

EJE 220/225/230/235/220r/225r

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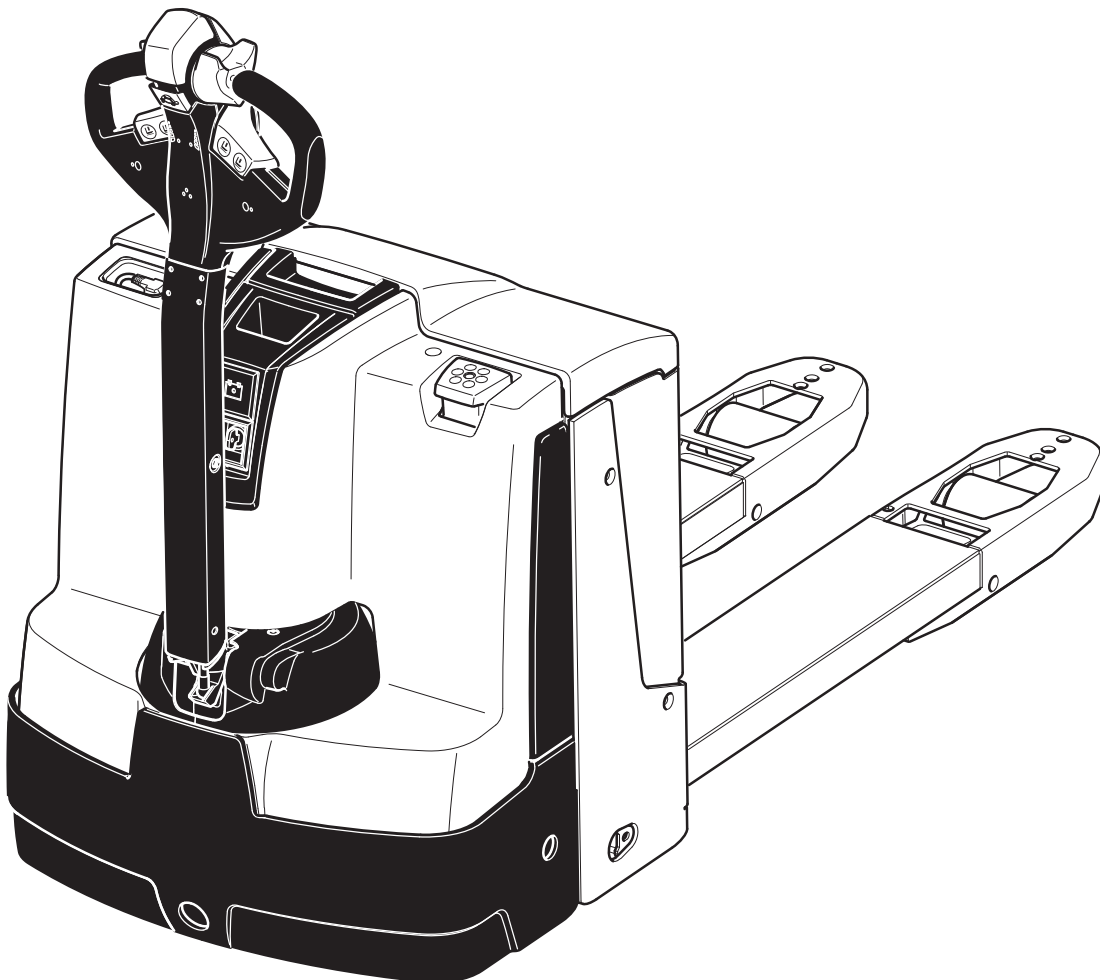
Operating instructions

en-GB

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EJE 220
EJE 225
EJE 230
EJE 235
EJE 220r
EJE 225r



 **JUNGHEINRICH**

Declaration of Conformity



Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

Description
Industrial truck

Type	Option	Serial no.	Year of manufacture
EJE 220 EJE 225 EJE 230 EJE 235 EJE 220r EJE 225r			

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 documentation.

Foreword

Notes on the operating instructions

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

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

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

Safety notices and text mark-ups

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

DANGER!

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

WARNING!

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

CAUTION!

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

NOTICE

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



Used before notices and explanations.

●	Indicates standard equipment
○	Indicates optional equipment

Copyright

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A Correct Use and Application

1 General

The truck must be used, operated and serviced in accordance with 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 88.

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

- Lifting and lowering of loads.
- Stacking and retrieving loads.
- Transporting lowered loads.

The following operations are prohibited:

- Carrying and lifting passengers.
- Pushing or pulling loads.
- Transverse lifting of long loads.

3 Approved application conditions

→ The permissible operating conditions change if the truck is equipped with a lithium-ion battery (○), see the manufacturer's operating instructions.

- Operation in industrial and commercial environments.
- Operation only on secure, level surfaces with sufficient capacity.
- Do not exceed the permissible surface and spot load limits on the travel routes.
- Operation only on routes that are visible and approved by the operating company.
- Negotiating inclines up to a maximum of 20 %.
- Do not travel across or at an angle on inclines. Travel with the load facing uphill.
- Operation in partially public traffic.

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.
-

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

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

- Permissible temperature range -10°C to 40°C.
- Secure parking is only permissible at +5°C to 40°C.
- Maximum air humidity 95% non-condensing.
- 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.
- Do not charge the battery below +5°C.

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

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.

- Permissible temperature range -28°C to +25°C.
- Maximum air humidity 95% non-condensing.
- Thawing is permissible only if the truck can be subsequently dried thoroughly.
- In cold store areas below -10°C the truck must be operated permanently and should not be parked securely for more than 15 minutes.
- Do not charge the battery below +5°C.

NOTICE

Battery damage

As the temperature becomes increasingly cold, the battery can be damaged if the battery charge is low.

- ▶ If the battery charge is low do not use the truck in areas of -28°C to -5°C.
 - ▶ If the battery charge is low it is preferable not to use the truck in areas of -5°C to +5°C.
 - ▶ Charge the battery, see page 45.
-

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.

B Truck Description

1 Application

The EJE 220/225/230/235/220r/225r is designed to transport goods on level surfaces. It can lift open-bottom pallets or pallets with transverse boards outside area the load-wheel area, as well as roll cages. The capacity is shown on the capacity plate, Qmax.

EJE 220r / 225r

The EJE 220r / 225r with ramp lift is particularly suitable for loading and unloading on ramps. In particular, it can be used for lifting and depositing palletised goods right up to the pitch bend.

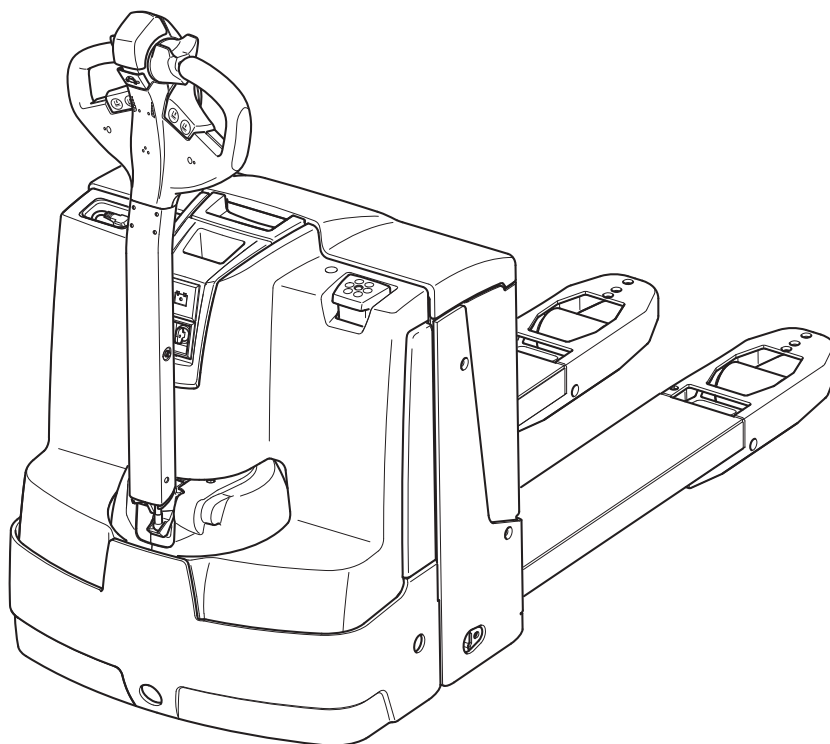
1.1 Truck models and rated capacity

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

EJE220

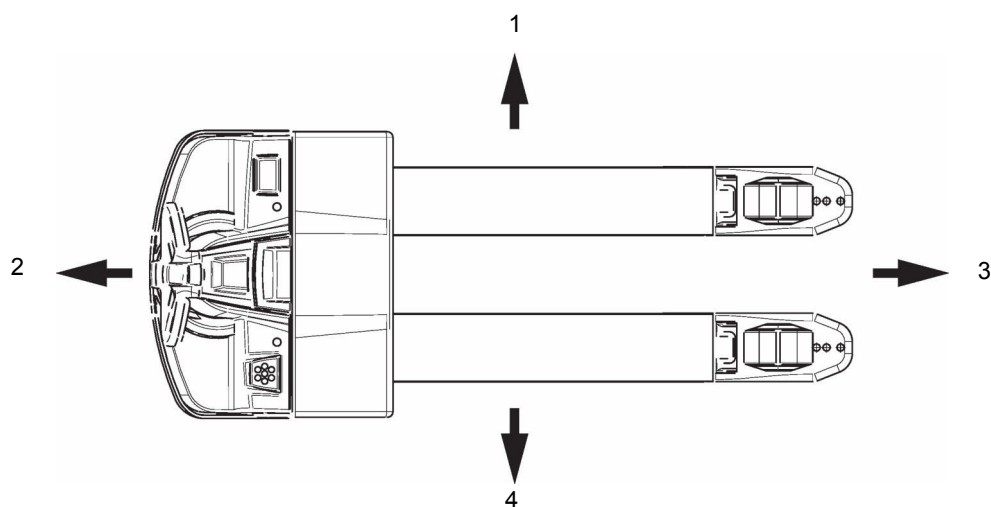
EJE	Model name
2	Series
20	Rated capacity x 100 kg

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



2 Travel direction definition

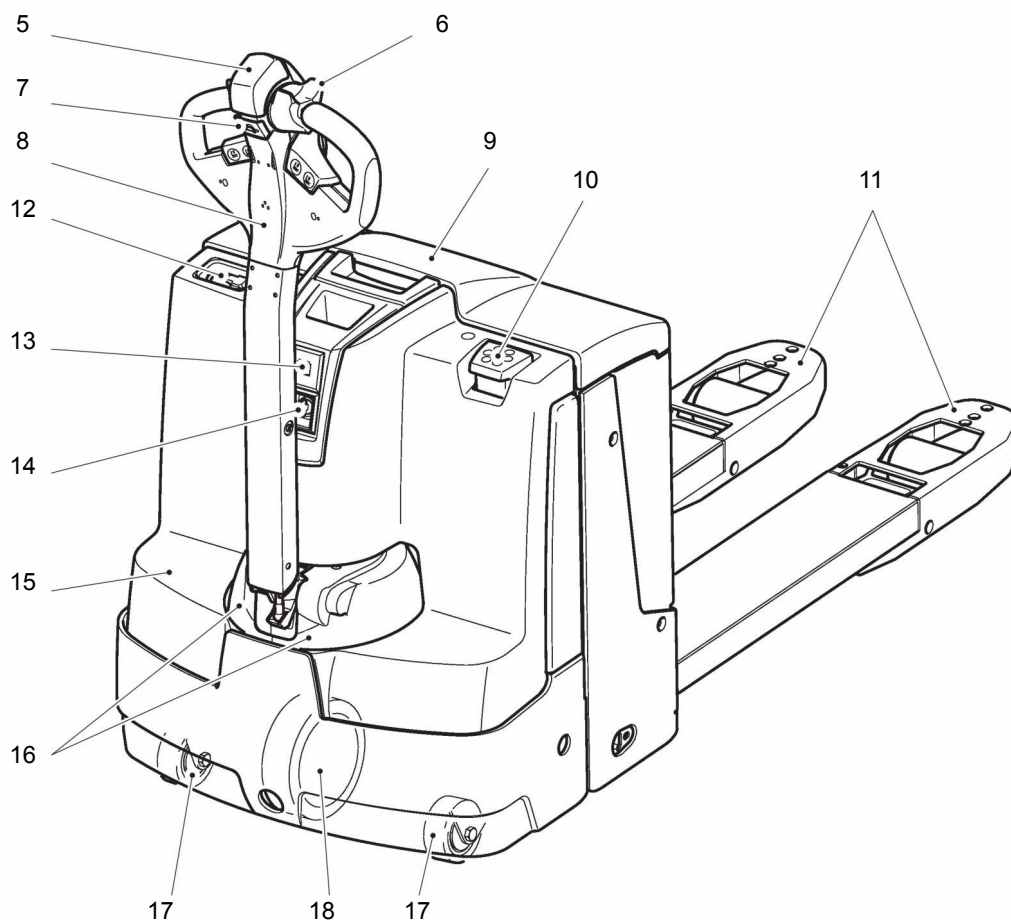
The following determinations have been made for travel direction specification:



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

3 Assemblies and Functional Description

3.1 Assembly Overview



Item		Description	Item		Description
5	●	Collision safety switch	14	●	Key switch
6	●	Travel switch		○	Keypad (CanCode)
7	●	Slow-travel button		○	Key switch (also with second stage for brake release)
8	●	Tiller		○	ISM access module
9	●	Battery panel		○	Keypad
10	●	Emergency disconnect		○	Transponder reader
11	●	Load handler	15	●	Front panel
12	○	On-board battery charger 24 V / 30 A (including safety switch)			

13	●	Discharge indicator	16	●	Two-section drive panel
	○	Display instrument (CanDis)	17	●	Support wheels
	○	Display unit (2-inch display)	18	●	Drive wheel
● = Standard equipment			○ = Optional equipment		

3.2 Functional Description

Safety mechanisms

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

The long tiller provides a maximum safety distance to the truck. When it is released and in hazardous situations a gas pressure spring forces the tiller up into the brake position. The collision safety switch in the tiller head responds to body contact, the travel direction changes and the truck moves away from the operator.

Activating the Emergency Disconnect switch rapidly cuts out all electrical functions in hazardous situations.

Emergency stop safety concept

The emergency stop is activated by the traction controller. Each time the truck is switched on, the system carries out a self-diagnosis. If an error is detected, the truck automatically brakes to a halt. Indicator lights on the CanDis display instrument (○) or on the display unit (2-inch display) (○) indicate the emergency stop.

CAUTION!

The truck brakes automatically

If the truck detects that signals which are required have not been received, or if it detects an error, the system reacts by triggering an emergency stop, either by braking the truck to a halt or until a valid signal status has been reached.

► Remain at a suitable distance from the truck during operation.

Hydraulic system

Pressing the lifting button starts the pump unit, supplying hydraulic oil from the oil reservoir to the lift cylinder. Pressing the lifting button raises the load handler at a constant speed; pressing the lowering button lowers the load handler.

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.

Tiller

The driver steers with an ergonomic tiller. All travel and lift operations can be performed sensitively without having to reach. The tiller has a steer angle of 180°.

Electrical system

The truck has an electronic traction controller. The operating voltage of the truck's electrical system is 24 volts.

Controls and displays

Ergonomic controls ensure fatigue-free operation for sensitive application of the travel and hydraulic operations. The battery discharge indicator shows the available battery capacity. The CanDis display instrument (○) or the display unit (2-inch display) (○) shows the operator key information such as the service hours, battery capacity and event messages.

3.2.1 Hourmeter

➔ Prepare the truck for operation, see page 68 or see page 106.

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

- Tiller in travel zone "F", see page 78.
- "Slow travel button", see page 80.
- "Lift" button, see page 84.
- "Lower" button, see page 85.

On the EJE 220r / 225r the service hours are also counted when one of the following controls is applied:

- "Ramp lift raise" button, see page 86.
- "Ramp lift lower" button, see page 87.

4 Technical Specifications

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

4.1 Performance data

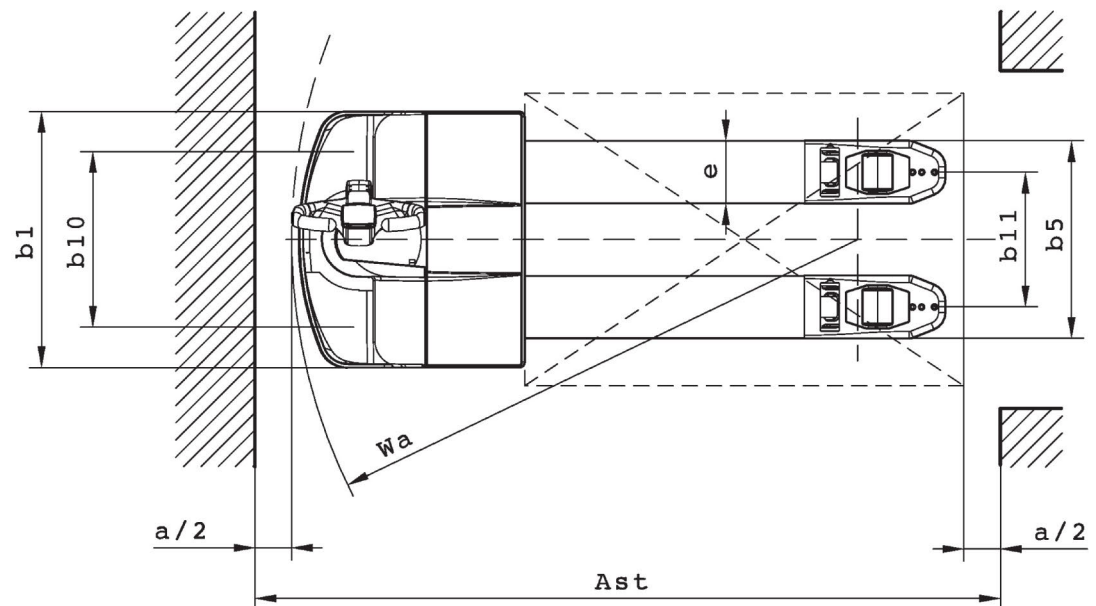
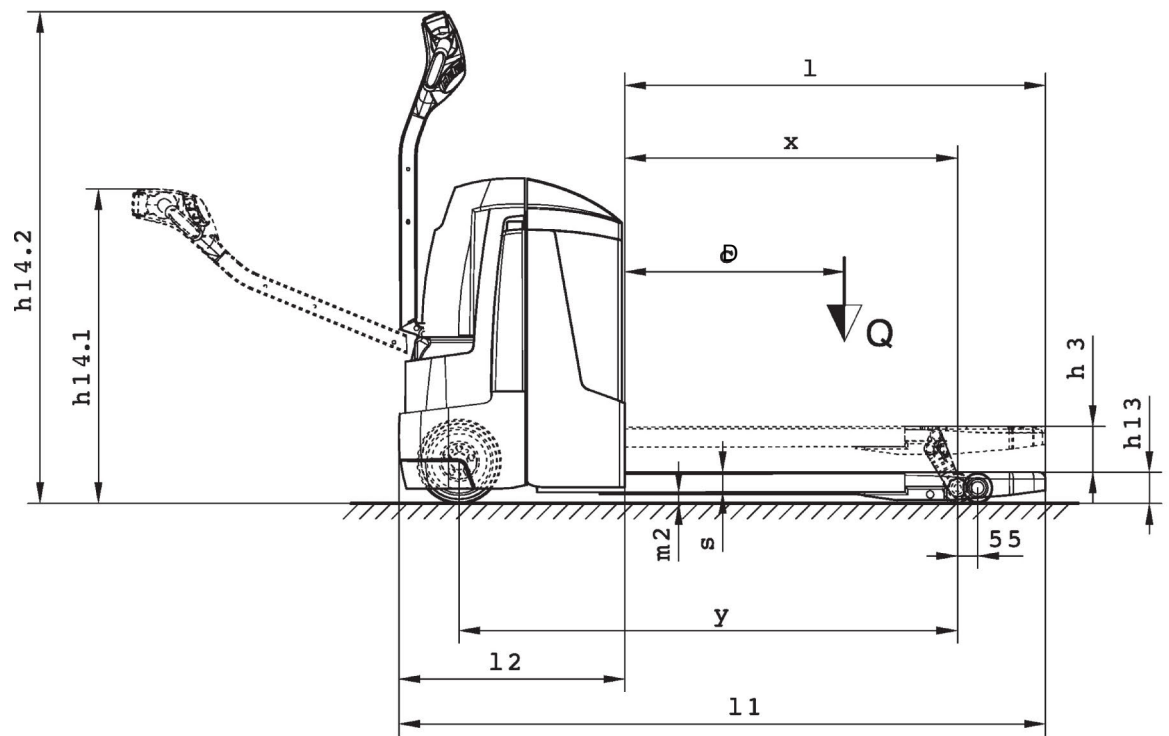
	Model	EJE 220	EJE 225	EJE 230	EJE 235	
Q	Rated capacity	2000	2500	3000	3500	kg
D	Load centre distance for standard load handler length *)	600	600	600	600	mm
	Travel speed with / without rated load	6.0 / 6.0	6.0 / 6.0	6.0 / 6.0	6.0 / 6.0	km/h
	Lift speed with / without rated load	0.04/0.06	0.03/0.06	0.02/0.06	0.02/0.06	m/s
	Lowering speed with / without rated load	0.05/0.05	0.05/0.05	0.05/0.05	0.05/0.05	m/s
	Max. gradeability (5 min rating) with / without rated load	10 / 20	8 / 20	6 / 20	6 / 20	%

*) For longer load handler lengths the load centre of gravity is at the centre of the load handler

	Model	EJE 220r	EJE 225r	
Q	Rated capacity	2,000	2500	kg
c	Load centre distance for standard load handler length *)	600	600	mm
	Travel speed with / without rated load	6.0 / 6.0	6.0 / 6.0	km/h
	Lift speed with / without rated load	0.04/0.06	0.03/0.06	m/s
	Lowering speed with / without rated load	0.05/0.05	0.05/0.05	m/s
	Max. gradeability (5 min rating) with / without rated load	10 / 20	8 / 20	%

*) For longer load handler lengths the load centre of gravity is at the centre of the load handler

4.2 Dimensions



	Model	EJE 220 / 225 / 235	EJE 230	
D	Load centre distance for standard load handler length *)	600		
h3	Lift	122		m m
h13	Load handler lowered	85		m m
h14	Tiller height in the travel position min./max.	805 / 1321	805 / 1321	m m
Y*	Wheelbase (short, long)	1353 / 1425	1353 / -	m m
l1	Overall length (short, long)	1763 / 1835	1763 / -	m m
l2	Chassis length (short / long)	613 / 685	613 / -	m m
b1	Truck width	720		m m
b5	Overall width of the load handler	540		m m
b10	Track width, front	508		m m
b11	Track width, rear	368		m m
s/e/l	Load handler dimensions	55 / 172 / 1150		m m
m2	Ground clearance, centre wheelbase	30		m m
x	Load distance	911		m m
Wa**	Turning radius (short / long)	1538 / 1610	1538 / -	m m
Ast**	Working aisle width for pallets 800x1200 length (short/long)	2027***/2099***	2027 / - ***	m m
Ast**	Aisle width for pallet 1000 x 1200 short (short/long)	1977**** / 2049****	1977 / - ****	m m
a	Safety distance	200		m m

*) For longer load handler lengths the load centre of gravity is at the centre of the load handler

** Load handler raised / lowered +53 mm

***Diagonal in accordance with the German directive "Data Sheets for Industrial Trucks +204 mm

***Diagonal in accordance with the German directive "Data Sheets for Industrial Trucks +386 mm

	Model	EJE 220r	EJE 225r	
D	Load centre distance for standard load handler length *)	600		
h3	Lift	122		m m
h13	Load handler lowered	85		m m
h14	Tiller height in the travel position min. / max.	805 / 1321		m m
Y*	Wheelbase (short, long)	1353 / 1425		m m
l1	Overall length (short, long)	1763 / 1835		m m
l2	Chassis length (short / long)	613 / 685		m m
b1	Truck width	720		m m
b5	Load handler external dimensions	540		m m
b10	Track width, front	508		m m
b11	Track width, rear	368		m m
s/e/l	Load handler dimensions	55 / 172 / 1150		m m
m2	Ground clearance, centre of wheelbase	30		m m
x	Load distance	911		m m
Wa**	Turning radius (short / long)	1538 / 1610		m m
Ast**	Aisle width for pallets 800x1200 lengthways (short, long)	2027 *** / 2099***		m m
Ast**	Aisle width, pallet 1000x1200 transverse (short, long)	1977 **** / 2049****		m m
a	Safety clearance	200		m m

*) For longer load handler lengths the load centre of gravity is at the centre of the load handler.

** Load handler raised / lowered +53 mm

***Diagonal in accordance with the German directive "Data Sheets for Industrial Trucks +204 mm

***Diagonal in accordance with the German directive "Data Sheets for Industrial Trucks +386 mm

4.3 Weights

Description	EJE 220	EJE 225	EJE 230	EJE 235	
Truck weight; m / l	540 / 637	550 / 647	580	550	kg
Axle loading, laden drive axle / load axle; m	876 / 1664	990 / 2060	1154 / 2426	1300 / 2750	kg
Axle loading, unladen drive end/ load end; m	423 / 117	427 / 123	457 / 123	427 / 123	kg

Component	EJE 220r	EJE 225r	
Net weight;	540	550	kg
Axle loading, with load drive axle / load side:	876 / 1664	990 / 2060	kg
Axle load without load drive side / load side:	423 / 117	427 / 123	kg

4.4 Tyre type

Description	EJE 220	EJE 225	EJE 230	EJE 235	
Tyre size, drive end	ø230 x 70	ø230 x 70	ø230 x 70	ø230 x 70	mm
Tyre size, load end; single / tandem	ø85x110 / ø85x85	ø85x110 / ø85x85	- / ø85x85	- / ø85x85	mm
Additional wheels (dimensions)	ø100x40	ø100x40	ø100x40	ø100x40	mm
Wheels, number (drive end / load end (x = driven))	1x +2 / 2 or 4		1x +2 / 4		

Model	EJE 220r	EJE 225r	
Tyre size, drive side	ø230 x 70	ø230 x 70	mm
Tyre size, load side; single	ø85x110	ø85x110	mm
Additional wheels (dimensions)	ø100x40	ø100x40	mm
Wheels, number drive side / load side (x = driven)	1x +2 / 2 or 4		

4.5 EN norms

Continuous sound pressure level

– EJE 220/225/230/235/220r/225r: 70 dB(A)

in accordance with EN 12053 as harmonised with ISO 4871.



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

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!

Medical equipment can be damaged by non-ionised radiation

Electrical equipment on the truck emitting non-ionised 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.

4.6 Conditions of use

Ambient temperature

- without cold store equipment: operating at -10°C to 40°C, see page 13
- with cold store equipment: operating at -28°C to +25°C, see page 13



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

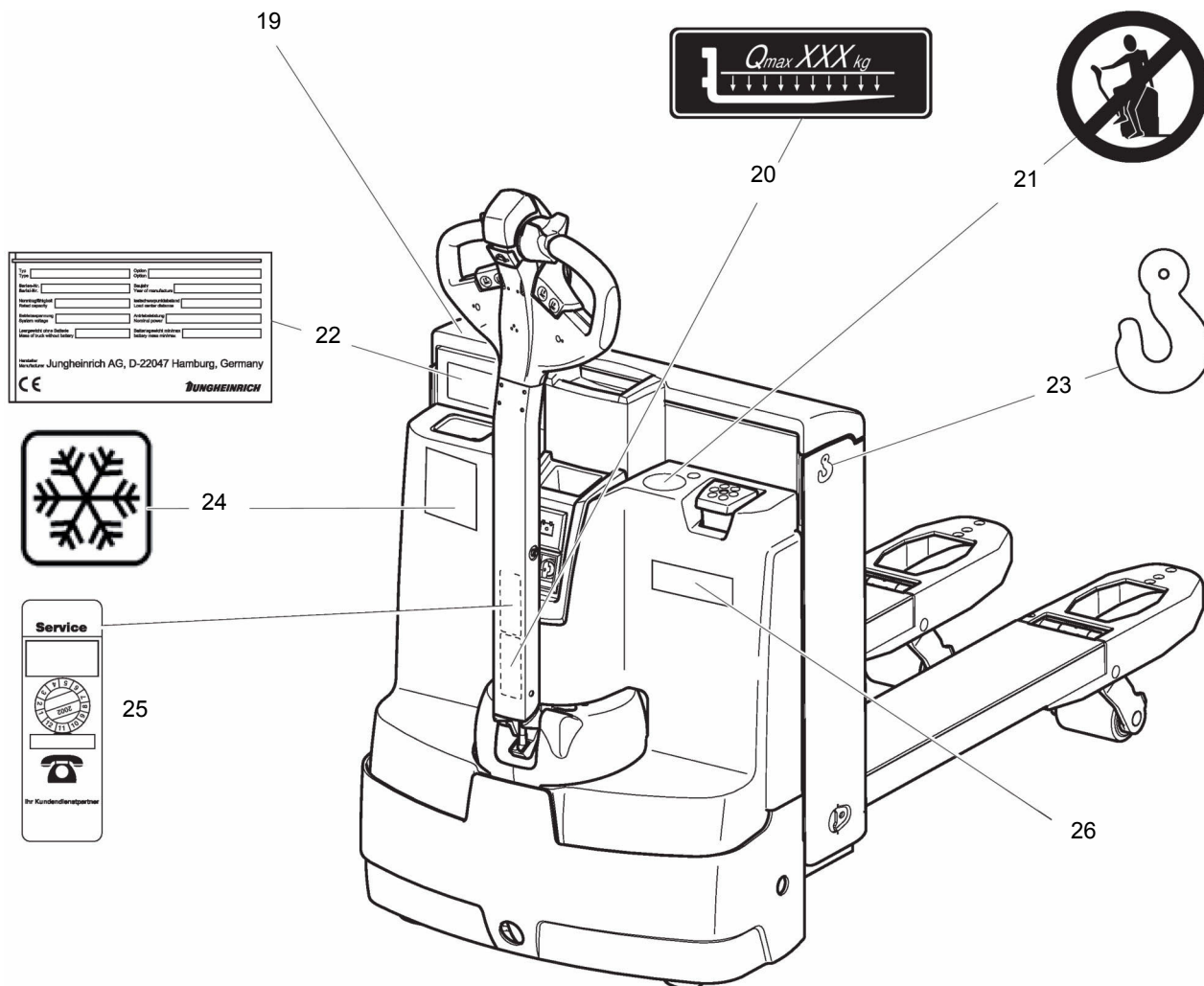
4.7 Electrical Requirements

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

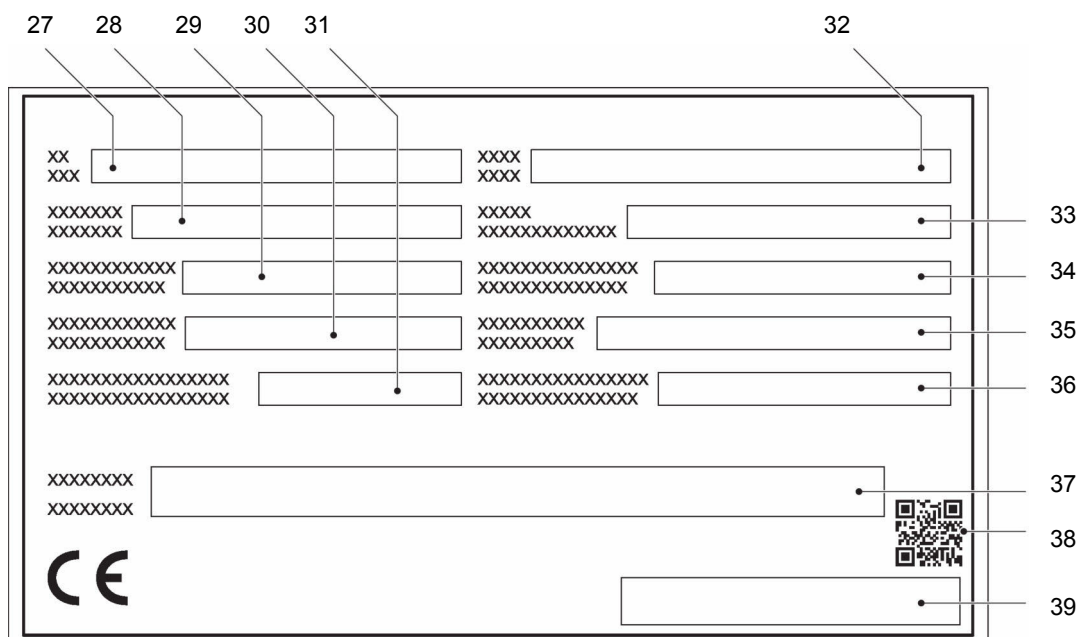
- Warnings and notices such as capacity charts, strap points and data plates must be legible at all times. Replace if necessary.

5.1 Indication Points



Item	Component
19	Serial number
20	Capacity Qmax
21	Prohibition plate: "No passengers"
22	Truck data plate
23	Strap point for crane lifting
24	Cold store (○)
25	Inspection plaque (○)
26	Model description

5.2 Data plate



Item	Model	Item	Model
27	Type	34	Load centre distance (mm)
28	Serial number	35	Drive output
29	Rated capacity (kg)	36	Min./max. battery weight (kg)
30	Battery voltage (V)	37	Manufacturer
31	Net weight w/o battery (kg)	38	QR code
32	Option	39	Manufacturer's logo
33	Year of manufacture		



For queries regarding the truck or ordering spare parts, always quote the truck serial number (28).

QR code

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



5.3 Truck capacity plate



The capacity plate (20) gives the maximum load-bearing capacity (Q) of the truck in kg assuming the load on the load handler is evenly distributed.

C Transport and Commissioning

1 Lifting by crane

WARNING!

All persons involved in loading by crane must be trained

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

- ▶ Loading must only be performed by specialist personnel trained for this purpose. The specialist personnel must be instructed in securing loads on road vehicles and handling load securing devices. In each case correct measurements must be taken and appropriate safety measures applied.

WARNING!

Improper loading by crane can result in accidents

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

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

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

⚠ CAUTION!

- ▶ Trucks with side battery removal (○) can only be raised when the battery is not in position: strap points are covered by the battery.



Strap points (23) on the chassis are provided for transporting the truck with crane lifting gear.

Lifting the truck by crane

Requirements

- Park the truck securely, see page 71.

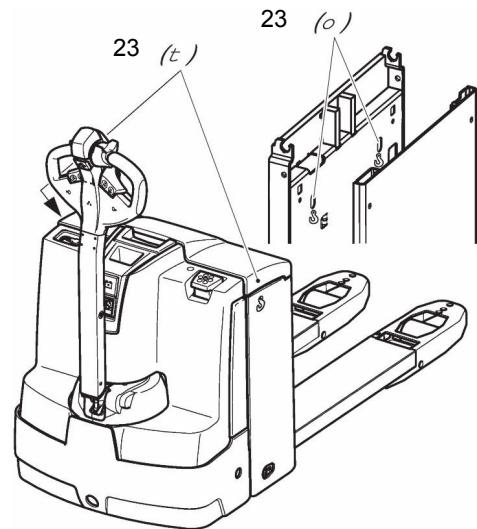
Tools and Material Required

- Lifting gear
- Crane lifting gear

Procedure

- Open the battery cover and remove the battery if necessary.
- Secure the lifting slings to the strap points (23).

The truck can now be lifted by crane.



2 Transport

⚠ WARNING!

Accidental movement during transport

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

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

Securing the truck for transport

Requirements

- Load the truck.
- Truck parked securely, see page 71.

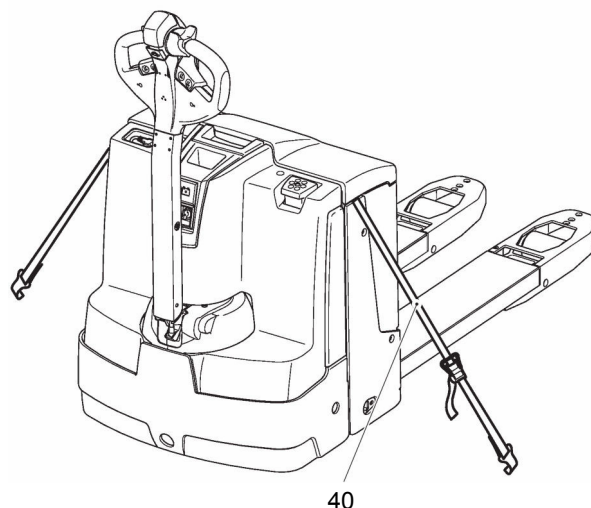
Tools and Material Required

- 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.
- Attach the lashing straps (40) to the industrial truck and 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.

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 52. Do not damage the battery cable.
- Charge the battery, see page 45.

→ 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 162).
- Start up the truck (see page 68).

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

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

1 Safety Regulations Governing the Handling of Lead-Acid Batteries

Maintenance personnel

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

Fire Protection

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

⚠ CAUTION!

The use of unsuitable fire protection equipment can result in scalding

Extinguishing fires with water can cause a reaction with the battery acid. This can result in scalding from the acid.

- ▶ Use powder extinguishers.
- ▶ Never extinguish a burning battery with water.

Battery maintenance

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 terminal grease.

⚠ WARNING!

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.

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.

WARNING!

Batteries can be hazardous

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

- ▶ Dispose of used battery acid in accordance with regulations.
 - ▶ Always wear protective clothing and goggles when working with batteries.
 - ▶ Do not let battery acid come into contact with skin, clothing or eyes. If necessary, rinse with plenty of clean water.
 - ▶ In the event of physical damage (e.g. skin or eye contact with battery acid) call for a doctor immediately.
 - ▶ Spilled battery acid should be neutralised immediately with plenty of water.
 - ▶ Only batteries with a sealed battery container may be used.
 - ▶ Follow national guidelines and legislation.
-

WARNING!

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

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

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

Park the truck securely before carrying out any work on the batteries (see page 71).

2 Battery types

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

EJE 220 / 225

Battery tray	Battery type	Weight (kg)	Dimensions (mm)
M	24 V - XFC 158 Ah	220	623X211X627
	24 V - XFC 158 Ah	180	623X211X627
	24 V - 2PzV 160 Ah wf Exide	180	624X212X537
	24 V - 2PzW 160 Ah	180	624X212X537
	24 V - 2PzV 174 Ah wf Hawker	183	623X211X537
	24 V - 2PzS 180 Ah	180	624X212X537
	24 V - 2PzM 180 Ah	180	621X209X537
	24 V - 2PzV 200 Ah wf Exide	215	621X209X627
	24 V - 2PzV 220 Ah wf Hawker	218	623X211X627
	24 V - 2PzW 220 Ah	220	624X212X627
	24 V - 2PzS 250 Ah	220	624X212X627
	24 V - 2PzS 250 Ah	220	621X209X627
	24 V - 2PzM 250 Ah	222	621X209X625
	24 V - LIB 110 Ah	210	624X207X627
L	24 V - 3PzV 300 Ah wf Exide	290	621X281X627
	24 V - XFC 316 Ah	288	624X284X627
	24 V - 3PzV 330 Ah wf Hawker	300	623X283X627
	24 V - 3PzW 330 Ah	288	624X284X627
	24 V - 3PzS 345 Ah Lib. Silver	282	621X284X627
	24 V - 3PzS 375 Ah	288	624X284X627
	24 V - 3PzS 375 Ah Lib. Silver	288	621X281X627
	24 V - 3PzM 375 Ah	299	621X281X627
	24 V - LIB 240 Ah SBE	288	624X284X683
	24 V - LIB 360 Ah SBE	288	624X284X683



Optionally, the truck can be fitted with a lithium-ion battery, see "Li-Ion battery 24V - 240Ah / 360Ah" operating instructions.

EJE 230 / 235

Battery tray	Battery type	Weight (kg)	Dimensions (mm)
M	24 V - XFC 158 Ah	220	623X211X627
	24 V - XFC 158 Ah	180	623X211X627
	24 V - 2PzV 160 Ah wf Exide	180	624X212X537
	24 V - 2PzW 160 Ah	180	624X212X537
	24 V - 2PzV 174 Ah wf Hawker	183	623X211X537
	24 V - 2PzS 180 Ah	180	624X212X537
	24 V - 2PzM 180 Ah	180	621X209X537
	24 V - 2PzV 200 Ah wf Exide	215	621X209X627
	24 V - 2PzV 220 Ah wf Hawker	218	623X211X627
	24 V - 2PzW 220 Ah	220	624X212X627
	24 V - 2PzS 250 Ah	220	624X212X627
	24 V - 2PzS 250 Ah	220	621X209X627
	24 V - 2PzM 250 Ah	222	621X209X625



Optionally, the truck can be fitted with a lithium-ion battery, see "Li-Ion battery 24V - 240Ah / 360Ah" operating instructions.

EJE 220r / 225r

Battery tray	Battery type	Weight (kg)	Dimensions (mm)
M	24 V - XFC 158 Ah	220	623X211X627
	24 V - XFC 158 Ah	180	623X211X627
	24 V - 2PzV 160 Ah wf Exide	180	624X212X537
	24 V - 2PzW 160 Ah	180	624X212X537
	24 V - 2PzV 174 Ah wf Hawker	183	623X211X537
	24 V - 2PzS 180 Ah	180	624X212X537
	24 V - 2PzM 180 Ah	180	621X209X537
	24 V - 2PzV 200 Ah wf Exide	215	621X209X627
	24 V - 2PzV 220 Ah wf Hawker	218	623X211X627
	24 V - 2PzW 220 Ah	220	624X212X627
	24 V - 2PzS 250 Ah	220	624X212X627
	24 V - 2PzS 250 Ah	220	621X209X627
	24 V - 2PzM 250 Ah	222	621X209X625
L	24 V - 3PzV 300 Ah wf Exide	290	621X281X627
	24 V - XFC 316 Ah	288	624X284X627
	24 V - 3PzV 330 Ah wf Hawker	300	623X283X627
	24 V - 3PzW 330 Ah	288	624X284X627
	24 V - 3PzS 345 Ah Lib. Silver	282	621X284X627
	24 V - 3PzS 375 Ah	288	624X284X627
	24 V - 3PzS 375 Ah Lib. Silver	288	621X281X627
	24 V - 3PzM 375 Ah	299	621X281X627

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.

NOTICE

Battery damage

The battery, charger (charge characteristics) and battery parameters must match each other, otherwise damage may result.

NOTICE

Reduced service life of the battery

To ensure the optimum service life of the battery, the battery manufacturer's latest operating and maintenance instructions must be observed.

3 Exposing the battery

⚠ WARNING!

An unsecured truck can cause accidents

Parking the truck on an incline or with a raised 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.

⚠ CAUTION!

A closing battery panel can pose a trapping hazard

If the battery cover is not opened fully, it can suddenly close on its own and cause bruising. The battery cover is only properly opened at an angle greater than 90°. It is then held by gravity.

- ▶ Open the battery cover as far as the stop.

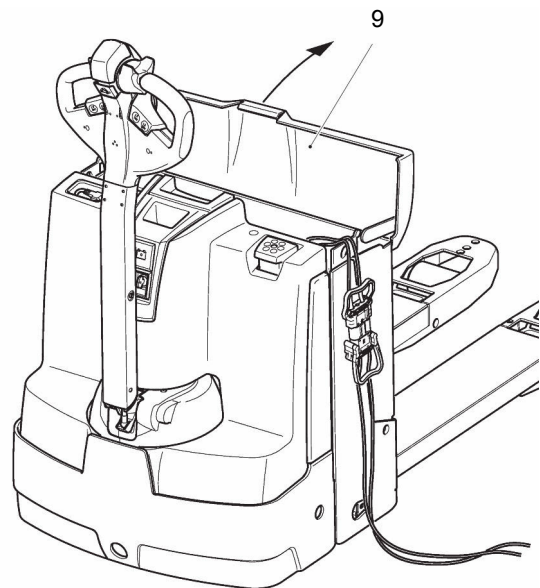
Requirements

- Park the truck on a level surface.
- Park the truck securely, see page 71.

Procedure

- Open the battery panel (9).
- Where necessary remove the insulating mat from the battery.

The battery is now exposed.



4 Charging the battery

WARNING!

The gases produced during charging can cause explosions

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

- ▶ Switch the charging station and truck off first before connecting/disconnecting the charging cable of the battery charging station to/from the battery connector.
- ▶ The charger must match the battery in terms of voltage, charge capacity and battery type.
- ▶ 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 must be no inflammable material or consumables capable of creating sparks within a minimum distance of 2 m from the truck.
- ▶ Fire-control equipment must be available.
- ▶ Do not place any metallic objects on the battery.
- ▶ Always follow the safety regulations of the battery and charger station manufacturers.

NOTICE

Battery damage

The battery, charger (charge characteristics) and battery parameters must match each other, otherwise damage may result.

4.1 Charging the battery with a stationary charger

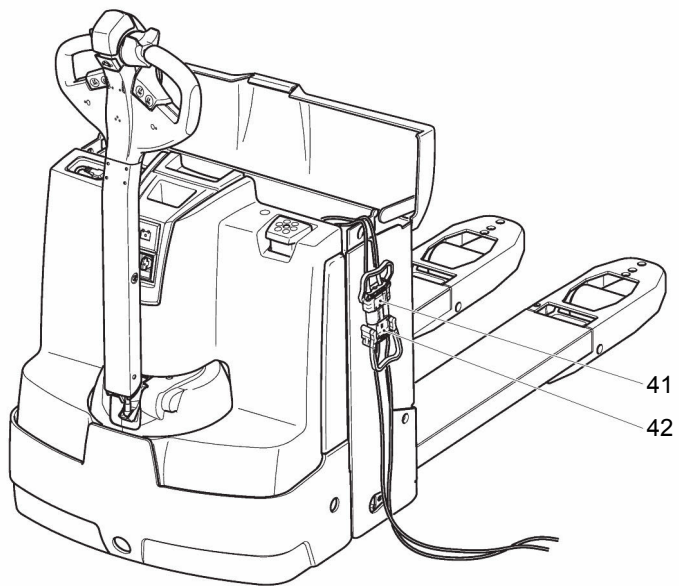
Charging the battery

Requirements

- Expose the battery, see page 44.

Procedure

- Disconnect the battery connector (41) from the truck connector.
- Connect the battery connector (41) to the charging cable (42) of the stationary charger.
- Start charging in accordance with the charger operating instructions.



The battery is charging.

Completing battery charging, restoring the truck to operation

NOTICE

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

Requirements

- The battery is fully charged.

Procedure

- Complete charging in accordance with the charger operating instructions.
- Disconnect the battery connector (41) from the charging cable (42) of the stationary charger.
- Attach the battery connector (41) to the industrial truck.

The truck is now ready for operation.

4.2 Charging the battery with an on-board charger (○)

⚠ DANGER!

Risk of electric shock and fire

Damaged and unsuitable cables can cause electric shocks and can overheat, resulting in fires.

- ▶ Always use mains cables with a maximum length of 30 m.
Local regulations must be observed.
- ▶ Unwind the cable reel fully when using it.
- ▶ Always use original manufacturer's mains cables.
- ▶ Insulation safety, acid and caustic ratings must comply with the manufacturer's mains lead.
- ▶ The charging connector must be dry and clean when used.

NOTICE

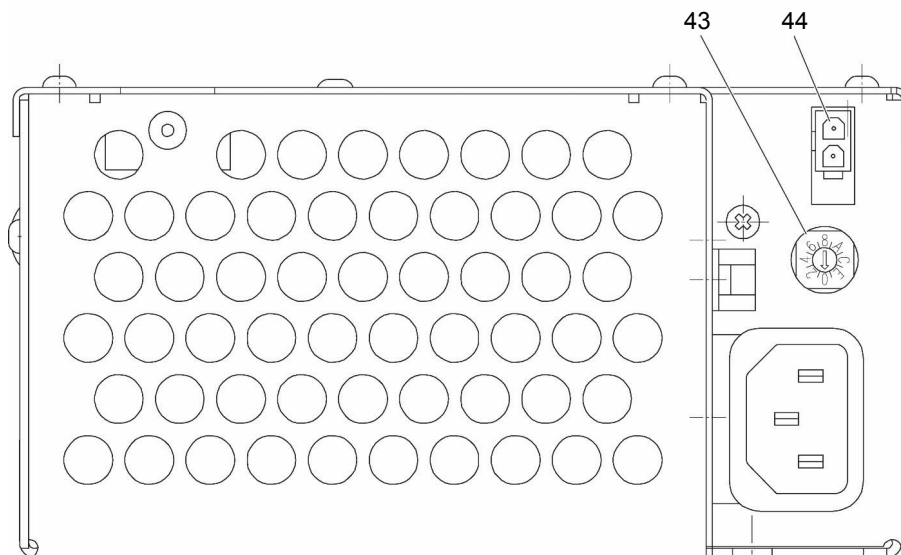
Improper use of the on-board charger can cause material damage

The on-board charger consisting of a battery charger and battery controller must not be opened. If faulty, contact the manufacturer's customer service department.

- ▶ The charger must only be used for batteries supplied by Jungheinrich or other approved batteries provided it has been adapted by the manufacturer's customer service department.
- ▶ Batteries must never be swapped from truck to truck.
- ▶ Do not connect the battery to two chargers simultaneously.

4.2.1 Setting the charging characteristics (ELG 2430)

- The factory setting for trucks without a battery is the 0 position. A battery discharge indicator, a charge/discharge indicator, a CanDis or a bipolar LED can be attached to the connector (44).



⚠ CAUTION!

- ▶ Remove the mains connector before setting the respective charging curve.

Set the charging characteristic

Requirements

- Battery connected.

Procedure

- Turn the setting switch (43) on the charger right to adapt the charging curve to the battery being used.
- The validity of the new setting is acknowledged by the flashing of the green LED and the setting takes immediate effect.

The charging characteristic is now set.

Flashing sequence / charging curve assignment (ELG 2430)

Flashing sequence	Selected charging curves (characteristics)
0	Truck without battery
1	Wet cell battery: PzS with 100 - 300 Ah Wet cell battery: PzM with 100 - 179 Ah
2	Maintenance-free: PzV with 100 - 149 Ah
3	Maintenance-free: PzV with 150 - 199 Ah
4	Maintenance-free: PzV with 200 - 330 Ah
5	Wet cell battery: PzS with pulse characteristic 200 - 400 Ah Wet cell battery: PzM with pulse characteristic 180 - 400 Ah Wet cell battery: PzS with pulse characteristic 200 - 414 Ah
6	Jungheinrich 100 - 300 Ah

NOTICE

- All other switch positions (43) block the charger, and the battery is not charged.
- For PzM batteries with a capacity of less than 180 Ah set characteristic 1, beyond 180 Ah set characteristic 5.
- With PzS 200-300 Ah wet cell batteries both characteristic curves 1 and 5 can be used. Characteristic 5 achieves a faster charge.
- When the battery is connected this allows you to adjust via the charger: If the switch position is valid the green LED flashes according to the position set; if the switch position is invalid the red LED flashes.

4.2.2 Charging the battery

Starting to charge with the on-board charger

Mains connection

Mains supply: 230 V / 110 V (+10/-15%)

Mains frequency: 50 Hz / 60 Hz

The mains cable of the charger (45) is in the front panel or the battery compartment.

Charging the battery

Requirements

- Park the truck securely, see page 71.
- Expose the battery, see page 44.
- Correct charging program set on charger.

Procedure

- Remove any insulating mats from the battery.
- The battery connector must remain plugged.
- Attach the mains connector (45) to a mains socket.
- Pull the emergency disconnect switch up.

The flashing LED indicates the charge status or a fault (for flashing codes see “LED Display” table).

The battery is charged.



When the mains connector (45) is attached to the mains, all the truck's electrical functions are disconnected (electric immobilizer). The truck cannot be operated.

Completing battery charging, restoring the truck to operation

NOTICE

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

Requirements

- The battery is fully charged.

Procedure

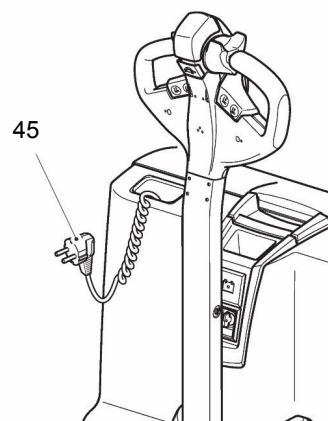
- Remove the mains connector (45) from the mains socket and store it along with the cable in the storage compartment (47).
- If applicable, place the existing insulating mats back over the battery.
- Close the battery panel securely.

The truck is now ready for operation.

⚠ CAUTION!

Damaged mains cables can be hazardous

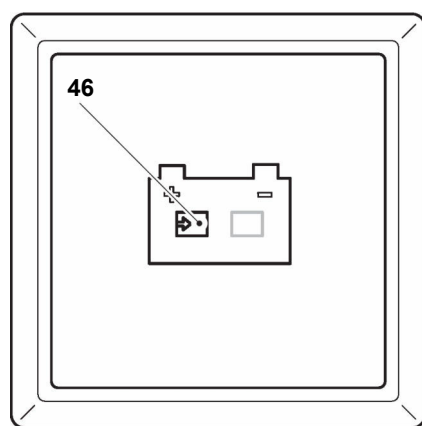
- ▶ Do not trap the mains cable when closing the battery panel.



Charging times

The duration of charge depends on the battery capacity.

- Charging continues automatically after a mains failure. Charging can be interrupted by removing the mains connector and continued as partial charging.



LED display (46)

Green LED (charge status)	
Lit	Charging complete, battery full. (Charge interval, float or compensation charge).
Flashes slowly	Charging.
Rapid flash	Display at beginning of charge or after setting a new characteristic curve. Number of flash pulses corresponds to the characteristic curve set.

Red LED (fault)	
Lit	Overtemperature. Charging is interrupted.
Flashes slowly	Safety charging time exceeded. Charging is cancelled. Mains must be disconnected for charging to restart.
Rapid flash	Invalid characteristic curve setting.

Compensation charge

The compensation charge starts automatically when charging is complete.

Partial charging

The charger is designed to automatically adapt to partially charged batteries. This keeps battery wear to a minimum.

5 Battery removal and installation

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. If necessary cover them with a rubber mat.
 - ▶ Park the truck on a level surface.
 - ▶ Make sure the crane lifting gear has sufficient capacity to replace the battery.
 - ▶ Use only approved battery replacement devices (battery roller stand, replacement trolley etc.).
 - ▶ Make sure the battery is securely located in the truck's battery compartment.
-

CAUTION!

Risk of accidents and injury from electrical voltage

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

- ▶ The lithium-ion battery may only be installed and removed by trained experts.
-

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.
-

5.1 Changing the battery from the top

Removing the battery

Requirements

- Park the truck securely, see page 71.
- Expose the battery, see page 44.

Tools and Material Required

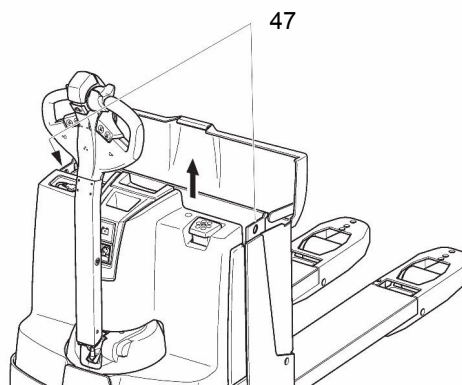
- Crane lifting gear

Procedure

- Disconnect the battery connector from the truck connector.

- Place the battery cable on the tray so that it cannot be severed when the battery is pulled out.
- Attach the crane lifting gear to the eyes (47).
- The hooks must be fitted in such a way that when the crane lifting gear is slackened, they do not fall onto the battery cells. The lifting gear must exert a vertical pull so that the battery container is not compressed.
- Lift the battery slowly out of the battery compartment using crane lifting gear.

The battery has now been removed.



Battery Installation EJE 220 / 225 / 230 / 235

Requirements

- Park the truck securely, see page 71.

Procedure

- Assembly is the reverse order. Note the correct assembly position and make sure the battery is connected correctly.
- Place the battery cable on the tray so that it cannot be severed when the battery is inserted.
 - Attach the battery connector to the truck connector.

⚠ CAUTION!

Trapping hazard

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

- ▶ Do not reach between the battery cover and chassis. Hold the battery cover only by the designated recess.
 - ▶ Close the battery panel carefully and slowly.
-

Close the battery panel.

The battery is now installed.

- After installing the battery again, check all cables and plug connections for visible signs of damage.

Battery Installation EJE 220r / 225r

Requirements

- Park the truck securely, see page 71.

Procedure

- Assembly is the reverse order. Note the correct assembly position and make sure the battery is connected correctly.
- Place the battery cable on the tray so that it cannot be severed when the battery is inserted.

NOTICE

Avoid damaging the auxiliary hydraulics in the battery compartment

- ▶ When installing the battery make sure that the auxiliary hydraulics components (valves, hoses and electrical connecting cables) are not trapped.

- Attach the battery connector to the truck connector.

⚠ CAUTION!

Trapping hazard

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

- ▶ Do not reach between the battery cover and chassis. Hold the battery cover only by the designated recess.
- ▶ Close the battery panel carefully and slowly.

Close the battery panel.

The battery is now installed.

- After installing the battery again, check all cables and plug connections for visible signs of damage.

5.2 Lateral battery removal

- Lateral battery removal is optional only. And on the EJE 220r / 225r the battery can only be removed from the left-hand side.

⚠ 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

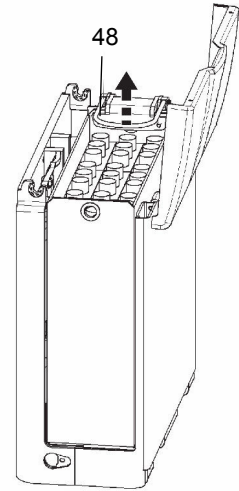
Requirements

- Park the truck securely, see page 71
- Battery exposed, see page 44.

Procedure

- Disconnect the battery connector from the truck connector.
- Turn the battery lock (48) as far as the stop.
- Pull the battery out from the side.

The battery is now removed.



- Installation is the reverse order. When reinstalling the battery, note the proper installation position and make sure the battery is connected correctly. Place the battery cable on the tray so that it cannot be severed when the battery is inserted.

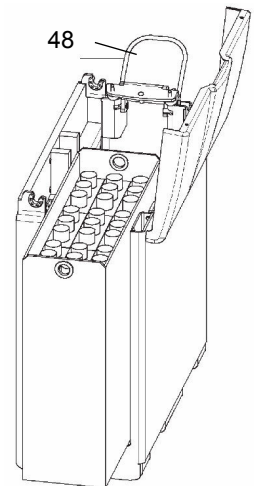
- After installing the battery, check all cables and plug connections for visible signs of damage.

⚠ CAUTION!

Trapping hazard

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

- Do not reach between the battery cover and chassis. Hold the battery cover only by the designated recess.
- Close the battery panel carefully and slowly.



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 faults

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 31) and warning instructions in the present operating instructions must be strictly observed.

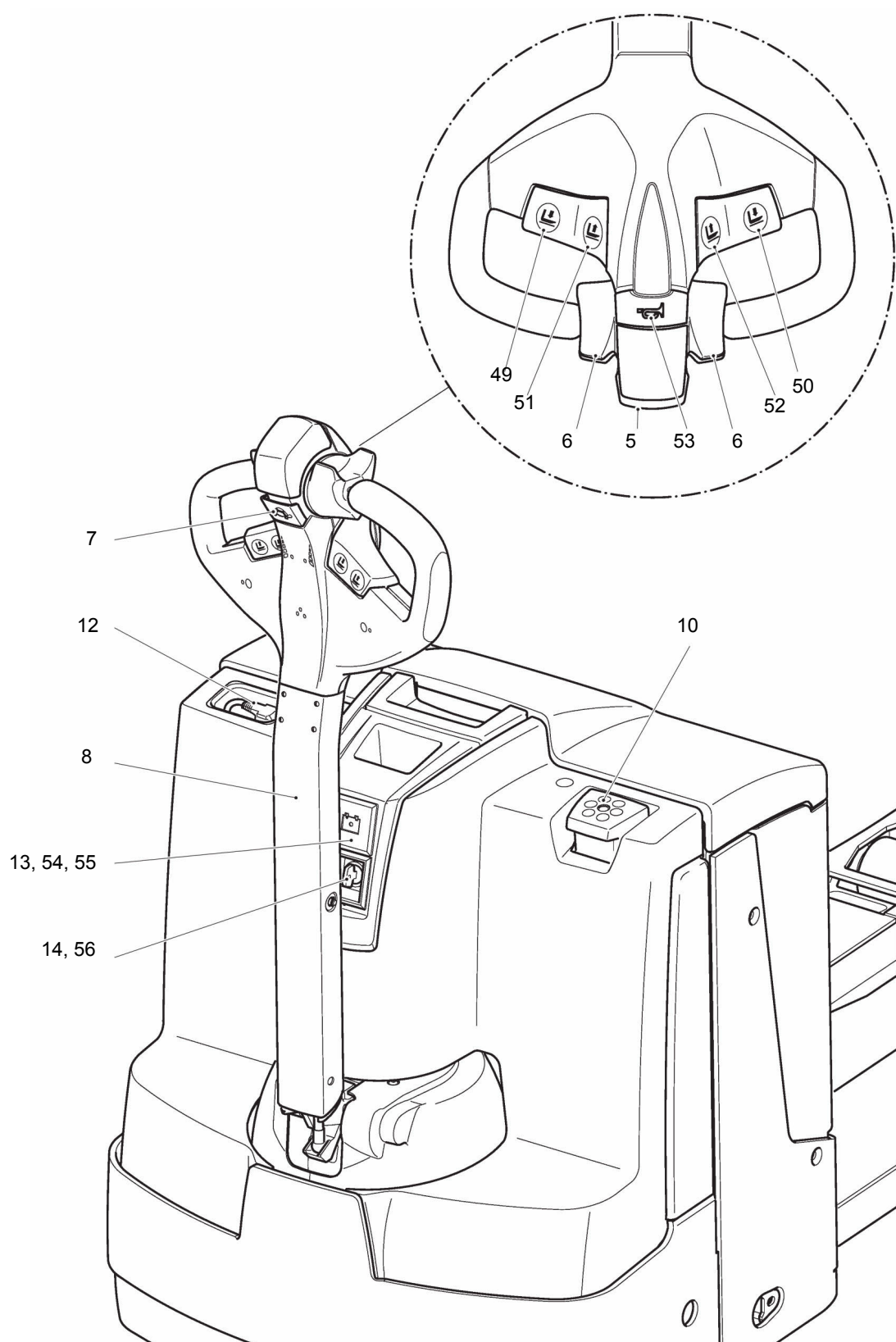
WARNING!

Removing or disabling safety devices can cause accidents

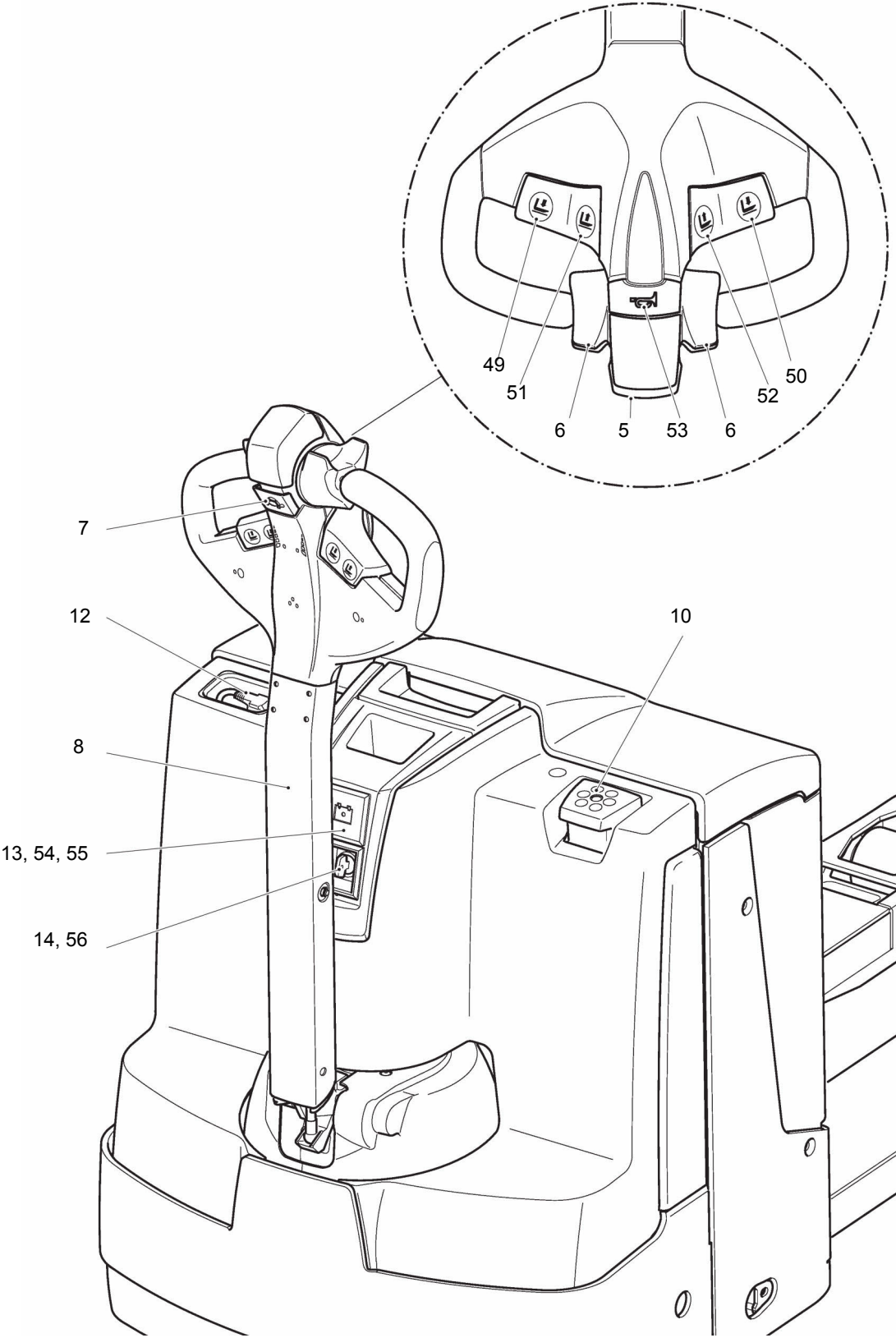
Removing or disabling safety devices such as the emergency disconnect switch, key switch, buttons, horn, strobe lights, sensors, panels, etc. can result in accidents and injury.

- ▶ 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.
-

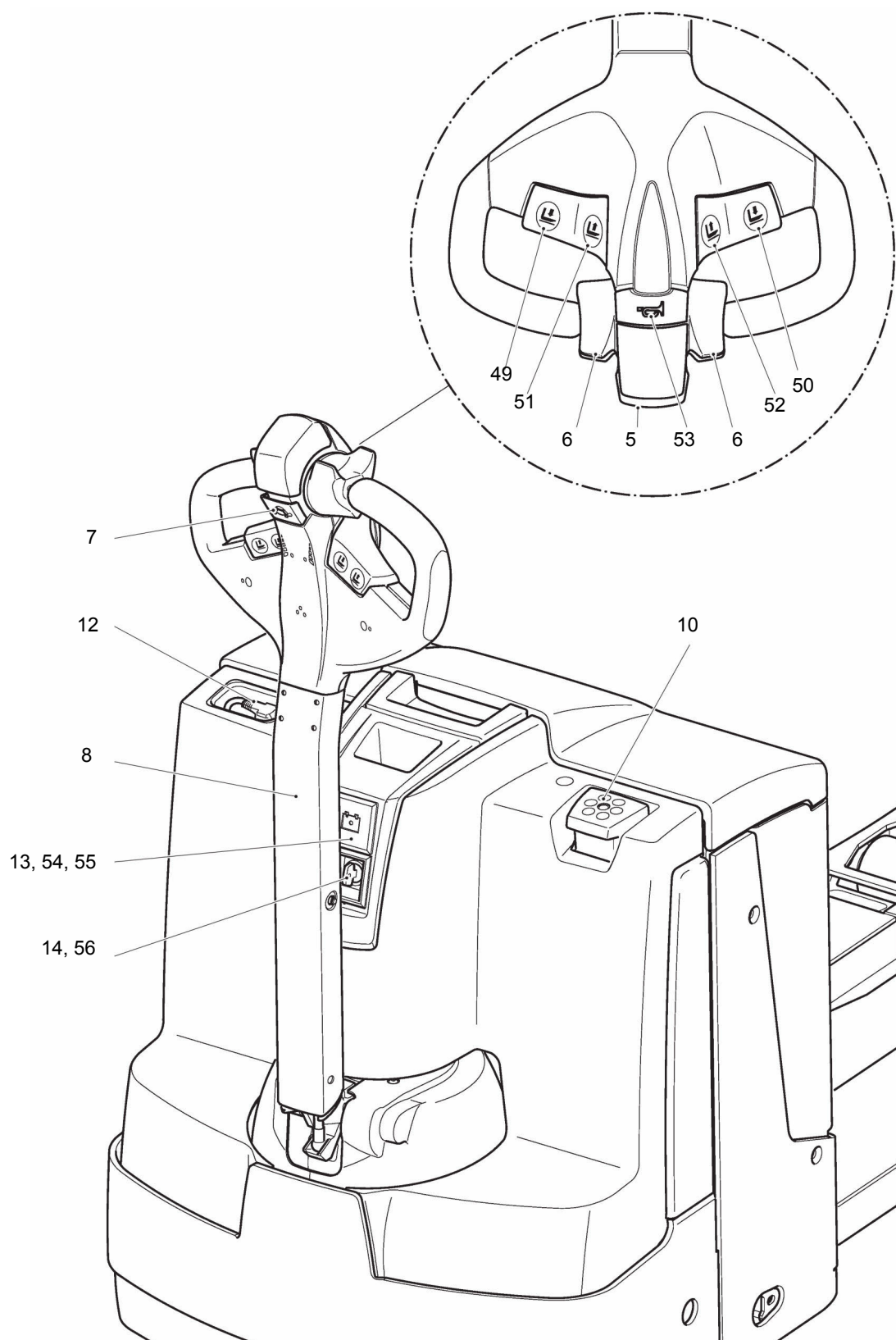
2 Displays and Controls



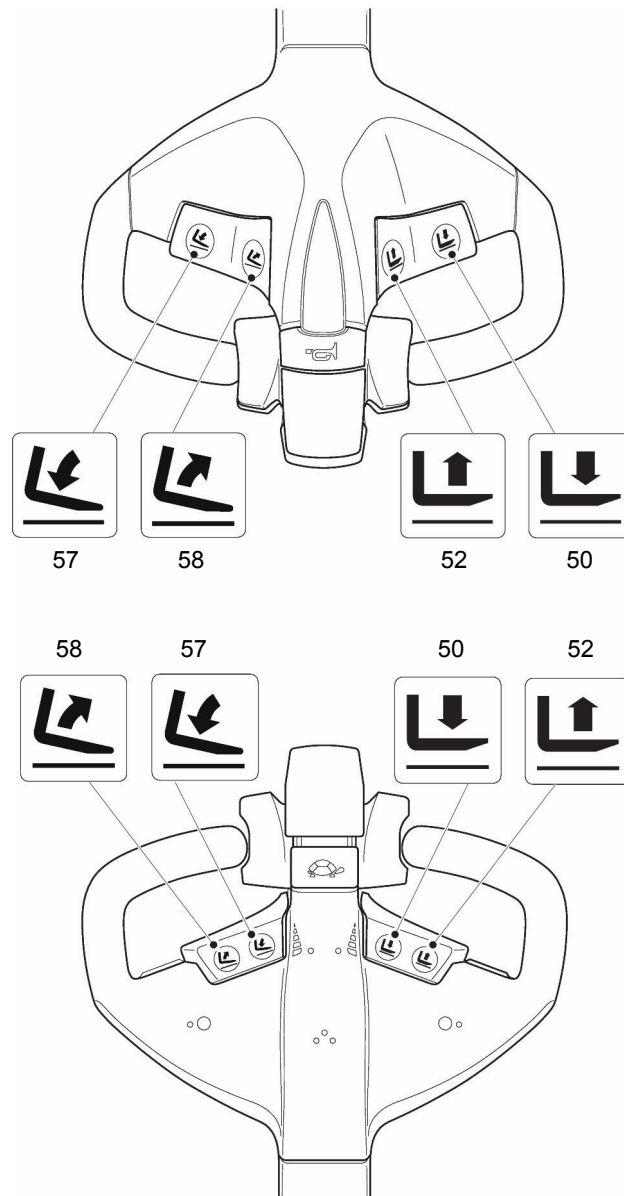
Item	Control/display		Function
5	Collision safety switch	●	Safety function for travel in the drive direction: When the collision safety switch is actuated, the truck travels for approx. 3 seconds in the load direction. The truck then switches off until the travel switch is briefly restored to the neutral position.
6	Travel switch	●	Controls the travel direction and the travel speed.
7	Slow-travel button	●	Pressing the slow-travel button reduces the travel speed and acceleration. If the tiller is in the brake zone, pressing this button overrides the brake function and the truck can be operated at slow speed.
8	Tiller	●	Used for steering and braking.
10	Emergency disconnect switch	●	Disconnects the battery supply – All electrical functions are deactivated and the truck is braked
12	Cable connection On-board battery charger (including safety switch)	○	Charges the battery by inserting the mains connector into a mains socket.
49	Load handler lower button	○	Lowers the load handler.
50	Load handler lower button	●	Lowers the load handler.
51	Load handler raise button	○	Raises the load handler.
52	Load handler raise button	●	Raises the load handler.
53	Warning signal button	●	Activates an audible signal.
7	Slow-travel button	●	Pressing the slow-travel button reduces the travel speed and acceleration. If the tiller is in the brake zone, pressing this button overrides the brake function and the truck can be operated at slow speed.



Item	Control/display		Function
13	Charge/discharge indicator	●	Shows the charge/discharge status of the battery.
14	Key switch	●	– Activates the truck by applying the control voltage – Removing the key prevents the truck from being switched on by unauthorised personnel
	Key switch with second switch stage	○	Brake release to move the truck when non-operational.
54	CanDis	○	Display instrument for: – Battery charge status – Service hours – Warning messages – Parameter setting
55	Display unit (2-inch display)	○	Display for: – Battery charge status – Battery capacity – Service hours – Travel program – Warning indicators – Event messages
	Soft keys under the display unit		
56	CanCode	○	Replaces the key switch – Entering the appropriate code activates the truck – Travel program selection – Code setting
	ISM Online	○	Replaces the key switch – Activates the truck via a card/transponder – Displays readiness for operation – Operational data logging – Data exchange with card/transponder
	Keypad	○	Replaces the key switch – Provided only as a supplement to the display unit – Truck release by entering set-up and access codes
	Transponder reader	○	Replaces the key switch – Provided only as a supplement to the display unit – Activates the truck via a card/transponder



2.1 EJE 220r / EJE 225r Tiller

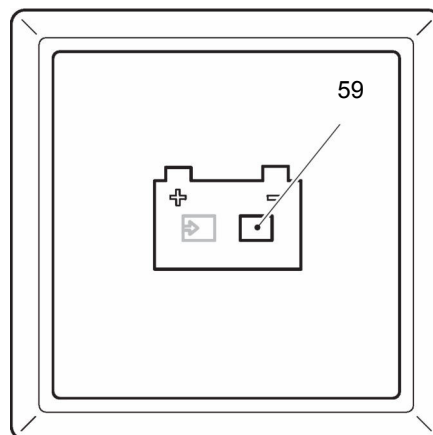


Item	Control/display		Function
50	Load handler lower button	●	Lowest the load handler.
52	Load handler raise button	●	Raises the load handler.
57	Ramp lift lower button	●	Lowest ramp lift.
58	Ramp lift raise button	●	Raises ramp lift.

2.2 Battery discharge indicator

When the truck has been released via the key switch, CanCode or ISM, the battery charge status is displayed. The LED colours (59) represent the following conditions:

LED colour	Charge status
Green	40–100%
Orange	30–40%
Green/orange flashes at 1 Hz	20–30%
Red	0–20%



- If the LED is red, the load can no longer be lifted. Lifting is only enabled when the battery connected is at least 70% charged.

If the LED flashes red and the truck is not ready for operation, inform the manufacturer's service department. Red flashing is a truck controller code. The flashing sequence indicates the type of fault.

2.3 Battery discharge monitor

- The standard setting for the battery discharge indicator / discharge monitor is based on standard batteries. When using maintenance-free or special batteries, the display and cut-out points of the battery discharge monitor must be set by manufacturer's service department. If this adjustment is not made, the battery may become damaged due to deep discharge.

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 45.

If the residual capacity falls below the required level, lifting is inhibited. An alternating display (59) appears. Lifting is only released when the battery connected is at least 70% charged.

3 Preparing the Truck for Operation

3.1 Checks and Operations to Be Performed Before Starting Daily Work

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.

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 the battery attachment and wire connections for damage and make sure they are secure.
- Check the battery connectors are secure.
- Check the load handler for visible signs of damage such as cracks, bent or severe wear.
- Check the drive wheel and load wheels for damage.
- Check that the markings and labels are present, clean and legible, see page 31.
- Make sure the drive panels and covers are secure and check for damage.

3.2 Preparing the truck for operation

Switching on the truck

Requirements

- Checks and operations to be performed before starting daily work, see page 67.

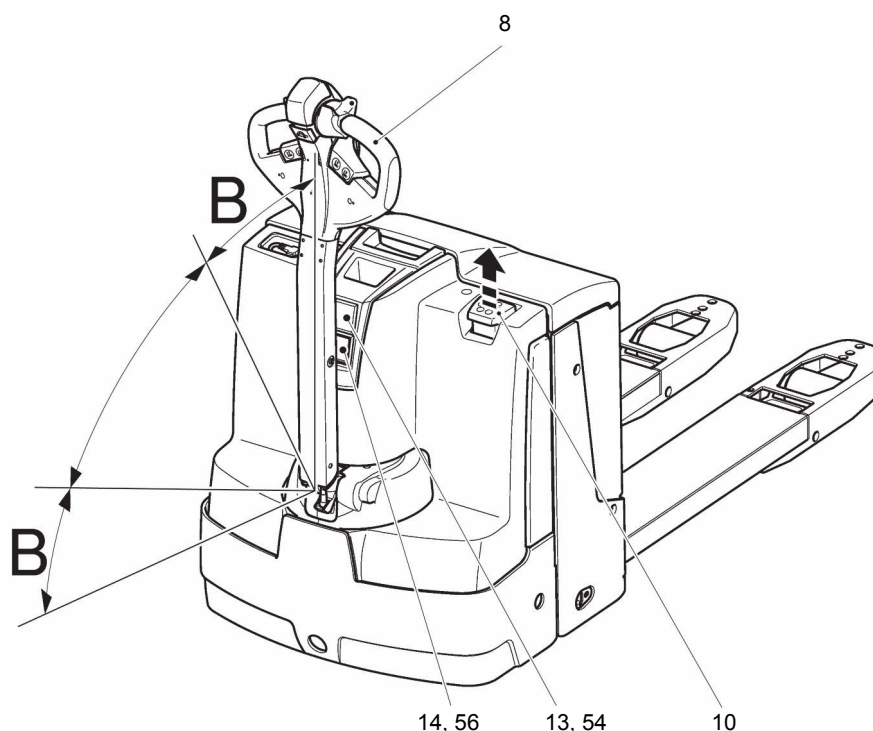
Procedure

- Pull the emergency disconnect switch (10) to unlock it.
- To switch on the truck:
 - Insert the key in the key switch (14) and turn it as far to the right as it will go.
 - Enter the code in CanCode (○) (56).
 - Hold the card or transponder in front of the ISM access module and, depending on the setting, press the green button on the ISM access module (○).

- ➔ The tiller (8) must be in the upper braking zone "B". If event message "E-0914" is displayed on the CanDis display instrument (○) or on the display unit (2-inch display) (○), move the tiller to the upper brake zone "B", see page 78.

The truck is ready for operation.

- The charge status indicator (13) shows the current battery charge status.
- The CanDis display instrument (54) or the display unit (2-inch display) (○) shows the current battery charge status and the service hours.



3.3 Making the EJE 220r / 225r operational

- On the EJE 220r / 225r you must check that the load handler is lowered when making the truck operational. If the load handler is not fully lowered, it can tilt slightly when raised.

Switching on the EJE 220r / 225r truck

Requirements

- Checks and operations to be performed before starting daily work, see page 67.

Procedure

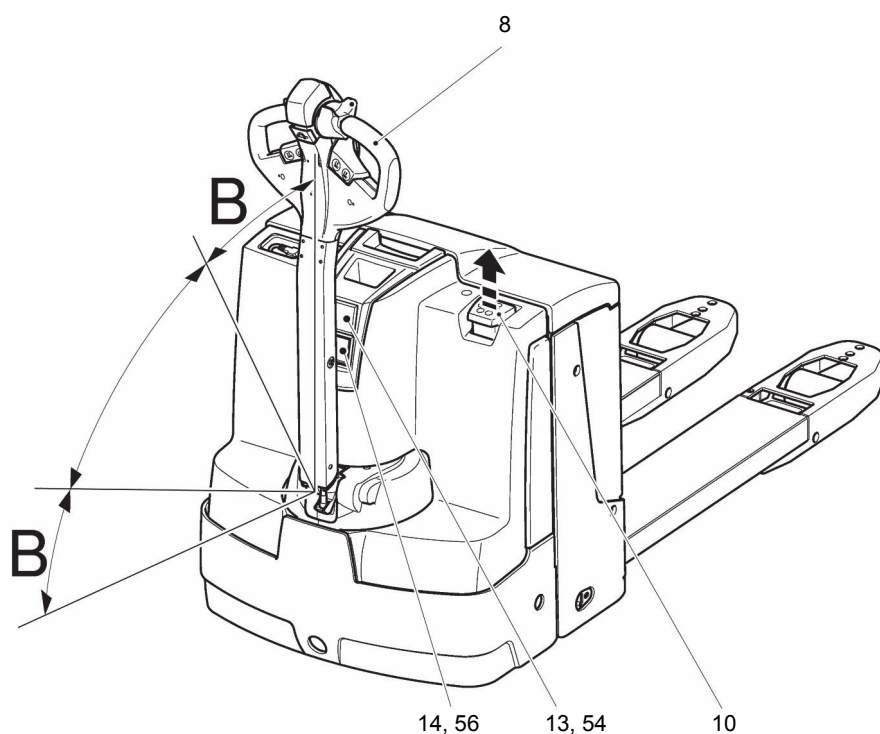
- Pull the emergency disconnect switch (10) to unlock it.
- To switch on the truck:
 - Insert the key in the key switch (14) and turn it as far to the right as it will go.
 - Enter the code in CanCode (○) (56).
 - Hold the card or transponder in front of the ISM access module and, depending on the setting, press the green button on the ISM access module (○).

- The tiller (8) must be in the upper braking zone "B". If event message "E-0914" is displayed on the CanDis display instrument (○) or on the display unit (2-inch display) (○), move the tiller to the upper brake zone "B", see page 78.
- Check that the load handler is fully lowered.
 - Lower the load handler if necessary, see page 83.

The truck is ready for operation.

- The charge status indicator (13) shows the current battery charge status.

○ The CanDis display instrument (54) or the display unit (2-inch display) (○) shows the current battery charge status and the service hours.



3.4 Checks and operations to be carried out when the truck is operational

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 devices:
 - 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.
 - Check braking efficiency, see page 81.
 - Test the steering, see page 81.
 - Test the hydraulic system, see page 83.
 - Test travel operations, see page 78.
 - Test the "collision safety switch" by depressing it whilst driving in the drive direction.
- Test the controls and displays and check for damage, see page 59.
 - Check tiller return function.
 - Check the controls automatically return to the neutral position after use.

3.5 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.

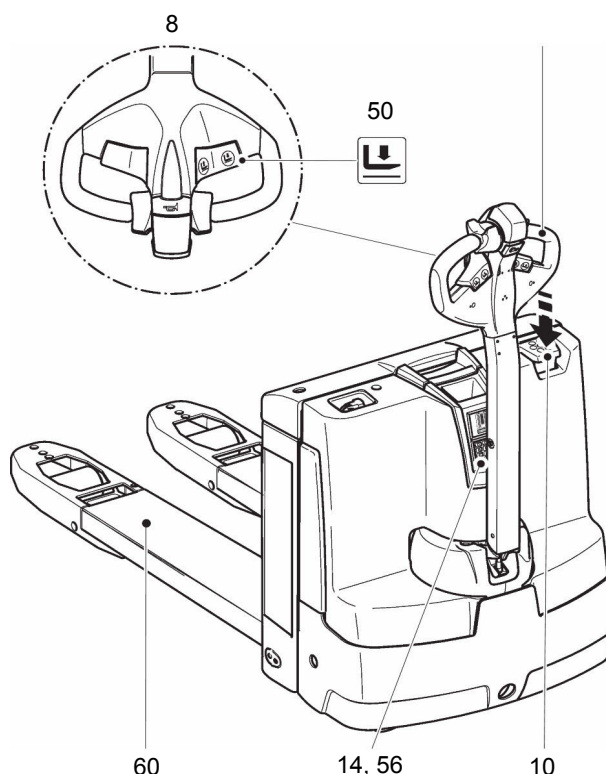
EJE 220 / 225 / 230 / 235

Park the truck securely

Procedure

- Park the truck on a level surface.
- Fully lower the load handler (60):
 - Press the lower button (50).
- Using the tiller (8) set the drive wheel to the straight ahead position.
- Switch off the truck, to do this:
 - Turn the key in the key switch (14) anti-clockwise as far as it will go. Remove the key from the key switch (14).
 - For CanCode (56) press the O key (○).
 - Press the red button on the ISM access module (○).
- Press the Emergency Disconnect (10).

The truck is parked.

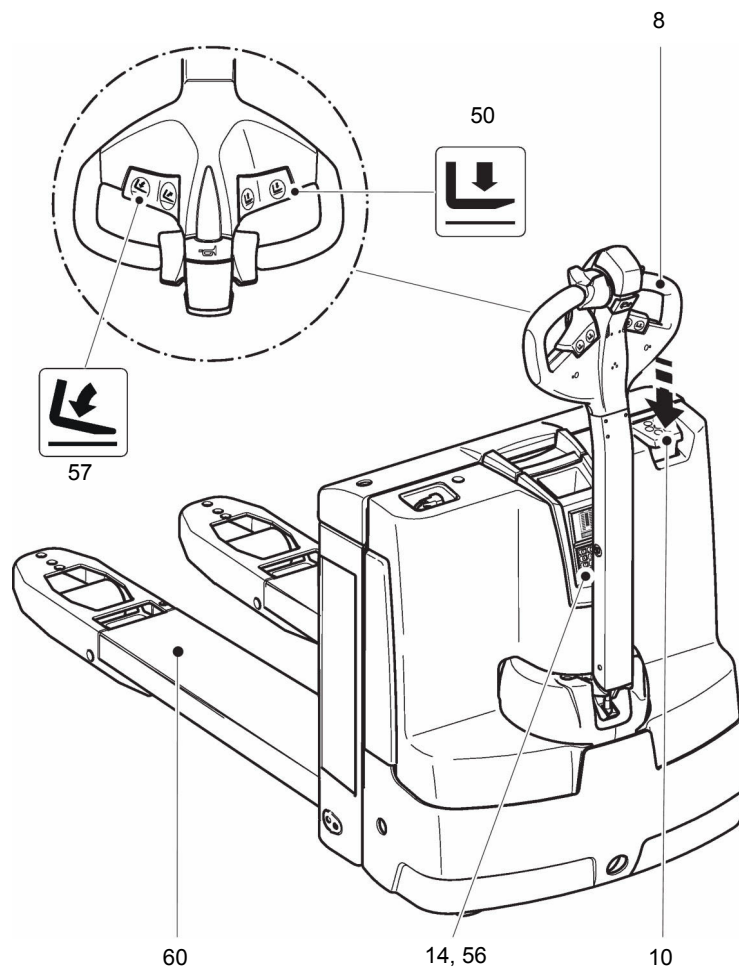


Parking the truck securely

Procedure

- Park the truck on a level surface.
- Fully lower the load handler (60):
 - Press the "lower" button (50) or the "ramp lift lower" button (57).
- Using the tiller (8), turn the drive wheel to "forward travel".
- Switch off the truck, to do this:
 - Turn the key in the key switch (14) anti-clockwise as far as it will go. Remove the key from the key switch (14).
 - For CanCode (56), press the O key (○).
 - Press the red key on the ISM access module (○).
- Press the emergency disconnect switch (10).

The truck is parked.



4 Industrial Truck Operation

4.1 Safety regulations for truck operation

Travel routes and work areas

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

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

DANGER!

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

At blind spots get a second person to assist.

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

Travel conduct

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

Travel visibility

The operator must look in the direction of travel and must always have a clear view of the route ahead. If the truck is carrying loads that affect visibility, the truck must travel against the load direction. If this is not possible, a second person must walk alongside the truck as a lookout to observe the travel route while maintaining eye contact with the operator. Proceed only at walking pace and with particular care. Stop the truck as soon as you lose eye contact.

Negotiating slopes and inclines

Negotiating slopes and inclines up to 20 % is only permitted when they are recognised lanes. The slopes and inclines must be clean, have a non-slip surface, and negotiating them safely must be within the technical specifications of the truck. The truck must always be driven with the load facing uphill. The industrial truck must not be turned, operated at an angle or parked on inclines or slopes. Inclines must only be negotiated at slow speed, with the driver ready to brake at any moment.

Negotiating lifts, loading ramps and docks

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

Type of loads to be carried

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

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.
-

4.2 Emergency Disconnect

CAUTION!

Applying maximum braking can result in accidents

Applying the Emergency Disconnect switch during travel will cause the truck to decelerate to a halt at maximum force. This may cause the load to slide off the load handler. There is a higher risk of accidents and injury.

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

CAUTION!

Faulty or non-accessible Emergency Disconnect switches can cause accidents

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

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

Press the Emergency Disconnect switch

Procedure

- Press the Emergency Disconnect (10).

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

- Press the Emergency Disconnect switch on in emergencies.

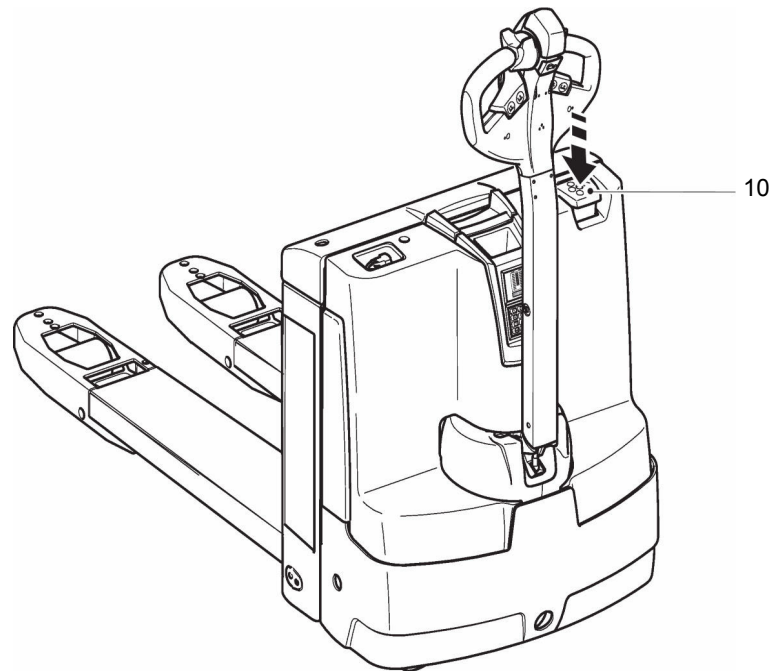
Releasing the Emergency Disconnect switch

Procedure

- Pull the Emergency Disconnect switch (10) to unlock it.

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

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



4.3 Automatic braking

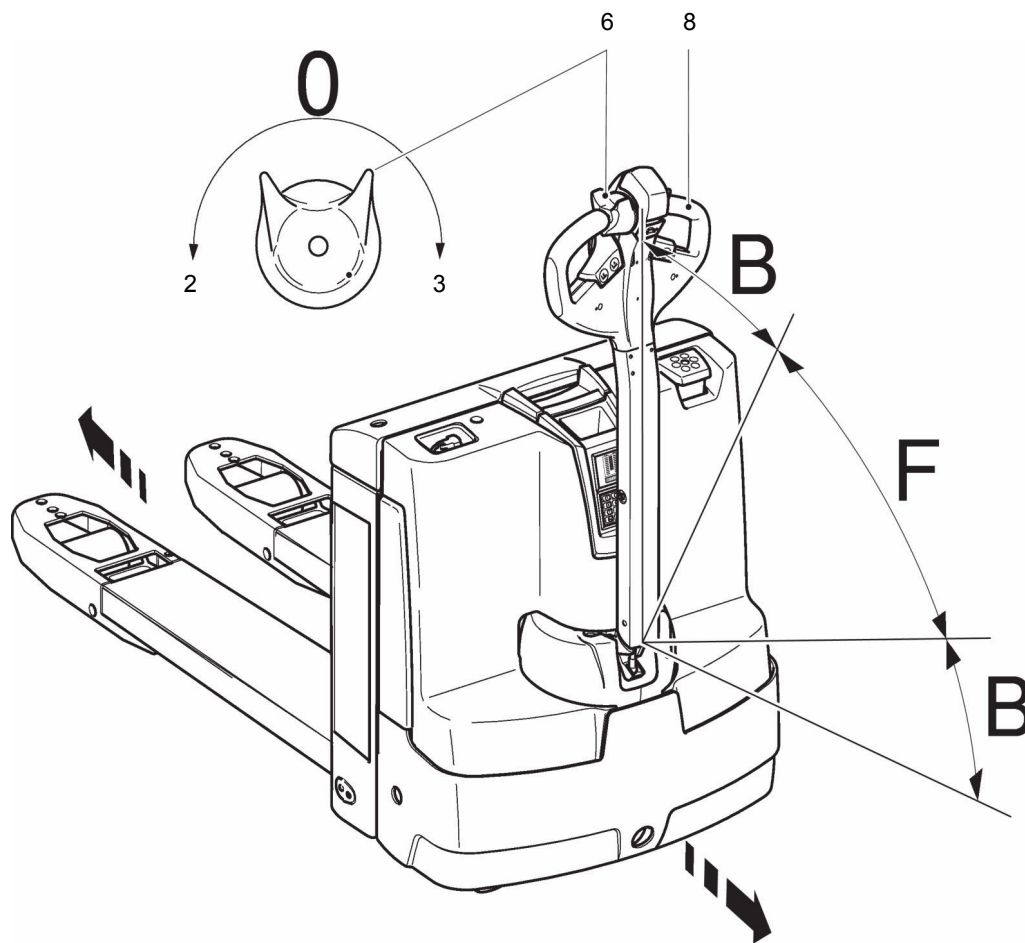
- When the tiller is released, it returns automatically to the upper brake zone (B) and the brakes are applied automatically.

⚠ WARNING!

Risk of collision due to a defective tiller

Operating the truck with a defective tiller can lead to collisions with persons or objects.

- ▶ If the tiller returns to the brake position slowly or not at all, the truck must be taken out of service until the cause of this fault is rectified.
- ▶ Contact the manufacturer's customer service department.



4.4 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.
- ▶ When travelling through swing doors etc. make sure that the doors do not activate the collision safety button.

Requirements

- Start up the truck, see page 67.

Procedure

- Set the tiller (8) to the travel zone (F).
 - Control the travel direction with the travel switch (6):
 - Rotate the travel switch (6) slowly in the load direction (3):
Travel in load direction:
 - Rotate the travel switch (6) slowly in the drive direction (2):
Travel in drive direction:
 - Control the travel speed with the travel switch (6):
 - The further the travel switch (6) is rotated, the greater the travel speed.
 - Control the travel speed by rotating the travel switch (6) further or less.
-  After releasing the travel switch (6), it automatically returns to the neutral position (0), and the truck brakes.

The brakes are released and the truck moves in the selected direction.

Anti-roll back device for slow travel on inclines

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

○ Reduced speed when the load handler is fully lowered

When the load handler is fully lowered the truck can only travel at reduced speed. The load handler must be raised in order to use the maximum available speed.

4.4.1

⚠ CAUTION!

Danger when changing direction during travel

Changing direction during travel causes the truck to decelerate sharply. When the truck changes direction, it can start travelling at high speed in the opposite direction unless the travel switch is released in time.

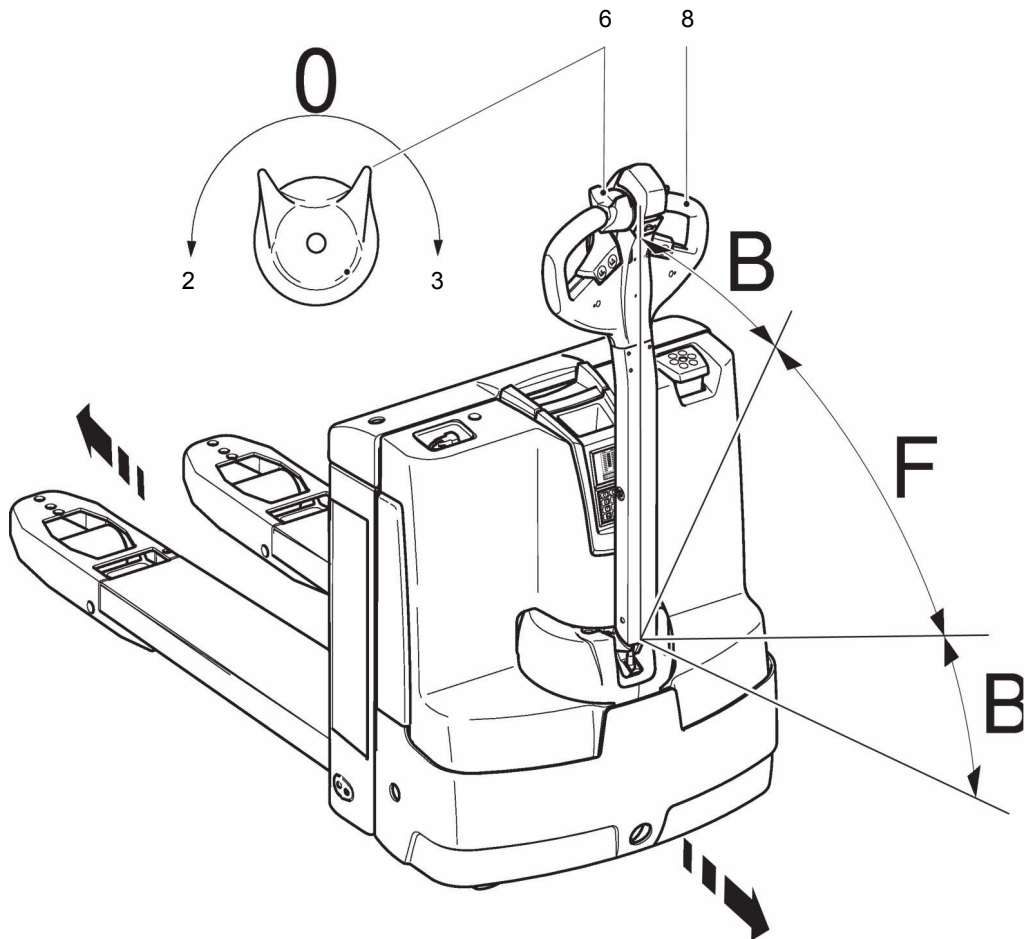
- ▶ After setting off in the opposite direction, apply the travel switch gently or not at all.
- ▶ Do not perform any sudden steering operations.
- ▶ Always face in the direction of travel.
- ▶ Maintain an adequate overview of the route you are travelling.

Changing direction during travel

Procedure

- Set the travel switch (6) to the opposite direction while travelling.

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



4.5 Slow travel

⚠ CAUTION!

Risk of accident if the service brake is deactivated

Particular care and attention is required by the operator during slow travel. The service brake is deactivated during slow travel and is only reactivated after the "slow travel" button is released.

- ▶ In hazardous situations brake by immediately releasing the "slow travel" button and the travel switch.
- ▶ During slow travel you can only brake by coating braking.



The truck can be operated with an upright tiller (8) (e. g. in confined spaces / elevators).

Switch on the slow travel function

Procedure

- Press and hold down the "slow travel" button (7).
- Rotate the travel switch (6) in the required travel direction.

The brake is released. The truck travels at slow speed.

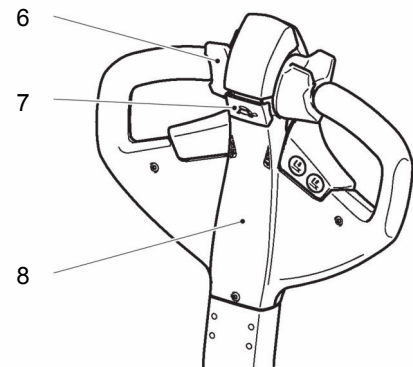
Switching off slow travel

Procedure

- Release the "slow travel" button (7).
If the tiller is in brake zone "B", the brake applies and the truck stops.
If the tiller is in brake zone "F" the truck continues at slow travel speed.

- Release the travel switch (6).

Slow travel ends and the truck can now travel again at normal speed.



4.6 Steering

Procedure

- Move the tiller (8) to the left or right.

The truck is steered in the required direction.

4.7 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.

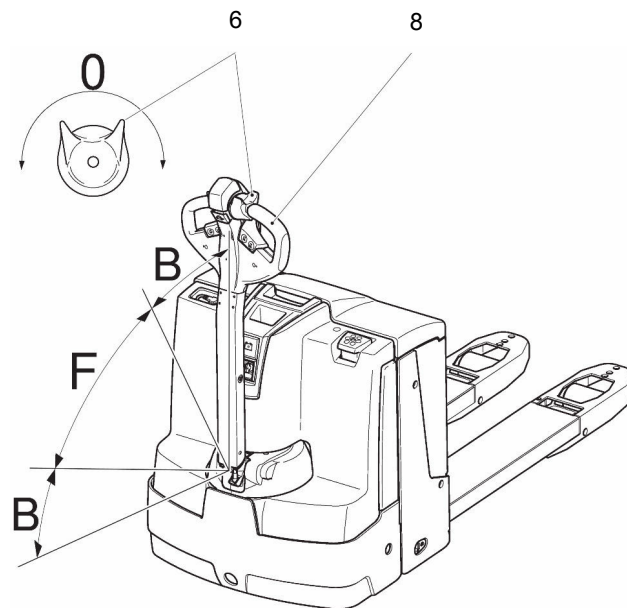
- ▶ The operator must be aware of floor conditions and take them into account when braking.
- ▶ Brake with care to prevent the load from slipping.

⚠ CAUTION!

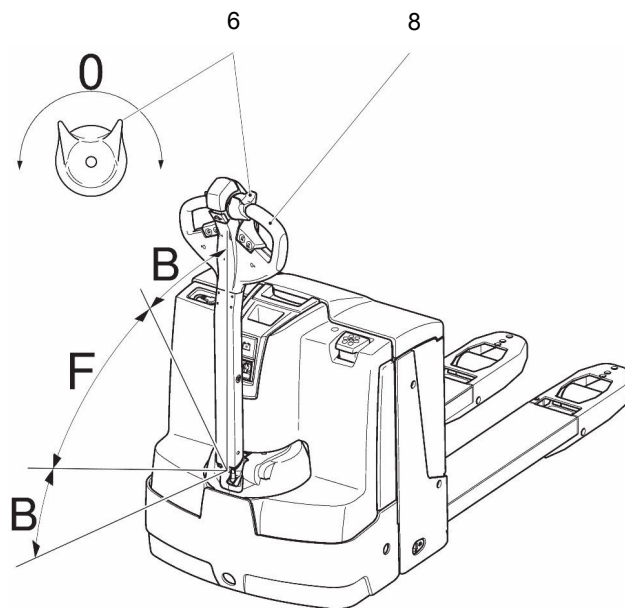
- ▶ In hazardous situations, move the tiller to the brake position or press the emergency disconnect switch.

The truck can brake in two ways:

- With the service brake (brake zone B).
- By regenerative braking (coasting brake).



4.7.1 Braking with the service brake



Procedure

- Move the tiller (8) up or down to one of the brake zones (B).

The truck decelerates at the maximum rate until it comes to a halt.

→ The mechanical brake applies automatically when the truck comes to rest.

4.7.2 Regenerative braking

Procedure

- If the travel switch (6) is set to (0), the truck automatically brakes regeneratively.

The truck brakes to a halt regeneratively via the coasting brake.

→ *When braking regeneratively, energy is returned to the battery, ensuring a longer service time.*

4.7.3 Parking brake

→ The mechanical brake applies automatically when the truck comes to rest.

4.8 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.
-

4.8.1 Raising the load handler

Requirements

- Prepare the truck for operation, see page 68.

Procedure

Press the “Raise load handler ” button (52) until you reach the desired lift height.

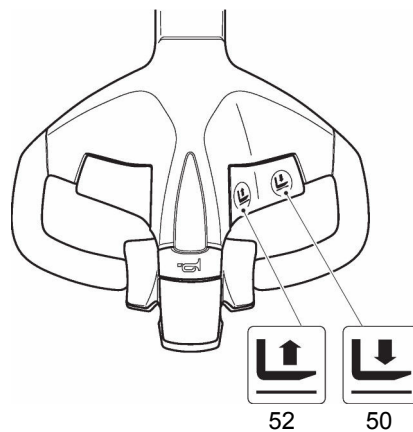
NOTICE

Risk of material damage to the hydraulic unit

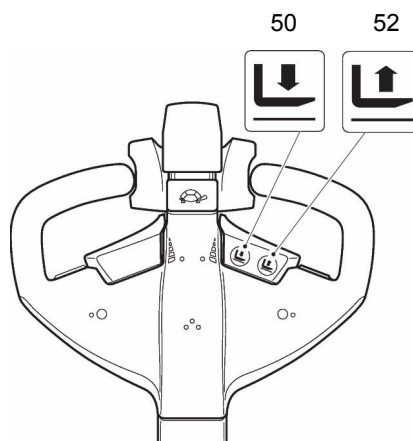
When the mechanical end stop of the load has been reached, release the "Raise load handler" button. Otherwise the hydraulic unit could suffer material damage.

The load handler is raised.

Tiller from above



Tiller from below



4.8.2 Lowering the load handler

Requirements

- Prepare the truck for operation, see page 68.

Procedure

- Press the “Lower load handler” button (50) until you reach the desired lift height.

The load handler is lowered.

4.8.3 Raising the ramp lift

EJE 220r / 225r

Requirements

- Prepare the truck for operation, see page 68.

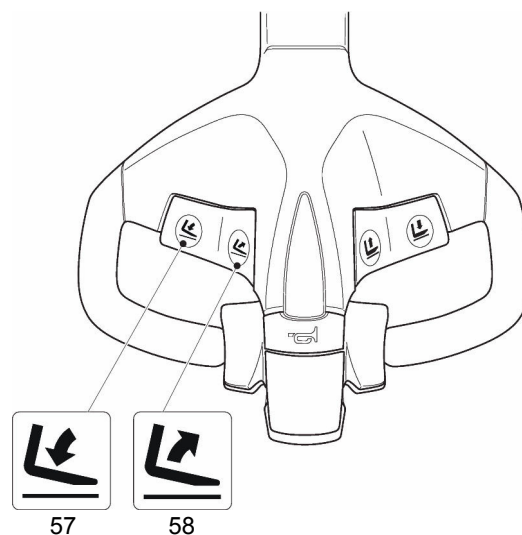
Procedure

- Press the “ramp lift raise” button (58) until you reach the desired lift height.

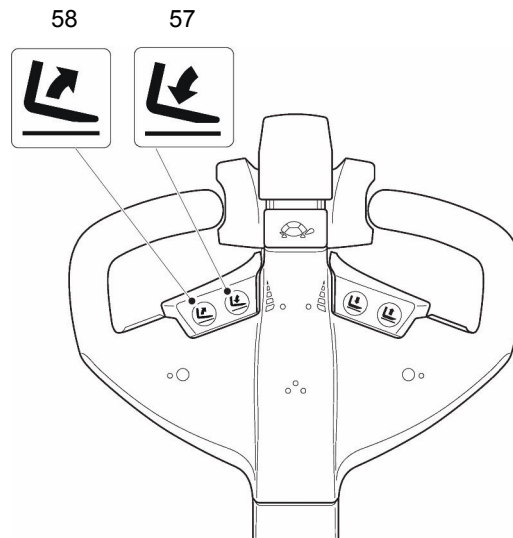
The load handler is raised to ramp lift.

- If the load handler is raised with the "load handler raise" button, it cannot change directly to ramp lift. When the "ramp lift raise" button is applied the load handler is first fully lowered and then raised to ramp lift.
- If the load handler is raised with ramp lift, it cannot change directly to normal lift. When the "load handler raise" button is applied, ramp lift is first fully lowered and then the load handler is raised.

Tiller from above



Tiller from below



4.8.4 Lowering ramp lift

EJE 220r / 225r

Requirements

- Prepare the truck for operation, see page 68.

Procedure

- Press the “ramp lift lower” button (57) until you reach the desired lift height.

The load handler is lowered from ramp lift.



When you release the "ramp lift lower" button (57) or the "load handler lower" button a lag time of 1 to 2 seconds begins. If the "ramp lift raise" button (58) or the "load handler raise" button are pressed during this lag time, the load handler is raised after a delay.

The lag time ensures that the load handler is fully lowered.

4.9 Lifting, transporting and depositing loads

WARNING!

Unsecured and incorrectly positioned loads can cause accidents.

Before lifting a load unit, the driver 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.

CAUTION!

- ▶ Do not lift long loads at an angle.

4.9.1 Raising a load

Requirements

- Load correctly palletised.
- Load weight matches the truck's capacity.
- Load handler evenly loaded for heavy loads.

Procedure

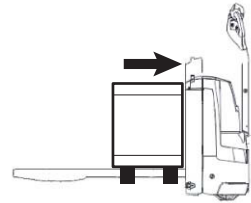
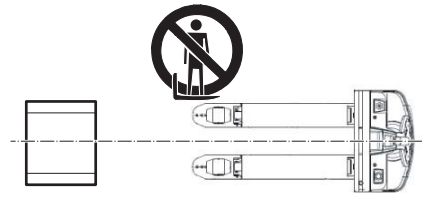
- Drive the truck carefully up to the pallet.
- Drive the load handler slowly into the pallet until the pallet is against the back of the load handler (see graphic to the right).



The load must not extend by more than 50 mm beyond the load handler tips.

- Raise the load handler until the desired height is reached, (see page 84).

The load is being raised.



NOTICE

Risk of material damage to the hydraulic unit

When the mechanical stops of the load handler have been reached, release the "raise load handler" button. Otherwise the hydraulic unit may suffer material damage.

4.9.2 Raising the load with ramp lift

EJE 220r / 225r

Requirements

- Load correctly palletised.
- Load weight matches the truck's rated capacity.
- Load handler evenly laden for heavy loads.
- Truck is on a ramp.
- Load handler lowered.

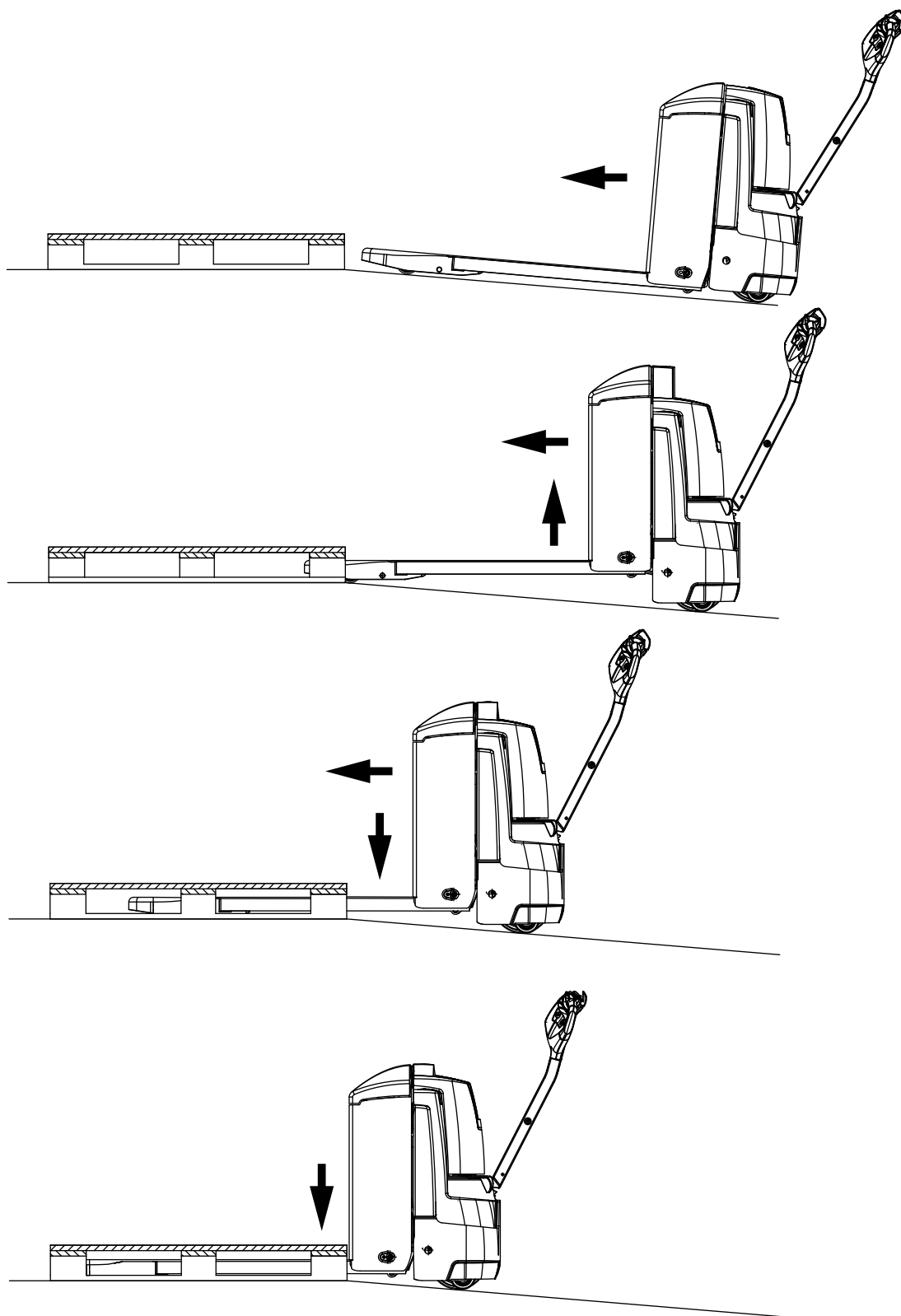
Procedure

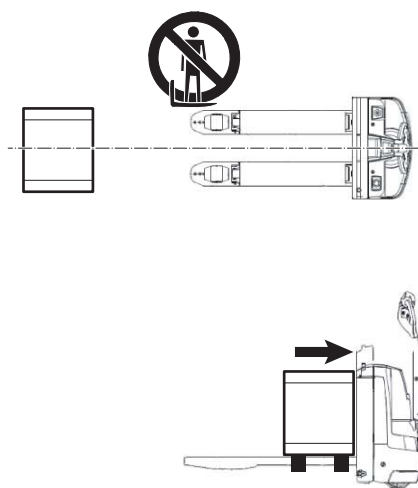
- Drive the truck slowly up to the pallet.
- Raise ramp lift (see page 86).
- Slowly insert the load handler into the pallet and lower the ramp lift incrementally.
- Insert the load handler into the pallet until the pallet is resting against the back of the load handler.

 The load must not extend by more than 50 mm beyond the load handler tips.

- Fully lower the ramp lift.
- Raise the load handler until you reach the desired height, (see page 84).

The load is raised.





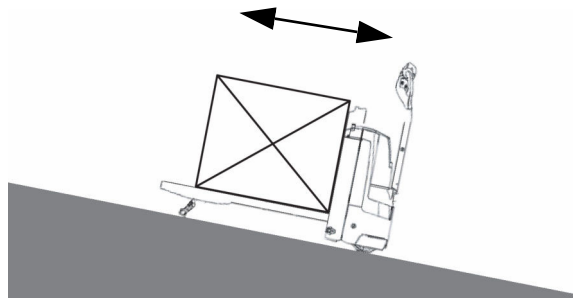
4.9.3 Transporting a load

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).



4.9.4 Depositing a load

CAUTION!

Loads must not be set down on transport or escape routes, in front of safety installations or factory equipment that must be accessible at all times.

Requirements

- Storage location suitable for storing the load.

Procedure

- Drive the truck carefully up to the storage location.
 - Lowers the load handler.
-  To avoid damaging the load and the load handler, avoid setting the load down abruptly.
- Lower the load handler so that it is clear of the load (see page 85).
 - Carefully drive the load handler out from beneath the pallet.

The load is deposited.

NOTICE

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

4.9.5 Depositing the load with ramp lift

EJE 220r / 225r

CAUTION!

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

Requirements

- Storage location suitable for storing the load.

Procedure

- Drive carefully up to the storage location.
- Lower the load handler fully (see page 85).



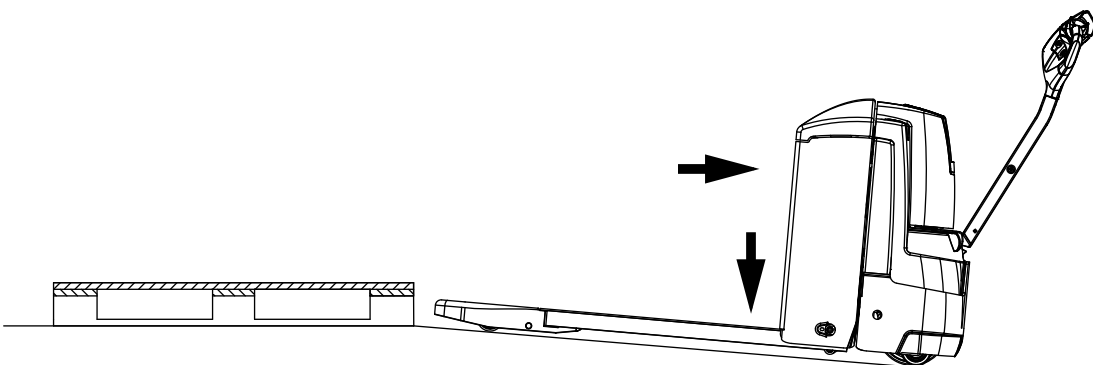
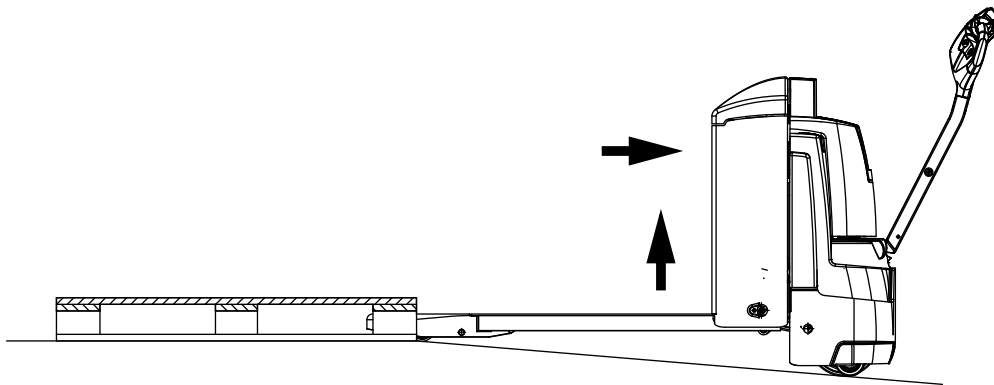
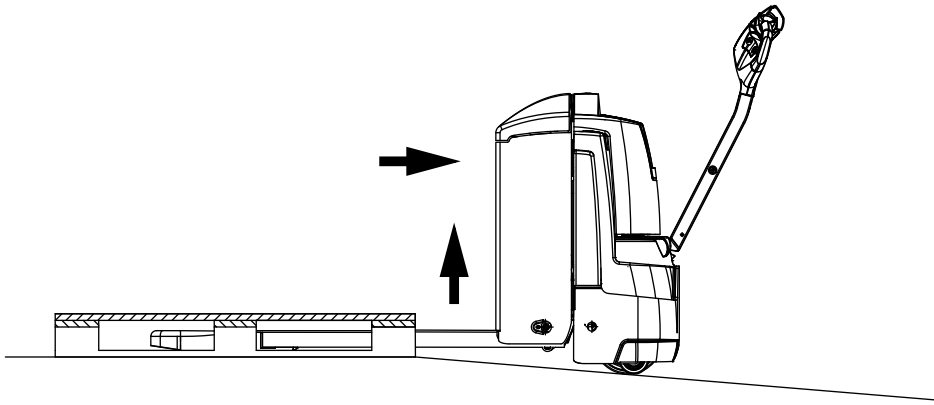
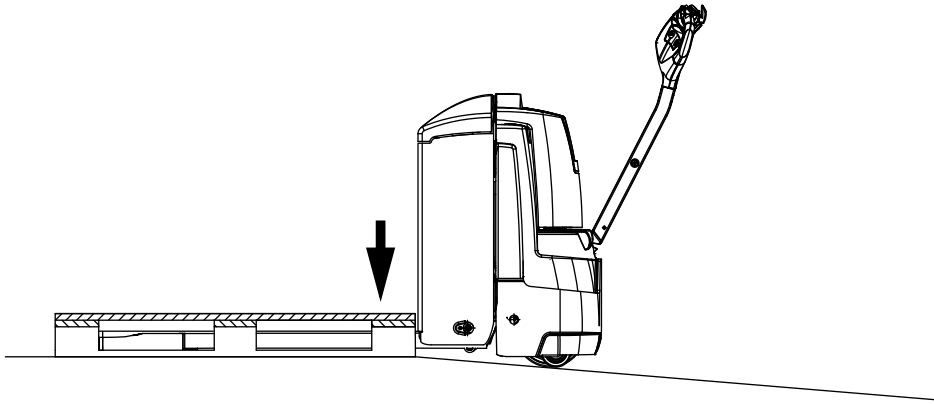
Avoid lowering the load suddenly to prevent the load and load handler from damage.

- Carefully remove the load handler from the pallet and raise the ramp lift incrementally (see page 86).
- When the load handler has been fully removed from the pallet, lower the ramp lift.

The load has been deposited.

NOTICE

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



5 Troubleshooting

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



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

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

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

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

5.1 Truck does not start

Possible cause	Actions
Battery connector not plugged in	Check the battery connector and connect if necessary
Emergency disconnect switch pressed	Release the emergency disconnect switch, see page 75
Key switch in position "O"	Set the key switch to position "I"
Battery charge too low	Check battery charge and charge battery if necessary, see page 45
Faulty fuse	Check fuses, see page 164
Incorrect ISM access module transponder used	Use correct transponder
Incorrect code entered in CanCode	Enter correct code, see page 108
Tiller not in brake position when the truck is switched on (for CanDis or on the display unit (2-inch display) (○), event message E-0914 appears)	Swing the tiller into the top or the bottom brake zone
"Raise load handler" button/"Lower load handler" button not in home position when truck switched on (for CanDis or on the display unit (2-inch display) (○), event message E-2951 appears)	Do not actuate the buttons
Travel switch not in home position when truck switched on (for CanDis or the display unit (2-inch display) (○), event message E-1901 appears)	Do not actuate the travel switch
Collision safety switch actuated when truck switched on (for CanDis or on the display unit (2-inch display) (○), event message E-1914 appears)	Do not actuate the collision safety switch
"Slow travel" button actuated when truck switched on (for CanDis or the display unit (2-inch display) (○), event message E-1901 appears)	Do not actuate the button

5.2 Load cannot be lifted

Possible cause	Actions
Truck not operational	Carry out all actions listed under "Truck does not start"
Hydraulic oil level too low	Check the hydraulic oil level, see page 162
Battery discharge monitor has switched off	Charge the battery, see page 45
Faulty fuse	Check fuses, see page 164
Excessive load	Observe the rated capacity, see data plate
Tiller not in brake position when the truck is switched on (for CanDis or on the display unit (2-inch display) (○), event message E-0914 appears)	Swing the tiller into the top or the bottom brake zone
"Raise load handler" button/"Lower load handler" button not in home position when truck switched on (for CanDis or on the display unit (2-inch display) (○), event message E-2951 appears)	Do not actuate the buttons
Travel switch not in home position when truck switched on (for CanDis or the display unit (2-inch display) (○), event message E-1901 appears)	Do not actuate the travel switch
Collision safety switch actuated when truck switched on (for CanDis or on the display unit (2-inch display) (○), event message E-1914 appears)	Do not actuate the collision safety switch
"Slow travel" button actuated when truck switched on (for CanDis or the display unit (2-inch display) (○), event message E-1901 appears)	Do not actuate the button

6 Operating the truck without its own drive system

- With the right optional equipment (○) it is possible to switch the truck to emergency operation via the GF60 service key: The brakes are released electrically and the truck can move without its own drive system, see page 103.

6.1 Release and activate the drive wheel brake

WARNING!

Accidental truck movement

When the brakes are de-activated the truck must be parked on a level surface, since the brakes are no longer effective.

- ▶ Do not release the brake on slopes or inclines.
 - ▶ Do not park the truck with the brake released.
 - ▶ Apply the brake again when you reach your destination.
-

Release the brake

Tools and Material Required

- Two M5x45 screws
- Spanner

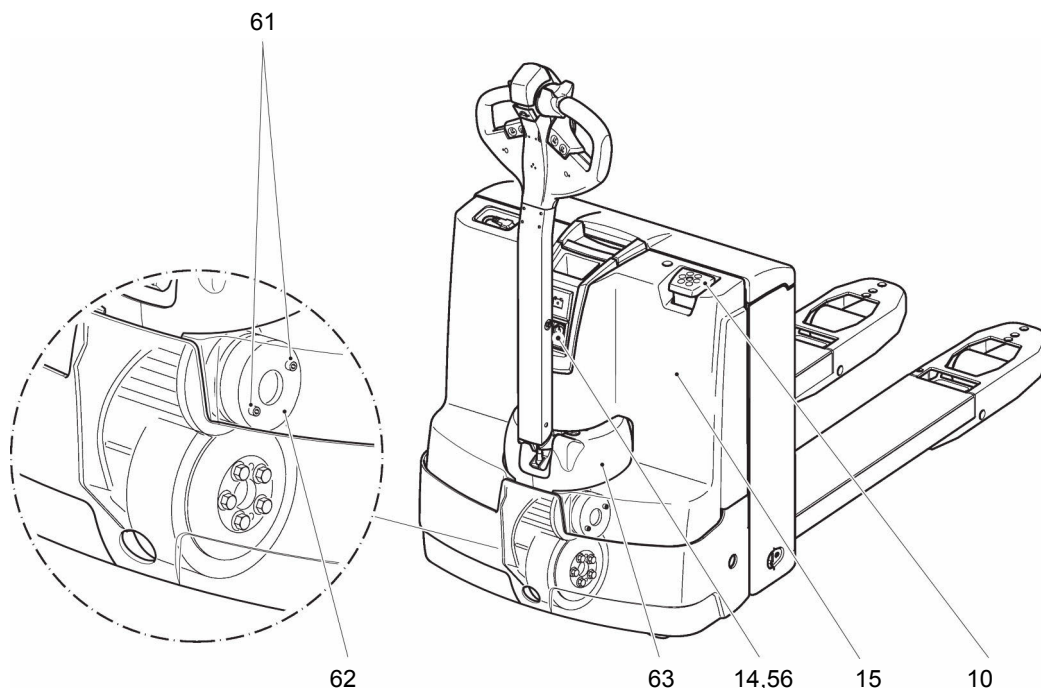
Procedure

- Switch off the truck, to do this:
 - Turn the key in the key switch (14) anti-clockwise as far as it will go. Remove the key from the key switch (14).
 - Press button O on CanCode (56).
 - Press the red button on the ISM access module(○).
- Press the emergency disconnect switch (10).
- Remove the front panel (15), see page 159.
- Remove the right-hand drive panel (63), see page 160.
- Use wedges to prevent the truck from moving.
- Insert two M5x45 screws (61) as far as they will go in the brake (62) and lift up the anchor plate.

→ The two M5x45 screws (61) are used to tension (unlock) the compression springs which activate the parking brake, so that the truck does not brake when de-energised.

- Remove the wedges.

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



Activating the brake

Procedure

- Use wedges to prevent the truck from moving.
- Remove the two M5x45 screws (61) from the brake (62).

⚠ CAUTION!

Open covers can cause injury and accidents

► The covers (side panels, drive compartment cover etc.) must be closed during operation.

Refit the right-hand drive panel (63), see page 160.

- Install the front panel (15), see page 159.

The brake has been reactivated. The brake is now be applied without current.

⚠ WARNING!

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

7 Optional equipment

7.1 Emergency operation with service key GF60

⚠ WARNING!

Accidental truck movement

When the brakes are de-activated the truck must be parked on a level surface, since the brakes are no longer effective.

- ▶ Do not release the brake on slopes or inclines.
- ▶ Do not park the truck with the brake released.
- ▶ Apply the brake again when you reach your destination.

- The service key GF60 must not remain on the truck during normal operation. The service key should only be used by an authorised person (e.g. warehouse manager).

Operating the truck without its own drive system.

Requirements

- Truck prevented from rolling away.
- Charged battery in truck.

Tools and Material Required

- Service key GF60 with lock bar

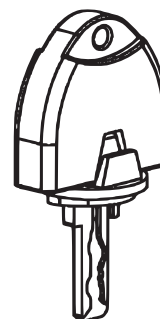
Procedure

- Insert the service key GF60 in the key switch.

- The service key GF60 with lock bar can only be inserted and turned on one side. If inserted in the wrong direction the key will not turn.
- Turn service key to position 1.
 - Move the lock bar on the head of the key.
 - Turn service key to position 2.

The truck can be moved without its own drive system.

GF 60



⚠ CAUTION!

Risk of accident when the brake is released

The operator must pay special care and attention when moving the truck with the brake released. The truck can be braked by the following measures:

- ▶ Turning the service key to position 1.
- ▶ Pressing the emergency disconnect switch.

Parking the truck

Procedure

- Turn the service key to the 0 position and remove the key.

- After switching back from level 2 to level 1, the lock bar returns to its original position.

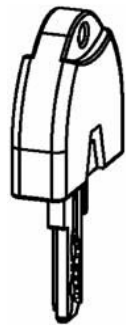
The brake is now activated again.

⚠ WARNING!

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

GF 30

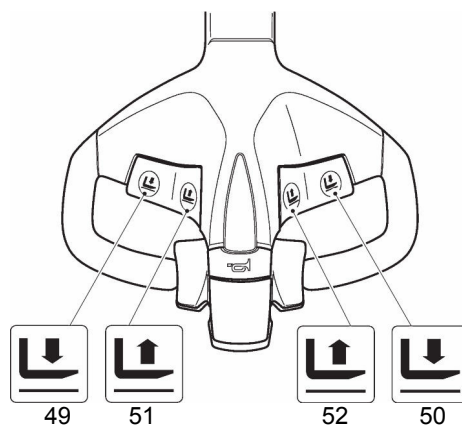
- The GF30 key (without lock bar) is for normal operation.
The key can be inserted in both directions and can only be turned to position 1 in the key switch.



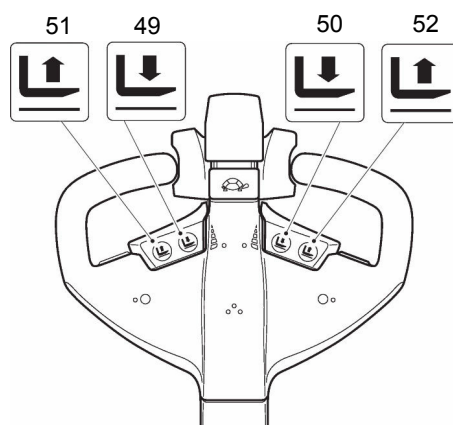
7.2 Tiller with buttons on both faces

EJE 220 / 225 / 230 / 235

Tiller from above



Tiller from below



Item		Control
50	●	Load handler lower button
52	●	Load handler raise button
49	○	Load handler lower button
51	○	Load handler raise button

7.3 Keypad (CanCode) (○)

7.3.1 Code lock

The code lock allows a user or group of users to assign an individual user code. Travel programs can also be assigned to the individual user codes. The user code is configured with a master code and is described in the following sections in this chapter.

When you have entered the valid user code the truck will be operational. The truck will be able to perform travel, steering and hydraulic operations.

When you have entered the valid master code, the truck will be switched on. Travel operations are, however, inhibited. The truck will be able to perform hydraulic operations. The code lock is in programming mode. When you enter one of the following parameters, the settings in the code lock can be changed.

Parameter	Description
0-0-0	– Change master code (see page 109)
0-0-1	– Add user codes (see page 111)
0-0-2	– Change a user code (see page 113)
0-0-3	– Delete a user code (see page 115)
0-0-4	– Delete all user codes (see page 117)
0-1-0	– Switch on the truck automatically (see page 119)
0-2-4	– Assign travel programs to the user codes (see page 121)

Trucks in as-supplied condition have the code indicated on a sticker. When using the truck for the first time, change the master and user codes and remove the sticker.

- Default user code: 2-5-8-0
- Default master code: 7-2-9-5

WARNING!

Lack of usage restrictions can result in accidents

If the same codes are used to operate different trucks, there is no restriction of usage for the operators or operator groups.

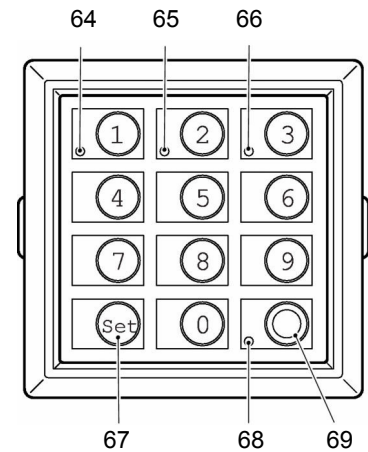
- When allocating the codes, ensure rider trucks are given a different code from pedestrian trucks.

The keypad consists of 10 digit keys, a Set key (67) and a  key (69).

Digit keys

The digit keys are used to enter the user or master code and select the travel program.

The green LEDs of the digit keys 1, 2 and 3 (64, 65, 66) show the travel program setting.



key

Pressing the  key switches the truck off and sets it to "non operational" status.

The  key indicates the follow operating conditions via a red / green LED (68):

- Code lock function (commissioning the truck).
- Error display configuring the user code.
- Adjusting the travel program depending on the setting and truck.
- Setting and changing parameters.

SET key

When you change the parameters the SET key (67) acts as a confirmation key.

7.3.2 Preparing the truck for operation with the keypad (CanCode)

Preparing the truck for operation by entering a valid operator code

Procedure

- Pull the Emergency Disconnect to unlock it, see page 75.

The LED (68) lights up red.

- Enter the operator code with the digit keys.

When you have entered a valid operator code the LED (68) lights up green, the travel program selected is indicated by the corresponding LEDs (64,65,66) and the truck is switched on.



If the LED (68) flashes red this means the wrong code has been entered. Enter the code again.

The Set key (67) has no function in operating mode.

7.3.3 Switching off the truck with the keypad (CanCode)

Switching off the truck

Procedure

- Press the O key (69).

The truck is switched off and the LED (68) is lit red.



The truck can cut out automatically after a specified time. If no travel, steering or hydraulic operations are performed within a set time, the truck switches off automatically. When you enter a valid code again the truck will be operational. The code lock parameter responsible for automatic cutout must be set, see page 119.

7.3.4 Changing the master code

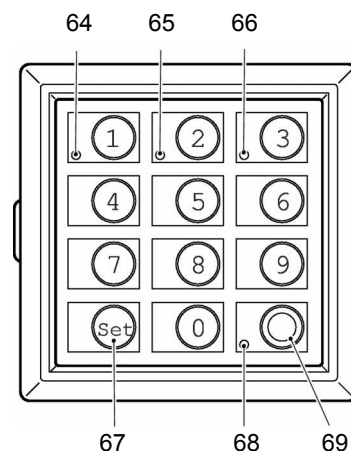
- To change the length of the master code you must follow the procedure in "Choose length of the new master code (4-6 digit) and add user codes", see page 118. If there are still user codes stored in the code lock, the master code to be changed must be the same length as the saved user codes.

Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the valid master code the LED (68) flashes green.
- Enter the parameters 0-0-0 with the digit keys.
- Confirm with the SET key (67).
The LEDs (64,68) flash green.
- Enter the valid master code again with the digit keys.
- Confirm with the SET key (67).
The LEDs (65,68) flash green.
- Enter the valid master code with the digit keys.
- The new master code must be different from existing user codes.
- Confirm with the SET key (67).
The LEDs (66,68) flash green.
- Enter the new master code again with the digit keys.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. The setting is saved.
- Press the O key (69).
The truck is switched off and the LED (68) is lit red.
- Check the new master code:
 - Switch on the truck with the new master code, see page 108
When you enter the valid master code the LED (68) flashes green.
 - Press the O key (69).
The truck is switched off and the LED (68) is lit red.



Error displays changing the master code

For the following events the LED (68) flashes red:

Cause	Remedy
– New master code is already occupied by a user code	– Switch off the truck, see page 108. – Choose a different master code, see page 109. – Change the user code so that the required master code can be used, see page 113. – Delete the user code so that the required master code can be used, see page 115.
– The master codes to be changed do not match	– Switch off the truck, see page 108. – Enter the master code again, see page 109.
– The master code entered is not the same length as the user code	– Switch off the truck, see page 108. – Repeat the entry, making sure that the length of the master code matches that of the user code.

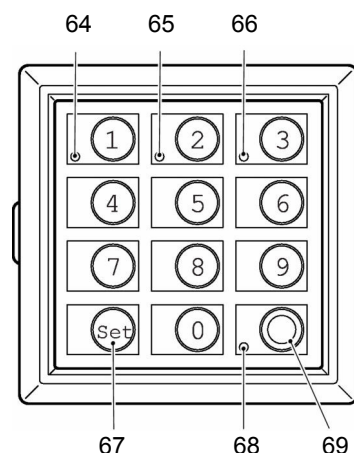
7.3.5 Add operator code

Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the valid master code the LED (68) flashes green.
- Enter the parameters 0-0-1 with the digit keys.
- Confirm with the SET key (67).
The LEDs (65,68) flash green.
- Enter the new user code with the digit keys.
- ➔ The length (4-6 digit) of the new user code must be the same as that of the previously entered master code. The new user code must also be different from the existing master code.
- Confirm with the SET key (67).
The LEDs (66,68) flash green.
- Enter the new user code again with the digit keys.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. The setting is saved.
- Press the O key (69).
The truck is switched off and the LED (68) is lit red.
- Check the new user code:
 - Switch on the truck with the new user code, see page 108
After entering the valid user code the LED (68) lights up green, the travel program setting is shown by the illumination of the corresponding LEDs (64,65,66) and the truck is switched on.
 - Press the O key (69).
The truck is switched off and the LED (68) is lit red.



Error displays adding a user code

For the following events the LED (68) flashes red:

Cause	Remedy
– The user code entered is not the same length as the master code	– Switch off the truck, see page 108. – Repeat the entry, making sure that the master code is the same length as the user code.
– New user code is already occupied by a master code	– Switch off the truck, see page 108. – Choose a different user code, see page 111.
– The newly entered user codes do not match	– Switch off the truck, see page 108. – Add the user code again, see page 111.
– Code log full.	– Switch off the truck, see page 108. – Delete individual user codes, see page 115. – Delete all user codes, see page 117.

7.3.6 Change operator code

Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the valid master code the LED (68) flashes green.

- Enter the parameters 0-0-2 with the digit keys.
- Confirm with the SET key (67).

The LEDs (64,68) flash green.

- Enter the user code to be changed with the digit keys.
- Confirm with the SET key (67).
The LEDs (65,68) flash green.

- Enter the new user code with the digit keys.

→ The length (4-6 digit) of the new user code must be the same as that of the previously entered master code. The new user code must also be different from the existing master code.

- Confirm with the SET key (67).

The LEDs (66,68) flash green.

- Enter the new user code again with the digit keys.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. The setting is saved.

- Press the O key (69).
The truck is switched off and the LED (68) is lit red.

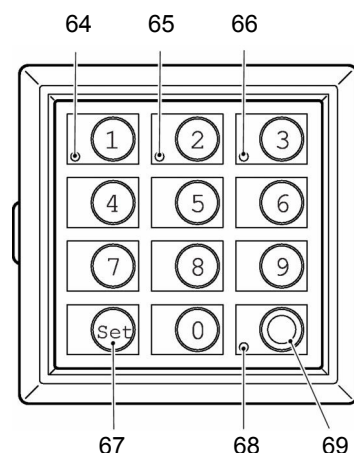
- Check the new user code:

- Switch on the truck with the new user code, see page 108

After entering the valid user code the LED (68) lights up green, the travel program setting is shown by the illumination of the corresponding LEDs (64,65,66) and the truck is switched on.

- Press the O key (69).

The truck is switched off and the LED (68) is lit red.



Error displays changing a user code

For the following events the LED (68) flashes red:

Cause	Remedy
– The user code entered is not the same length as the master code	– Switch off the truck, see page 108. – Repeat the entry, making sure that the master code is the same length as the user code.
– Operator code to be changed does not exist.	– Switch off the truck, see page 108. – Check the user code entered.
– The user codes to be changed do not match	– Switch off the truck, see page 108. – Change the user code again, see page 113.
– Tried to change the operator code to another user code that already exists.	– Switch off the truck, see page 108. – Choose a different user code, see page 113.

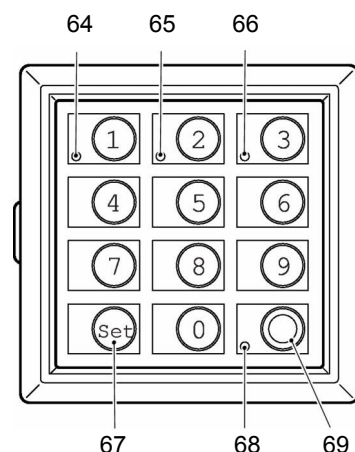
7.3.7 Delete individual user codes

Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the valid master code the LED (68) flashes green.
- Enter the parameters 0-0-3 with the digit keys.
The LEDs (65,68) flash green.
- Confirm with the SET key (67).
The LEDs (66,68) flash green.
- Enter the user code to be deleted with the digit keys.
- Confirm with the SET key (67).
The LEDs (66,68) flash green.
- Enter the user code to be deleted again with the digit keys.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. The user code is now deleted.
- Press the O key (69).
The truck is switched off and the LED (68) is lit red.
- Check that the user code has been deleted:
 - Switch the truck on with the user code to be deleted, see page 108
After entering the user code the LED (68) flashes red and the truck remains switched off.
- Press the O key (69).
The truck remains switched off and the LED (68) is lit red.



Error displays deleting individual user codes

For the following events the LED (68) flashes red:

Cause	Remedy
– The user code entered is not the same length as the master code	– Switch off the truck, see page 108. – Repeat the entry, making sure that the master code is the same length as the user code.
– Tried to delete an operator code that does not exist.	– Switch off the truck, see page 108. – Check the user code entered.
– The user codes to be changed do not match	– Switch off the truck, see page 108. – Delete the user code again, see page 115.

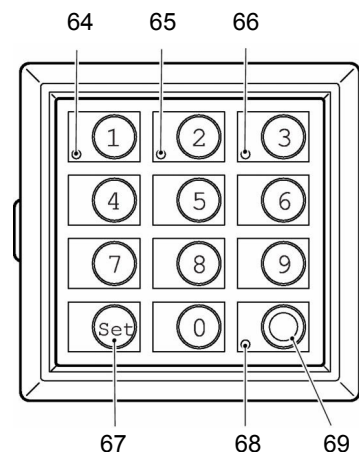
7.3.8 Delete all user codes,

Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the valid master code the LED (68) flashes green.
- Enter the parameters 0-0-4 with the digit keys.
- Confirm with the SET key (67).
The LEDs (66,68) flash green.
- Enter the code 3-2-6-5 with the digit keys.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. All user codes are deleted.
- Press the O key (69).
The truck is switched off and the LED (68) is lit red.
- Check that the user codes have been deleted:
 - Switch on the truck with a previous user code, see page 108.
After entering the user code the LED (68) flashes red and the truck remains switched off.
 - Press the O key (69).
The truck remains switched off and the LED (68) is lit red.



7.3.9 Choose length of the new master code (4-6 digit) and add user codes

- The master code is factory set to a four-digit entry: If necessary, the four-digit master code can be changed to a five or six-digit entry. Before the master code length can be changed, all user codes must be deleted. The length of the user code (4-6 digit) is always determined by the length of the master code.

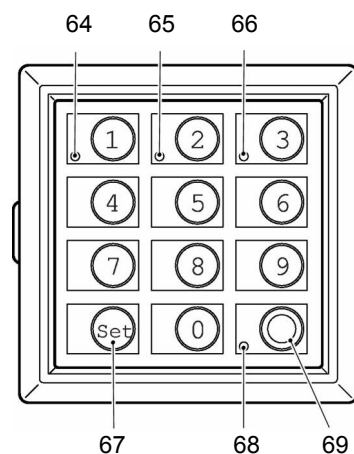
Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Delete all user codes, see page 117.
- Enter the new master code (4-6 digit), see page 109.
- Add user codes again, see page 111.

The length of the new master code is now changed and user codes have been added.



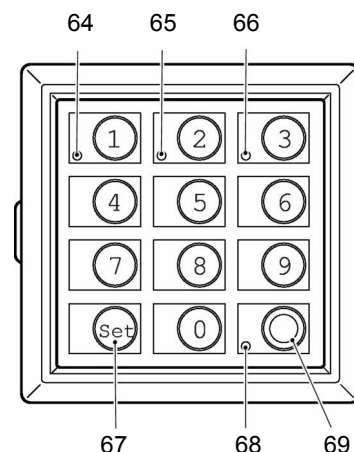
7.3.10 Setting the automatic truck cutout (timeframe)

Requirements

- To prepare the truck for operation, see page 108.

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the correct master code the LED (68) flashes green.
- Enter the 0-1-0 parameter with the digit keys.
Wait until the LED (68) flashes green.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green.
- Set the truck automatic cutout (time period) with the digit keys:
 - 00:
Automatic truck cutout is deactivated.
 - 01 - 30:
Set time period (in minutes) after which the truck automatically cuts out (minimum cutout time is 1 minute, maximum cutout time is 30 minutes).
 - 31:
After 10 seconds the truck cuts out automatically.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. The setting is saved.
- Press the O key (69).
The truck is switched off and the LED (68) lights up red.
- Checking the truck's automatic cutout:
 - Switch on the truck with a valid operator code, see page 108.
When you have entered a valid operator code the LED (68) lights up green, the travel program selected is indicated by the corresponding LEDs (64,65,66) and the truck is switched on.
 - Do not perform any travel, steering or hydraulic operations with the truck.
 - Wait until the truck automatically cuts out at the end of the time period.
The truck is switched off and the LED (68) lights up red.



Error displays setting the automatic cutout period of the truck

For the following events the LED (68) flashes red:

Cause	Remedy
– Cutout time entered is out of range	– Switch off the truck, see page 108. – Enter the time again while making sure it is within range.

7.3.11 Assigning the travel program

The travel programs are fixed to the user code and can be released or blocked with a configuration code. The configuration code can also be used to assign a starting travel program to each user code.



The starting travel program is the travel program that is activated when the truck is switched on and is displayed by the (64,65,66) LEDs.

LED (64) lit = travel program 1 activated

LED (65) lit = travel program 2 activated

LED (66) lit = travel program 3 activated

The configuration code is four-digit and is comprised as follows:

- 1st digit: Specifies the authorisation for travel program 1:
- 2nd digit: Specifies the authorisation for travel program 2:
- 3rd digit: Specifies the authorisation for travel program 3:
- 4. digit: Specifying the starting travel program

When you add or change a user code all travel programs are enabled, the starting travel program is travel program 2.

Specifying a configuration code:

	Setting	Description
1st digit	0	– Travel program 1 is blocked for the user code selected
	1	– Travel program 1 is enabled for the user code selected
2nd digit	0	– Travel program 2 is blocked for the user code selected
	1	– Travel program 2 is enabled for the user code selected
3rd digit	0	– Travel program 3 is blocked for the user code selected
	1	– Travel program 3 is enabled for the user code selected
4th digit	0	– When the truck has been switched on with the selected user code, no travel program is activated
	1	– When the truck has been switched on with the selected user code, travel program 1 is activated
	2	– When the truck has been switched on with the selected user code, travel program 2 is activated
	3	– When the truck has been switched on with the selected user code, travel program 3 is activated



The default setting for the travel program configuration code is:
1-1-1-2.

Meaning:

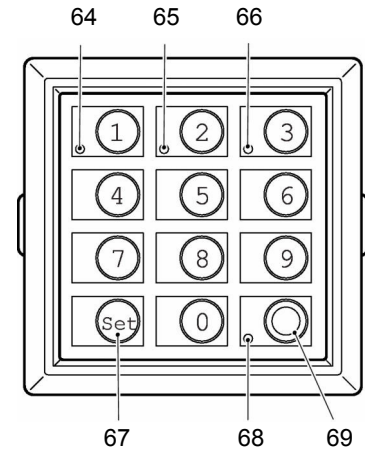
Travel programs 1, 2 and 3 are enabled.

When the truck has been switched on with the selected user code, travel program 2 is activated

Adapting the travel program configuration to the user code

Procedure

- Press the O key (69).
- Enter the valid master code with the digit keys.
When you enter the valid master code the green LED (68) flashes green.
- Enter the parameters 0-2-4 with the digit keys.
- Confirm with the SET key (67).
The LEDs (64,68) flash green.
- Enter the valid user code with the digit keys.
- Confirm with the SET key (67).
The LEDs (65,68) flash green.
- Enter the configuration code (4 digit) for the travel programs.
- Confirm with the SET key (67).
The LEDs (66,68) flash green.
- Enter the configuration code (4 digit) for the travel programs again using the digit keys.
- Confirm with the SET key (67).
Wait until the LED (68) flashes green. The travel programs are now assigned to the user code.
- Press the O key (69).
The truck is switched off and the LED (68) is lit red.
- Checking the travel program configuration to the user code:
 - Switch on the truck with the configured user code, see page 108
After entering the valid user code the LED (68) lights up green, the travel program setting is shown by the illumination of the corresponding LEDs (64,65,66) and the truck is switched on.
 - Press the O key (69).
The truck is switched off and the LED (68) is lit red.
- If necessary, repeat the procedure for other user codes.



Error displays configuring the travel programs

For the following events the LED (68) flashes red:

Cause	Remedy
– Blocked travel program defined as start travel program	– Switch off the truck, see page 108. – Try again, making sure the configuration code is entered correctly.

7.4 Setting the truck parameters with CanCode

⚠ CAUTION!

Incorrect input

Without CanDis, only CanCode internal parameters can be changed. Traction controller parameters can be changed only with CanDis; without CanDis, the settings must be configured by the manufacturer's service department.

⚠ CAUTION!

Altering settings for the travel and hydraulic functions can result in accidents

Increasing the settings for travel and hydraulic functions can result in accidents.

- ▶ Carry out a test run in a secure environment.
- ▶ This requires greater attention on the part of the operator.

Parameter-setting example

The following example shows the parameter setting for the acceleration of travel program 1 (parameter 0256).

Acceleration example

Procedure

- Enter four-digit parameter number "0256" and confirm with the Set key (67).
- Enter subindex (enter "2") and confirm with the Set key (67).
- The parameter and sub index are displayed alternately with the current reading (0256-2<->0000-3).
- Enter the parameter according to the parameter list and confirm with the Set key (67).
- The LED (68) of the O key (69) switches briefly to continuous light and starts flashing again after 2 seconds.
- If the entry is incorrect, the LED (68) of the O key (69) flashes in red. Enter the parameter number again to repeat the setting.
- The parameter and sub index are displayed alternately with the current reading (0256-2<->0000-5).

The travel parameter is now set.

Repeat the procedure to enter further parameters as soon as the LED (68) of the O key (69) flashes.

- Travel is disabled while the parameters are being entered.

Checking the setting in programming mode

Procedure

- Select the travel program to be worked on after entering the parameter value, and confirm with the Set key (67).

The truck is now in travel mode and can be checked.

- To continue setting, reconfirm with the Set key (67).

Saving travel parameters

Requirements

- Enter all parameters.

Procedure

- Run "SaveParameters" by pressing 1-2-3-Set.
- Confirm with the O key (69).

7.5 Parameters

Travel program 1

No.	Function	Setting range	Standard setting	Comments
0256	Acceleration	0 - 9 (0.2 - 2.0 m/s ²)	2 (0.6 m/s ²)	
0260	Coasting brake	0 - 9 (0.2 - 1.1 m/s ²)	6 (0.8 m/s ²)	
0264	Maximum speed in drive direction using travel switch	0 - 9 (0.5 - 6.0 km/h)	6 (4.8 km/h)	depending on travel switch
0268	Maximum speed in load direction using travel switch	0 - 9 (0.5 - 6.0 km/h)	6 (4.8 km/h)	depending on travel switch

Travel program 2

No.	Function	Setting range	Standard setting	Comments
0272	Acceleration	0 - 9 (0.2 - 2.0 m/s ²)	5 (1.2 m/s ²)	
0276	Coasting brake	0 - 9 (0.2 - 1.1 m/s ²)	6 (0.8 m/s ²)	
0280	Maximum speed in drive direction using travel switch	0 - 9 (0.5 - 6.0 km/h)	9 (6.0 km/h)	depending on travel switch
0284	Maximum speed in load direction using travel switch	0 - 9 (0.5 - 6.0 km/h)	9 (6.0 km/h)	depending on travel switch

Travel program 3

No.	Function	Setting range	Standard setting	Comments
0288	Acceleration	0 - 9 (0.2 - 2.0 m/s ²)	9 (2.0 m/s ²)	
0292	Coasting brake	0 - 9 (0.2 - 1.1 m/s ²)	9 (1.1 m/s ²)	
0296	Maximum speed in drive direction using travel switch	0 - 9 (0.5 - 6.0 km/h)	9 (6.0 km/h)	depending on travel switch
0300	Maximum speed in load direction using travel switch	0 - 9 (0.5 - 6.0 km/h)	9 (6.0 km/h)	depending on travel switch

Battery parameters

No.	Function	Range	Standard setting	Comments
1377	Battery type	0 - 9	1	0 = Normal (wet) 1 = High performance (wet) 2 = Dry (maintenance-free) 9 = XFC (Special battery)
1389	Discharge monitor function	0 /1	1	0 = Not active 1 = Active

7.6 Setting the Battery Parameters with CanCode

⚠ WARNING!

Altering parameters can cause accidents

- ▶ Altering the settings can cause accidents.
- ▶ This requires greater attention on the part of the operator

The following example shows the parameter setting for the battery type (parameter 1377) to "dry - maintenance-free".

Requirements

- CanCode and CanDis are available.

Procedure

- Press the O key (69).
- Enter the master code.
- Enter the four-digit parameter number "1377" and confirm with the Set key.
- Enter sub index "2" and confirm with the Set key.

The parameter with subindex are displayed alternately with the current reading. E.g. (1377-2<->0000-1--corresponds to battery type „high-performance (wet)".

- Enter parameter "2" according to the parameter list and confirm with the Set key.

The LED of the O key switches briefly to continuous light and starts flashing again after approx. 2 seconds.

If the entry is incorrect, the LED of the O key turns red. Enter the parameter number again to repeat the setting.

The parameter and subindex are displayed alternately with the current reading (1377-2<->0000-2).

The "dry maintenance-free" battery type is set.



Travel is disabled while the parameters are being entered.

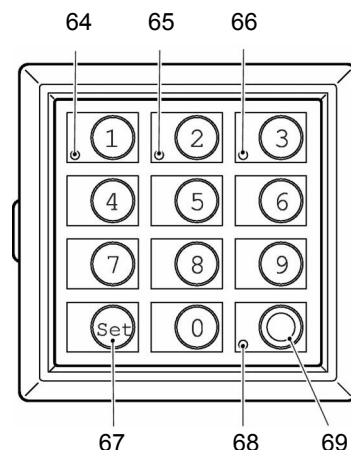
Storing the parameter

Requirements

- The parameter is now entered.

Procedure

- Run "SaveParameters" by pressing 1-2-3-Set.
- Press the O key.



The parameter is now saved.

Testing an altered parameter

Requirements

- The parameter is now saved.

Procedure

- Press the O key (69).
- Enter the master code.
- Enter the four-digit parameter number "1377" and confirm with the Set key.
- Enter sub index "2" and confirm with the Set key.

The parameter with subindex are displayed alternately with the current reading.

E.g. (1377-2<->0000-2--corresponds to the "dry - maintenance-free" battery type.

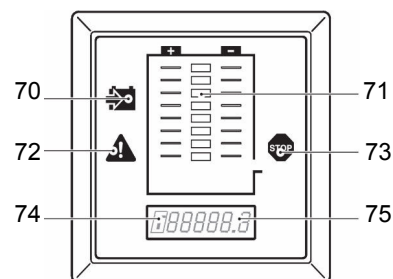
- Press the O key.

The parameter has now been checked.

7.7 CanDis Display Instrument (○)

The instrument indicates:

70	Battery charge display (on board charger only)
71	LED bars for battery charge status
72	"Warning" symbol (yellow), Battery charge recommended
73	"Stop" symbol (red); lift cut-off, Battery charge essential
74	No symbol when battery type set to normal or enhanced performance wet cell battery "T" symbol appears permanently during operation when battery type set to maintenance-free "T" symbol flashes during operation when battery type set to special, such as XFC
75	6 digit LCD: – Service hours – Parameter entry and changes – Event messages



Charge status display

The charge status is shown through eight LED bars.

Eight lit LED bars correspond to a fully charged battery. One lit LED bar corresponds to an almost discharged battery.

When the "Attention" symbol (72) starts to flash, it is advisable to charge the battery.

If the "Attention" symbol (72) is lit steadily, the battery must be charged.

If the "Stop" symbol (73) is lit steadily, the battery must be **charged** immediately. If activated, the discharge monitor function is applied in this case, see page 132.

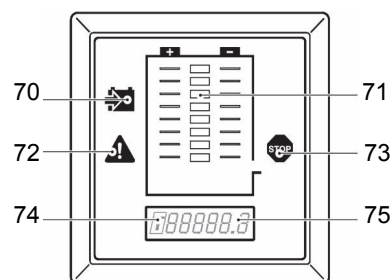


The point at which the "Attention" (72) and "Stop" (73) symbols start to light up differs depending on the battery type.

7.7.1 Discharge monitor function

The discharge limit has been reached when the "Stop" symbol (73) lights up. When the discharge monitor function is activated lifting operations are disabled. Travel and lowering are still possible.

Lifting is only enabled again when the battery is 70% charged.



7.7.2 Service hour display

The service hour display range is between 0.0 and 99,999.0 hours. The display (75) has background lighting.

- For maintenance-free batteries a "T" (74) symbol is shown in the display.
- For special batteries the "T" (74) symbol flashes in the service hour display.

7.7.3 Event Messages

The service hours display is also used to display event messages. The event messages overwrite the service hour display. Event message start with an "E" for Event and a four-digit error number.

The event message is displayed as long as the fault persists. If there are several event messages they are displayed consecutively. Most event messages result in the Emergency Stop being activated.

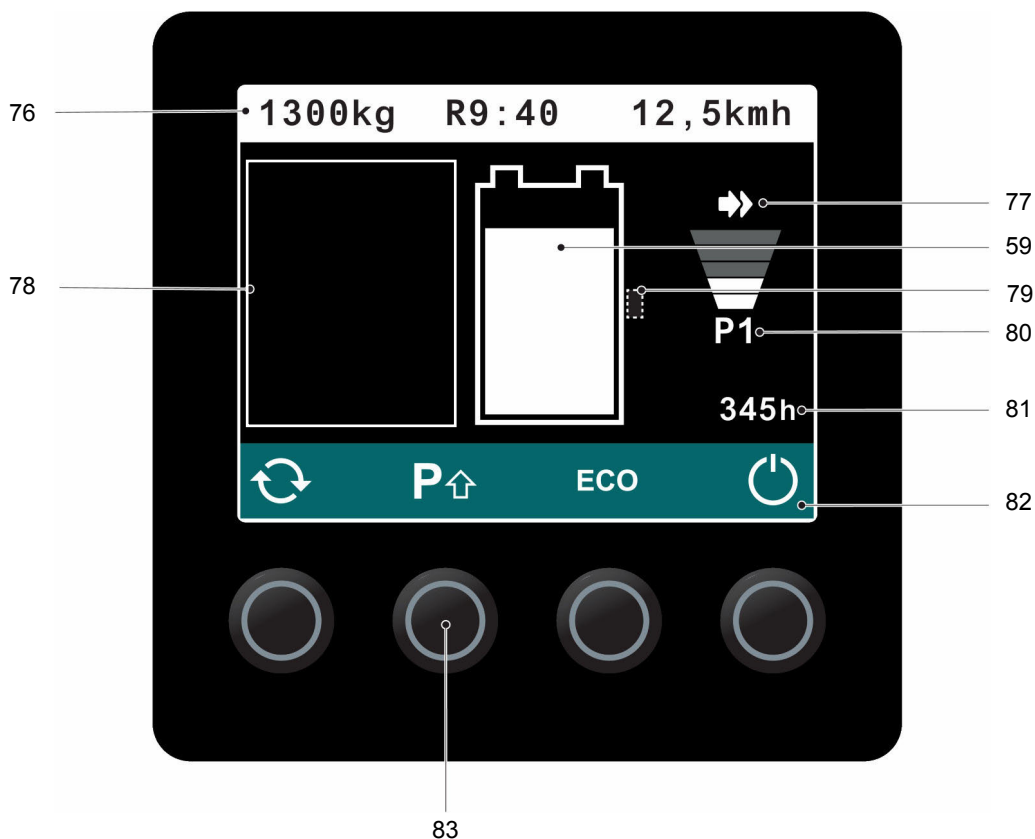
- Remedies, see page 97.

7.7.4 Power up test

Once the truck has become operational the following displays appear:

- Display unit software version is flashed briefly
- Service hours
- Battery charge status

7.8 Display unit (2 inch display)



Item	Control or display element	Function
59	Battery capacity display	Battery discharge status
76	Information line	Displays event messages and optional information such as speed or remaining time.
77	Power display	Shows the available power in the travel program selected.
78	Symbol field	Displays the symbols, see page 136.
79	Battery type (characteristics)	Displays the set battery type or set battery characteristic curve ¹ 1 = Maintenance-free gel/dry-cell battery 2 = Special battery, for example XFC
80	Travel program	Shows the travel program selected.
81	Service hours	Shows the truck service hours, see page 20.
82	Button allocation	see page 135
83	Buttons	Selection buttons for the functions shown above them.

¹⁾ If the setting is for normal or high-performance wet-cell batteries or batteries for special options, no battery type is shown.

7.8.1 Information field

Any event messages are shown in the left section of the information line (76).

The right section of the information line shows the truck speed in km/h or mph.

- ➔ The manufacturer's customer service department can change the information line from kg and km/h units to lbs and mph units and vice versa.

7.8.2 Button allocation of the display

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

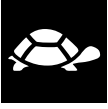
Key allocation in main menu

Symbol	Meaning
	Menu change: Changes to the next operator menu
	Travel program up (●): Changes the travel program in rider mode
	(No symbol) (○): Uses the pre-set travel program in rider mode The default setting can be changed by the manufacturer's customer service department.
	Shut-down (○): Allows the truck to be switched off Switch off is only available on the display if the truck is switched on with an access code.

7.8.3 Symbols in the display

Any number of pictograms can be displayed in the pictogram field (78). Which pictograms are shown in the pictogram field depends on the operating and truck status.

Symbol	Meaning	Colour	Function
	Operator platform Deadman switch	Yellow	Operator platform not occupied when travel switch actuated (trucks without pedestrian mode optional equipment only)
	Stop notice	red	Truck malfunction detected. – Lifting, lowering and travel functions deactivated.
	Warning	yellow	Operating error
		red	Truck malfunction detected – Lifting, lowering and/or travel functions reduced
	Battery indicator, low residual capacity	Yellow	Battery capacity $\leq 30\%$ for wet-cell batteries and lithium-ion batteries, battery capacity $\leq 50\%$ for maintenance-free batteries – Charge the battery soon.
		Red	Battery capacity $\leq 20\%$ for wet-cell batteries and lithium-ion batteries, battery capacity $\leq 40\%$ for maintenance-free batteries – Charge the battery immediately.
	Charging	Green	Battery charge display (on-board battery charger only): – Flashing: Charging in progress – Steady light: Charging complete
		Red	Charging interrupted
	Overtemperature	yellow	Overtemperature detected – Lifting, lowering and travel functions reduced
		Red	Overtemperature detected – Lifting, lowering and travel functions deactivated

Symbol	Meaning	Colour	Function
	Lithium-ion battery low temperature (○)	Yellow	Lithium-ion battery low temperature detected – Discharge currents and energy recovery are reduced at low temperatures.
			Lithium-ion battery below permissible temperature range – The truck switches off via the battery contactor. – The display unit switches off.
	Side arm	Yellow	Illuminates if both side arms are not folded in or both are not folded out.
	Lift deactivated	Yellow	Illuminates if the lifting functions are shut off due to insufficient battery capacity.
	Tiller position	Yellow	Lights up on power-up with tiller in travel zone. Illuminates with travel switch operated and tiller in braking zone.
	Support arm lift lifting limit	Yellow	Illuminates if the "lift support arms" button is pressed when the lifting limit of the support arm lift has been reached.
	Support arm lift lowering limit	Yellow	Illuminates if the "lower support arms" button is pressed when the lowering limit of the support arm lift has been reached.
	Slow travel	Green	Symbol illuminates when the "slow travel" button is pressed (travel speed reduction).

7.9 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!

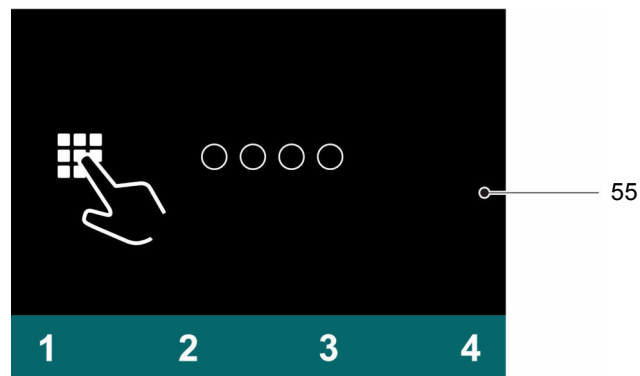
- Default code: 1-2-3-4
- Factory set-up code: 2-4-1-2



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

7.10 Using the Display:

7.10.1 Switch on the truck with the access code.



Procedure

- Release the emergency disconnect switch, see page 75.
- Enter the access code with the buttons below the display (55).

The truck is switched on.

7.10.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (84) in the display unit.
- Press the Emergency Disconnect switch, see page 75.

The truck is switched off.



84

7.10.3 Changing the Set-up Code

Requirements

- The truck is switched on, see page 139.

Procedure

- Press the key below the "Settings" symbol (85).
- Press the key below the "Change set-up code" symbol (86).
- Enter the set-up code using the keys below the display unit (55).

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

- Press the key below the "Delete" symbol (87).

The set-up code is deleted.

- Enter the new set-up code using the keys below the display unit (55).

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

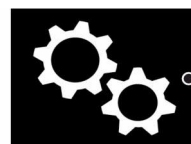
- Press the key below the "Confirm" symbol (88).

The new set-up code is displayed.

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

To return to the main menu, press the key below the "Back" symbol (89).

The set-up code has been changed.



85



86



55



87



88



89



7.10.4 Adding a new access code

Requirements

- The truck is switched on, see page 139.

Procedure

- Press the key below the "Settings" symbol (85).
- Press the key below the "Edit access code" symbol (90).

The set-up code is requested.

- Enter the set-up code using the keys below the display unit (55).

All the access codes are displayed.

- Press the key below the "Add" symbol (91).
- Enter the new access code using the keys below the display unit (55).

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

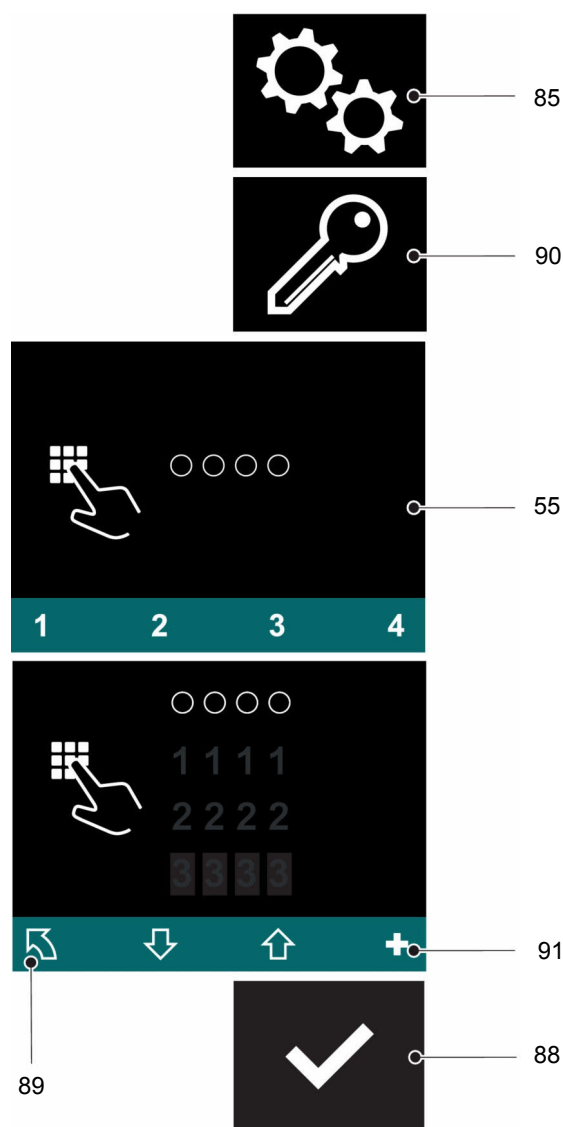
- Press the key below the "Confirm" symbol (88).

The new access code is displayed.

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

To return to the main menu, press the key below the "Back" symbol (89).

A new access code has been added.



7.10.5 Deleting an access code

Requirements

- The truck is switched on, see page 139.

Procedure

- Press the key below the "Settings" symbol (85).
- Press the key below the "Edit access code" symbol (90).

The set-up code is requested.

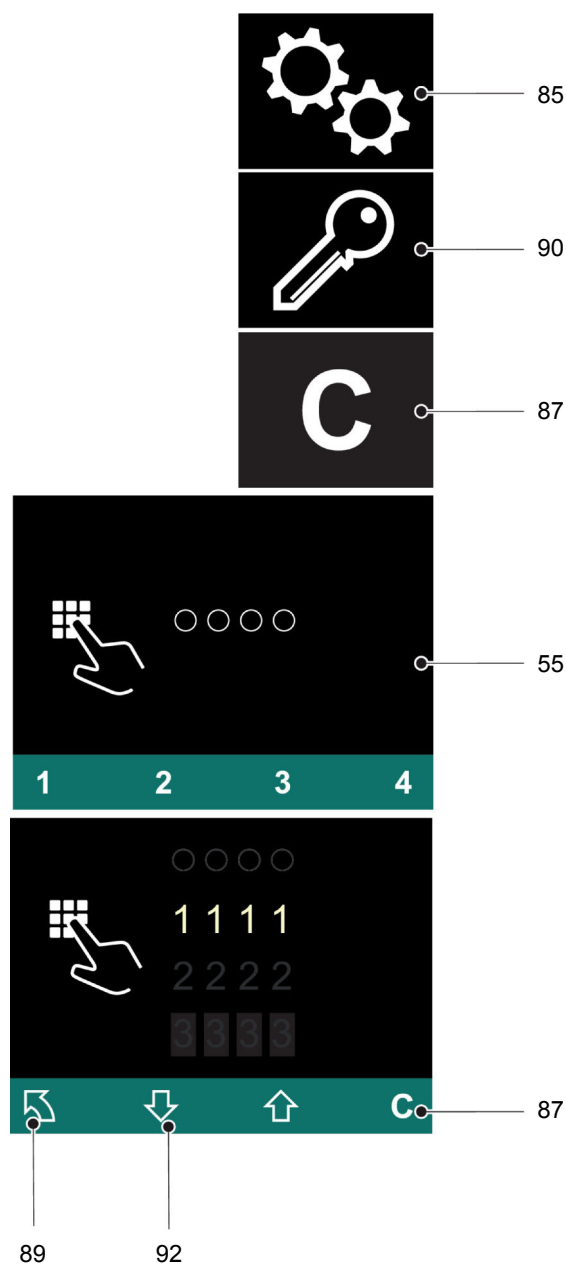
- Enter the set-up code using the keys below the display unit (55).

All the access codes are displayed.

- Select the access code to be deleted using the key below the "Down selection" symbol (92).
- Press the key below the "Delete" symbol (87).

The access code has been deleted.

- To return to the main menu, press the key below the "Back" symbol (89).



7.10.6 Displaying the Log-in Process

The use of the last different access codes is displayed during the log-in process. The last log-in is displayed first.

- If multiple access codes are logged as being displayable simultaneously, the display area can be moved by scrolling forward or back.

Requirements

- The truck is switched on, see page 139.

Procedure

- Press the key below the "Settings" symbol (85).
- Press the key below the "Log-in process" symbol (93).
- Enter the set-up code using the keys below the display unit (55).

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

- To scroll forward, press the button under the "Down selection" symbol (92) as many times as necessary.

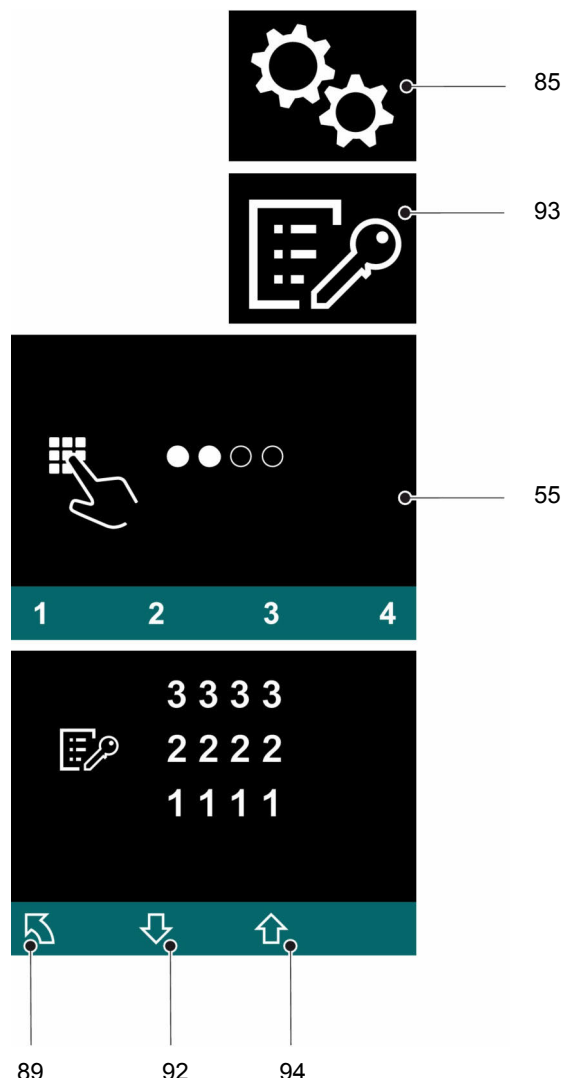
The display area moves: Additional earlier log-ins are displayed.

- To scroll back, press the button under the "Up selection" symbol (94) 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 (89).

The log-in process is displayed.



7.11 ISM access module (○)

- *If the truck is equipped with an ISM access module or Can Code refer to the "ISM Access Module" or "CanCode" operator manuals.

F Industrial Truck Maintenance

1 Operational Safety and Environmental Protection

The inspections and maintenance tasks listed in chapter "Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement" must be performed according to the defined service intervals (see page 171).

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 171).

WARNING!

Risk of accidents and component damage

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

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

- Ensure that the changes to be made are planned, tested and performed by an engineer specialising in industrial trucks taking safety into account.
- Keep permanent records of plans, 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 type of changes made, the date of the changes and the name and address of the organisation responsible for the work.

NOTICE

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



On completion of inspection and service work, carry out the operations listed in the "Recommissioning the truck after cleaning or maintenance work" section (see page 166).

2 Maintenance Safety Regulations

Maintenance and repair personnel

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

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

Customer Services

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

Operating company

The maintenance personnel 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 154.

CAUTION!

Fire hazard

Do not use flammable liquids to clean the industrial truck.

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

2.1 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 71).
 - ▶ Remove the battery, see page 44.
 - ▶ Remove any rings, metal wristbands etc.
-

2.2 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.
-

2.3 Wheels

WARNING!

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

The quality of wheels affects the stability and driving characteristics of the truck.

Uneven wear affects the truck's stability and increases the stopping distance.

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



When replacing wheels fitted at the factory, only use the manufacturer's original spare parts. Otherwise the manufacturer's specification will not be adhered to.

2.4 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

Testing and replacing hydraulic hoses

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

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

→ The auxiliary hydraulics of the EJE 220r / 225r is a closed system. The auxiliary hydraulics must only be replaced or topped up by the manufacturer's customer service department who are specially trained for this task.

→ Mini measurement connections on the truck should only be used by the manufacturer's trained customer service department.

3 Lubricants and Lubrication Schedule

3.1 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 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.
-

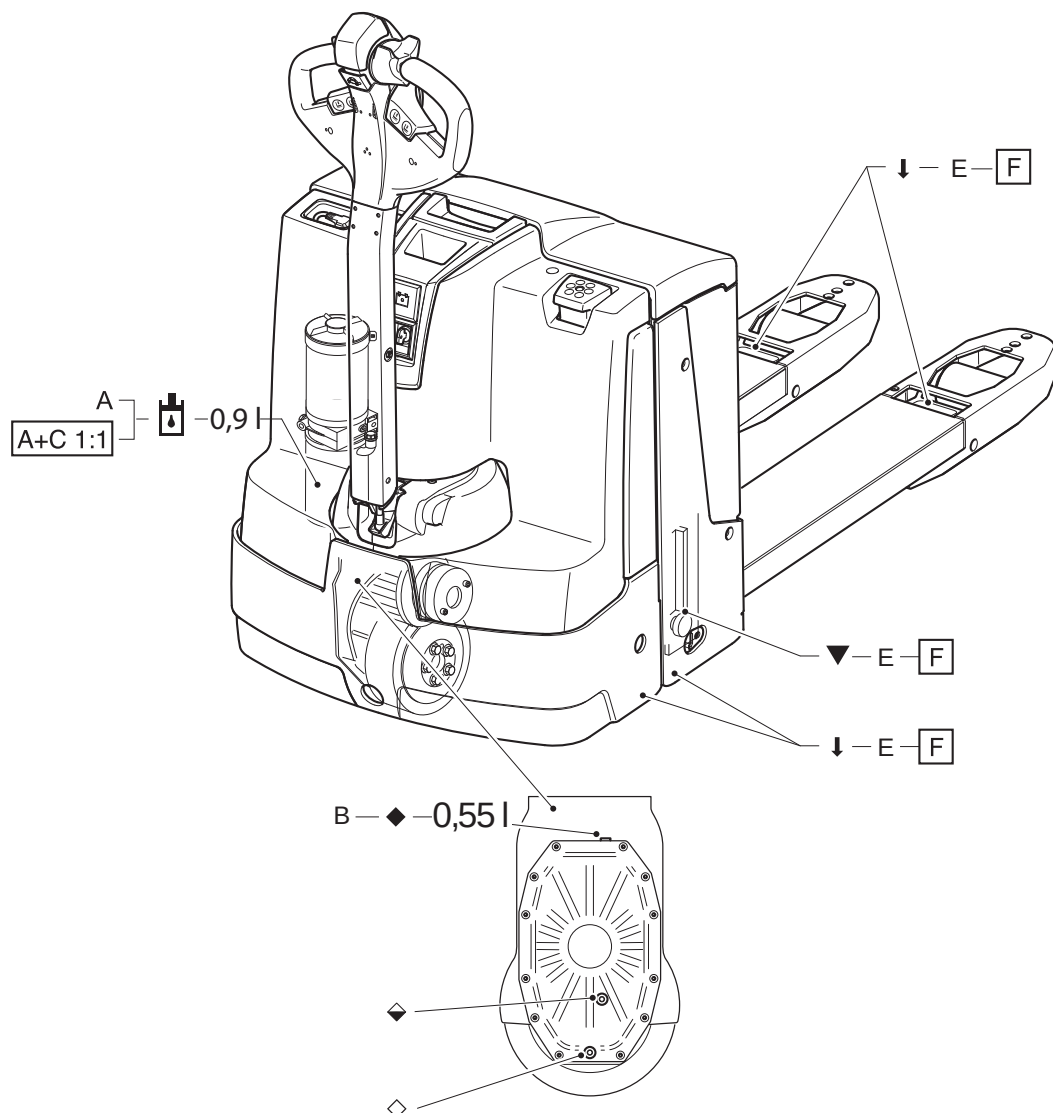
CAUTION!

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.
-

3.2 Lubrication Schedule



▼	Running surfaces	☐	Cold-store application Mixing ratio 1:1
↓	Grease nipple	◇	Transmission-oil drain plug
◆	Transmission-oil filler neck	◆	Gear-oil overflow and dipstick
	Hydraulic-oil filler plug		

3.3 Consumables

Cod e	Order no.	Quantity	Description	Used for
A	5044 9669	5.0 l	H-LP 46, DIN 51524	Hydraulic system
	5113 2827 *	5.0 l	Jungheinrich hydraulic oil	
B	5038 0904	5.0 l	Fuchs Titan Gear HSY 75W-90	Transmission
C	5103 7497 *	5.0 l	H-LP 22, DIN 51524 Cold-store hydraulic oil	Hydraulic system Additive for use in cold stores
E	2920 1430	1.0 kg	Grease, DIN 51825	Lubrication
F	5043 0702	1.0 kg	Grease, DIN 51818	Lubrication Low temperature

*The trucks are factory-equipped with a special hydraulic oil (the Jungheinrich hydraulic oil with a blue colouration) and the cold store hydraulic oil (red colouration). The Jungheinrich hydraulic oil can only be obtained 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 operations the Jungheinrich hydraulic oil and the cold store hydraulic oil 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
F	--	--	310 - 340	1	-52/+100

4 Maintenance and repairs

4.1 Preparing the truck for maintenance and repairs

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

Procedure

- Park the truck securely, see page 71.
- Disconnect the battery to prevent the truck from being switched on accidentally.

⚠ WARNING!

Risk of accidents when working under the load handler and lift truck

- ▶ When working under a raised load handler or a raised truck, secure them to prevent the truck from lowering, tipping or sliding away.
 - ▶ When raising the truck, follow the instructions, see page 35. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with wedges).
-

4.2 Lifting and jacking up the truck safely

⚠ WARNING!

A truck tipover can cause accidents

In order to raise the truck, use only suitable lifting gear at the points specially provided for this purpose.

- ▶ Note the weight of the truck on the data plate.
 - ▶ Always use a jack with sufficient capacity.
 - ▶ Raise the unladen truck on a level surface.
 - ▶ When raising the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).
-

Raising and jacking up the truck securely

Requirements

- Prepare the truck for maintenance and repairs (see page 154).

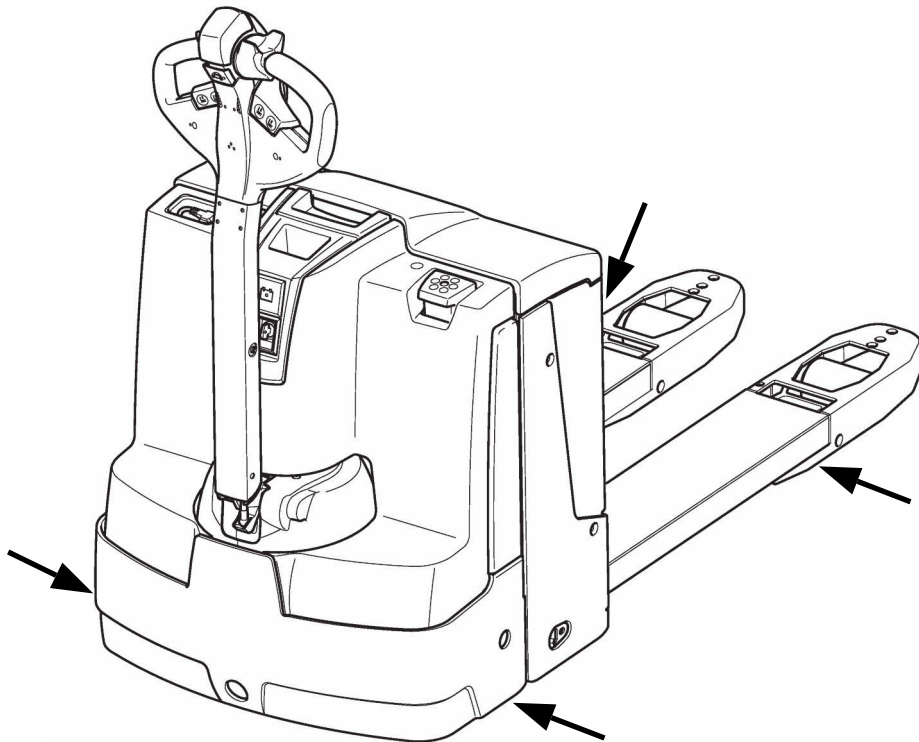
Tools and Material Required

- Jack
- 4 hard wooden blocks

Procedure

- Apply the jacks in turn:
 - On the right-hand side of the drive chassis
 - On the right-hand side of the load handler
 - On the left-hand side of the drive chassis
 - On the left-hand side of the load handler
- Raise the truck.
- Support the truck with hard wooden blocks.
- Remove the jack.

The truck is now securely raised and jacked up.



4.3 Cleaning

4.3.1 Cleaning the truck



The truck may only be cleaned in the designated locations, which adhere to the stipulations of the country of use.

⚠ CAUTION!

Fire hazard

Do not use flammable liquids to clean the industrial truck.

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

⚠ CAUTION!

Risk of component damage when cleaning the truck

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

- ▶ Cover all electronic system assemblies (controllers, sensors, motors etc.) before cleaning the truck with a pressure washer.
 - ▶ Do not hold the jet of the pressure washer by the marked points to avoid damaging them (see page 31).
 - ▶ Do not clean the truck with pressurised water.
-

Cleaning the truck

Requirements

- Prepare the truck for maintenance and repairs (see page 154).

Tools and Material Required

- Water-based solvents
- Sponge or cloth

Procedure

- Clean the surface of the truck with water-based solvents and water. Use a sponge or cloth to clean.
- In particular, clean the following areas:
 - Window(s)
 - Oil filler ports 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 166).

The truck is now clean.

4.3.2 Cleaning the electrical system assemblies

CAUTION!

Risk of electrical system damage

Cleaning the assemblies (controllers, sensors, motors etc.) of the electronic system 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 not a conductive, anti-static brush.

Cleaning the electrical system assemblies

Requirements

- Prepare the truck for maintenance and repairs (see page 154).

Tools and Material Required

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

Procedure

- Expose the electrical system, see page 159.
- Clean the electrical system assemblies with weak suction or compressed air (use a compressor with a water trap) and not a conductive, anti-static brush.
- Fit the electrical system panel, see page 159.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" (see page 166).

The electrical system assemblies are now clean.

4.4 Front cover disassembly

Front cover disassembly

Requirements

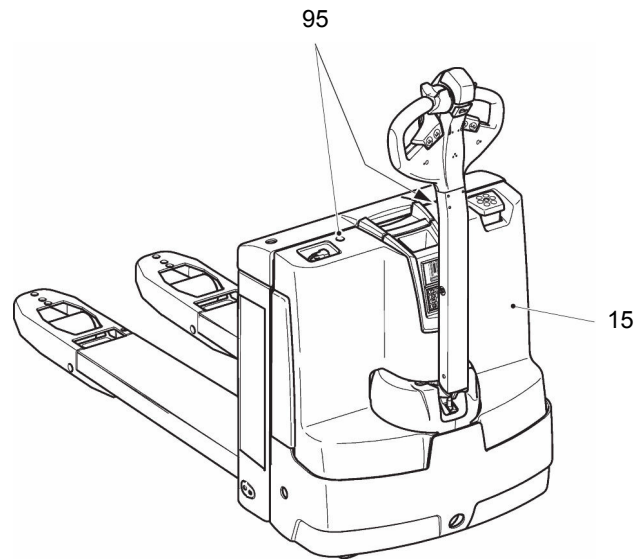
- Prepare the truck for maintenance and repairs, see page 154.

Tools and Material Required

- Allen key size 8

Procedure

- Remove the screws (95) with the Allen key.
- Lift and remove the front panel (15).
- Place the front panel (15) safely to one side.



The front cover has been removed.

Front panel assembly

Tools and Material Required

- Allen key size 8

Procedure

- Insert the front panel (15) carefully and secure it.
- Attach the front cover (15) to the truck with the screws (95). Tighten the screws (95) with the Allen key.

The front panel is now assembled.

4.5 Drive panel disassembly and assembly

The drive panel consists of two halves (63 and 97).

Drive panel disassembly

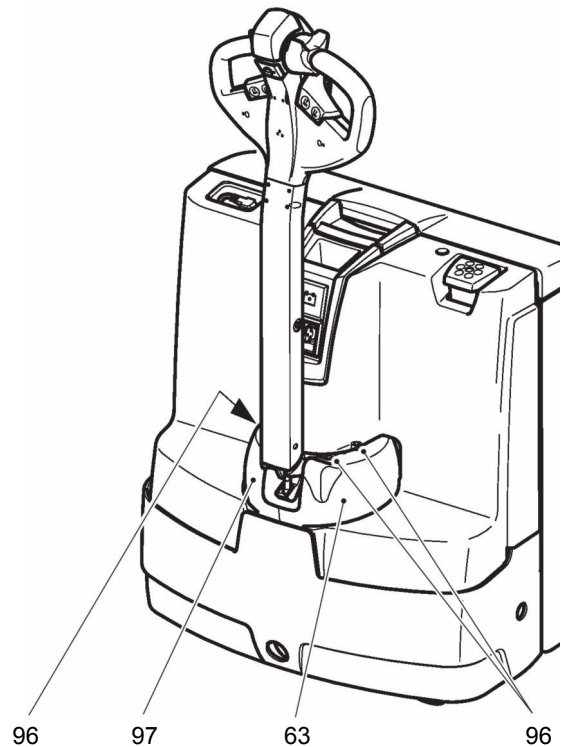
Tools and Material Required

- Allen key

Procedure

- Turn the tiller to the right limit position.
- Remove 2 screws (96).
- Carefully remove the first half (63).
- Turn the tiller to the left limit position.
- Release the second half (97) and carefully remove it.

The drive panel is now disassembled.



Drive panel assembly

Tools and Material Required

- Allen key

Procedure

- Turn the tiller to the right limit position.
- Carefully insert the first half (63).
- Tighten the first half (63) with 2 screws (96).
- Turn the tiller to the left limit position.
- Carefully insert the second half (97).
- Tighten the second half (97) with 2 screws (96).

The drive panel is now assembled.

4.6 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 171.

Tightening the wheel nuts

Requirements

- Prepare the truck for maintenance and repairs, see page 154.

Tools and Material Required

- Torque wrench

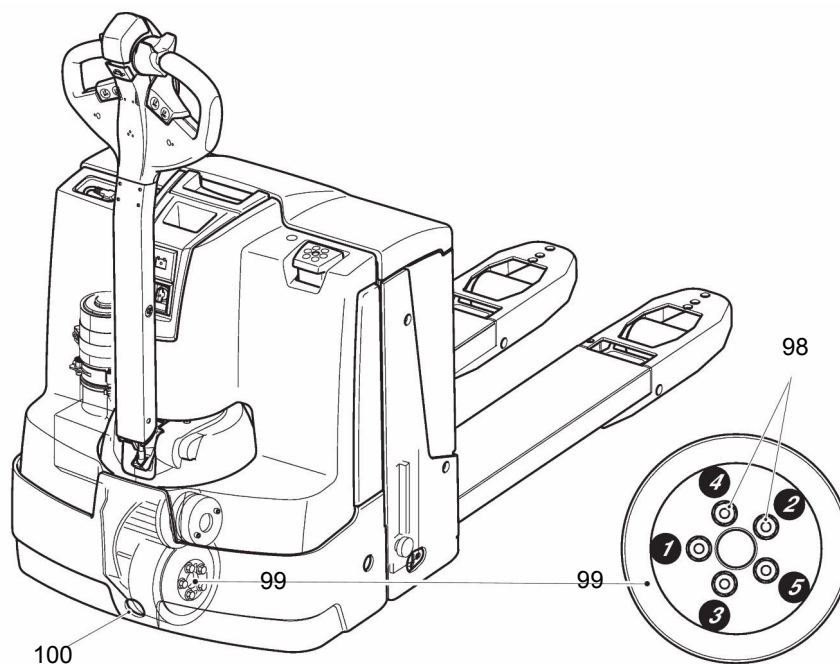
Procedure

- Position the drive wheel (99) so that the wheel nuts (98) can be pulled through the hole (100).
- Tighten all the wheel nuts (98) through the hole (100) in the impact buffer with the socket wrench.

To do this, tighten the wheel nuts in the prescribed order.

- First of all tighten to 10 Nm.
- and then to 150 Nm.

The wheel nuts have now been tightened.



4.7 Checking the hydraulic oil level

Checking the hydraulic oil level and replenishing

Requirements

- Fully lower the load handler.
- Prepare the truck for maintenance and repairs, see page 154.

Procedure

- Remove the front panel, see page 159.
- Check the oil level in the hydraulic reservoir (103).



The hydraulic reservoir (103) has two markings (101). With the load handler completely lowered, the hydraulic oil level in the reservoir should lie between the min. and max. markings (101).

- Add hydraulic oil if necessary:
 - Turn the lid (102) anti-clockwise from the hydraulic reservoir (103).
 - Add hydraulic oil of the correct grade until the oil level lies between the markings (see page 153).
 - Turn the lid (102) clockwise on the hydraulic reservoir (103).
- Install the front panel, see page 159.
- To restore the industrial truck to service after maintenance or repair work, see page 168.

The hydraulic oil level is now checked.



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

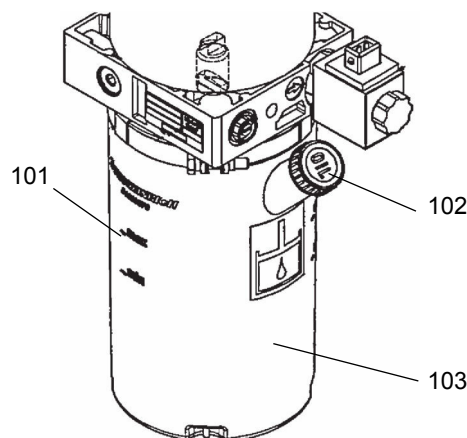
4.7.1 Top up the auxiliary hydraulics on the EJE 220r / 225r



The auxiliary hydraulics of the EJE 220r / 225r is a closed system. The auxiliary hydraulics must only be replaced or topped up by the manufacturer's customer service department who are specially trained for this task.



Mini measurement connections on the truck should only be used by the manufacturer's trained customer service department.



4.8 Check the gear oil level

Check the transmission oil level

Requirements

- Park the truck securely, see page 71.

Tools and Material Required

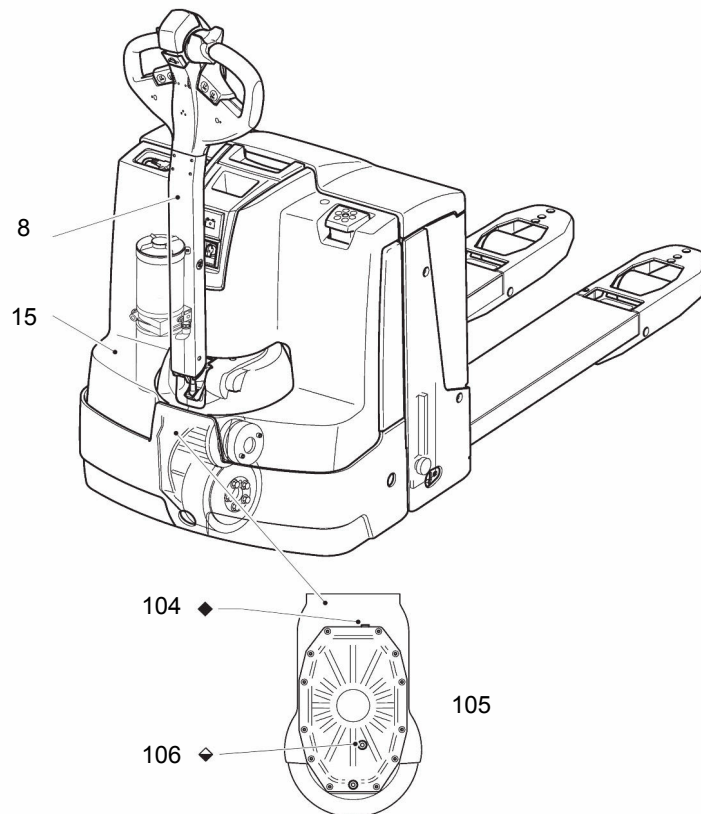
- Oil sump

Procedure

- Place the oil drain tray underneath the transmission (105).
- Remove the front panel (15), see page 159.
- Turn the tiller (8) to the right limit position.
- Check transmission oil level and, if necessary, top up with the correct grade through the filler hole (104).

- ➞ The oil level should reach the lower edge of the oil control screw (106) .

The transmission oil level is now checked.



4.9 Checking electrical fuses

Checking fuses

Requirements

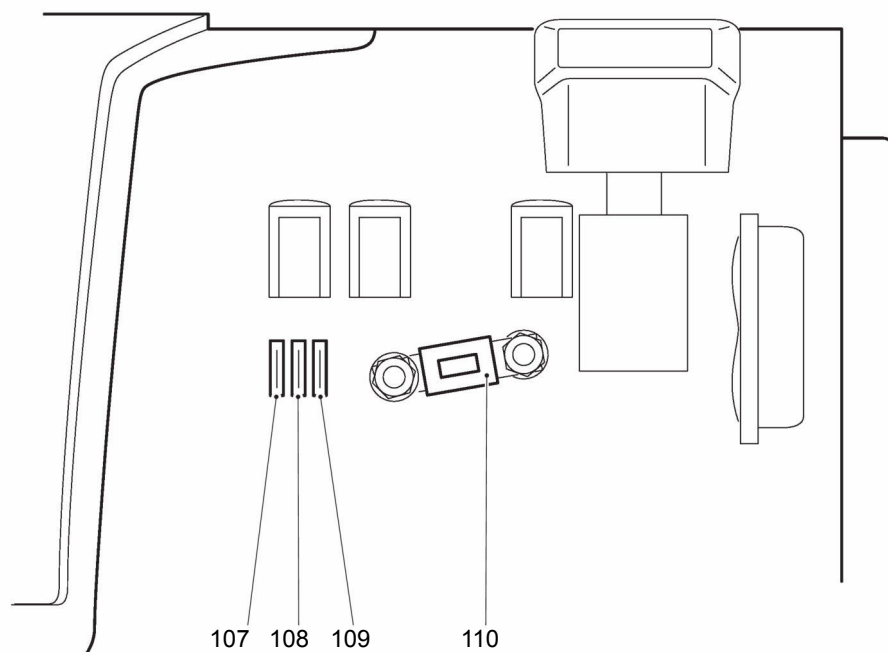
- Truck prepared for maintenance and repairs, see page 154.
- Front panel removed, see page 159.

Procedure

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

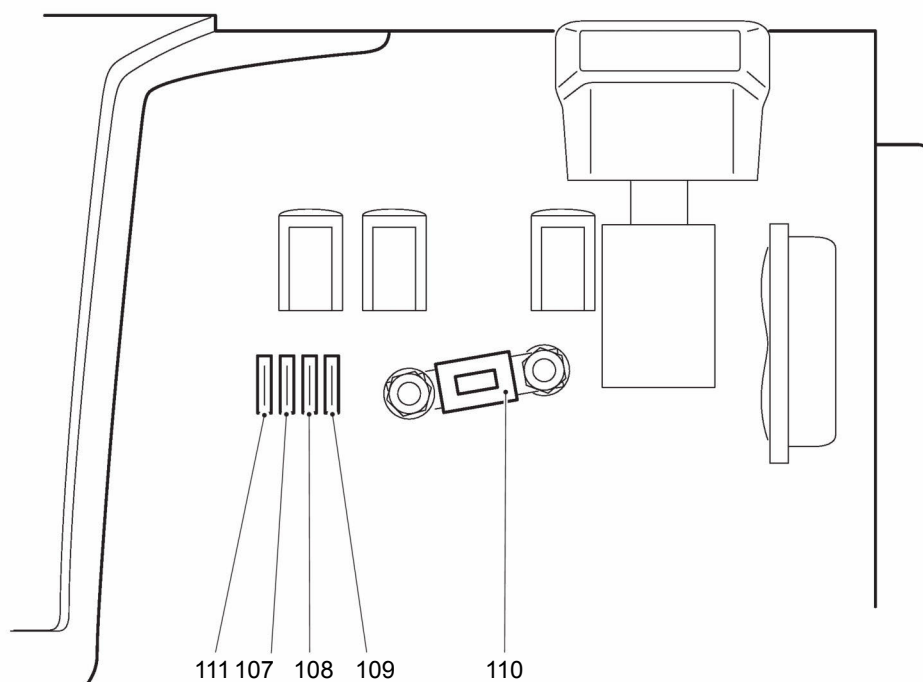
The fuses have been checked.

EJE 220 / 225 / 230 / 235



Item	Description	To protect	Rating
107	F13	Solenoid / magnetic brake control fuse	10 A
108	1F9	Traction / lift electronics control fuse	5 A
109	6F1	Discharge indicator control fuse	2 A
110	F15	Travel / lift fuse	200 A

EJE 220r / 225r



Item	Component	To protect	Rating
107	F13	Solenoid / magnetic brake control fuse	10 A
108	1F9	Travel / lift electronics control fuse	5 A
109	6F1	Discharge indicator control fuse	2 A
110	F15	Travel / lift fuse	200 A
111	9F17	EJE 220r / 225r auxiliary hydraulics fuse	2 A

4.10 Restoring the truck to service after maintenance and repairs

Procedure

- Thoroughly clean the truck, see page 155.
- Lubricate the truck according to the lubrication schedule, see page 152.
- Clean the battery, grease the terminal screws and connect the battery.
- Charge the battery, see page 45.
- Start up the truck, see page 67.

⚠ WARNING!

Faulty brakes can cause accidents

As soon as the truck has been started, test the brakes several times.

- ▶ Report any defects immediately to your supervisor.
- ▶ Tag out and decommission the faulty industrial truck.
- ▶ Only return the truck to service when you have identified and rectified the fault.



If there are switching problems in the electrical system, apply contact spray to the exposed contacts and remove any oxide layers on the contacts of the controls by applying them repeatedly.

5 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 154.

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

5.1 Prior to decommissioning

Procedure

- Thoroughly clean the truck, see page 155.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see page 162.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication schedule, see page 152.
- Charge the battery, see page 45.
- Disconnect the battery, clean it and grease the terminals.

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

5.2 Action to be taken 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 45.

5.3 Restoring the truck to service after decommissioning

Procedure

- Thoroughly clean the truck, see page 155.
- Lubricate the truck according to the lubrication schedule, see page 152.
- Clean the battery, grease the terminal screws and connect the battery.
- Charge the battery, see page 45.
- Start up the truck, see page 67.

⚠ WARNING!

Faulty brakes can cause accidents

As soon as the truck has been started, test the brakes several times.

- ▶ Report any defects immediately to your supervisor.
- ▶ Tag out and decommission the faulty industrial truck.
- ▶ Only return the truck to service when you have identified and rectified the fault.



If there are switching problems in the electrical system, apply contact spray to the exposed contacts and remove any oxide layers on the contacts of the controls by applying them repeatedly.

6 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.

7 Final de-commissioning, disposal

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

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

8 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 EJE 235

Issued on: 2019-04-24 12:00

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 function of the brakes
Hydraulic operations
Correct the hydraulic oil level.
Steering
Test the tiller return function.

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 devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage
Power supply
Battery and battery components for damage
The function and secure seating of the battery connector and for damage
Travel
The function of the collision safety switch and for damage
Wheels for wear and damage
Chassis/structure
Industrial truck for damage and leaks
Labels are legible, complete and plausible
Doors and/or covers for damage
Protective mechanism against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Hydraulic operations
The function of the hydraulic system
The forks or load handler for wear and damage

1.1.2.2 Optional equipment

The following points must be checked:

Standard on-board charger

Battery charger
The mains plug and mains cable for damage

Lead-acid battery, international

Power supply
Battery and battery components for damage
Battery cable connections are secure

Lead-acid battery

Power supply
Battery cable connections are secure

1.2 Customer Service

1.2.1 Maintenance contents

In accordance with the EJE 235 service interval, to be performed every 1000 service hours, but at least once a year.

1.2.1.1 Standard equipment

Brakes
Test the brake with the tiller in the maximum vertical and horizontal positions.
Measure the air gap of the magnetic brake.
Electrical system
Test the contactors and/or relays.
Carry out a chassis insulation-resistance test.
Chassis/structure
Check that the panels and covers as well as mounting brackets are secure. Ensure they function correctly and are safe.
Hydraulic operations
Correct the hydraulic oil level.
Test the pressure relief valve.
Agreed services
Carry out a test run with the rated load or a customer-specific load.
Demonstration after maintenance.
Lubricate truck according to the lubrication diagram.
Steering
Test the tiller return function.

1.2.1.2 Optional equipment

Standard on-board charger

Battery charger
Test the immobiliser on trucks with on-board chargers.
Carry out a potential measurement on the chassis while charging is in progress.

Data radio

System components
Clean the scanner and terminal.

Other inspections

Agreed services
Note: Tests on other options and special parts such as radio data and access modules (ISM) must be recorded in the test report.

Lead-acid battery, international

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

Lead-acid battery

Power supply
Clean and grease the battery terminals.
Clean the battery.
Measure the 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 engine are secure and for damage
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage
Contactors and/or relays for wear and damage
The electric wiring for damage (insulation damage, connections) and the fuse ratings
Power supply
The function of the battery latch and battery attachment and for damage
The function and secure seating of the battery connector and for damage
Travel
Drivetrain bearings for wear and damage
Transmission for noise and leaks
Wheel bearings and attachment for wear and damage
Wheels for wear, damage and secure mounting
Chassis/structure
Industrial truck for damage and leaks
The secure seating of the chassis and screw connections and for damage
Labels are legible, complete and plausible
Protective mechanism against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Hydraulic operations
The function of the "hydraulic system" controls and for legibility, completeness and plausibility
The function of the lift mechanism and for wear and damage
The secure seating of the cylinders and piston rods and for leaks and damage
The function of the hydraulic system
The forks or load handler for wear and damage
Tie/plunger rods are uniformly adjusted and for wear and damage
The secure seating of the hoses, pipes and connections and for wear, leaks, damage, blisters and kinks
Steering
Lateral play of the tiller
The steering components for play and damage

1.2.2.2 Optional equipment

Standard on-board charger

Battery charger
The mains plug and mains cable for damage
The secure seating of the cables and electrical connections and for damage

Electrolyte circulation

Power supply
The function of the hose connections and pump

Aquamatik

Power supply
The function of the Aquamatik plug, hose connections and float and for leaks
The function of the flow indicator and for leaks

Lateral battery removal

Power supply
The function of the battery latch and battery attachment and for damage

Shock sensor / data recorder

Electrical system
The shock sensor/data recorder is secure and for damage

Data radio

System components
The function and secure seating of the scanner and terminal and for damage
Fuse ratings
The secure seating of the cables and for damage

Access module

Electrical system
Access module is secure and functions correctly and for damage

Entry skids/rollers

Hydraulic operations
The function of entry skids or entry rollers and for damage and wear

Lead-acid battery, international

Power supply
The secure seating of the battery, battery cables and cell connectors and for damage
The presence of safety labels are present and for damage

Lead-acid battery

Power supply
The secure seating of the battery, battery cables and cell connectors and 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
Hydraulic oil	2000	12
Hydraulic system - breather filter	2000	12
Transmission oil	10000	

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 EJE 220r-225r

Issued on: 2019-04-24 12:00

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 function of the brakes
Hydraulic operations
Correct the hydraulic oil level.
Steering
Test the tiller return function.

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 devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage
Power supply
Battery and battery components for damage
The function and secure seating of the battery connector and for damage
Travel
The function of the collision safety switch and for damage
Wheels for wear and damage
Chassis/structure
Industrial truck for damage and leaks
Labels are legible, complete and plausible
Doors and/or covers for damage
Hydraulic operations
The function of the hydraulic system
The forks or load handler for wear and damage

2.1.2.2 Optional equipment

The following points must be checked:

Standard on-board charger

Battery charger
The mains plug and mains cable for damage

Lead-acid battery, international

Power supply
Battery and battery components for damage
Battery cable connections are secure

Lead-acid battery

Power supply
Battery cable connections are secure

2.2 Customer Service

2.2.1 Maintenance contents

In accordance with the EJE 220r-225r service interval, to be performed every 1000 service hours, but at least once a year.

2.2.1.1 Standard equipment

Brakes
Test the function of the brakes
Measure the air gap of the magnetic brake.
Electrical system
Adjust the microswitches.
Test the contactors and/or relays.
Carry out a chassis insulation-resistance test.
Clean the motor (engine?) with compressed air.
Hydraulic operations
Test ramp lift and 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 load or a customer-specific load.
Demonstration after maintenance.
Lubricate truck according to the lubrication diagram.
Steering
Test the tiller return function.

2.2.1.2 Optional equipment

Standard on-board charger

Battery charger
Test the immobiliser on trucks with on-board chargers.
Carry out a potential measurement on the chassis while charging is in progress.

Lead-acid battery, international

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

Lead-acid battery

Power supply
Clean and grease the battery terminals.
Clean the battery.
Measure the 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 engine are secure and for damage
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
Microswitches for function and damage
The function of the emergency disconnect and for damage
Contactors and/or relays for wear and damage
Carbon brushes for wear
Connections and cables are secure and for insulation damage and other damage
Power supply
The function of the battery latch and battery attachment and for damage
The function and secure seating of the battery connector and for damage
Travel
Drivetrain bearings for wear and damage
Transmission for noise and leaks
Wheel bearings and attachment for wear and damage
Wheels for wear, damage and secure mounting
Chassis/structure
Industrial truck for damage and leaks
The secure seating of the chassis and screw connections and for damage
Labels are legible, complete and plausible
Doors and/or covers for damage
Hydraulic operations
The function of the "hydraulic system" controls and for legibility, completeness and plausibility
The function of the lift mechanism and for wear and damage
The secure seating of the cylinders and piston rods and for leaks and damage
The function of the hydraulic system
The secure seating and function of the accumulator and for leaks
The forks or load handler for wear and damage
Tie/plunger rods are uniformly adjusted and for wear and damage

2.2.2.2 Optional equipment

Standard on-board charger

Battery charger
The mains plug and mains cable for damage
The secure seating of the cables and electrical connections and for damage

Electrolyte circulation

Power supply
The function of the hose connections and pump

Aquamatik

Power supply
The function of the Aquamatik plug, hose connections and float and for leaks
The function of the flow indicator and for leaks

Battery refill system

Power supply
The function of the battery refill system and for leaks

Lateral battery removal

Power supply
The function of the battery latch and battery attachment and for damage

Shock sensor / data recorder

Electrical system
The shock sensor/data recorder is secure and for damage

Access module

Electrical system
Access module is secure and functions correctly and for damage

Entry skids/rollers

Hydraulic operations
The function of entry skids or entry rollers and for damage and wear

Automatic crawl speed

Travel
Sensors/switches are secure and function correctly and for damage

Lead-acid battery, international

Power supply
The secure seating of the battery, battery cables and cell connectors and for damage
The presence of safety labels are present and for damage

Lead-acid battery

Power supply
The secure seating of the battery, battery cables and cell connectors and 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
Hydraulic oil	2000	12
Hydraulic system - breather filter	2000	12
Transmission oil	10000	

2.2.3.2 Optional equipment

Cold-store application

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

3 Maintenance Contents EJE 230

Issued on: 2019-04-24 12:00

3.1 Owner

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

3.1.1 Maintenance contents

3.1.1.1 Standard equipment

Brakes
Test the function of the brakes
Hydraulic operations
Correct the hydraulic oil level.
Steering
Test the tiller return function.

3.1.1.2 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.

3.1.2 Inspection contents

3.1.2.1 Standard equipment

The following points must be checked:

Electrical system
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage
Power supply
Battery and battery components for damage
The function and secure seating of the battery connector and for damage
Travel
The function of the collision safety switch and for damage
Wheels for wear and damage
Chassis/structure
Industrial truck for damage and leaks
Labels are legible, complete and plausible
Doors and/or covers for damage
Hydraulic operations
The function of the hydraulic system
The forks or load handler for wear and damage

3.1.2.2 Optional equipment

The following points must be checked:

Standard on-board charger

Battery charger
The mains plug and mains cable for damage

Lead-acid battery, international

Power supply
Battery and battery components for damage
Battery cable connections are secure

Lead-acid battery

Power supply
Battery cable connections are secure

3.2 Customer Service

3.2.1 Maintenance contents

In accordance with the EJE 230 service interval, to be performed every 1000 service hours, but at least once a year.

3.2.1.1 Standard equipment

Brakes
Test the function of the brakes
Measure the air gap of the magnetic brake.
Electrical system
Adjust the microswitches.
Test the contactors and/or relays.
Carry out a chassis insulation-resistance test.
Clean the motor (engine?) with compressed air.
Hydraulic operations
Correct the hydraulic oil level.
Test and adjust the pressure relief valve.
Agreed services
Carry out a test run with the rated load or a customer-specific load.
Demonstration after maintenance.
Lubricate truck according to the lubrication diagram.
Steering
Test the tiller return function.

3.2.1.2 Optional equipment

Standard on-board charger

Battery charger
Test the immobiliser on trucks with on-board chargers.
Carry out a potential measurement on the chassis while charging is in progress.

Lead-acid battery, international

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

Lead-acid battery

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

3.2.2 Inspection contents

The following points must be checked:

3.2.2.1 Standard equipment

Electrical system
Cables and engine are secure and for damage
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
Microswitches for function and damage
The function of the emergency disconnect and for damage
Contactors and/or relays for wear and damage
Carbon brushes for wear
Power supply
The function of the battery latch and battery attachment and for damage
The function and secure seating of the battery connector and for damage
Travel
Drivetrain bearings for wear and damage
Transmission for noise and leaks
Wheel bearings and attachment for wear and damage
Wheels for wear, damage and secure mounting
Chassis/structure
Industrial truck for damage and leaks
The secure seating of the chassis and screw connections and for damage
Labels are legible, complete and plausible
Doors and/or covers for damage
Hydraulic operations
The function of the "hydraulic system" controls and for legibility, completeness and plausibility
The function of the lift mechanism and for wear and damage
The secure seating of the cylinders and piston rods and for leaks and damage
The function of the hydraulic system
The forks or load handler for wear and damage
Tie/plunger rods are uniformly adjusted and for wear and damage

3.2.2.2 Optional equipment

Standard on-board charger

Battery charger
The mains plug and mains cable for damage
The secure seating of the cables and electrical connections and for damage

Electrolyte circulation

Power supply
The function of the hose connections and pump

Aquamatik

Power supply
The function of the Aquamatik plug, hose connections and float and for leaks
The function of the flow indicator and for leaks

Lateral battery removal

Power supply
The function of the battery latch and battery attachment and for damage

Shock sensor / data recorder

Electrical system
The shock sensor/data recorder is secure and for damage

Access module

Electrical system
Access module is secure and functions correctly and for damage

Entry skids/rollers

Hydraulic operations
The function of entry skids or entry rollers and for damage and wear

Lead-acid battery, international

Power supply
The secure seating of the battery, battery cables and cell connectors and for damage
The presence of safety labels are present and for damage

Lead-acid battery

Power supply
The secure seating of the battery, battery cables and cell connectors and for damage

3.2.3 Maintenance parts

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

3.2.3.1 Standard equipment

maintenance part	service hours	months
Hydraulic oil	2000	12
Hydraulic system - breather filter	2000	12
Transmission oil	10000	

3.2.3.2 Optional equipment

Cold-store application

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

4 Maintenance Contents EJE 220/225

Issued on: 2019-04-24 12:00

4.1 Owner

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

4.1.1 Maintenance contents

4.1.1.1 Standard equipment

Hydraulic operations
Correct the hydraulic oil level.
Steering
Test the tiller return function.

4.1.1.2 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.

4.1.2 Inspection contents

4.1.2.1 Standard equipment

The following points must be checked:

Electrical system
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage
Power supply
Battery and battery components for damage
The function and secure seating of the battery connector and for damage
Travel
The function of the collision safety switch and for damage
Wheels for wear and damage
Chassis/structure
Industrial truck for damage and leaks
Labels are legible, complete and plausible
Doors and/or covers for damage
Protective mechanism against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Hydraulic operations
The function of the hydraulic system
The forks or load handler for wear and damage

4.1.2.2 Optional equipment

The following points must be checked:

Standard on-board charger

Battery charger
The mains plug and mains cable for damage

Lead-acid battery, international

Power supply
Battery and battery components for damage
Battery cable connections are secure

Lead-acid battery

Power supply
Battery cable connections are secure

4.2 Customer Service

4.2.1 Maintenance contents

In accordance with the EJE 220/225 service interval, to be performed every 1000 service hours, but at least once a year.

4.2.1.1 Standard equipment

Brakes
Test the brake with the tiller in the maximum vertical and horizontal positions.
Measure the air gap of the magnetic brake.
Electrical system
Test the contactors and/or relays.
Carry out a chassis insulation-resistance test.
Chassis/structure
Check that the panels and covers as well as mounting brackets are secure. Ensure they function correctly and are safe.
Hydraulic operations
Correct the hydraulic oil level.
Test the pressure relief valve.
Agreed services
Carry out a test run with the rated load or a customer-specific load.
Demonstration after maintenance.
Lubricate truck according to the lubrication diagram.
Steering
Test the tiller return function.

4.2.1.2 Optional equipment

Standard on-board charger

Battery charger
Test the immobiliser on trucks with on-board chargers.
Carry out a potential measurement on the chassis while charging is in progress.

Data radio

System components
Clean the scanner and terminal.

Other inspections

Agreed services
Note: Tests on other options and special parts such as radio data and access modules (ISM) must be recorded in the test report.

Lead-acid battery, international

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

Lead-acid battery

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

4.2.2 Inspection contents

The following points must be checked:

4.2.2.1 Standard equipment

Electrical system
Cables and engine are secure and for damage
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage
Contactors and/or relays for wear and damage
The electric wiring for damage (insulation damage, connections) and the fuse ratings
Power supply
The function of the battery latch and battery attachment and for damage
The function and secure seating of the battery connector and for damage
Travel
Drivetrain bearings for wear and damage
Transmission for noise and leaks
Wheel bearings and attachment for wear and damage
Wheels for wear, damage and secure mounting
Chassis/structure
Industrial truck for damage and leaks
The secure seating of the chassis and screw connections and for damage
Labels are legible, complete and plausible
Protective mechanism against trapping and shearing is present, secure, functions correctly and is free of dirt and damage
Hydraulic operations
The function of the "hydraulic system" controls and for legibility, completeness and plausibility
The function of the lift mechanism and for wear and damage
The secure seating of the cylinders and piston rods and for leaks and damage
The function of the hydraulic system
The forks or load handler for wear and damage
Tie/plunger rods are uniformly adjusted and for wear and damage
The secure seating of the hoses, pipes and connections and for wear, leaks, damage, blisters and kinks
Steering
Lateral play of the tiller
The steering components for play and damage

4.2.2.2 Optional equipment

Standard on-board charger

Battery charger
The mains plug and mains cable for damage
The secure seating of the cables and electrical connections and for damage

Electrolyte circulation

Power supply
The function of the hose connections and pump

Aquamatik

Power supply
The function of the Aquamatik plug, hose connections and float and for leaks
The function of the flow indicator and for leaks

Lateral battery removal

Power supply
The function of the battery latch and battery attachment and for damage

Shock sensor / data recorder

Electrical system
The shock sensor/data recorder is secure and for damage

Data radio

System components
The function and secure seating of the scanner and terminal and for damage
Fuse ratings
The secure seating of the cables and for damage

Access module

Electrical system
Access module is secure and functions correctly and for damage

Entry skids/rollers

Hydraulic operations
The function of entry skids or entry rollers and for damage and wear

Lead-acid battery, international

Power supply
The secure seating of the battery, battery cables and cell connectors and for damage
The presence of safety labels are present and for damage

Lead-acid battery

Power supply
The secure seating of the battery, battery cables and cell connectors and for damage

4.2.3 Maintenance parts

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

4.2.3.1 Standard equipment

maintenance part	service hours	months
Hydraulic oil	2000	12
Hydraulic system - breather filter	2000	12
Transmission oil	1000	

4.2.3.2 Optional equipment

Cold-store application

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

H Traction battery

1 Correct Use and Application

Failure to observe the operating instructions, carrying out repairs with non-original spare parts, tampering with the battery or using electrolyte additives will invalidate the warranty.

Observe the instructions for maintaining the safety rating during operation for batteries in accordance with Ex I and Ex II (see relevant certification).

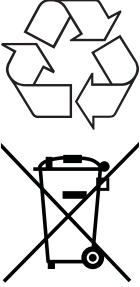
2 Data plate

112	_____	_____	33
113	_____	_____	114
30	_____	_____	115
116	_____	_____	117
118	_____	_____	119
37	_____	_____	
120	_____	_____	39
		_____	121



112	Model (battery name)
33	Production week / production year
113	Serial number
114	Supplier number
30	Rated voltage
115	Capacity
116	Number of cells
117	Weight
118	Part no.
119	Acid quantity
37	Manufacturer
39	Manufacturer's logo
120	CE mark (for batteries above 75 V only)
121	Safety instructions and warning information

3 Safety Instructions, Warning Indications and other Notes

	Used batteries must be treated as hazardous waste. These batteries are marked with the recycling symbol and the sign showing a crossed-out rubbish bin, and should not be disposed of with ordinary household waste. Buy-back terms and type of recycling are to be agreed with the manufacturer as described in § 8 of the battery legislation.
	Do not smoke! No naked flames, glowing embers or sparks near the battery - fire and explosion hazard!
	Avoid fire and explosion hazards and short circuits due to overheating! Keep away from naked flames and strong heat sources.
	Always wear protective clothing (e.g. safety goggles and safety gloves) when working on cells and batteries. Always wash your hands after completing the work. Use only insulated tools. Do not mechanically machine the battery, strike, crush, compress, notch, dent or modify it in any way.
	Hazardous electric voltage! The metal parts of the battery cells are permanently live. Therefore do not place any foreign objects or tools on the battery. Observe national health and safety regulations.
	If the materials leak, do not inhale the fumes. Wear safety gloves.
	Follow the user instructions and keep them in a visible position in the charging area. Work on the batteries should be performed only as instructed by specialist personnel.

4 Lead acid batteries with armour plated cells and liquid electrolyte

4.1 Description

Jungheinrich traction batteries are lead acid batteries with armour plated cells and liquid electrolyte. The names of the traction batteries are PzS, PzB, PzS Lib and PzM.

Name	Explanation
PzS	– Lead acid battery with "Standard" armour plated cells and liquid electrolyte – Battery cell width: 198 mm
PzB	– Lead acid battery with "British Standard" armour plated cells and liquid electrolyte – Battery cell width: 158 mm
PzS Lib	– Lead acid battery with "Standard" armour plated cells and liquid electrolyte
PzM	
	– Lead acid battery with extended maintenance interval – Battery cell width: 198 mm

Electrolyte

The rated density of the electrolyte assumes a temperature of 30°C and the rated electrolyte level is fully charged. Higher temperatures will reduce, lower temperatures will increase the electrolyte density.

The corresponding adjustment factor is ± 0.0007 kg/l per K, e. g. electrolyte density 1.28 kg/l at 45 °C corresponds to a density of 1,29 kg/l at 30 °C.

The electrolyte must comply with the purity regulations of DIN 43530 Part 2.

4.1.1 Battery nominal data

1.	Product	Traction battery
2.	Nominal voltage	2.0 V x number of cells
3.	Rated capacity C5	See data plate
4.	Discharge current	C5/5h
5.	Nominal electrolyte density ²	1.29 kg/l
6.	Nominal temperature ³	30 °C
7.	System rated electrolyte level	up to "Max" electrolyte level marking
	Limit temperature ⁴	55 °C

²) Reached within the first 10 cycles.

³) Higher temperatures shorten the useful life, lower temperatures reduce the available capacity.

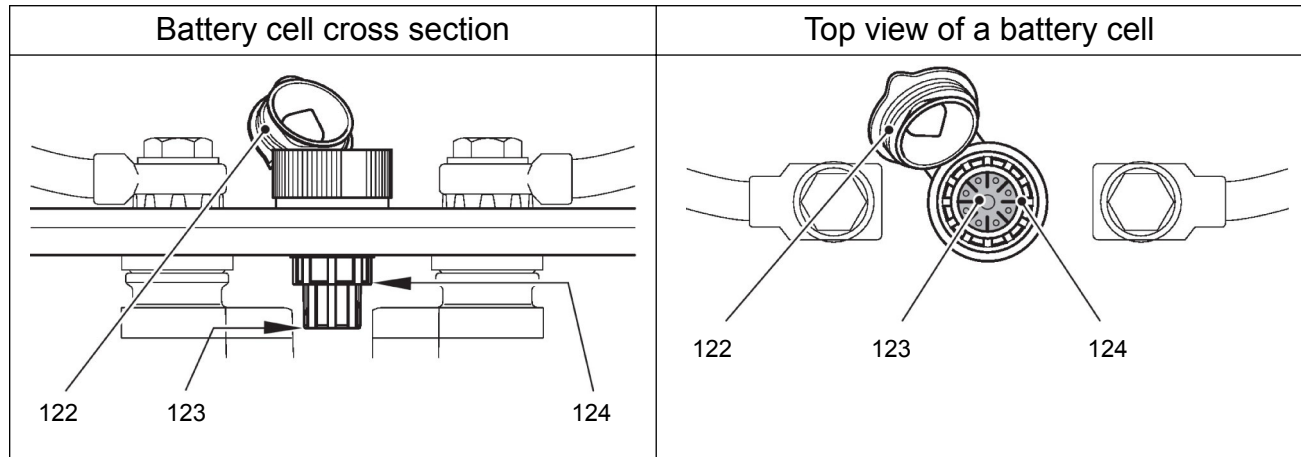
⁴) Not permissible as operating temperature.

4.2 Operation

4.2.1 Commissioning unfilled batteries

- The operations required must be carried out by the manufacturer's customer service department or a customer service organisation authorised by the manufacturer.

4.2.2 Commissioning filled and charged batteries



Checks and operations to be performed before starting daily work

Procedure

- Make sure the battery is in physically good condition.
- Make sure the terminals are correct (positive to positive and negative to negative) and check that contacts on the battery terminal conducting system are secure.
- Check the M10 terminal screws of the conductors and connectors are secure and if necessary torque to 23 ± 1 Nm.
- Charge the battery, see page 216.
- Check the electrolyte level of each battery cell after charging and top up if necessary:

- Open the plug (122).

- The electrolyte level should not be less than the "Min" electrolyte marking (123) and must not exceed the "Max" (124) marking.

- If necessary, add electrolyte with pure water up to the "Max" electrolyte level marking (124), see page 218.
- Close the plug (122).

The test is now complete.

4.2.3 Discharging the battery

- To achieve an optimum useful life avoid operational discharge of more than 80% of nominal capacity (full discharge). This corresponds to a minimum electrolyte density of 1.13 kg/l at the end of the discharge.
Fully or partially discharged batteries must be re-charged immediately and not left unattended.

4.2.4 Charging the battery

⚠ WARNING!

The gases produced during charging can cause explosions

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

- ▶ Always disconnect the charger and truck before connecting or disconnecting the charger and battery.
- ▶ The charger must be adapted to the battery in terms of voltage, charge capacity and battery technology.
- ▶ Before charging, check all cables and plug connections for visible signs of damage.
- ▶ Ventilate the room in which the truck is being charged.
- ▶ Battery cell surfaces must remain exposed during charging in order to ensure sufficient ventilation, see truck operating instructions, chapter D, Charging the Battery.
- ▶ Do not smoke and avoid naked flames when handling batteries.
- ▶ Wherever an industrial truck is parked for charging there must be no inflammable material or consumables capable of creating sparks within a minimum distance of 2 m from the truck.
- ▶ Fire protection equipment must be available.
- ▶ Do not place any metallic objects on the battery.
- ▶ Always follow the safety regulations of the battery and charger station manufacturers.

NOTICE

The battery must only be charged with DC current. All charging procedures in accordance with DIN 41773 and DIN 41774 are permissible.

- The electrolyte temperature rises by approx. 10°C during charging. Charging should therefore only begin when the electrolyte temperature is below 45°C. The electrolyte temperature of batteries must be at least +10°C before charging. Otherwise the battery will not charge correctly. Below 10°C the battery is insufficiently charged with standard charging systems.

Charging the battery

Requirements

- Permissible electrolyte temperature 10°C to 45°C).

Procedure

- Open or take off the tray lid or covers from the battery compartment.

- Deviations are outlined in the truck's operating instructions. The plugs remain on the cells or remain closed.
- Connect the battery to the switched off charger, ensuring the terminals are connect (positive to positive and negative to negative).
 - Switch on the charger.

The battery is charged.

- *Charging is considered to be complete when the electrolyte density and battery voltage remain constant for more than 2 hours.*

Compensation charging

Compensation charging is used to ensure the useful life and maintain capacity after full discharge and repeated insufficient charging. The maximum compensation charge current is 5 A/100 Ah rated capacity.

- Compensation charging should be carried out weekly.

Trickle charging

Battery trickle charging is partial charging that extends the daily application time. Higher average temperatures occur during trickle charging which reduce the useful life of the batteries.

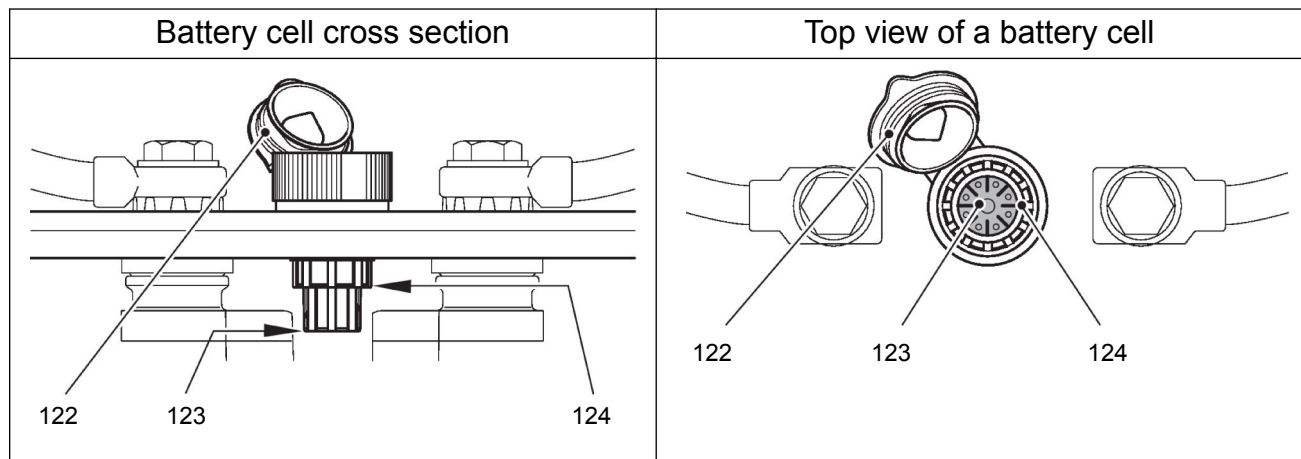
- Trickle charges should only be performed when the charge level is below 60 %. Use replacement batteries instead of regular trickle charging.

4.3 Servicing lead-acid batteries with armour plated cells

4.3.1 Quality of Water for Adding Electrolyte

- The quality of the water used to add electrolyte must correspond to purified or distilled water. Purified water can be produced through distillation or ion exchangers and is then suitable for the production of electrolyte.

4.3.2 Daily



- Charge the battery after each discharge.
 - After charging, check the electrolyte level of each battery cell and replenish as required:
 - Open the plug (122).
 - If necessary, add electrolyte with pure water up to the "Max" electrolyte level marking (124).
 - Close the plug (122).
- The electrolyte level should not be less than the "Min" electrolyte marking (123) and must not exceed the "Max" (124) marking.

4.3.3 Weekly

- After re-charging, carry out a visual inspection for dirt and physical damage.
- If the battery is charged regularly according to the IU characteristic, carry out a compensation charge.

4.3.4 Monthly

- Towards the end of the charging process measure and record the voltages of all the cells with the charger switched on.
- After charging measure and record the electrolyte density and the electrolyte temperature in all the cells.
- Compare the results with the previous ones.



If you find significant differences compared with the previous measurements or differences between the cells, contact the manufacturer's customer service department.

4.3.5 Annually

- Measure the insulation resistance of the truck in accordance with EN 1175-1.
- Measure the insulation resistance of the battery in accordance with DIN EN 1987-1.



In accordance with DIN EN 50272-3 the battery insulation resistance should not be less than 50 Ω per volt of rated voltage.

5 PzV and PzV-BS lead-acid batteries with sealed armour plated cells

5.1 Description

PzV batteries are sealed batteries with fixed electrolytes, to which no water can be added over the entire lifespan of the battery. Relief valves are used as plugs which are destroyed when opened. During operation the same safety requirements apply to the sealed batteries as for batteries with liquid electrolyte. This is to avoid electric shock, explosion of the electrolyte charging gases or hazardous electrolyte burns if the cell vessels are destroyed.

→ PzV batteries are low gassing, but not gassing-free.

Electrolyte

The electrolyte is sulphuric acid which is fixed in gel. The density of the electrolyte cannot be measured.

Name	Explanation
PzV	– Lead acid battery with "Standard" closed armour plated cells and electrolyte in gel compound – Battery cell width: 198 mm
PzV-BS	– Lead acid battery with "British Standard" closed armour plated cells and electrolyte in gel compound – Battery cell width: 158 mm

5.1.1 Battery nominal data

1.	Product	Traction battery
2.	Nominal voltage	2.0 V x number of cells
3.	Rated capacity C5	See data plate
4.	Discharge current	C5/5h
5.	Rated temperature	30°C
	Limit temperature ⁵	45°C, not permissible as operating temperature
6.	Rated density of the electrolyte	Cannot be measured
7.	System rated electrolyte level	Cannot be measured

⁵) Higher temperatures shorten the useful life, lower temperatures reduce the available capacity.

5.2 Operation

5.2.1 Commissioning

Checks and operations to be performed before starting daily work

Procedure

- Make sure the battery is in physically good condition.
- Make sure the terminals are correct (positive to positive and negative to negative) and check that contacts on the battery terminal conducting system are secure.
- Check the M10 terminal screws of the conductors and connectors are secure and if necessary torque to 23 ± 1 Nm.
- Charge the battery, see page 221.

The test is now complete.

5.2.2 Discharging the battery

- To achieve an optimum useful life avoid operational discharges of more than 60% of nominal capacity.
- If the battery is discharged during operation by more than 80% of rated capacity the useful life of the battery will reduce significantly. Fully or partially discharged batteries must be re-charged immediately and not left unattended.

5.2.3 Charging the battery

⚠ WARNING!

The gases produced during charging can cause explosions

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

- ▶ Always disconnect the charger and truck before connecting or disconnecting the charger and battery.
- ▶ The charger must be adapted to the battery in terms of voltage, charge capacity and battery technology.
- ▶ Before charging, check all cables and plug connections for visible signs of damage.
- ▶ Ventilate the room in which the truck is being charged.
- ▶ Battery cell surfaces must remain exposed during charging in order to ensure sufficient ventilation, see truck operating instructions, chapter D, Charging the Battery.
- ▶ Do not smoke and avoid naked flames when handling batteries.
- ▶ Wherever an industrial truck is parked for charging there must be no inflammable material or consumables capable of creating sparks within a minimum distance of 2 m from the truck.
- ▶ Fire protection equipment must be available.
- ▶ Do not place any metallic objects on the battery.
- ▶ Always follow the safety regulations of the battery and charger station manufacturers.

NOTICE

Charging the battery incorrectly can result in material damage.

Incorrect battery charging can result in overloading of the electric wires and contacts, hazardous gas formation and electrolyte leakage from the battery cell.

- ▶ Always charge the battery with DC current.
 - ▶ All DIN 41773 charging procedures are permitted in the format approved by the manufacturer.
 - ▶ Always connect the battery to a charger that is appropriate to the size and type of the battery.
 - ▶ If necessary have the charger checked by the manufacturer's customer service department for suitability.
 - ▶ Do not exceed the limit currents in accordance with DIN EN 50272-3 in the gassing area.
-

Charging the battery

Requirements

- Electrolyte temperature between +15°C and +35°C

Procedure

- Open or take off the tray lid or covers from the battery compartment.
- Connect the battery to the switched off charger, ensuring the terminals are connect (positive to positive and negative to negative).
- Switch on the charger.

- The electrolyte temperature rises by approx. 10°C during charging. If the temperatures are permanently higher than 40°C or lower than 15°C, a temperature-dependent constant voltage control of the charger is required. The adjustment factor must be applied with -0.004 V/C per °C.

The battery is charged.

- *Charging is considered to be complete when the electrolyte density and battery voltage remain constant for more than 2 hours.*

Compensation charging

Compensation charging is used to ensure the useful life and maintain capacity after full discharge and repeated insufficient charging.

- Compensation charging should be carried out weekly.

Trickle charging

Battery trickle charging is partial charging that extends the daily application time. Higher average temperatures occur during trickle charging which can reduce the useful life of the batteries.

- Trickle charges should only be performed when the charge level is below 50%. Use replacement batteries instead of regular trickle charging.
- Avoid trickle charging with PzV batteries.

5.3 Servicing PzV and PzV-BS lead-acid batteries with sealed armour plated cells

 Do not add water!

5.3.1 Daily

- Charge the battery after each discharge.

5.3.2 Weekly

- Visually inspect for dirt and physical damage.

5.3.3 Every three months

- Measure and record the overall voltage.
- Measure and record the individual voltages.
- Compare the results with the previous ones.

 Carry out the measurements after full charging and subsequent resting for at least 5 hours.

 If you find significant differences compared with the previous measurements or differences between the cells, contact the manufacturer's customer service department.

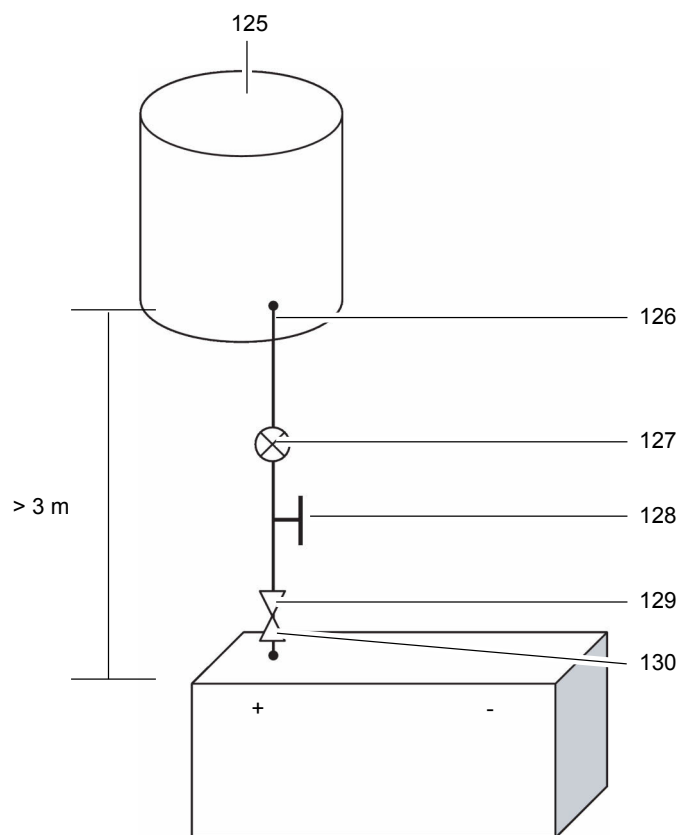
5.3.4 Annually

- Measure the insulation resistance of the truck in accordance with EN 1175-1.
- Measure the insulation resistance of the battery in accordance with DIN EN 1987-1.

 In accordance with DIN EN 50272-3 the battery insulation resistance should not be less than 50 Ω per volt of rated voltage.

6 Aquamatik water replenishment system

6.1 Water replenishment system design



125	Water container
126	Tap connection with ball cock
127	Flow indicator
128	Shut-off cock
129	Locking coupling
130	Battery lock connector

6.2 Functional Description

The Aquamatik water replenishment system is used to adjust the rated electrolyte level automatically on traction batteries for industrial trucks.

The battery cells are interconnected through hoses and are attached to the water supply (e.g. water container) through a plug connection. When the shut-off cock is opened all the cells are filled with water. The Aquamatik plug controls the amount of water required and, at the relevant water pressures, ensures the water supply is shut off and the valve is closed securely.

The plug systems have an optical level indicator, a diagnostic port to measure the temperature and electrolyte density and a degassing port.

6.3 Adding water

Water should be added to the batteries just before the battery is fully charged. This ensures that the amount of water added is mixed with the electrolyte.

6.4 Water pressure

The water replenishment system must be operated with a water pressure in the water line of 0.3 bar - 1.8 bar. Any deviations from the permissible pressure ranges will affect the operation of the systems.

Water drop

Assembly height above battery surface is between 3 - 18 m.
1 m corresponds to 0.1 bar.

Pressure water

The pressure regulating valve is adjusted to suit the system and must lie between 0.3 - 1.8 bar.

6.5 Filling time

The filling time for a battery depends on the electrolyte level, the ambient temperature and the filling pressure. Filling ends automatically. The water supply line must be disconnected from the battery when the water has been filled.

6.6 Water quality

- The quality of the water used to fill up electrolyte must correspond to purified or distilled water. Purified water can be produced through distillation or ion exchangers and is then suitable for the production of electrolyte.

6.7 Battery tubing

The tubing of the individual plugs is in accordance with the existing electric circuit. No changes should be made.

6.8 Operating temperature

Batteries with automatic water replenishment systems should only be stored in rooms with temperatures $> 0^{\circ}\text{C}$, as otherwise the systems could freeze.

6.9 Cleaning measures

The plug systems must only be cleaned with purified water in accordance with DIN 43530-4. No parts of the plugs must come into contact with solvent-based materials or soap.

6.10 Service mobile vehicle

Mobile water filling vehicle with pump and filling gun to fill individual cells. The immersion pump in the container generates the necessary filling pressure. The service mobile must be at exactly the same height as the battery base.

7 Electrolyte circulation

7.1 Functional Description

Electrolyte circulation ensures the supply of air during charging to mix the electrolyte, thereby preventing any acid layer, shortening the charge time (charge factor approx. 1.07) and reducing the formation of gas during charging. The charger must be suitable for the battery and electrolyte circulation.

A pump in the charger produces the necessary compressed air which is introduced to the battery cells via a hose system. The electrolyte is circulated via the inlet air and the electrolyte density level is constant over the entire length of the electrode.

Pump

In the event of a fault, e.g. if the pressure control system responds for an unknown reason, the filters must be checked and replaced if necessary.

Battery connection

A hose is attached to the pump module which together with the charge leads is routed from the charger to the charging connector. The air is passed on to the battery via the electrolyte circulation coupling ducts in the connector. When routing make sure the hose is not bent.

Pressure-monitoring module

The electrolyte circulation pump is activated when charging begins. The pressure monitoring module monitors the build-up of pressure during charging. This ensures that the required air pressure is provided for electrolyte circulation charging.

In the event of malfunctions, a visual error message appears on the battery charger. Some examples of malfunctions are listed below:

- No connection between the air coupling of the battery and the recirculation module (for separate coupling) or faulty air coupling
- Leaking or faulty hose connections on battery
- Contaminated intake filter

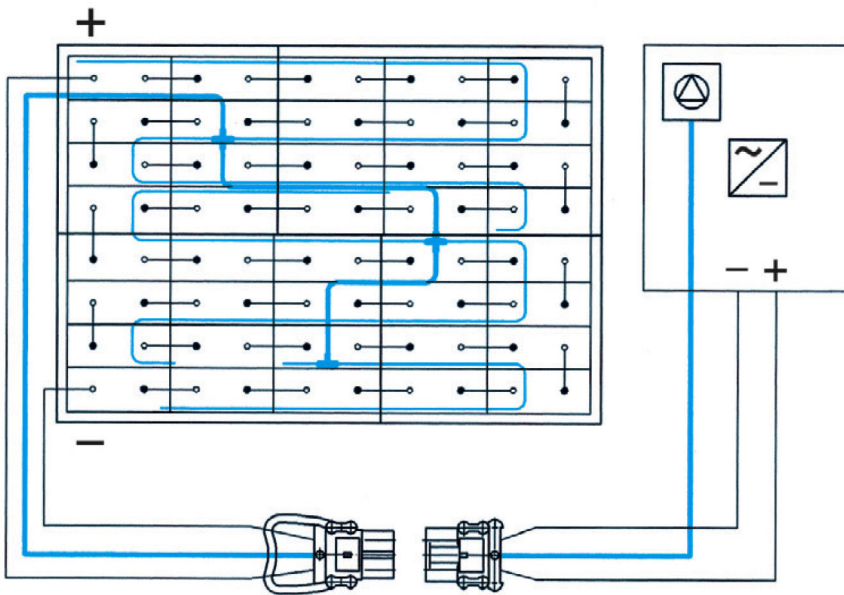
NOTICE

If an installed electrolyte circulation system is seldom used or not used at all, or if the battery is subjected to severe temperature fluctuations, the electrolyte may flow back into the hose system.

► Attach a separate coupling system to the air inlet line, such as: locking coupling to the battery side and through-coupling to the air supply side.

Schematic illustration

Electrolyte circulation on the battery and air supply via the charger.



8 Cleaning batteries

Batteries and trays must be cleaned in order to

- Maintain cell insulation and protect cells from ground or external conductive parts.
- Avoid damage from corrosion and stray currents.
- Avoid excessive and varying automatic discharge of the individual cells or block batteries due to stray currents.
- Avoid electric sparking due to stray currents.

When cleaning the batteries make sure that:

- The assembly site chosen for cleaning is close to a drainage system for processing the electrolytic rinsing water.
- All health and safety as well as water and waste disposal regulations are observed when disposing of used electrolyte or rinsing water.
- Protective goggles and clothing are worn.
- Cell plugs are not removed or opened.
- Clean the plastic components of the battery, in particular the cell containers, only with water or water-based cloths without any additives.
- After cleaning, the top of the battery is dried with suitable equipment, e.g. compressed air or cloths.
- Any fluid that has entered the battery tray must be suctioned off and disposed of in accordance with the above-mentioned regulations.

Cleaning the battery with a high pressure cleaner

Requirements

- Cell connectors tight, plugged in securely
- Cell plugs closed

Procedure

- Follow the high pressure cleaner's user instructions.
- Do not use any cleaning additives.
- Observe the permissible cleaning device temperature setting of 140°C.

→ This generally ensures that the temperature does not exceed 60°C at a distance of 30cm behind the outlet nozzle.

- Observe the maximum operating pressure of 50 bar.
- Observe a minimum distance of 30 cm from the top of the battery.
- The battery should be sprayed over its entire surface to avoid localised overheating.

→ Do not clean one spot for more than 3 seconds with the jet to avoid exceeding the maximum battery surface temperature of 60°C.

- After cleaning dry the battery surface with suitable materials e.g. compressed air or cleaning cloths.

Battery cleaned.

9 Storing the battery

NOTICE

The battery should not be stored for longer than 3 months without charging as otherwise it will no longer be functional.

If the battery is to be taken out of service for a long period, it should be stored fully charged in a dry room protected from frost. To ensure the availability of the battery the following charges can be selected:

- Monthly compensation charge for PzS and PzB batteries or 4-monthly full charge for PzV batteries.
- Trickle charge for a charging voltage of $2.23 \text{ V} \times \text{number of cells}$ for PzS, PzM and PzB batteries or $2.25 \text{ V} \times \text{number of cells}$ for PzV batteries.

If the battery is to be taken out of service for a long period (> 3 months), it should, as far as possible, be charged to 50% of its charge level and stored in a dry room protected from frost.

10 Troubleshooting

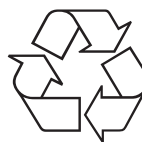
If any faults are found on the battery or charger, contact the manufacturer's customer service department immediately.



The operations required must be carried out by the manufacturer's customer service department or a customer service organisation authorised by the manufacturer.

11 Disposal

Batteries marked with the recycling symbol and the sign showing a crossed-out rubbish bin should not be disposed of with ordinary household waste.



Buy-back terms and type of recycling are to be agreed with the manufacturer as described in § 8 of the battery legislation.