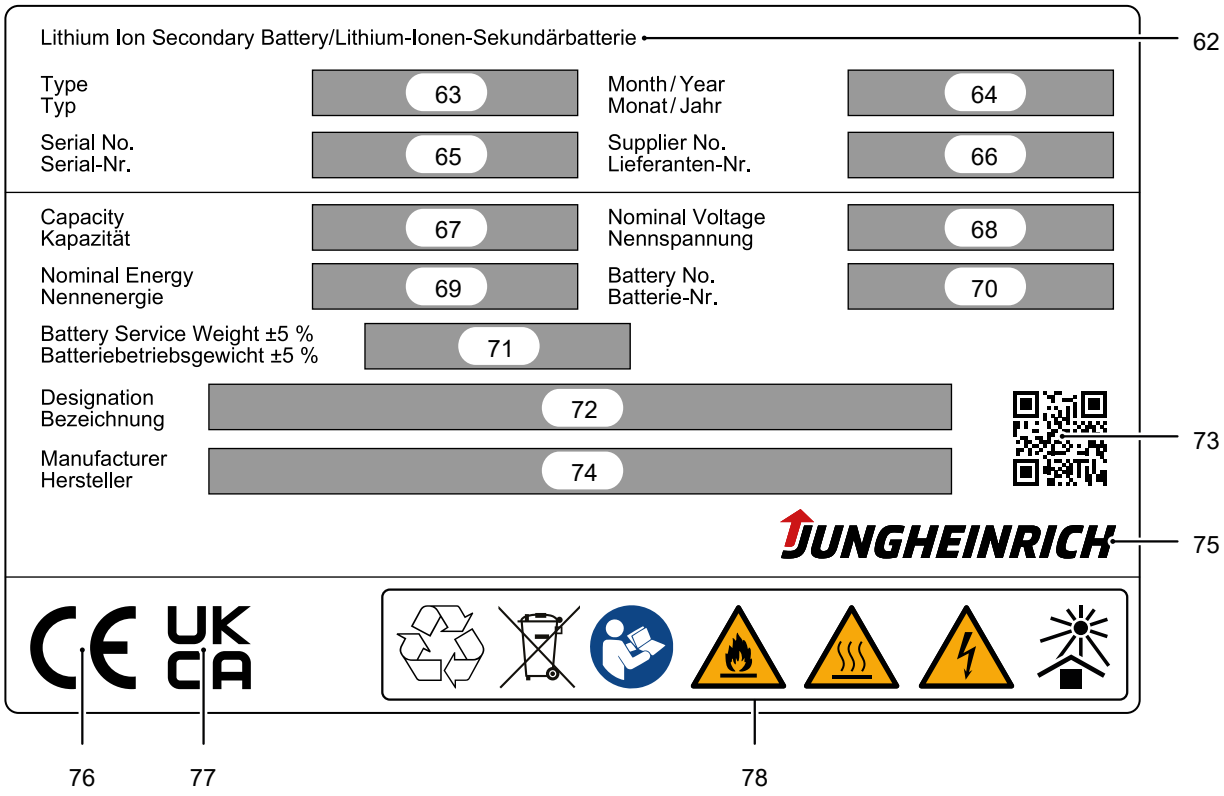
Touch voltage hazard

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

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

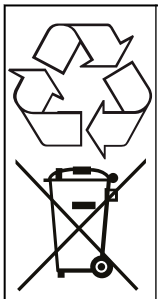


4.2 Lithium-ion battery data plate



Item	Designation
62	Lithium-ion secondary battery
63	Battery type
64	Year of manufacture
65	Serial number
66	Supplier number
67	Rated capacity in ampere-hours (Ah)
68	Rated voltage in volts (V)
69	Rated energy in watt-hours (Wh)
70	Battery number
71	Battery weight (± 5 %) in kg
72	Designation
73	QR code
74	Manufacturer
75	Manufacturer's logo
76	CE marking
78	Safety and warning information – see page 67

4.2.1 Safety and warning information

	Used batteries are recyclable commodities. These batteries must be treated as hazardous waste. As indicated by the marking showing the recycling symbol and a crossed-out waste bin, batteries must not be disposed of as domestic waste. Return or recycling of batteries must be ensured, for example, in accordance with the Battery Directive 2006/66/EG. Buy-back terms and the manner of recycling must be agreed with the manufacturer.
	Avoid fire and short-circuits due to overheating – Do not ignite or position open flames, glowing embers or sparks near the lithium-ion battery. – Keep batteries away from strong heat sources.
	Hot surfaces – Battery cells can generate very high short-circuit currents, causing them to become hot.
	Hazardous electrical voltage – The metal parts of the battery cells are permanently live. Therefore, do not place any foreign objects or tools on the battery. – Observe the accident prevention regulations and DIN EN 62485-3.
	Safety instructions – Wear personal protective equipment (e.g. safety gloves, respirator mask, safety shoes) when handling damaged battery cells and batteries. – Use only insulated tools. – If the contents leak out, do not inhale the fumes. – Always wash your hands after completing the work. – Do not mechanically process the battery, strike, crush, compress, notch, dent or modify it in any way. – Do not open, damage, penetrate, bend, heat the battery or allow it to become hot; do not throw it into a fire, short-circuit it or immerse it in water; do not store it or operate it in pressurised containers.
	Observe the operating instructions – The operating instructions must be clearly visible at the charging location. – If any faults are identified on the battery, the battery must no longer be used. Immediately tag out the faulty battery and take it out of service. Contact the manufacturer's customer service department. – Do not attempt to rectify faults independently. – Do not open the battery.
	Protect the battery from solar radiation or other forms of heat radiation.

4.3 Battery types

Depending on the version, the truck is equipped with different battery types. The following table shows the different battery types.

Nominal battery data		
Product	Lithium-ion battery 130/260/390 Ah	
Nominal voltage	25.6 V (3.2 V x 8 cells)	
Number of cells	130 Ah	8 (1 unit with 8 cells)
	260 Ah	16 (2 units each with 8 cells)
	390 Ah	24 (3 units each with 8 cells)
Electro-chemical system	Lithium ion, LiFeP04 cathode	

Battery type	Nominal voltage	Capacity	Battery weight
Lithium-ion battery	25.6 V	130 Ah	148 kg
Lithium-ion battery	25.6 V	260 Ah	146 kg
Lithium-ion battery	25.6 V	390 Ah	195 kg

4.4 Battery charge status

The charge status of the lithium ion battery is shown on the display of the display unit (98). The display of the display unit also indicates important information on the operating condition of the lithium-ion battery as required (e.g. low charge status, excessively high or low temperature) – see page 84.

Cut-out depending on the charge status

Depending on the charge status of the lithium-ion battery, the truck may initiate lift cut-off or travel cut-off:

– Lift cut-off:
  The lift cut-off prevents the load handler from lifting.
  Lowering of the load handler is still available.
– Travel cut-off:
  The travel cut-off locks the travel functions or reduces the truck travel speed.

Deeply discharged batteries

No charging takes place if the battery is deeply discharged. Deeply discharged batteries cannot be charged by the operator (faulty).

➔ Contact the manufacturer's customer service department.

4.5 Exposing the battery

Exposing the fixed lithium-ion battery is analogous to exposing the replaceable batteries, see page 53.

4.6 Removing or installing the battery

➔ The lithium-ion battery is permanently installed. Removal and installation are not foreseen in normal operation.

4.7 Charging the battery

⚠ WARNING!

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

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

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

⚠ WARNING!

Risk of accidents and injuries when handling lithium-ion batteries

Improper use can result in overheating, fire or explosion.

- ▶ Do not expose the lithium-ion battery during charging.
- ▶ Do not use the lithium ion battery cable connected to the truck for charging.
- ▶ Do not place any metallic objects on the lithium-ion battery.

⚠ WARNING!

Danger of overheating when charging with an unsuitable battery charger

The use of an unsuitable charger can cause the battery to overheat.

- ▶ Only charge the lithium-ion battery with a battery charger specially designed for this battery. Observe the operating instructions and operating conditions for the battery charger.

NOTICE

Battery damage

The battery, battery charger (charging characteristic) and battery parameters must match; otherwise, the battery may be damaged during charging.

Activating the lithium-ion battery

If the lithium-ion battery is not used for several hours, it switches to energy-saving mode to protect against deep discharge.

The lithium-ion battery can be reactivated by connecting it to the stationary battery charger, see page 72.

Intermediate charging

NOTICE

Intermediate charging

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

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

The lithium-ion battery can be partially charged (compensation charging) each time there is a break in use, without limiting its service life.

Partial charging

Charging can be interrupted on the battery charger and continued as partial charging. The charging process is automatically adapted to the charge status of the battery; see the operating instructions for the battery charger. This keeps battery wear to a minimum.

Trickle charge

A fully charged lithium-ion battery can be connected to the battery charger for automatic trickle charging.

In the event of an extended period out of use, it is recommend that the trickle charge function of the battery charger be used in order to maintain the available capacity of the battery.

Mains failure

Charging continues automatically after a mains failure.

4.7.1 Charging the battery with a stationary battery charger

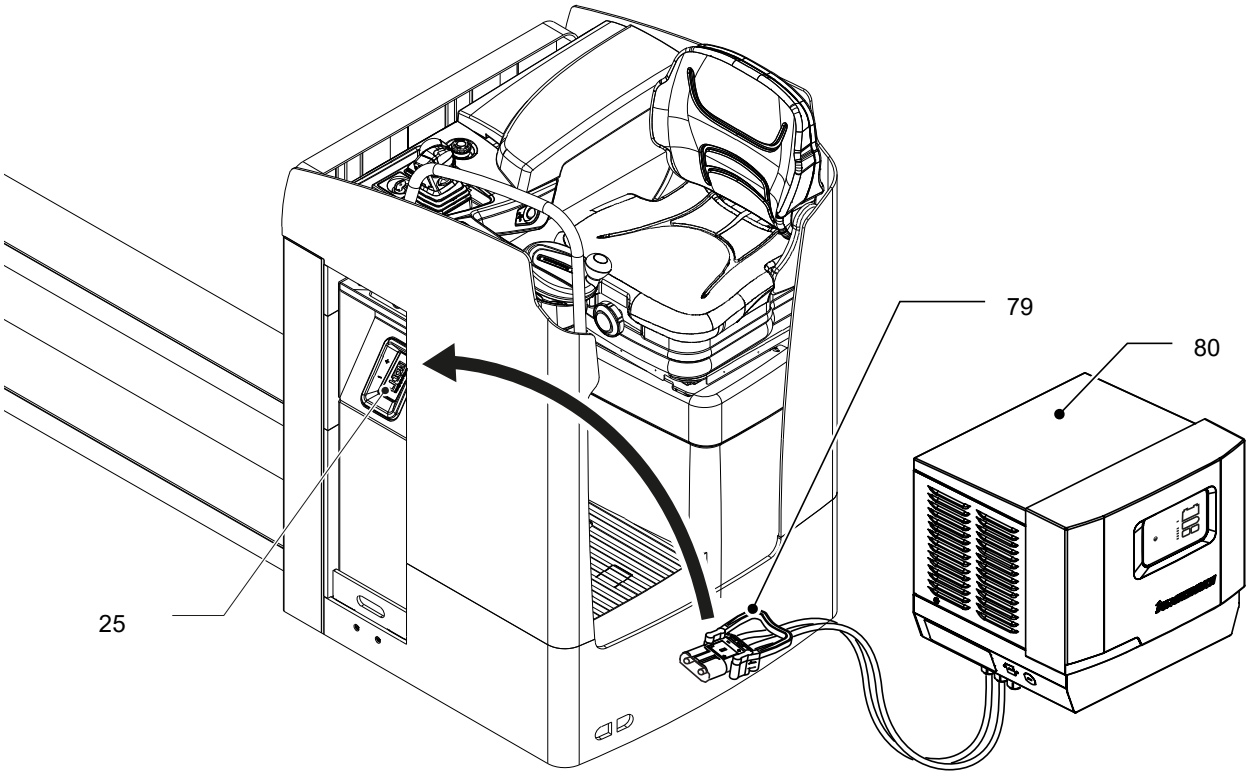
NOTICE

Damage to the lithium-ion battery due to incorrect charging

If a lithium-ion battery is charged directly via the battery connector (57) rather than via the comfort charging socket (25), the battery may be damaged.

▶ Never connect an external battery charger directly to the battery connector (57) of the lithium-ion battery.

▶ Always connect an external lithium-ion battery charger to the comfort charging socket (25) if the battery or truck has one.



Charging the battery

Requirements

– Battery charger operational.
– Truck parked securely – see page 97.

Procedure

- Check the cable and charge connector (79) of the battery charger (80) for visible damage before charging.

  If damage is identified, mark the affected battery charger accordingly and take out of service. Have the battery charger repaired by the manufacturer or by a specialist authorised by the manufacturer.
- Insert the charge connector of the battery charger (79) into the comfort charging socket (25) on the truck.
- Start charging in accordance with the battery charger operating instructions.
- If the charge status is to be displayed on the truck:
  - Unlock the emergency disconnect switch (83) – see page 102.

    The display unit displays the charge status or a fault – see page 69.

The battery is charging.

Trucks with a lithium-ion battery have a display unit with display as standard – see page 69.

While the charge connector of the stationary charger is connected to the truck, the electrical functions of the truck are disabled (electric immobiliser). The truck cannot be operated in this case.

Ending battery charging

⚠ WARNING!

There is a danger of sparks if charging is improperly interrupted

Owing to the high charge currents, there is a risk of spark discharge if the charge connector is removed while charging is active. There is a risk of injury and of damage to the electrical contacts.

▶ Stop charging on the battery charger before removing the charge connector.

▶ Do not disconnect the mains cable or charge connector of the battery charger while charging (under load).

Procedure

- Complete charging in accordance with the battery charger operating instructions.
- Remove the charge connector of the battery charger (79) from the comfort charging socket (25) on the truck.

Battery charging is complete.

E Operation

1 Safety Regulations for the Operation of Forklift Trucks

Driver authorisation

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

Operator’s rights, responsibilities and rules of conduct

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

Unauthorised use 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.

Safety devices, warning signs and warning instructions

Safety devices, warning signs (see page 39) and warning instructions in the present operating instructions must be strictly observed.

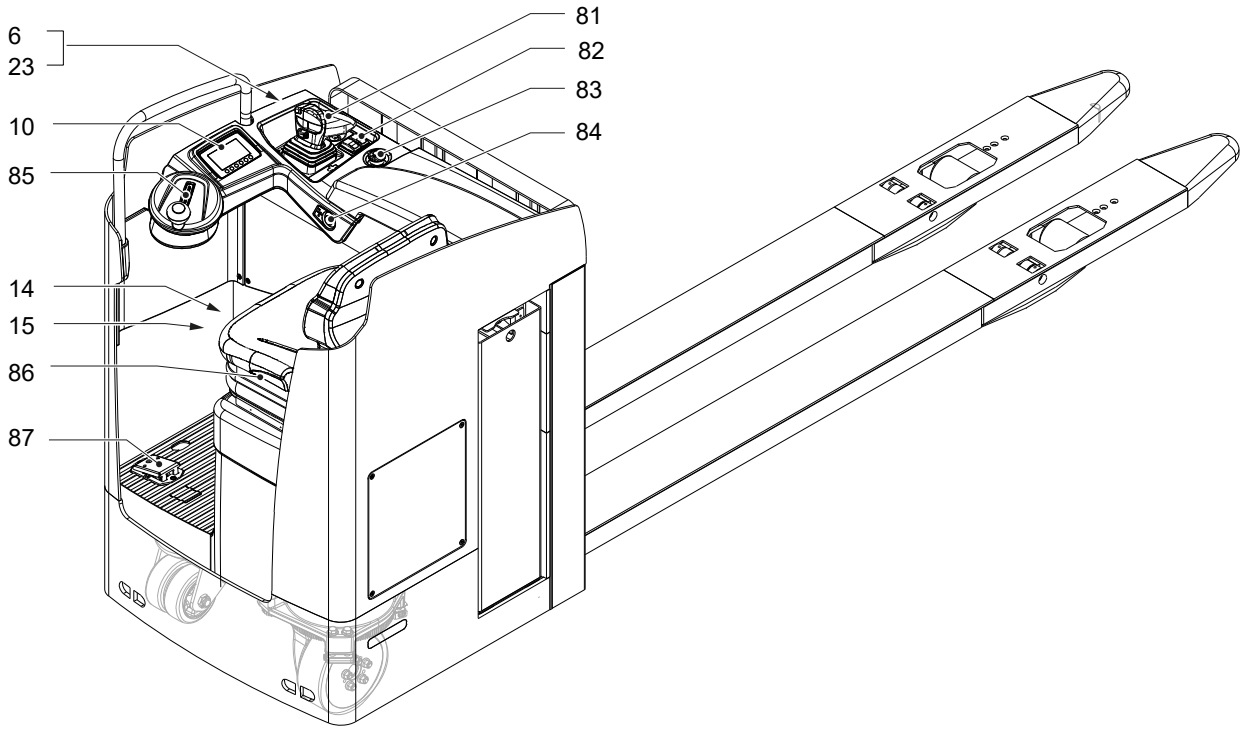
⚠ WARNING!

Removing or disabling safety devices can cause accidents

Removing or disabling safety devices such as the emergency disconnect switch, key switch, buttons, horn, strobe lights, sensors, panels, etc. can result in accidents and injury.

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

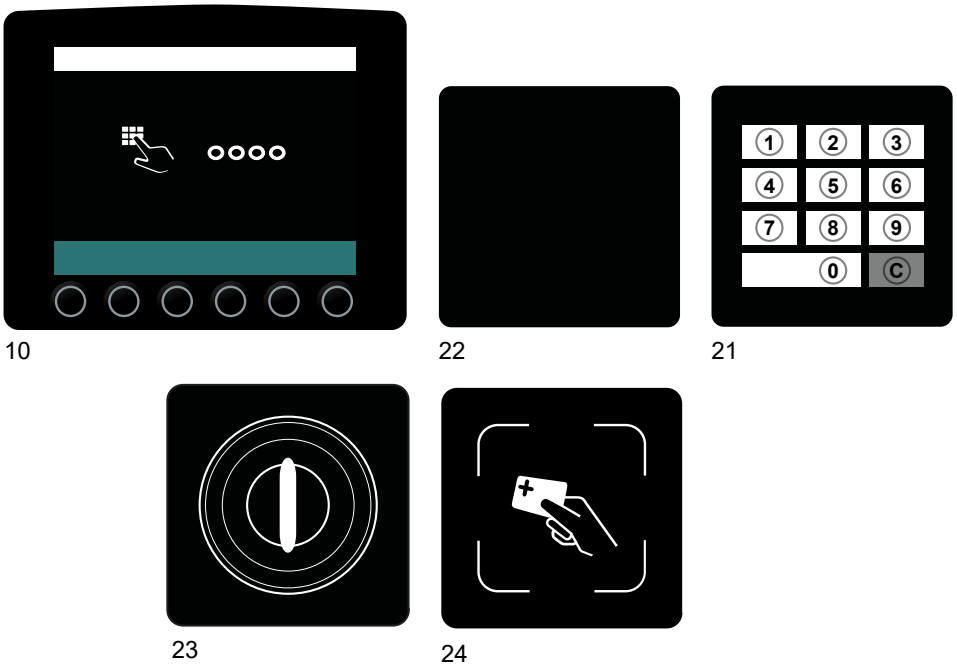
2 Displays and Controls



Item	Control/display		Function
6	Keyless access systems	○	Keyless access systems to release the truck
10	Display unit with 4-inch display	●	The display unit with 4-inch display provides the operator with all important information and enables control of the truck functions. – Used to enter the access code for the EasyAccess Softkey access system
14	Seat lock	●	Sliding the seat backwards and forwards
15	Seat cushioning	●	Adjusting the cushioning effect
23	Key switch	○	Switches the truck on and off
81	multiPILOT	●	Controls: – Forward/reverse travel – Load handler lift/lower
82	"Seat heating" switch	○	– Used to switch the seat heating on and off. – Indicates whether the seat heating is switched on or off.
83	Emergency disconnect switch	●	Used to brake the truck with maximum force and to interrupt the truck functions in an emergency. Activating the emergency disconnect switch disables all electrical functions in hazardous situations.

Item	Control/display		Function
84	"Floor plate adjustment" button	●	Adjusting the floor-plate height
85	Steering wheel	●	Steers the truck
86	Backrest lock	●	Releasing and locking the backrest
87	Deadman switch	●	Deadman switch pressed: – Travel and lifting enabled. Deadman switch not pressed: – Travel and lifting are deactivated. – The truck brakes to a halt.

2.1 Access systems

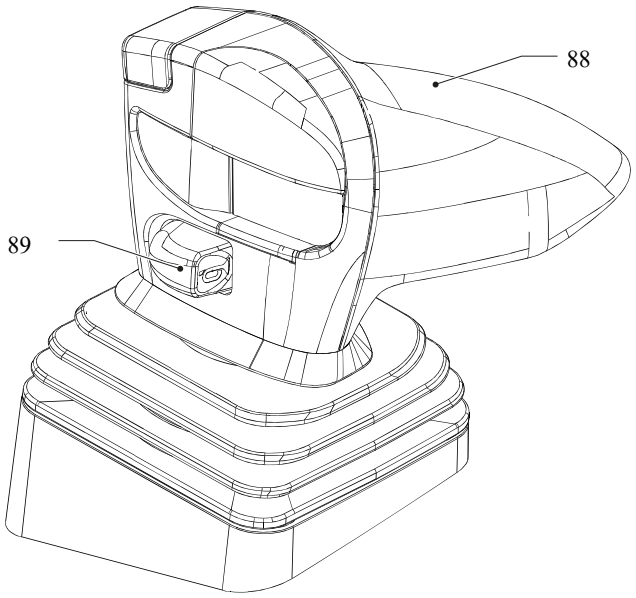


10 22 21

23 24

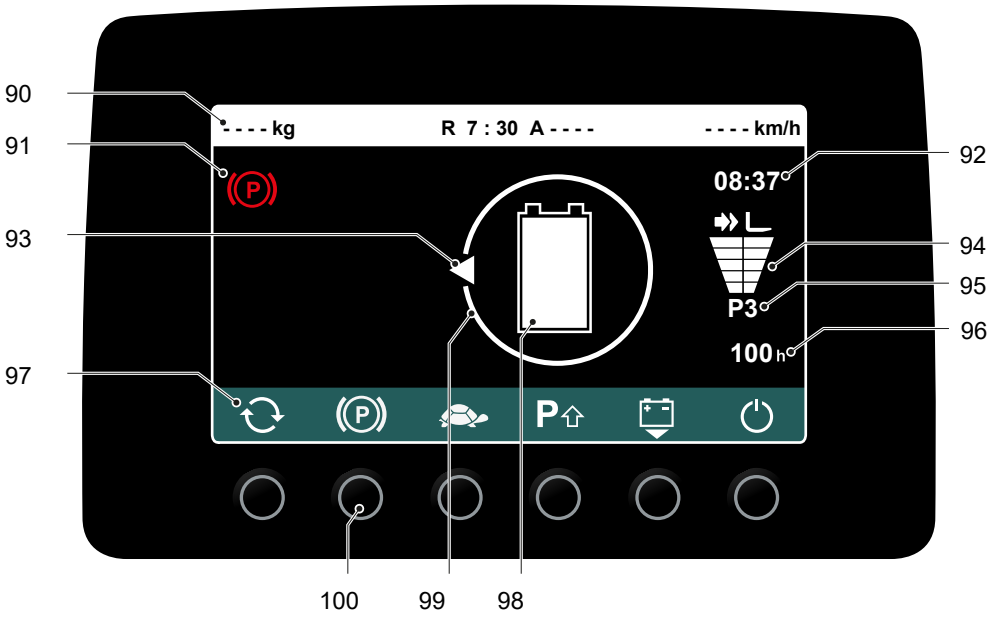
Item		Description
10	●	Display unit with 4-inch display
21	○	Keypad
22	●	Panel
23	○	Key switch
24	○	Transponder reader Plus

2.2 Pilots



Item	Description		Function
88	"Basic functions" lever	●	Lever for operating the basic functions – Travel/braking – Load handler lift/lower
89	Transmitter ("horn")	●	Triggers an audible warning signal

2.3 Display unit with 4-inch display



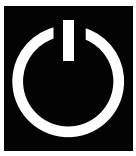
Item	Display or control element	Function
90	Information line	Displays event messages and optional information such as speed.
91	Parking brake	Indicates that the parking brake is activated.
92	Time	Displays the current time.
93	Travel direction	Shows the current travel direction of the truck and the current wheel position in 15° segments.
94	Performance	Display of travel speed and lift speed as a bar chart.
95	Travel program	Displays the current travel program. The selected travel program is also shown in text form (P1, P2, P3) under the bar display.
97	Function symbols	The functions shown as function symbols are operated using the function key located underneath, see page 84.

Item	Display or control element	Function
98	Battery charge status	The higher the fill level on the charge status indicator, the higher the residual capacity of the battery.
99	Steer mode 180°	
99	Steer mode 360°	
100	Function keys	Selection buttons for the corresponding functions.

2.3.1 Function Symbols

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

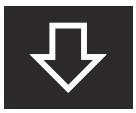
General

Symbol	Meaning	Function
	Function selection	Switches through the various functions and displays of the display unit.
	Manual parking brake	Actuation of the manual parking brake
	Slow travel	Activates or deactivates slow travel.
	Switch between 180°/ 360° steer mode	Alternates the steer mode between 180° and 360°
	ON/OFF	Switches the truck on and off.
	Travel program	Switches through the various travel programs of the truck.
	Floor-Spot	Activates or deactivates the Floor-Spot.
	Settings	Opens the Settings menu.

Settings menu

Symbol	Meaning	Function
	Back	Cancels the current operation and returns to the previous menu.
	Edit access code/ transponder	To add or delete access codes or transponders.
	Changing the Set-up Code	To change the set-up code and to activate the keypad or the transponder reader.
	Log-in History	Shows the log-in history in chronological order.

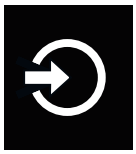
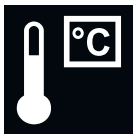
Submenus

Symbol	Meaning	Function
	Confirm	To confirm an entry or a transponder code.
	Adding	To add new access codes.
	Delete	To delete selected access codes.
	Selection up	For selecting the access codes or transponders and to scroll back during the log-in process.
	Selection down	For selecting the access codes or transponders and to scroll forward during the log-in process.

2.3.2 Display symbols

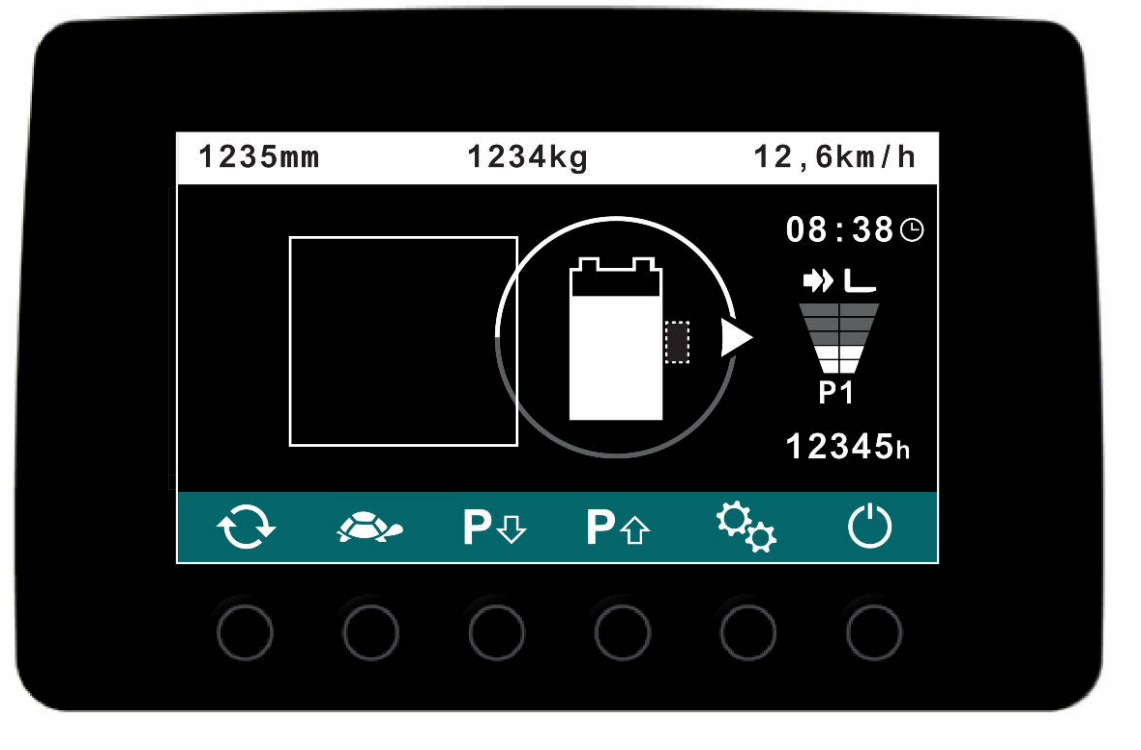
Any number of symbols can be shown in the display area. The symbols shown during operation depend on the operating and truck status.

Symbol	Meaning	Colour	Function
	Truck disabled	Yellow	Lights up when the truck has been disabled due to a serious event. Possible causes: – Error in the drive system – Error in the hydraulic system – Shock event (truck with fleet management system)
	Seat switch	Yellow	Flashes when controls are actuated but the seat switch is not actuated
		Red	Lights up in the event of a seat switch fault
	Accelerator pedal actuation	Yellow	Flashes when there is a travel request before the travel setpoint has returned to zero.
	Emergency stop	Red	Lights up in the case of automatic function deactivation due to truck malfunctions.
	Warning	Yellow	Lights up in the case of an operating error.
		Red	Lights up in the case of a truck fault. Travel is restricted to slow travel or lift, lower and travel functions are reduced.
	Assistance system not ready	Yellow	Lights up when an assistance system of the truck is not ready.
	Overload at pressure sensor	Yellow	Lights up when the carried load exceeds the permissible weight (overload).
		Red	Lights up when the lift function of the truck is deactivated due to the overload.
	Service note	Yellow	Lights up when maintenance is due.
	Lowering end, load fork	yellow	Illuminates if the “Lower load fork” button is pressed when the lowering limit in the mast lift has been reached.

Symbol	Meaning	Colour	Function
	Lift end, load fork	yellow	Illuminates if the “Raise load fork” button is pressed when the lift limit in the mast lift has been reached.
		green	
	Manual parking brake	Red	Illuminates when the manual parking brake is activated.
	Slow travel	Yellow	Lights up when the travel speed is reduced by the control unit of the industrial truck (e.g. optional when the load handler is completely lowered)
			Lights up when the operator reduces the travel speed ("slow travel" button pressed).
	Slow travel	Green	Lights up when slow travel is activated via an external interface (e.g. by the fleet management system).
		Yellow	
		White	
	Indicator lamp	Green	Illuminated when at least one indicator lamp is switched on.
	Impact display (equipment with fleet management system)	Yellow	Lights up when a moderate shock event has occurred. – Craw speed is triggered.
		Red	Lights up when a serious shock event has occurred. – Lifting, lowering and travel functions are deactivated.
	Login with additional equipment	White	Lights up when waiting for user authentication on additional equipment (○).
		Green	
		Yellow	
		Red	
	Truck overtemperature	Yellow	Lights up when the temperature of the truck exceeds the permissible range. – Lifting, lowering and travel functions are reduced.
		Red	Lights up when the temperature of the truck exceeds the permissible range. – Lifting, lowering and travel functions are deactivated.
	Lift limit, support arm lift	Yellow	Illuminates if the “Raise support arm lift” button is pressed when the lift limit in the support arm lift has been reached.

Symbol	Meaning	Colour	Function
	Lowering limit, support arm lift	Yellow	Illuminates if the “Lower support arm lift” button is pressed when the lowering limit in the support arm lift has been reached.
	“Automatic support arm lift lowering” function active	Green	Lights up green when the function for automatic lowering of the support arm lift is active.
	The support arms are lowered.	Flashes yellow	Flashes yellow while the support arms are being lowered by the "automatic support arm lift lowering" function.
	Lithium-ion battery overtemperature	Red	Lights up to indicate an overtemperature of the lithium-ion battery
	Lithium-ion battery low temperature	Yellow	Lights up to indicate a low temperature of the lithium-ion battery – Discharge currents and energy recovery are reduced.
		Red	Lights up to indicate a low temperature of the lithium-ion battery – The truck is switched off via the battery contactor. – The display unit switches off.
	Battery indicator, low residual capacity	Yellow	Lights up when residual capacity ≤ 30% Charge the battery soon.
		Red	Lights up when residual capacity ≤ 20 % Charge the battery immediately.
	Lift deactivated	Yellow	Lights up if the lift functions are deactivated due to insufficient battery capacity or if the lift function has not been released.

2.3.3 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.

2.3.4 Battery discharge indicator

The battery charge status is shown on the truck display unit via a battery symbol (98). When a battery is discharged to the permissible discharge level, the battery symbol (98) is displayed empty. (see page 82)

➔ The standard setting for the charge status indicator (98) is based on trucks delivered with a standard battery.

2.3.5 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.

2.3.6 Hourmeter

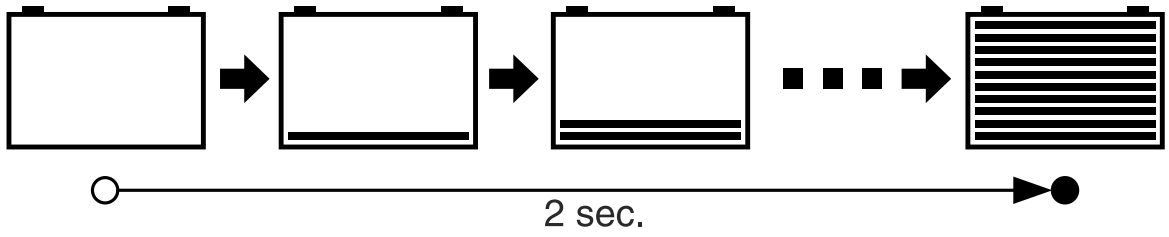
➔ Prepare the truck for operation, see page 95 or see page 122.

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

2.3.7 Energy recovery during regenerative braking

When the coasting or regenerative brakes are used, electric energy is fed back to the battery.

During the energy recovery stage, the discharge indicator on the driver’s display changes so that the bars in the battery container fill from bottom to top.



This is cyclical and is independent of the battery's charge status. When the energy has been fed back, the display shows the standard discharge again.

3 Preparing the Truck for Operation

3.1 Checks and Operations to Be Performed Before Starting Daily Work

⚠ WARNING!

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

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

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

▶ Do not return the industrial truck to service until you have identified and rectified the fault.

Inspection before daily operation

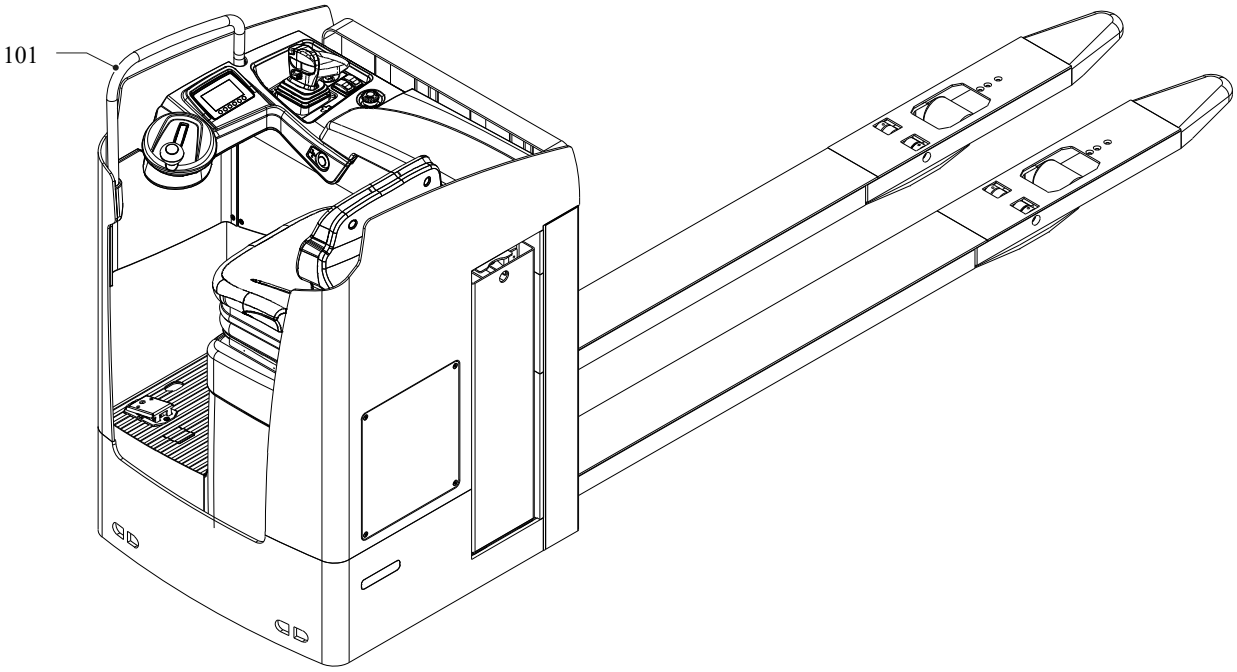
Procedure

- Check the whole of the outside of the truck for signs of damage and leaks. Damaged hoses must be replaced immediately.
- Check that the battery is securely mounted and that the cable connections are free of damage and firmly secured.
- Check the battery connector is secure.
- Check the load handler for visible signs of damage such as cracks, bent or severely worn forks.
- Check the drive wheel and load wheels for damage.
- Check that the markings and labels are all present and legible (see page 39).
- Make sure the drive panels and covers are secure and check for damage.

3.2 Entering or exiting

⚠ CAUTION!

No more than one person may operate the truck at a time.



Requirements

– Load handler fully lowered.

Procedure

➔ Always enter and exit the truck facing the load direction.

To enter and exit, hold onto the handle (101).

- Enter or leave the truck.

3.3 Adjusting the driver’s seat

⚠ 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.

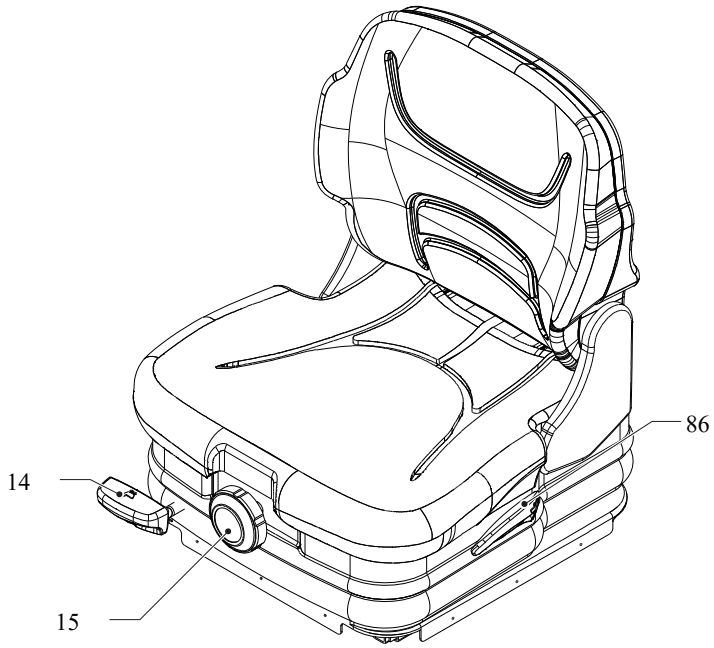
▶Do not adjust the driver’s seat while travelling.

Adjusting the driver’s seat

Procedure

- Sit down on the driver’s seat.
- Loosen the seat lock (14) and push it forward or backward to the desired position.
- Lock the seat in position again.
- Undo the backrest lock (86) and bring the backrest into its required position.
- Lock the backrest in position again.
- Set the seat cushioning to the required level by turning the adjusting wheel (15).

The driver's seat is now set in the correct position for the controls.

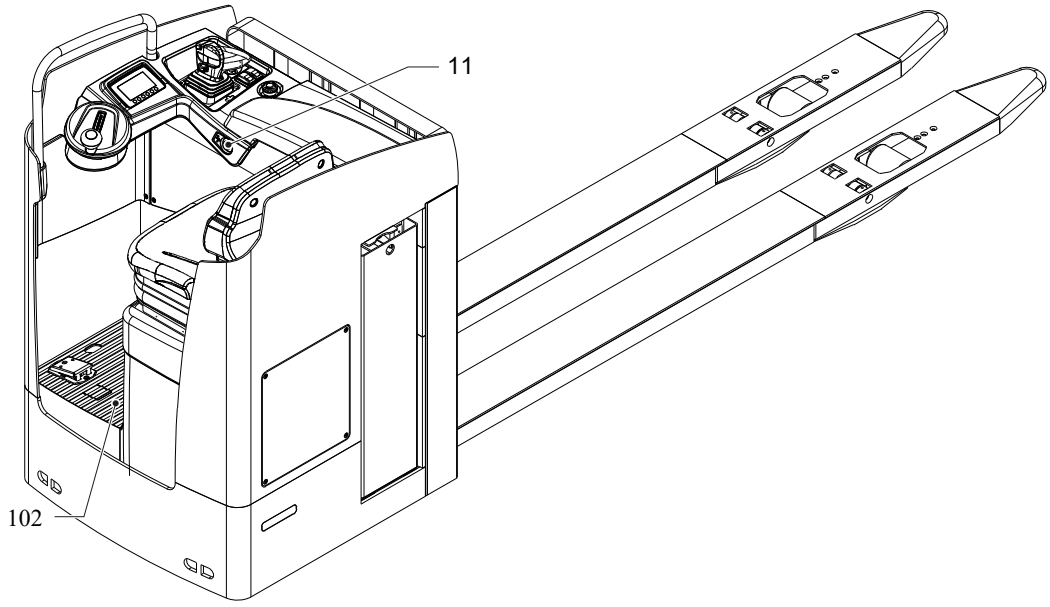


3.4 Adjusting the Floor-Plate Height

Procedure

- Sit down on the driver's seat.
- Press and hold down the "floor-plate adjustment" button (11).
  The floor plate can now be adjusted.
- Set the floor plate (102) to the correct height by standing on it or discharging it.
- Release the "floor-plate adjustment" button (11).

The floor plate is adjusted and locked at the required height.



3.5 Preparing the truck for operation

Switching on the truck

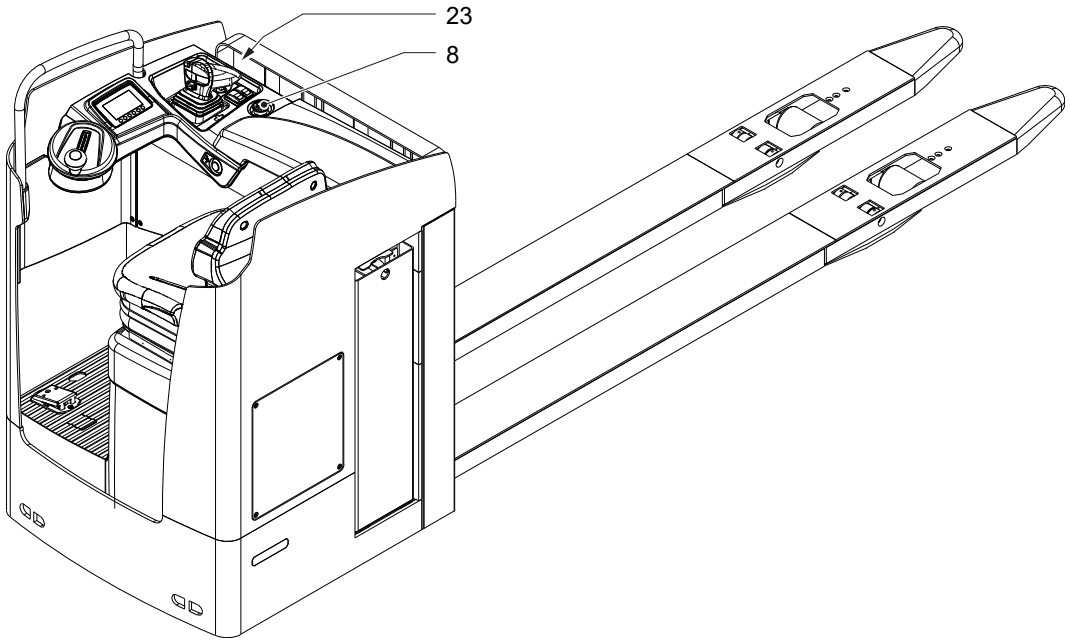
Requirements

– Checks and operations before starting daily work completed – see page 91.

Procedure

- Enter the operator position – see page 92.
- Sit down on the driver's seat (12).
- Turn the emergency disconnect switch (83) to unlock it.
- Switch on the truck. To do this:
  - Switch on the truck with the access code via the display unit (106) – see page 123.
  - Insert the key into the key switch (○) and turn it as far to the right as it will go.
  - Use the keyless access system (○) – see page 122.

The truck is ready for operation.



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

⚠ WARNING!

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

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

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

▶ Do not return the industrial truck to service until you have identified and rectified the fault.

Procedure

- Test warning indicators and safety equipment:
  - Test the emergency disconnect function by pressing the emergency disconnect switch. The main circuit is disconnected and no truck operations can be performed. Now pull the emergency disconnect switch to unlock it.
  - Test the horn by pressing the "warning signal" button.
  - Test the brake – see page 108.
- Test the controls and displays and check for damage – see page 77.
  - Check the controls automatically return to the neutral position after use.
- Test the steering – see page 107.
- Test the hydraulic system, see page 110.
- Test the travel functions, see page 105.

3.7 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 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.

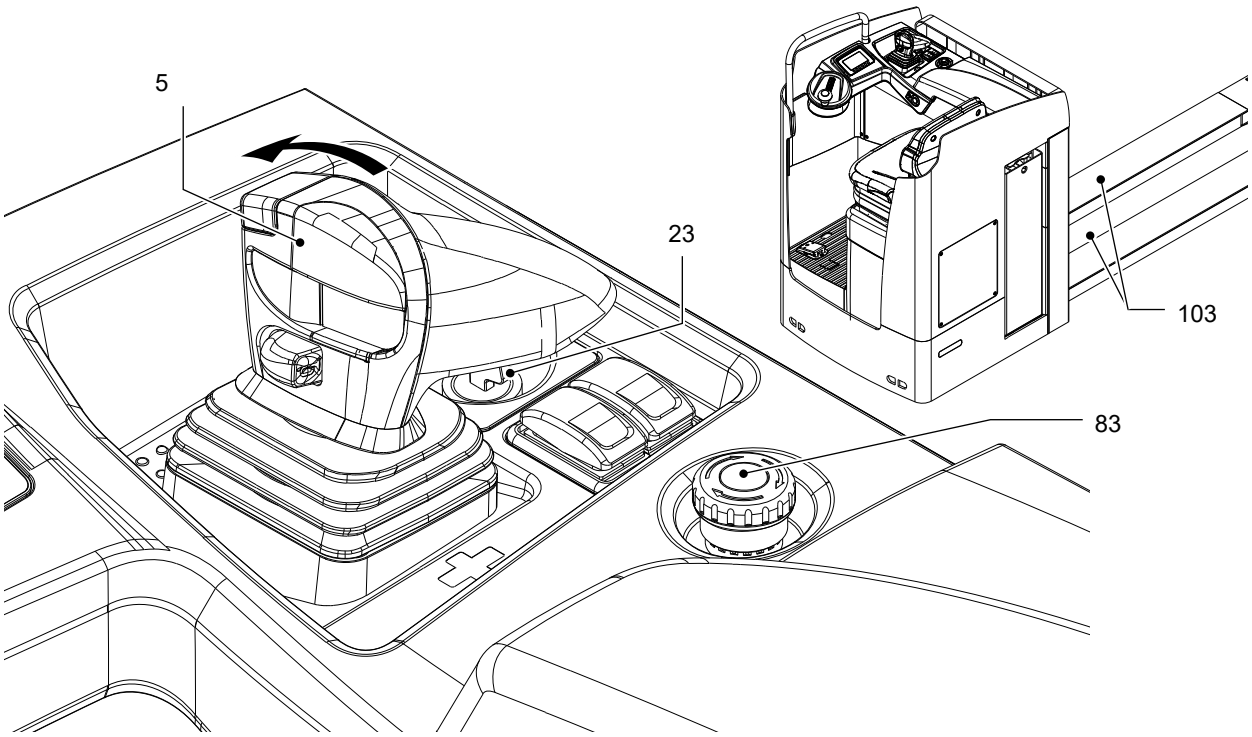
▶ Select a place to park where no other people are at risk of injury from the lowered load handler.

▶ If the brakes are not working, place wedges underneath the wheels of the truck to prevent it from moving.

Procedure

- Park the truck on a level, horizontal surface.
- Fully lower the load handler (103) with the multiPILOT (5).
- Turn the drive wheel until the arrow indicating the travel direction is pointing in the drive direction – see page 82.
- Switch off the truck; to do this:
  - Press the key under the "switch off" symbol on the display unit.
  - Turn the key in the key switch (○) anti-clockwise as far as it will go. Remove the key from the key switch.
  - Use the keyless access system (○) – see page 122.
- Press the emergency disconnect switch (83).

Truck is parked securely.



4 Working with 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.

⚠ 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.

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.

Negotiating lifts, loading ramps and docks

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

Types of load to be carried

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

⚠ 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.

⚠ WARNING!

Wind loads

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

4.2 Negotiate slopes and inclines

When negotiating slopes and inclines, observe the following:
– It is only permitted to negotiate slopes and inclines that are designated traffic lanes.
– Slopes and inclines must be clean and non-slip; it must be possible to negotiate them safely in accordance with the truck's technical specifications.
– Before negotiating slopes, ensure that the truck has sufficient gradeability, see page 28.
– Adapt your travel speed to the conditions of the route and the load you are transporting.
– Travel at a constant speed.
– Inclines must only be negotiated at slow speed.
– Do not travel across or at an angle on inclines.
– Negotiating slopes and inclines must be avoided wherever possible.
– When negotiating inclines, the driver must be ready to brake at any moment:
  • Brake gently in normal circumstances.
  • Only stop abruptly in hazardous situations.

➔ In accordance with the German accident prevention regulations DGUV regulation 68 (as at August 2013), the load must be transported on the upslope when travelling on slopes and inclines.

➔ When travelling on slopes and inclines unladen, the load handler must always be oriented towards the downslope.

➔ National regulations that deviate from this rule must be treated with priority.

4.3 How to act in hazardous situations

⚠ DANGER!

Tipovers can result in fatal accidents

If the truck is in danger of tipping over, incorrect operator action can result in serious injury and death.

- ▶ Do not jump off the truck if it tips over.
- ▶ If the truck tips over on the right side of the load direction, hold onto the option bar with both hands.
- ▶ If the truck tips over on the left side in the load direction, hold onto the steering wheel or the display panel with both hands.
- ▶ Never hold onto the side where the truck is about to tip over.
- ▶ Tilt your body in the opposite direction of fall.

⚠ WARNING!

Risk of injury from tipping or falling truck

If the truck tips or falls, there is a risk of severe crushing and impact injuries.

- ▶ Leave the truck immediately and move a safe distance away.
- ▶ Never attempt to a stop a truck that is tipping.
- ▶ Warn others in the danger area.

When travelling on a loading ramp, avoid steering and fold in the side arms as required to facilitate leaving the truck in the event of a tipover.

4.4 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.

Pressing the emergency disconnect switch

Procedure

- Press the emergency disconnect switch (83).

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

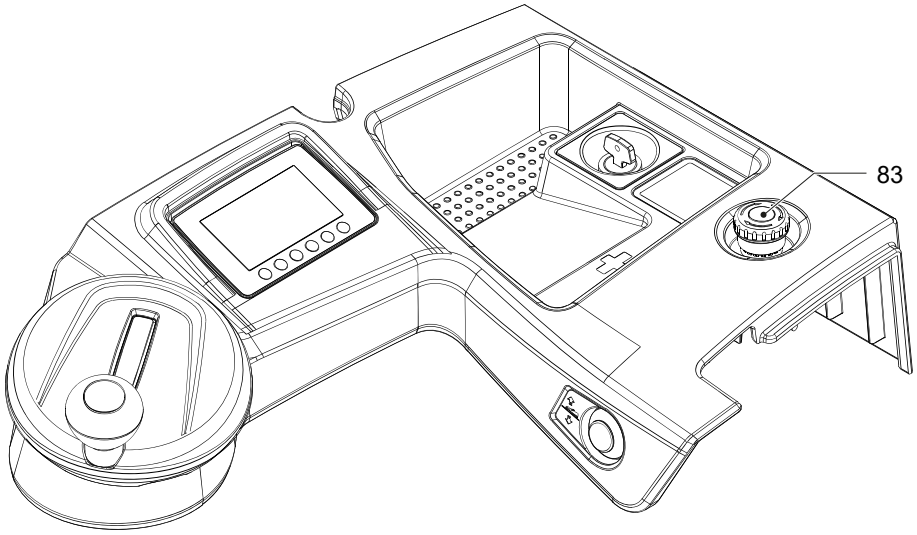
➔ Press the Emergency Disconnect switch on in emergencies.

Unlocking the emergency disconnect switch

Procedure

- Turn the emergency disconnect switch (83) to unlock it.

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



4.5 Deadman button

The deadman button must be pressed to lift, lower or travel.

If the deadman button is released during travel, the truck decelerates at the maximum rate until it stops.

If the deadman button is released during lifting or lowering, the respective function cuts out immediately.

4.6 Travel

⚠ WARNING!

Collision hazard when operating the truck

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

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

Requirements

– Start up the truck – see page 95.

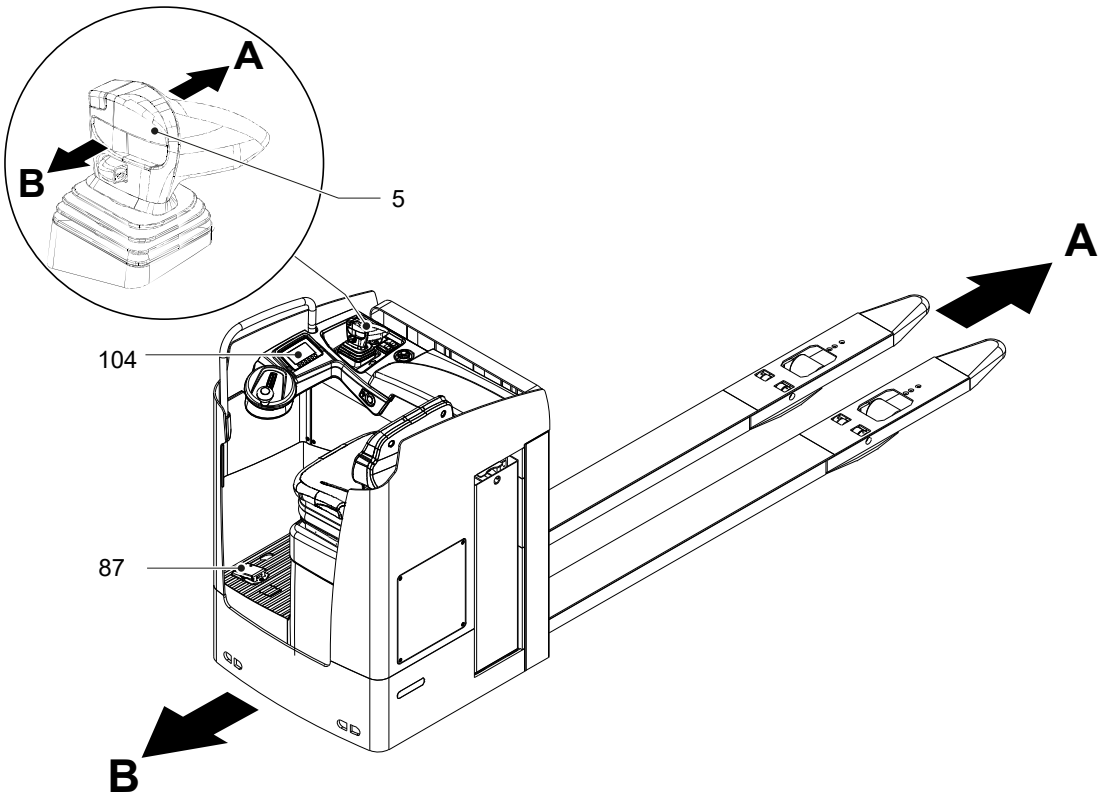
Procedure

- Press the deadman button (87).
- Move the multiPILOT (5) in the required travel direction:
  - multiPILOT (5) in the load direction (A): travel in load direction.
  - multiPILOT (5) in the drive direction (B): travel in drive direction.
- Control the travel speed by moving the multiPILOT (5):
  - The further the multiPILOT (5) is moved, the greater the speed.

➔ After releasing the multiPILOT (5), it automatically returns to the neutral position, and the truck brakes.

The brake is released and the truck moves in the selected direction.

➔ The truck display unit (104) displays the travel direction.



4.6.1 Changing the direction of travel

⚠ CAUTION!

Danger when changing travel direction during travel

Changing the travel direction causes the truck to decelerate sharply. When the travel direction is changed, this can result in a high speed in the opposite travel direction unless the multiPILOT is released in time.

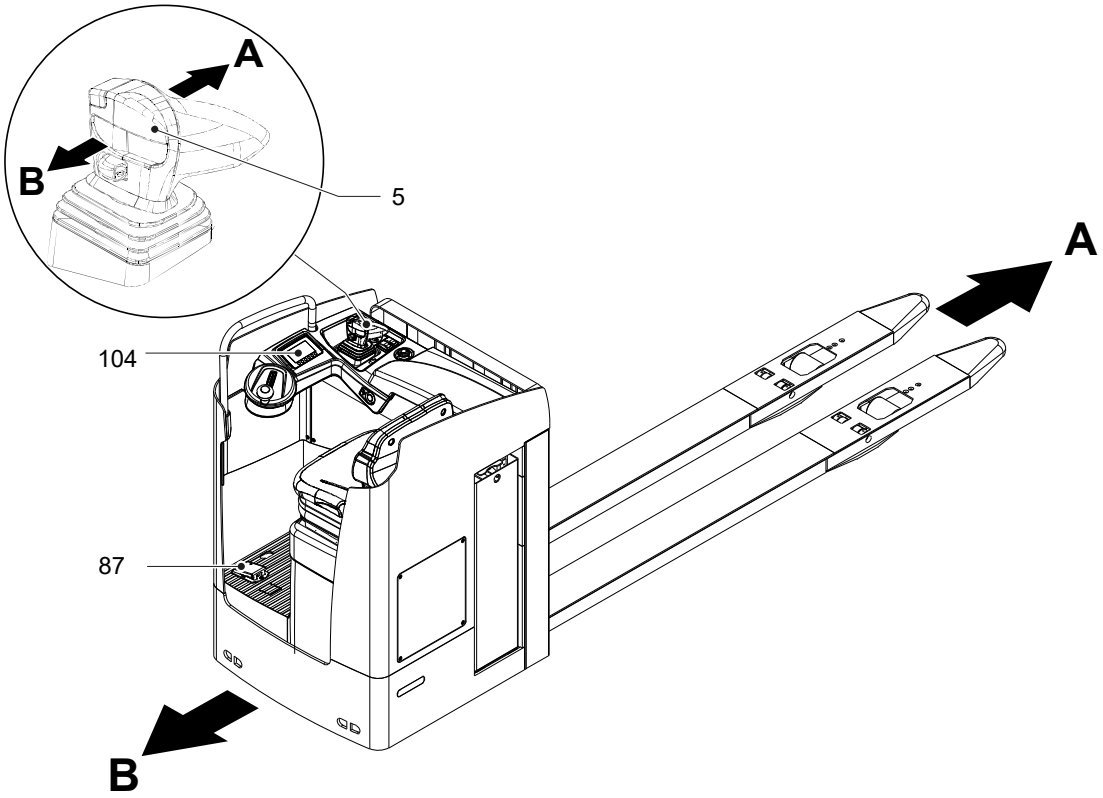
▶ After setting off in the opposite direction, press the multiPILOT gently or not at all.
▶ Do not perform any sudden steering operations.
▶ Always face the direction of travel.
▶ Maintain an adequate overview of the route you are travelling.

Changing direction during travel

Procedure

- Set the multiPILOT (5) to the opposite travel direction while travelling.

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



4.7 Steering

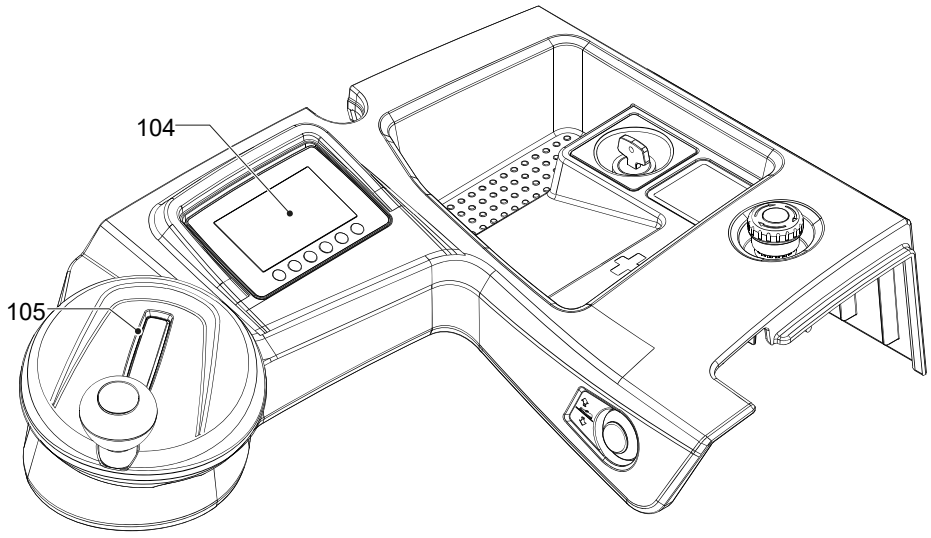
Steering the truck

Procedure

- Turn the steering wheel (105) to the left or right.

➔ The steer direction is dependent on the steer angle and selected travel direction. When travelling forward (travel in direction of entry = drive direction) steer to the left to turn into a left-hand bend and to the right into a right-hand bend. The drive wheel position is indicated on the display (104).

The truck travels in the required travel direction.



4.8 Brakes

⚠ WARNING!

Accident risk while braking

The truck's braking response depends largely on the floor condition and the type of surface. The truck's braking distance increases when the ground is wet or dirty.

▶ The operator must be aware of floor conditions and take them into account when braking.

▶ Brake with care to prevent the load from slipping.

⚠ CAUTION!

▶ In emergencies, only use the service brake for braking.

The truck can brake in two ways:

– Using the service brake (deadman switch).
– Using the regenerative brake (coasting brake).

Braking with the service brake

Procedure

- During travel, take your foot off the deadman switch (87).

The truck decelerates regeneratively at the maximum rate until it comes to a halt. The parking brake then applies.

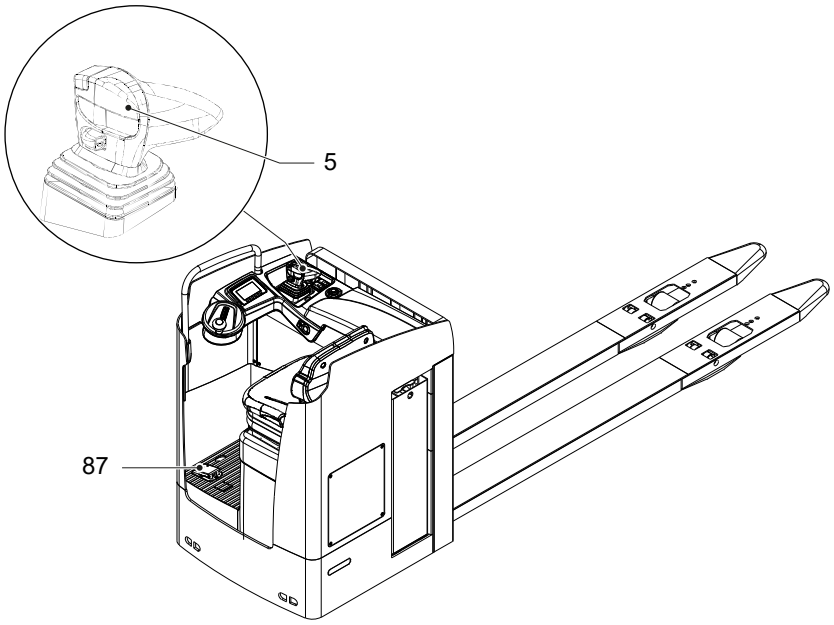
Regenerative braking

Procedure

- Release the multiPILOT (5) while travelling.

The multiPILOT (5) returns to the neutral position. The truck brakes regeneratively to a halt. The parking brake is then applied.

➔ The brake force can be set by the manufacturer's customer service department.



4.9 Load handler raise/lower

⚠ WARNING!

Accident risk when lifting and lowering

Other people can be injured in the truck's hazardous area.
The hazardous area is defined as the area in which people are at risk from the movement of the truck including the load handler, etc. This also includes areas which can be reached by falling loads, operating equipment, etc.
Apart from the driver (in the normal operating position) there should be no other people in the truck's hazardous area.

- ▶ Instruct other people to move out of the hazardous area of the truck. Stop working with the truck if people do not leave the hazardous area.
- ▶ If people do not leave the hazardous area despite the warning, prevent the truck from being used by unauthorised people.
- ▶ Only carry loads that have been secured and positioned in accordance with regulations. Use suitable precautions to prevent parts of the load from tipping or falling down.
- ▶ Never exceed the maximum loads specified on the capacity plate.
- ▶ Do not stand on the load handler.
- ▶ Do not lift other people on the load handler.
- ▶ Never reach or climb into moving truck parts.
- ▶ Do not climb onto parts of the building or other trucks.

4.9.1 Raising the load handler

Requirements

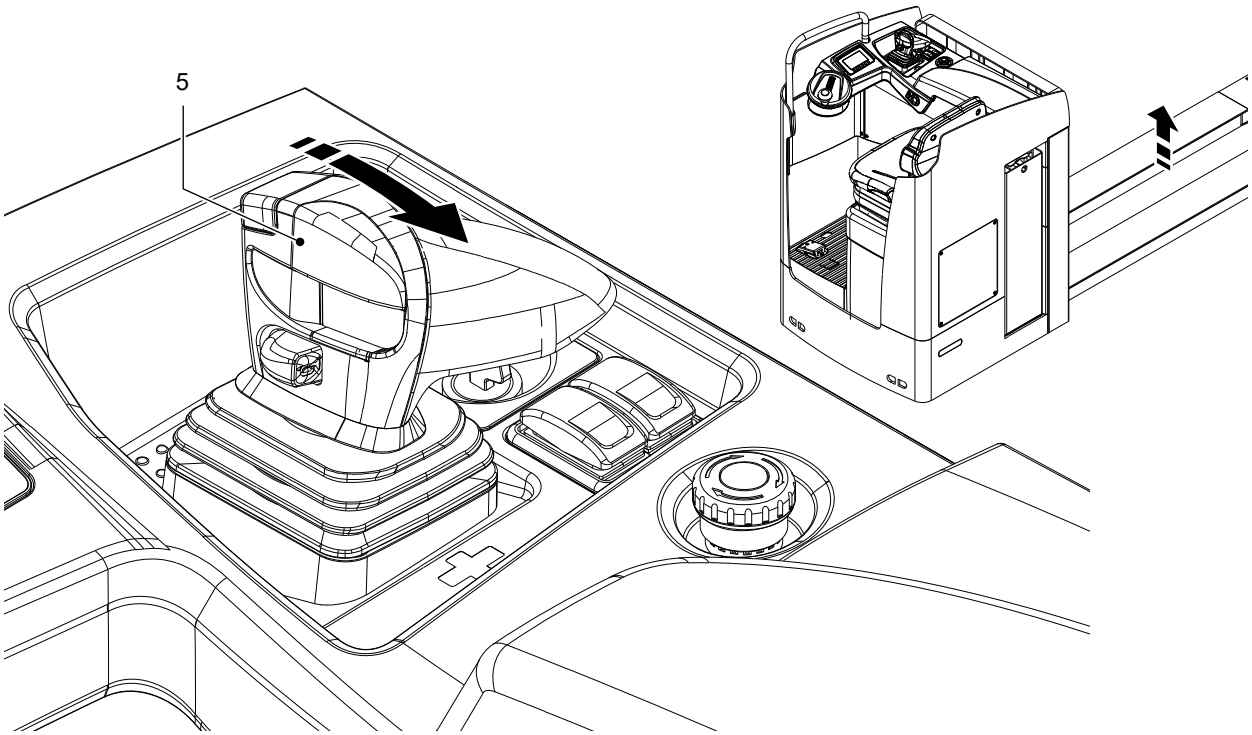
– Truck has been prepared for operation, see page 95.
– Deadman switch actuated – see page 104.

Procedure

• Pull the multiPILOT (5) in the direction of the arrow until you reach the required lift height.

➔ The lift speed can be infinitely controlled via the movement of the multiPILOT.
▶ Short movement = slow lift
▶ Large movement = fast lift

The load handler is raised.



4.9.2 Lowering the load handler

Requirements

– Truck has been prepared for operation, see page 95.
– Deadman switch actuated – see page 104.

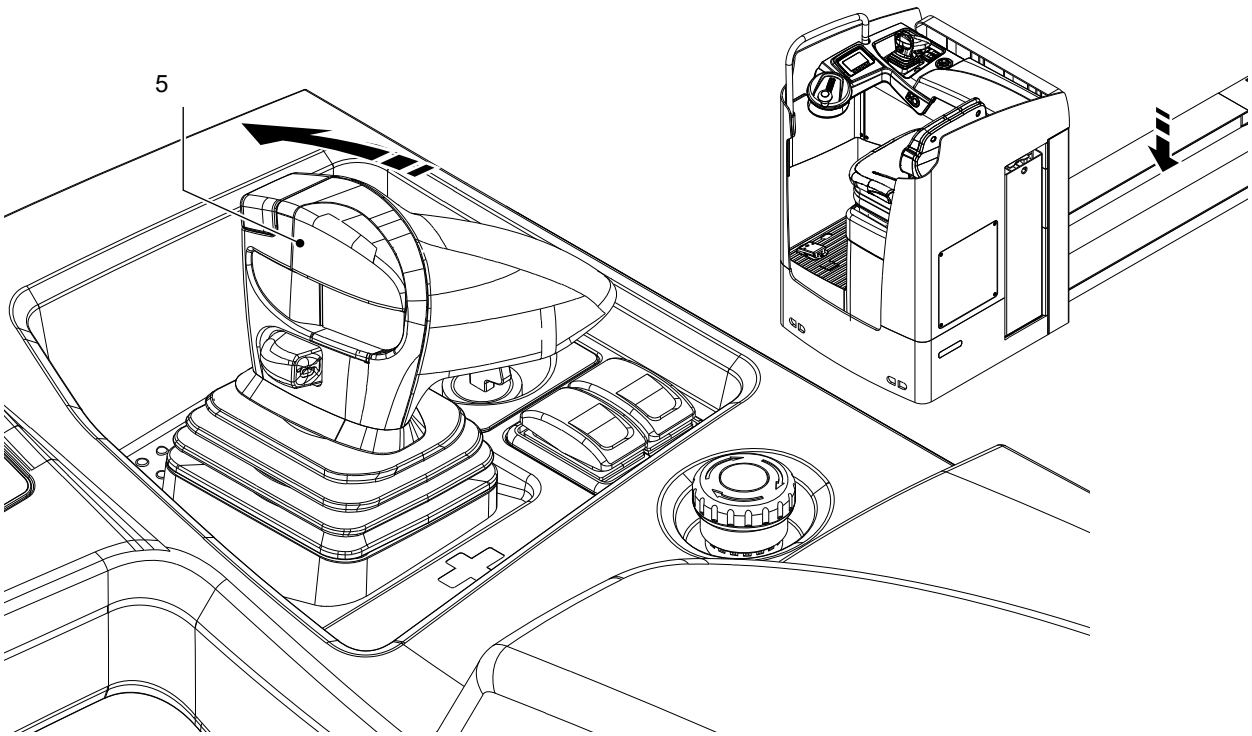
Procedure

• Pull the multiPILOT (5) in the direction of the arrow until you reach the required lift height.

➔ The lowering speed can be infinitely controlled via the movement of the multiPILOT.

▶ Short movement = slow lower
▶ Large movement = fast lower

The load handler is being lowered.



4.10 Lifting, transporting and depositing loads

⚠ WARNING!

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

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

- ▶ Observe load centre distances and capacities of the load handler, see page 41.
- ▶ Pick up the load so that its centre of gravity lies between the load arms of the load handler.
- ▶ Preferably, the load should be configured and picked up so that its centre distance lies within the load centre distance of the load handler ($d_1 \leq D$ and $d_2 \leq D$, see area DD in the illustration).
- ▶ A load with a centre of gravity outside of the load centre distance of the load handler ($d_1 > D$ and/or $d_2 > D$) should only be moved very carefully, as this load case has not been checked on a truck tested according to the test guideline.

⚠ WARNING!

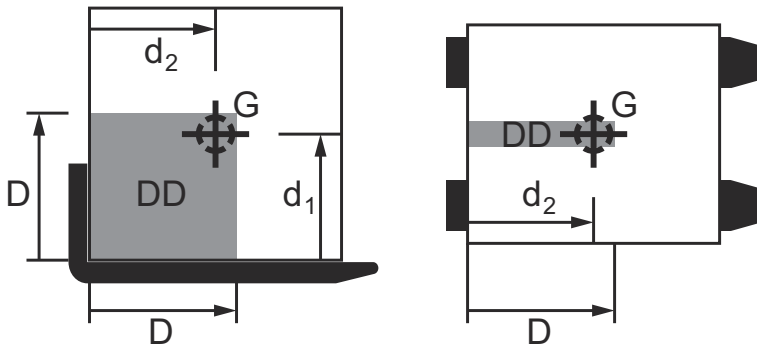
Risk of injury from falling loads

Low or small item loads moved above the mast protection pane or grille (○) and protruding over the load backrest can fall, endangering the operator and truck.

- ▶ Secure low or small item loads protruding over the load backrest, e.g. by wrapping them in film.

NOTICE

Do not lift loads if the truck is operated via a tow lead with an external battery.



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

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

⚠ WARNING!

Unsecured and incorrectly positioned loads can cause accidents

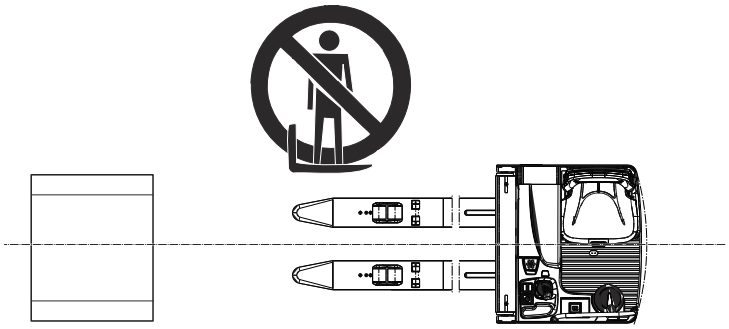
Before lifting a load, the operator must make sure that it has been correctly palletised and does not exceed the truck's capacity.

- ▶ Instruct other people to move out of the hazardous area of the truck. Stop working with the truck if people do not leave the hazardous area.
- ▶ Only carry loads that have been correctly secured and positioned. Use suitable precautions to prevent parts of the load from tipping over or falling off the truck.
- ▶ Damaged loads must not be transported.
- ▶ Never exceed the maximum loads specified on the load diagram.
- ▶ Never stand underneath a raised load handler.
- ▶ Do not stand on the load handler.
- ▶ Do not lift other people on the load handler.
- ▶ Insert the load handler as far as possible underneath the load.
- ▶ Cornering should be avoided when stacking and retrieving due to the risk of tipover.

⚠ CAUTION!

- ▶ Do not lift long loads at an angle.

4.10.1 Raising a load



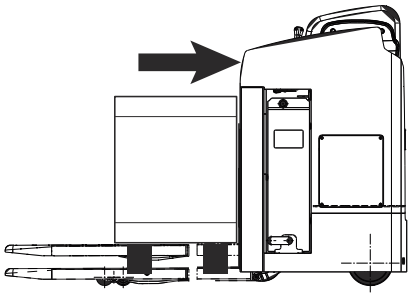
NOTICE

Risk of material damage to the hydraulic unit

Once you have reached the mechanical limit position, release the button for raising the load handler. Otherwise, the hydraulic unit may suffer material damage.

Requirements

– Load correctly palletised.
– Capacity of truck sufficient for load, see page 41.
– Load handler evenly loaded for heavy loads.
– Trucks with load centre setting (○):
  Load centre set correctly.



Procedure

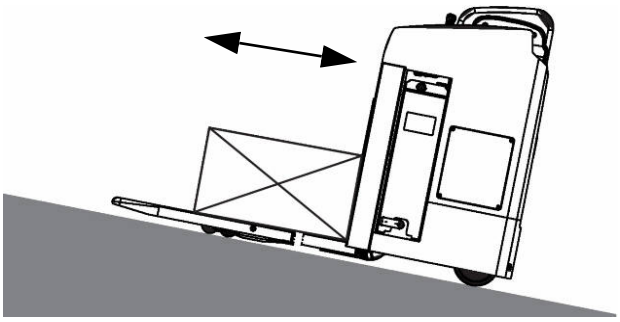
- Drive the truck carefully up to the pallet.
- Insert the load fork slowly into the pallet until the pallet is resting against the back (see figure).

➔ The load must not protrude more than 50 mm beyond the tips of the load fork.

- Raise the load fork until you reach the desired lift height – see page 111.

The load is raised.

4.10.2 Transporting a load



Requirements

– Load raised correctly.
– Load is not on the ground.
– Perfect ground conditions.

Procedure

- Accelerate and decelerate with care.
- Adapt your travel speed to the conditions of the route and the load you are transporting.
- Travel at a constant speed.
- Be prepared to brake at all times.
  - Brake gently in normal circumstances.
  - Only stop suddenly in dangerous situations.
- Watch out for other traffic at crossings and passageways.
- Always travel with a lookout at blind spots.
- Do not travel across or at an angle on inclines. Do not turn on slopes and inclines, and always drive with the load facing uphill (see graphic).

4.10.3 Depositing a load

⚠ CAUTION!

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

NOTICE

Avoid depositing the load suddenly to avoid damaging the load, load handler and the rack.

Requirements

– Storage location suitable for storing the load.

Procedure

- Drive carefully up to the storage location.
- Lower the load handler so that the load handler is clear of the load, see page 112.
- Carefully remove the load handler from the pallet.

The load is deposited.

5 Troubleshooting

This chapter allows the user to identify and rectify basic faults or the effects of incorrect operation. When trying to locate a fault, proceed in the order shown in the table.

If the fault cannot be rectified after carrying out the above procedures, notify the manufacturer's service department, as further troubleshooting can only be performed by specially trained and qualified service personnel.
In order for customer services to react quickly and specifically to the fault, the following information is essential:
- Truck serial number
- Error number on the display unit (if applicable)
- Error description
- Current location of truck

5.1 Truck in General

5.1.1 Truck does not start

Event message	Possible cause	Actions
-	Emergency disconnect switch pressed	– Unlock the emergency disconnect switch – see page 102
-	Truck switched off at key switch	– Switch on truck at key switch, see page 95
-	Battery charge too low	– Check the battery charge and charge battery, if necessary, see page 55
-	Faulty fuse	– Check fuses, see page 156

5.1.2 Load cannot be lifted

Possible Cause	Remedy
Truck not operational	Carry out all measures listed under "Truck does not start".
Hydraulic oil level too low	Checking the hydraulic oil level
Battery discharge monitor has switched off	Charging the battery
Faulty fuse	Check fuses
Excessive load	Note maximum capacity, see data plate.

Event message	Possible cause	Action
-	Truck not operational	– Carry out all measures listed under “Truck does not start”
-	Hydraulic oil level too low	– Check the hydraulic oil level, see page 155
-	Battery charge too low	– Check the battery charge and charge battery, if necessary, see page 55
-	Faulty fuse	– Check fuses, see page 156
-	Excessive load	– Note maximum capacity, see page 40

5.2 Battery

If any faults are found in the battery or the Jungheinrich battery charger, contact the manufacturer's customer service department immediately. The operating company must not carry out any actions on its own. Independent attempts to tamper with or repair the battery may invalidate the warranty. A service agreement with Jungheinrich will help identify faults before they lead to problems.

Safety regulations for handling lithium-ion batteries – see page 63.

5.2.1 Restricted use (slow travel, lift cut-off, no travel) of the truck

Event message	Possible cause	Actions
E-5195.x	Error in a strand The lithium-ion battery can still be used, but with reduced capacity	– Charge the lithium-ion battery, see page 70 – If the problem persists, contact the manufacturer's customer service department

5.2.2 Truck can no longer be switched on

Event message	Possible cause	Actions
-	The lithium-ion battery has switched to energy-saving mode to protect against deep discharge	– Charge the battery, see page 70 – If the problem persists, contact the manufacturer's customer service department
E-5409.1	Overtemperature or fault of the lithium-ion battery Before the lithium-ion battery is shut down, corresponding warnings appear on the truck	– Bring the lithium-ion battery within the permissible application range, see page 14 – Charge the battery, see page 70 – If the problem persists, contact the manufacturer's customer service department
E-5413.2	Low temperature or fault of the lithium-ion battery Before the lithium-ion battery is shut down, corresponding warnings appear on the truck	– Bring the lithium-ion battery within the permissible application range, see page 14 – Charge the battery, see page 70 – If the problem persists, contact the manufacturer's customer service department
E-5344.1 E-5342.1	Low voltage or fault of the lithium-ion battery Before the lithium-ion battery is shut down, corresponding warnings appear on the truck	– Charge the battery, see page 70 – If the problem persists, contact the manufacturer's customer service department

6 Moving a truck without its own drive system

⚠ WARNING!

Accidental truck movement

When the brakes are deactivated, the truck must be parked on a level surface, as the brakes are no longer effective.

- ▶ Do not install or remove the brake on slopes or inclines.
- ▶ The brake may only be installed or removed by the manufacturer's customer service department.
- ▶ Do not park the truck with the brake removed.

Recovering the truck

The truck can be moved without its own drive system only when the drive wheel brake is disassembled.

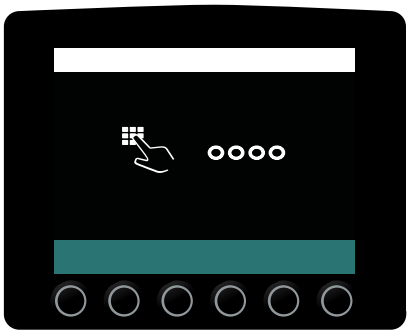
The brake may be disassembled and assembled only by authorised service personnel.

7 Optional Equipment

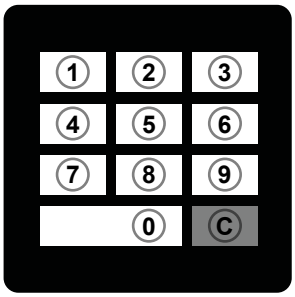
7.1 Keyless Access System

The keyless access systems serve as a replacement for the key switch to release the truck.

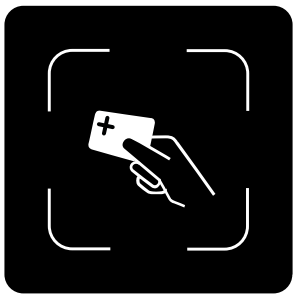
The keyless access system allows an individual code to be allocated to each operator or group of operators.



106



21



24

Item	Description
21	Keypad (EasyAccess PinCode): – Consists of keys 0 to 9 and C (clear) – Entry of 4-digit set-up and access codes – Up to 100 access codes can be stored
24	Transponder reader Plus (EasyAccess Transponder): – The transponder reader Plus supports additional transponder standards.
106	Display unit (EasyAccess Softkey): – Description see page 82 – Entry of 4-digit set-up and access codes – Up to 10 access codes can be stored – For set-up and access codes with the numbers 1 to 4

7.1.1 General Information about the Use of Keyless Access Systems

The default code is to be found on a sticker. When using for the first time, change the set-up code and remove the sticker!
– Default code: 1-2-3-4
– Factory set-up code: 2-4-1-2

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

➔ When a valid code is entered or a valid transponder used, a green tick appears in the display unit.
When an invalid code has been entered or a invalid transponder used, a red cross is displayed, and the entry must be repeated.

➔ If the truck is not used for a certain length of time, the display unit switches to standby mode. Pressing any key cancels the standby mode.

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

7.1.2 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.

7.1.2.1 Activating the keypad

Procedure

- Release the emergency disconnect switch, see page 102.
- Enter the default code 1-2-3-4 using the keys below the display unit (106).
  The truck is switched on.
- Press the key below the "Settings" symbol (107).
- Press the key below the "Change set-up code" symbol (108).
- Enter the set-up code 2-4-1-2 using the keypad (21).
  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.

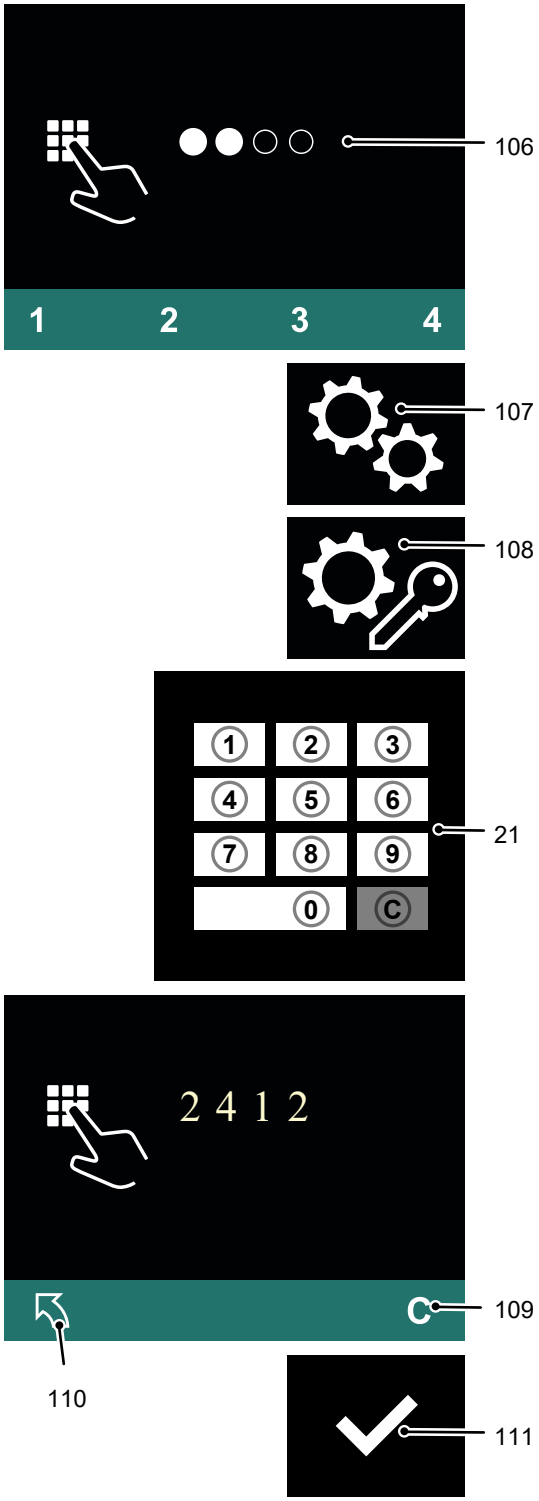
Press the key below the "Delete" symbol (109).
The set-up code is deleted.

- Enter the new set-up code using the keypad (21).
- Press the key below the "Confirm" symbol (111).
  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 (109).

- To return to the main menu, press the key below the "Back" symbol (110).
- Delete the default code, see page 129.
- Create access codes, see page 128.

The keypad is active.



7.1.2.2 Activating the transponder reader

Procedure

- Release the emergency disconnect switch, see page 102.
- Enter the default code 1-2-3-4 using the keys below the display unit (106).

  The truck is switched on.
- Press the key below the "Settings" symbol (107).
- Press the key below the "Change set-up code" symbol (108).
- Enter the set-up code 2-4-1-2 using the keys below the display unit (106).

  The set-up code entered is displayed.
- Press the key below the "Delete" symbol (109).

  The set-up code is deleted.
- Hold a transponder in front of the transponder reader (112).

  This transponder thus becomes the set-up transponder.
- Press the key below the "Confirm" symbol (111).

  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 (109).

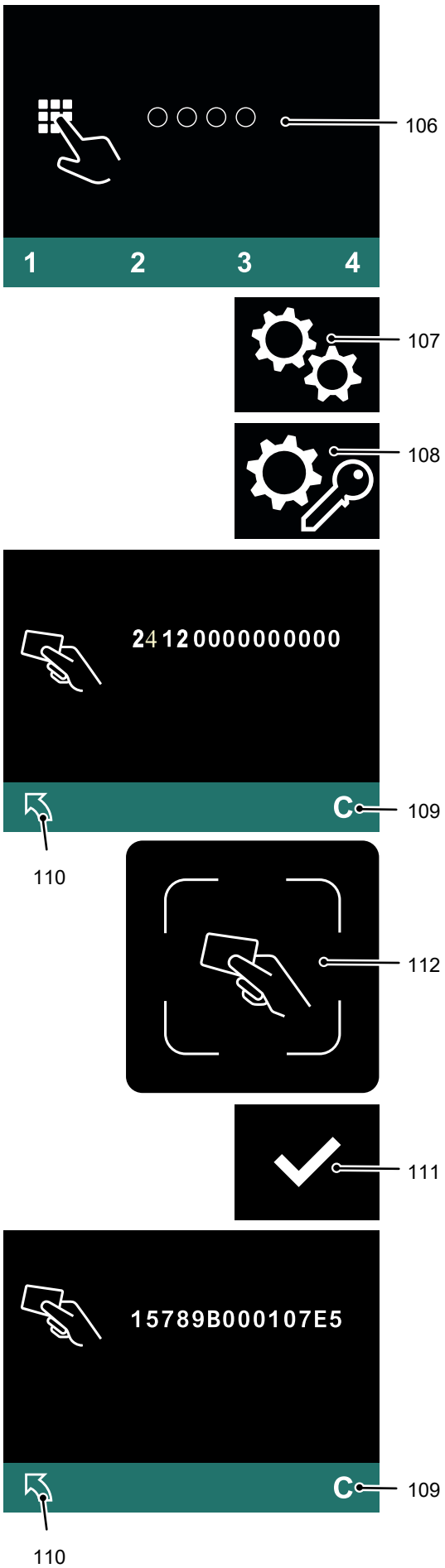
- To return to the main menu, press the key below the "Back" symbol (110).

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

Delete the default code, see page 134.

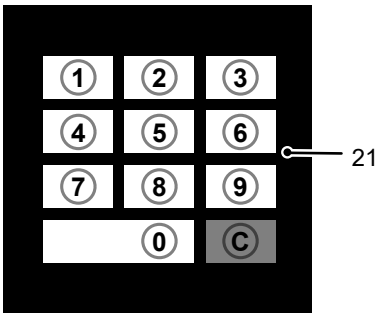
- Add new transponders, see page 133.

The transponder reader is now active.



7.1.3 Using the Keypad

7.1.3.1 Switching on the truck with an access code



Procedure

- Release the emergency disconnect switch, see page 102.
- Enter the access code with the keypad (21).

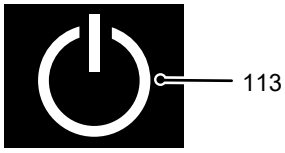
The truck is switched on.

Procedure

- Press the key under the "Switch off" symbol (113) in the display unit.
- Press the Emergency Disconnect switch, see page 102.

The truck is switched off.

7.1.3.2 Switching off the truck



Procedure

- Press the key under the "Switch off" symbol (113) in the display unit.
- Press the Emergency Disconnect switch, see page 102.

The truck is switched off.

7.1.3.3 Changing the set-up code

Requirements

– The truck is switched on, see page 126.

Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Change set-up code" symbol (108).
- Enter the set-up code using the keypad (21).

  The set-up code entered is shown in the display unit (106) as filled-in circles.
- Press the key below the "Delete" symbol (109).

  The set-up code is deleted.
- Enter the new set-up code using the keypad (21).

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

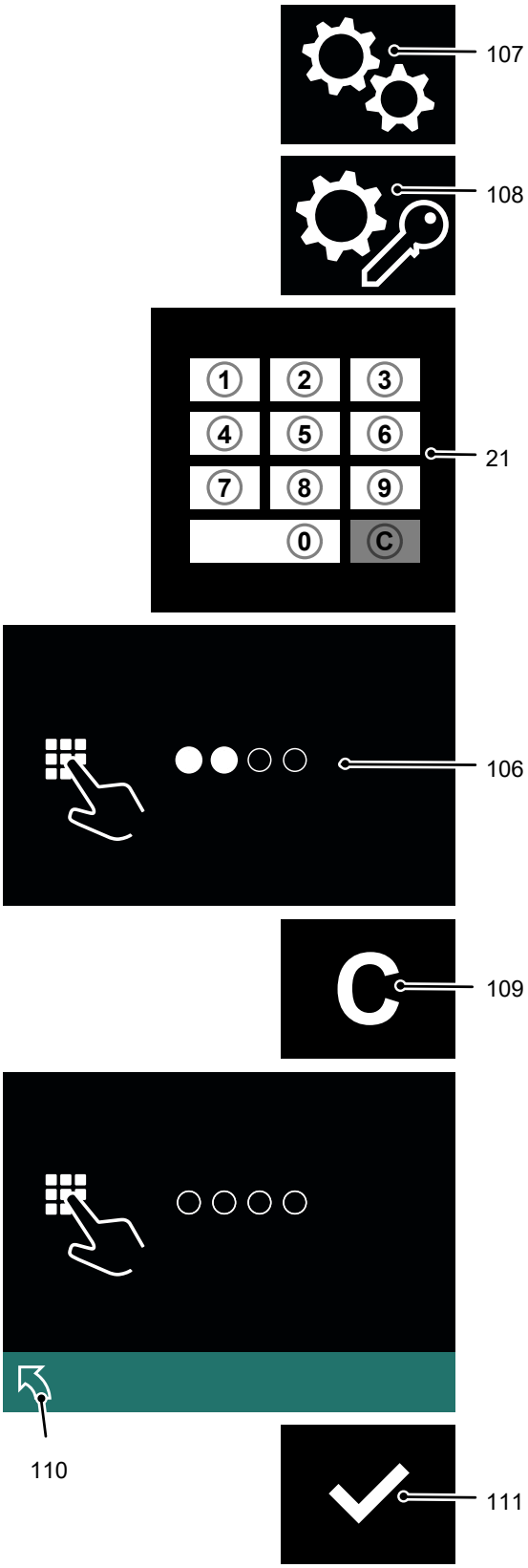
- Press the key below the "Confirm" symbol (111).

  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 (110).

The set-up code has been changed.



7.1.3.4 Adding a new access code

Requirements

– The truck is switched on, see page 126.

Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Edit access code" symbol (114).

  The set-up code is requested.
- Enter the set-up code using the keypad (21).

  All access codes are shown on the display unit (106).
- Press the key below the "Add" symbol (115).
- Enter a new access code using the keypad (21).

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

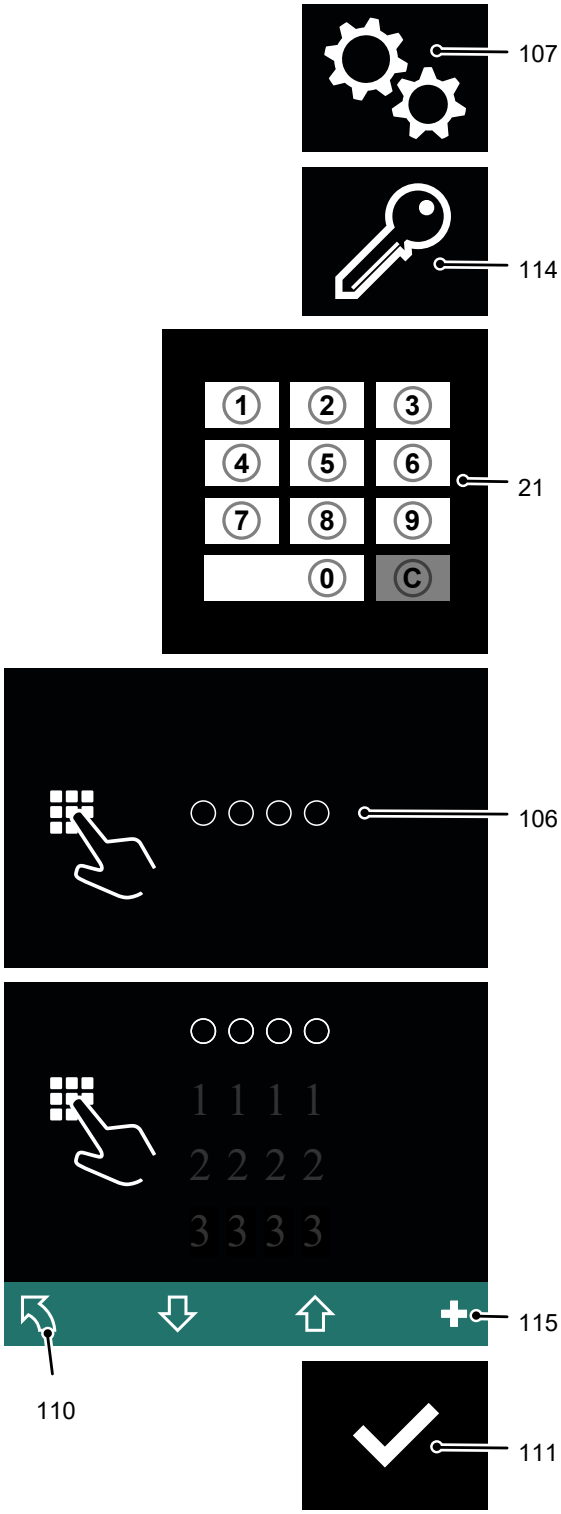
- Press the key below the "Confirm" symbol (111).

  The new access code is shown on the display unit (106).

➔ If the new access code has been entered incorrectly, delete it, see page 129, and enter the correct access code.

To return to the main menu, press the key below the "Back" symbol (110).

A new access code has been added.



7.1.3.5 Deleting an access code

Requirements

– The truck is switched on, see page 126.

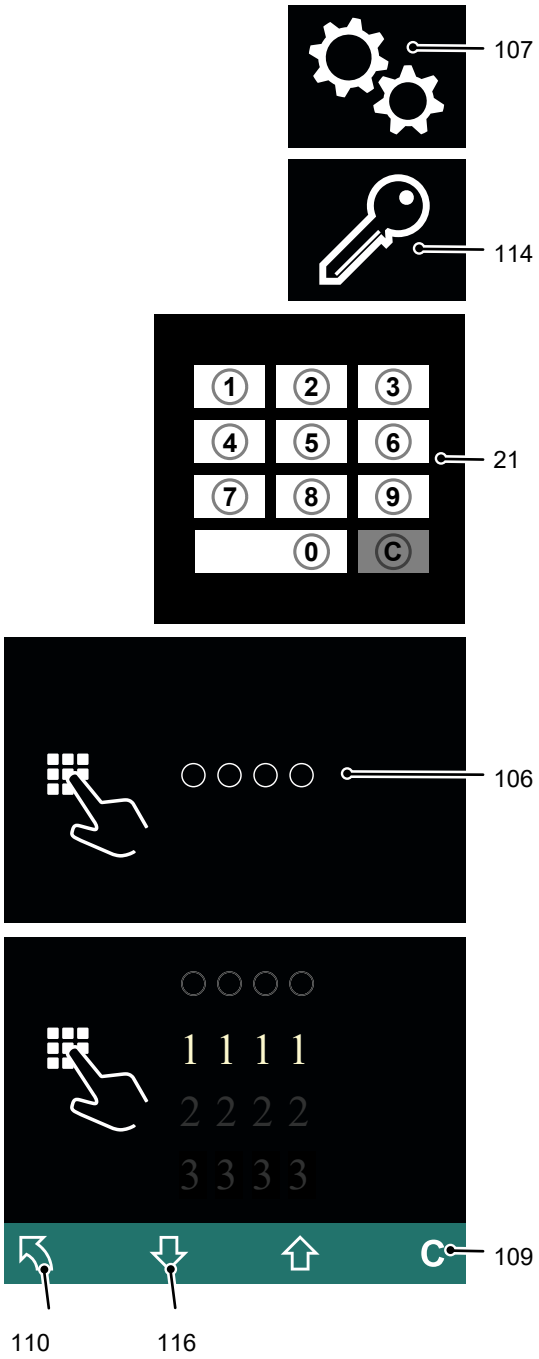
Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Edit access code" symbol (114).

  The set-up code is requested.
- Enter the set-up code using the keypad (21).

  All access codes are shown on the display unit (106).
- Select the access code to be deleted using the key below the "Down selection" symbol (116).
- Press the key below the "Delete" symbol (109).

  The access code has been deleted.
- To return to the main menu, press the key below the "Back" symbol (110).



7.1.3.6 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 126.

Procedure

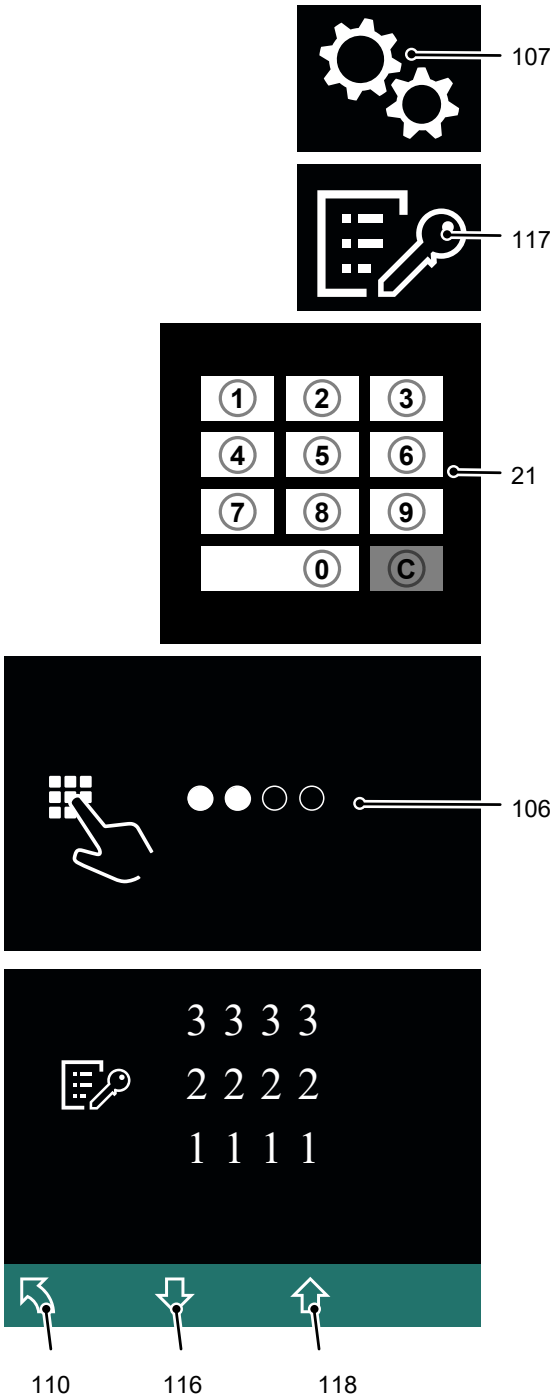
- Press the key below the "Settings" symbol (107).
- Press the key below the "Log-in process" symbol (117).
- Enter the set-up code using the keypad (21).

  The set-up code entered is shown in the display unit (106) as filled-in circles.
- To scroll forward, press the button under the "Down selection" symbol (116) 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 (118) 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 (110).

The log-in process is displayed.



7.1.4 Operating the transponder reader

NOTICE

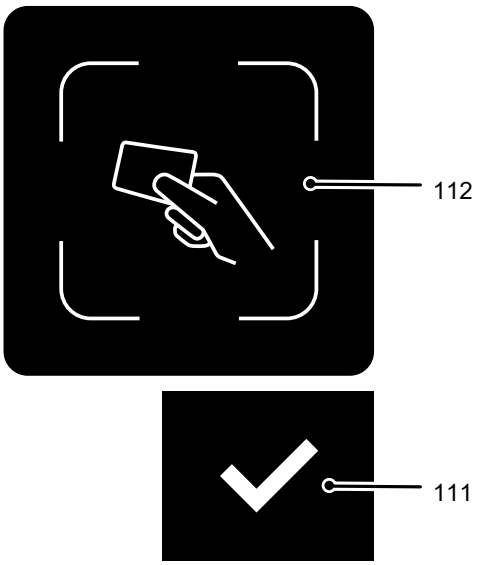
Take care not to damage the transponder. If the transponder is damaged, the truck cannot be switched on.

7.1.4.1 Switching on the truck with a transponder

Procedure

- Release the Emergency Disconnect switch, see page 102.
- Hold the transponder in front of the transponder reader (112).
  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 (111).

The truck is switched on.



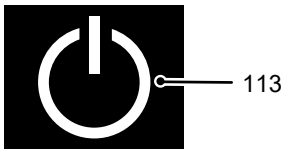
The truck can only be switched on when the display unit (106) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

7.1.4.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (113) in the display unit.
- Press the Emergency Disconnect switch, see page 102.

The truck is switched off.



7.1.4.3 Changing the set-up transponder

Requirements

– The truck is switched on, see page 131.

Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Change set-up code" symbol (108).
- Place the set-up transponder on the transponder reader (112).

  The code of the set-up transponder is shown on the display unit (106).
- Press the key below the "Delete" symbol (109).

  A dashed line is shown.
- Place the new set-up transponder on the transponder reader (112).

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

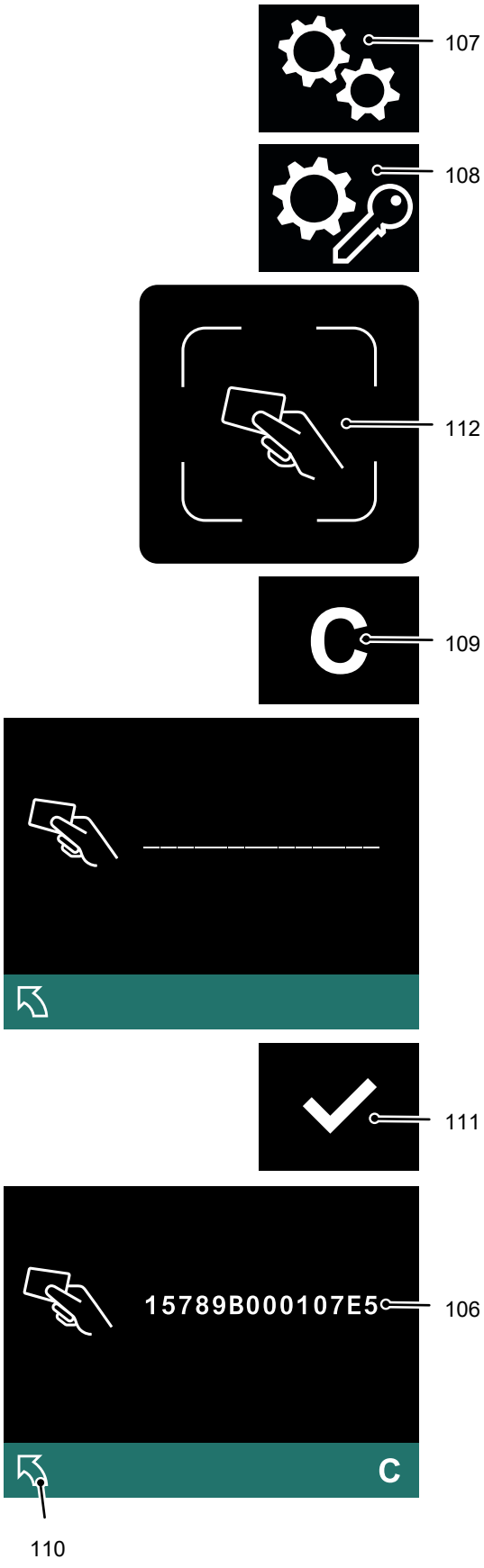
- Press the key below the "Confirm" symbol (111).

  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 (109).

To return to the main menu, press the key below the "Back" symbol (110).

The set-up transponder has been changed.



7.1.4.4 Adding a new transponder

Requirements

– The truck is switched on, see page 131.

Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Edit transponder" symbol (114).

  The set-up transponder is requested.
- Place the set-up transponder on the transponder reader (112).

  All transponder codes are shown on the display unit (106).
- Press the key below the "Add" symbol (115).
- Place the new transponder on the transponder reader (112).

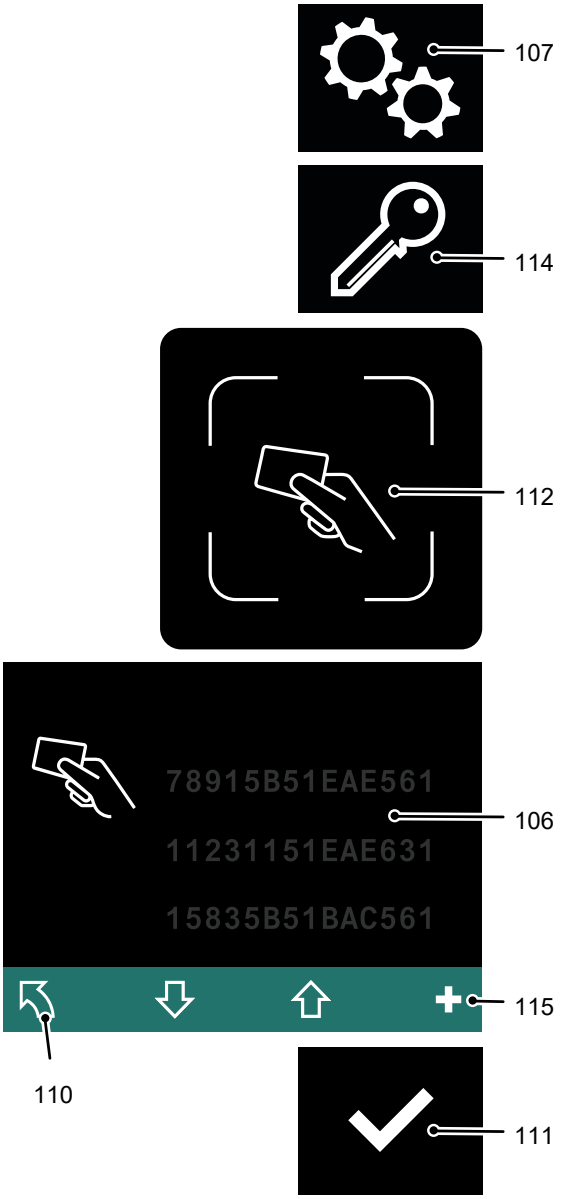
➔ The new transponder code must be different from existing transponder codes.

- Press the key below the "Confirm" symbol (111).

  The new transponder code is displayed.

➔ If the wrong transponder has been used, delete it, see page 134, and add a correct transponder.

To return to the main menu, press the key below the "Back" symbol (110).



A new transponder has been added.

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

7.1.4.5 Deleting a transponder

Requirements

– The truck is switched on, see page 131.

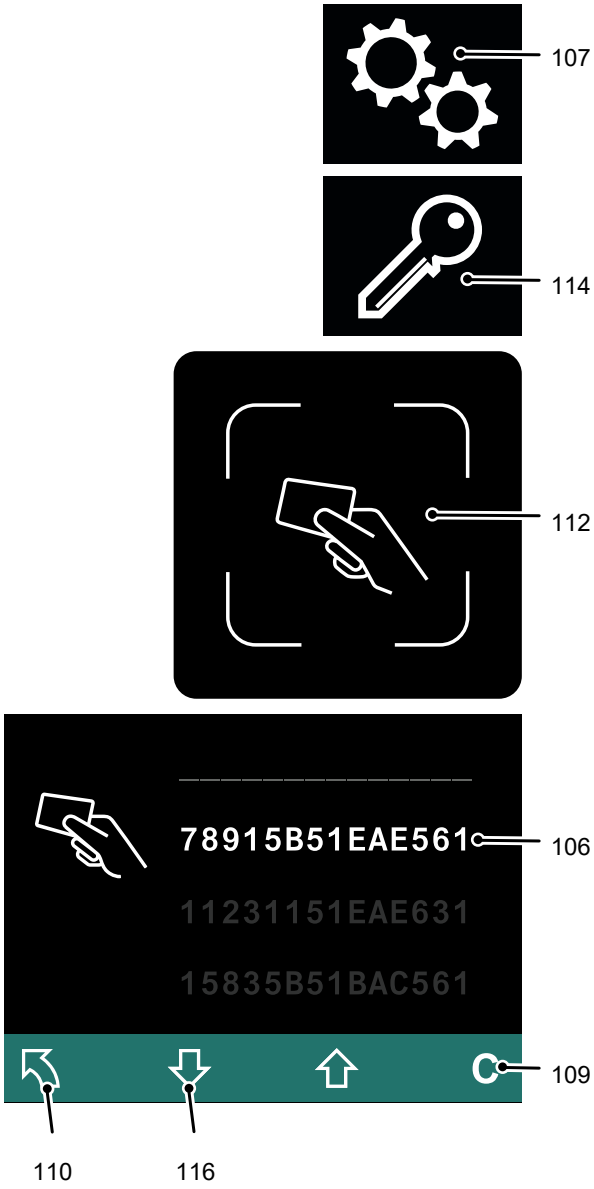
Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Edit transponder" symbol (114).

  The set-up transponder is requested.
- Place the set-up transponder on the transponder reader (112).

  All transponder codes are shown on the display unit (106).
- Select the transponder code to be deleted using the key below the "Down selection" symbol (116).
- Press the key below the "Delete" symbol (109).

  The transponder has been deleted.
- To return to the main menu, press the key below the "Back" symbol (110).



7.1.4.6 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 126.

Procedure

- Press the key below the "Settings" symbol (107).
- Press the key below the "Log-in process" symbol (117).
- Place the set-up transponder on the transponder reader (112).
- To scroll forward, press the button under the "Down selection" symbol (116) 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 (118) 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 (110).

The log-in process is displayed.

7.1.5 ISM access module (○)

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

7.2 Floor-Spot (○)

The Floor-Spot serves as an auxiliary device and projects a coloured dot onto the ground.

⚠ CAUTION!

Risk of accident due to restricted view

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

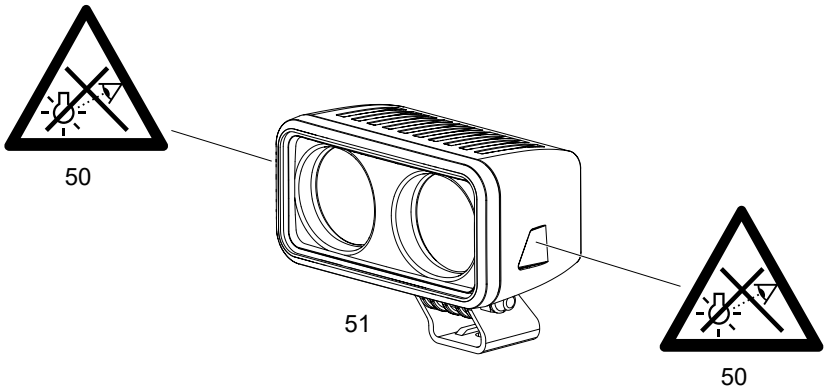
- ▶ Do not look directly at the LED light.
- ▶ Practise travelling and working with the floor spot carefully.
- ▶ Do not change the factory setting.

⚠ 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.



Item		Description
51	○	Revised Floor-Spot version from 2022
50	○	Warning notice: "Danger! Optical radiation" (on trucks with blue Floor-Spot)

7.3 zoneCONTROL

The assistance system makes it possible to mark various types of hazardous area in the warehouse as zones, use cyclical remote distance measurements to detect potential collisions with equipped personnel and trucks and reduce the likelihood of a collision.

The assistance system does not feature any safety functions and does not interfere with the safety functions of the truck. Depending on the situation, it is possible to limit or reduce the travel speed. The assistance system does not brake the truck to a standstill.

The assistance system does not release the operator from the duty to observe the applicable safety regulations for truck operation – refer to the truck operating instructions, e.g. with regard to visibility when driving.

➔ **Before using the assistance system, read the separate operating instructions**
They contain comprehensive information about operation as well as important safety instructions and warning information.

7.4 Fleet Management System

➔ *If equipped with a Jungheinrich fleet management component, see the “Jungheinrich fleet management system” operating instructions.

7.5 Parameters

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

For supplied batteries, the correct battery parameter is set ex works.

F Truck maintenance

1 Spare Parts

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

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

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

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

➔ The serial number can be found on the data plate, see page 40.

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 161.

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 161.

⚠ WARNING!

Risk of accidents and component damage

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

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.

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.

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 157.

3 Maintenance Safety Regulations

Maintenance and repair personnel

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

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

Operating company

The maintenance personal of the operating company has the technical expertise and experience to perform the activities in the maintenance check list for the operating company. The maintenance and repair work to be performed by the operating company are also written down, see page 148.

Customer Services

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

3.1 Working on the electrical system

⚠ WARNING!

Electrical current can cause accidents

Make sure the electrical system is voltage-free before starting work on it. The capacitors in the controller must be completely discharged. The capacitors are completely discharged after approximately 10 minutes. 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 97).
- ▶ Remove the battery, see page 53.
- ▶ Remove any rings, metal wristbands etc.

3.2 Consumables and used parts

⚠ CAUTION!

Consumables and used parts are an environmental hazard

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

- ▶ Note the safety regulations when handling these materials.

3.3 Wheels

⚠ WARNING!

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

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

Uneven wear reduces truck stability and increases the stopping distance.

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

When replacing wheels fitted at the factory, only use the manufacturer’s original spare parts. Otherwise the truck's rated performance cannot be ensured, see page 139.

3.4 Hydraulic system

⚠ WARNING!

Leaky hydraulic systems can result in accidents

Hydraulic oil can escape from leaky and faulty hydraulic systems.

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

⚠ WARNING!

Faulty hydraulic hoses can result in injury and infection

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

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

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.

4 Lubricants and Lubrication Schedule

4.1 Handling consumables safely

Handling consumables

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

⚠ WARNING!

Improper handling is hazardous to health, life and the environment

Consumables can be flammable.

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

⚠ CAUTION!

Spilled consumables can cause slipping and endanger the environment

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

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

⚠ WARNING!

Improper handling of oils can be hazardous

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

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

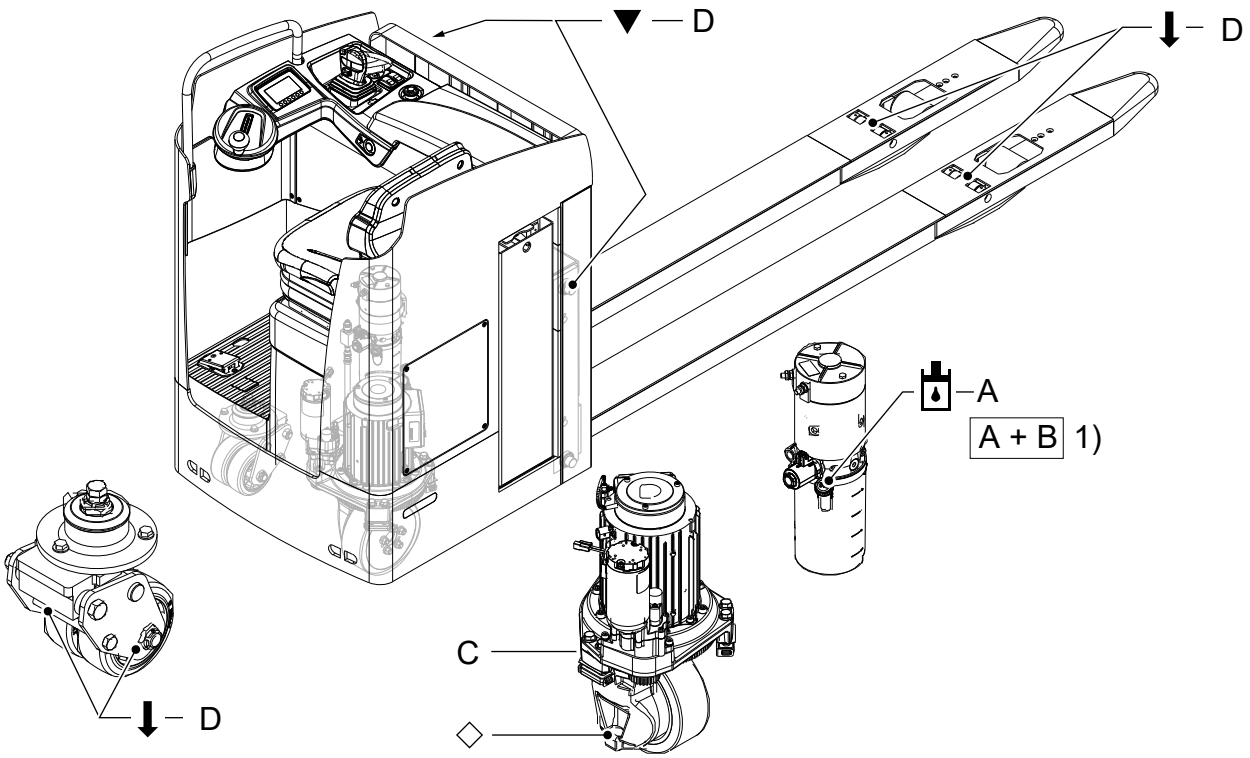
⚠ CAUTION!

Consumables and used parts are an environmental hazard

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

▶Note the safety regulations when handling these materials.

4.2 Lubrication Schedule



▼	Contact surfaces	✳	Cold store application
⬇	Grease nipple	◇	Transmission oil drain plug
☆	Hydraulic oil drain plug		Hydraulic oil filler plug

1) Mixing ratio for cold store application: 1:1

4.3 Consumables

Code	Order no.	Quantity	Description	Used for
A	51132826 *	1.0 l	Jungheinrich hydraulic oil	Hydraulic system
	51132827 *	5.0 l		
B	51081875	5.0 l	Renolin MR 310 cold store hydraulic oil	Hydraulic system Additive for use in cold stores
C	50449961	5.0 l	SAE 75W-90	Transmission
E	29201430	1.0 kg	Grease, DIN 51825	Lubrication

* 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.

For cold store applications, the Jungheinrich hydraulic oil (A) and the cold store hydraulic oil (C) must be mixed in a 1:1 ratio.

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

Procedure

- Park the truck securely, see page 97.
- Disconnect the battery to prevent the truck from being switched on accidentally.

5.2 Lifting and jacking up the truck safely

⚠ WARNING!

Lifting and jacking up the truck safely

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

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

▶ Jack up the truck only on a level surface and prevent it from moving accidentally.

▶ Always use a jack with sufficient capacity. When jacking up the burden carrier, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).

▶ In order to raise the truck, the lifting accessories must only be secured to the points specially provided for this purpose, see page 43.

5.3 Cleaning

5.3.1 Cleaning the truck

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

⚠ CAUTION!

Risk of fire due to use of flammable cleaning agents

Using flammable cleaning agents increases the risk of fire.

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

NOTICE

Risk of component damage when cleaning the truck

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

- ▶ Cover all electronic system assemblies (controls, sensors, motors etc.) before cleaning the truck with a high-pressure cleaner.
- ▶ Do not hold the jet of the high-pressure cleaner at marking points to avoid damaging them – see page 39.
- ▶ Do not clean the truck with a steam jet.

Requirements

– Truck prepared for maintenance and repair work – see page 148.

Tools and Material Required

– Water-based cleaning agents
– Sponge or cloth

Procedure

- Clean the surface of the truck with water-based solvents and water. Use a sponge or cloth to clean.
- In particular, clean the following areas:
  - Window(s)
  - Oil filler caps and their surroundings
  - Grease nipples (before lubrication)
- Dry the truck after cleaning, e.g. with compressed air or a dry cloth.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" – see page 157.

The truck is now clean.

5.3.2 Cleaning the electrical system assemblies

NOTICE

Risk of electrical-system damage

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

▶ Do not clean the electrical system with water.

▶ Clean the electrical system with weak suction or compressed air (use a compressor with a water trap) and a non-conductive, anti-static brush.

Cleaning the electrical system assemblies

Requirements

– Truck prepared for maintenance and repair work – see page 148.

Tools and Material Required

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

Procedure

- Expose the electrical system – see page 152.
- Clean the electrical system assemblies with weak suction or compressed air (use a compressor with a water separator) and a non-conductive, anti-static brush.
- Fit the electrical system cover – see page 152.
- Carry out all the tasks listed in the section "Recommissioning the truck after cleaning or maintenance work" – see page 157.

The electrical-system assemblies are now clean.

5.4 Removing or Fitting the Service Flap

Removing the drive compartment cover

Requirements

– Truck prepared for maintenance and repair work – see page 148.

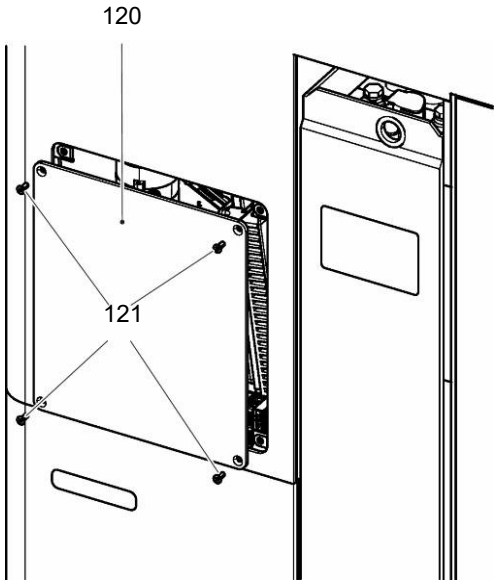
Tools and Material Required

– Allen key

Procedure

➔ Hold onto the cover (120) when removing the screws.

Remove 4 screws (121) with the Allen key.



The drive-compartment cover is now removed.

Fitting the drive compartment panel

Tools and Material Required

– Allen key

Procedure

⚠ CAUTION!

Arm trapping hazard

There is a risk of trapping when you close the drive compartment cover.

▶ Make sure there is nothing between the cover and the truck when you close the cover.

Insert the cover (120) into the truck chassis.

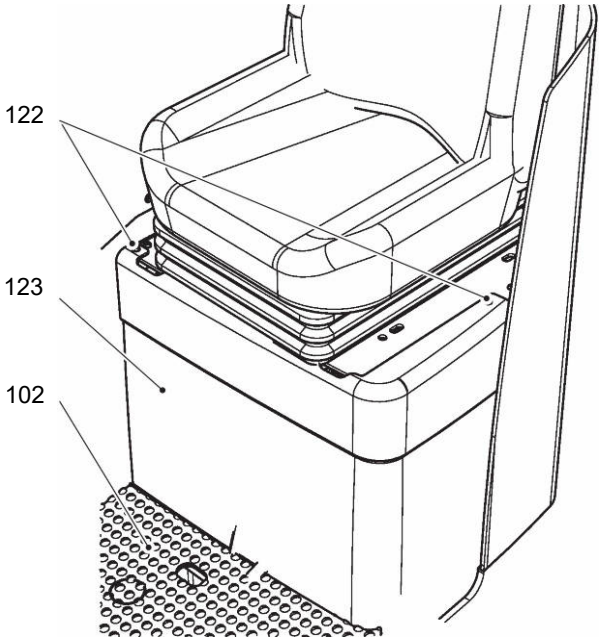
- Secure the cover to the truck using the four screws (121).

The drive compartment cover is now fitted.

5.5 Demontieren oder Montieren der Sitzhaube

Procedure

- Switch off the truck.
- Press the emergency disconnect switch – see page 102.
- Fully lower the floor plate (102) – see page 94.
- Remove the screws (122) from the seat cover (123).
- Remove the seat cover (123).



5.6 Replacing the drive wheel

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

5.7 Tightening the wheel nuts

➔ The wheel nuts on the drive wheel must be retightened in accordance with the maintenance intervals indicated in the maintenance checklist, see page 161.

Tightening the wheels nuts

Requirements

– Prepare the truck for maintenance and repair work, see page 148.

Tools and Material Required

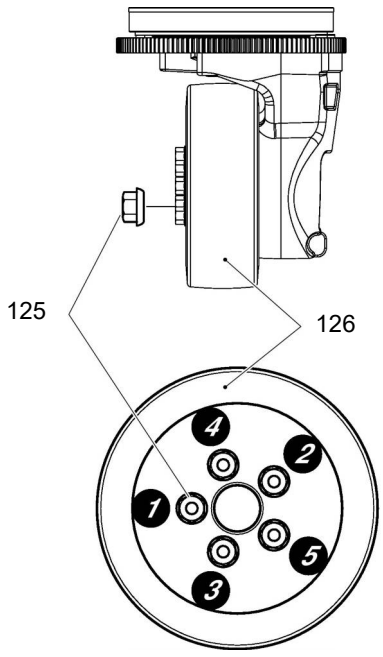
– Torque wrench

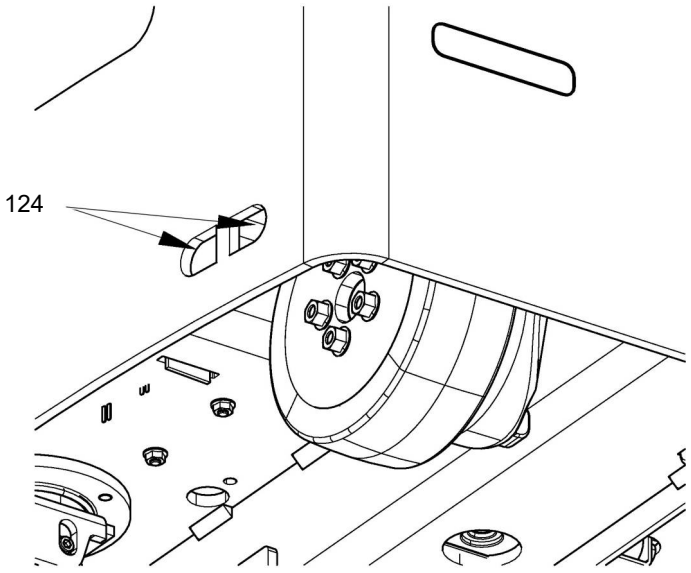
Procedure

- Position the drive wheel (126) such that the wheel nuts (125) can be tightened through the assembly opening (124).
- Tighten all wheel nuts (125) using the torque wrench through the assembly opening (124) in the bumper.

  To do this, tighten the wheel nuts in the prescribed order.
  - First tighten with 10 Nm.
  - Then tighten with 150 Nm.

The wheel nuts have now been tightened.





5.8 Checking the hydraulic oil level

Checking the oil level

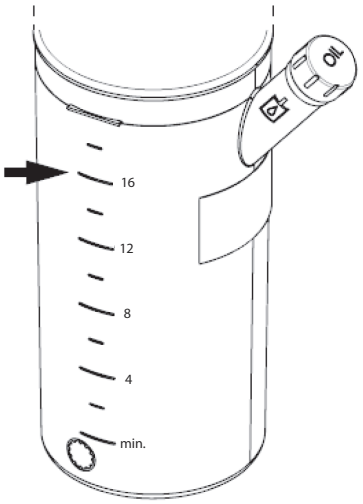
Requirements

– Load handler fully lowered – see page 112.
– Truck prepared for maintenance and repair work – see page 148.
– Seat cover removed – see page 153.

Procedure

• Read off the hydraulic oil level at the markings on the hydraulic reservoir and compare with the table below.

The oil level has now been checked.



Hydraulic oil level	Marking on the hydraulic reservoir
Minimum	8
Setpoint	**12**
Maximum	14

Correct hydraulic oil level

Requirements

– Correct hydraulic oil specification determined – see page 147.

Procedure

• Add hydraulic oil until the setpoint level is reached.

  Around 0,16 l of hydraulic oil is required to bring the hydraulic oil up from mark 8 to mark 12.

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

5.9 Checking the electrical fuses

Checking fuses

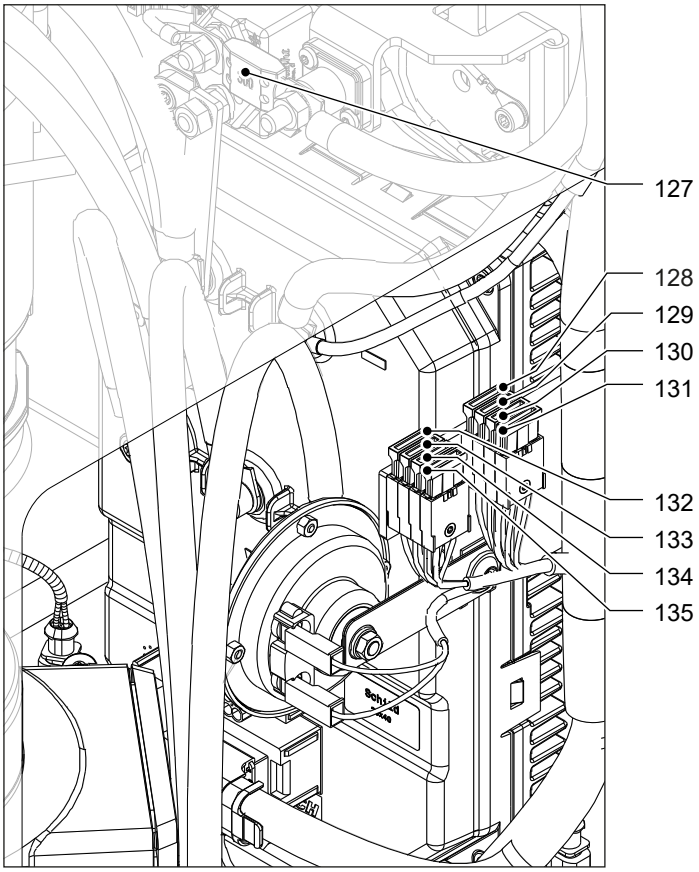
Requirements

– Truck prepared for maintenance and repair work.
– Service flap removed – see page 152.

Procedure

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

The fuses are now checked.



Item	Description	Protection	Rating (A)
129	9F22	Electromechanical components	4
127	F50	Main fuse	300
130	9F17	Floor-Spot option	4
131	9F2	Adjustable floor plate	4
132	F17	Radio data option	4
133	6F1	Battery measurement input	2
134	F18	Control fuse (telematics and display)	4
135	4F9	Overall control circuit fuse	4
128	9F36	Seat heating option	4

5.10 Restoring the truck to service after maintenance and repairs

Procedure

- Thoroughly clean the truck, see page 149.
- Lubricate the truck according to the lubrication diagram, see page 146.
- Clean the battery, grease the terminals and connect the battery.
- Charge the battery, see page 55.
- Start up the truck, see page 91.

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 148.

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 149.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see page 147.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication schedule, see page 146.
- Charge the battery, see page 55.
- Disconnect the battery, clean it and grease the terminals.

➔ In addition, follow the battery manufacturer’s instructions.

6.2 During decommissioning

NOTICE

Full discharge can damage the battery

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

▶Charge the battery at least every 2 months.

➔ Charge the battery see page 55.

6.3 Restoring the truck to service after decommissioning

Procedure

- Thoroughly clean the truck, see page 149.
- Lubricate the truck according to the lubrication schedule, see page 146.
- Clean the battery, grease the terminal screws and connect the battery.
- Charge the battery, see page 55.
- Start up the truck, see page 91.

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

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

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

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

8 Final de-commissioning, disposal

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

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

9 Human vibration measurement

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

G Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement

⚠ WARNING!

Lack of maintenance can result in accidents

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

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

NOTICE

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

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

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

1 Maintenance Contents ESE 220

Issued on: 2022-08-29 15:00

1.1 Owner

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

1.1.1 Maintenance contents

1.1.1.1 Standard equipment

Brakes
Test the brake.

Hydraulic operations
Correct the hydraulic-oil level.

1.1.1.2 Optional Equipment

Lead-acid battery, international

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

Lead-acid battery

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

1.1.2 Inspection contents

1.1.2.1 Standard equipment

The following points must be checked:

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

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

Travel
Check wheels for wear and damage

Chassis/structure
Industrial truck for damage and leaks
Check labels for legibility, completeness and plausibility
Check doors or covers for damage
Mechanism to protect against trapping and shearing is present, secure, functions correctly and is free of dirt and damage

Hydraulic operations
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:

Lead-acid battery, international

Power supply
Check the battery cable connections for secure attachment
Check battery and battery components for damage

Lead-acid battery

Power supply
Check the battery cable connections for secure attachment

1.2 Customer Service

In accordance with the ESE 220 service interval, to be performed every 1000 service hours, but at least once a year.

1.2.1 Maintenance contents

1.2.1.1 Standard equipment

Brakes
Test the brake.
Measure the air gap of the magnetic brake.

Electrical system
Test the contactors and/or relays.
Clean the motor with compressed air.
Carry out a frame leakage test.

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

Hydraulic operations
Test the lift-limit cut-off/lift cut-off.
Adjust the lift mechanism.
Correct the hydraulic-oil level.
Test the pressure relief valve.

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

1.2.1.2 Optional Equipment

Radio data

System components
Clean the scanner and terminal.

Lead-acid battery, international

Electrical system
Carry out a frame leakage test.

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
Carry out a frame leakage test.

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

1.2.2 Inspection contents

The following points must be checked:

1.2.2.1 Standard equipment

Electrical system
Cables and motor for secure fit and damage
Warning and safety equipment in accordance with the operating instructions
Functionality of display and controls
Test 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
Check carbon brushes for wear

Power supply
Battery latch and battery attachment for correct function and damage
Battery connector for secure fit, functionality and damage

Travel
Deadman switch for function and damage
Drive system bearings for wear and damage
Transmission for noise and leaks
Check wheels for wear, damage and secure mounting
Check wheel bearings and mounting of wheels for wear and damage

Chassis/structure
Industrial truck for damage and leaks
Check chassis connections and screw connections are securely attached and check for damage
Check labels for legibility, completeness and plausibility
function of adjustable floor plate and ensure that it is secure
Check driver's seat for damage
Check driver's seat is securely attached and test adjustment mechanism
Mechanism to protect against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Check operator mat and steps are non-slip and free of damage

Hydraulic operations
Test hydraulic controls and check their labels for legibility, completeness and plausibility
Lift-limit cut-off/lift cut-off for secure fit and damage
Lift mechanism for wear, functionality and damage
Check cylinders and piston rods are securely attached and check for damage

Hydraulic operations
Check slide pieces and stops for wear and damage
Check mast rollers and their running surfaces for wear and damage
Test hydraulic system
Check hydraulic connections, hoses and pipes are securely attached and check for leaks and damage
Check fork arms or load handler for wear and damage
Tie/plunger rods for uniform adjustment, wear and damage
Check the hoses, pipes and connections are securely attached and check for wear, leaks, damage, blisters and kinks

Steering
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

1.2.2.2 Optional Equipment

Electrolyte recirculation

Power supply
Hose connections and pump for correct function

Aquamatic

Power supply
Aquamatic plug, hose connections and float for functionality and sealing
Flow indicator for functionality and sealing

Load backrest

Hydraulic operations
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and 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

Access module

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

Entry skids/rollers

Hydraulic operations
Check entry skids or entry rollers for damage and wear, and test their function

Lead-acid battery, international

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

Lead-acid battery

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

1.2.3 Maintenance parts

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

1.2.3.1 Standard equipment

maintenance part	service hours	months
Gear oil	10000	
Hydraulic system breather filter	2000	12
Hydraulic oil	2000	12
Hydraulic oil filter	2000	12
Hydraulic system – venting plug	2000	12

1.2.3.2 Optional Equipment

Cold store application

maintenance part	service hours	months
Hydraulic oil	1000	12
Hydraulic oil additive	1000	12

2 Maintenance Contents ESE 320

Issued on: 2022-08-29 15:00

2.1 Owner

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

2.1.1 Maintenance contents

2.1.1.1 Standard equipment

Brakes
Test the brake.

Hydraulic operations
Correct the hydraulic-oil level.

2.1.1.2 Optional Equipment

Lead-acid battery, international

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

Lead-acid battery

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

2.1.2 Inspection contents

2.1.2.1 Standard equipment

The following points must be checked:

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

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

Travel
Check wheels for wear and damage

Chassis/structure
Industrial truck for damage and leaks
Check labels for legibility, completeness and plausibility
Check doors or covers for damage
Mechanism to protect against trapping and shearing is present, secure, functions correctly and is free of dirt and damage

Hydraulic operations
Test hydraulic system
Check fork arms or load handler for wear and damage

2.1.2.2 Optional Equipment

The following points must be checked:

Lead-acid battery, international

Power supply
Check the battery cable connections for secure attachment
Check battery and battery components for damage

Lead-acid battery

Power supply
Check the battery cable connections for secure attachment

2.2 Customer Service

In accordance with the ESE 320 service interval, to be performed every 1000 service hours, but at least once a year.

2.2.1 Maintenance contents

2.2.1.1 Standard equipment

Brakes
Test the brake.
Measure the air gap of the magnetic brake.

Electrical system
Test the contactors and/or relays.
Clean the motor with compressed air.
Carry out a frame leakage test.

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

Hydraulic operations
Test the lift-limit cut-off/lift cut-off.
Adjust the lift mechanism.
Correct the hydraulic-oil level.
Test the pressure relief valve.

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

2.2.1.2 Optional Equipment

Radio data

System components
Clean the scanner and terminal.

Lead-acid battery, international

Electrical system
Carry out a frame leakage test.

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
Carry out a frame leakage test.

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.

2.2.2 Inspection contents

The following points must be checked:

2.2.2.1 Standard equipment

Electrical system
Cables and motor for secure fit and damage
Warning and safety equipment in accordance with the operating instructions
Functionality of display and controls
Test 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
Check carbon brushes for wear

Power supply
Battery latch and battery attachment for correct function and damage
Battery connector for secure fit, functionality and damage

Travel
Deadman switch for function and damage
Drive system bearings for wear and damage
Transmission for noise and leaks
Check wheels for wear, damage and secure mounting
Check wheel bearings and mounting of wheels for wear and damage

Chassis/structure
Industrial truck for damage and leaks
Check chassis connections and screw connections are securely attached and check for damage
Check labels for legibility, completeness and plausibility
function of adjustable floor plate and ensure that it is secure
Check driver's seat for damage
Check driver's seat is securely attached and test adjustment mechanism
Mechanism to protect against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Check operator mat and steps are non-slip and free of damage

Hydraulic operations
Test hydraulic controls and check their labels for legibility, completeness and plausibility
Lift-limit cut-off/lift cut-off for secure fit and damage
Lift mechanism for wear, functionality and damage
Check cylinders and piston rods are securely attached and check for damage

Hydraulic operations
Check slide pieces and stops for wear and damage
Check mast rollers and their running surfaces for wear and damage
Test hydraulic system
Check hydraulic connections, hoses and pipes are securely attached and check for leaks and damage
Check fork arms or load handler for wear and damage
Tie/plunger rods for uniform adjustment, wear and damage
Check the hoses, pipes and connections are securely attached and check for wear, leaks, damage, blisters and kinks

Steering
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

2.2.2.2 Optional Equipment

Electrolyte recirculation

Power supply
Hose connections and pump for correct function

Aquamatic

Power supply
Aquamatic plug, hose connections and float for functionality and sealing
Flow indicator for functionality and sealing

Load backrest

Hydraulic operations
Check the attachment is securely attached to the truck and check the load-bearing components for secure fit and 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

Access module

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

Entry skids/rollers

Hydraulic operations
Check entry skids or entry rollers for damage and wear, and test their function

Lead-acid battery, international

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

Lead-acid battery

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

2.2.3 Maintenance parts

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

2.2.3.1 Standard equipment

maintenance part	service hours	months
Gear oil	10000	
Hydraulic system breather filter	2000	12
Hydraulic oil	2000	12
Hydraulic oil filter	2000	12
Hydraulic system – venting plug	2000	12

2.2.3.2 Optional Equipment

Cold store application

maintenance part	service hours	months
Hydraulic oil	1000	12
Hydraulic oil additive	1000	12