EJC 112z

08.16

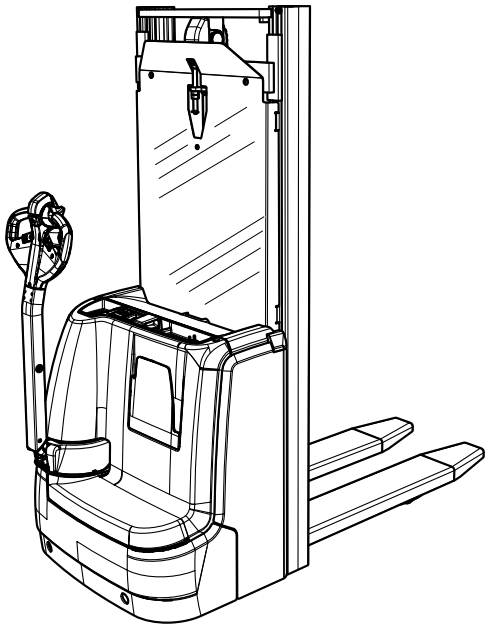
Operating instructions

GB

51554526

08.16

EJC 112z



JUNGHEINRICH

Machines. Ideas. Solutions.

Declaration of Conformity

Jungheinrich AG, Friedrich-Ebert-Damm 129, 22047 Hamburg, Germany
Manufacturer or agent acting in the European Union

Model	Option	Serial no.	Year of manufacture
EJC 112z			

Additional information

On behalf of

Date

(GB) EC Declaration of Conformity

The undersigned hereby declare that the powered industrial truck described below in detail complies with the European Directives 2006/42/EG (Machinery Directive) and 2014/30/EU (Electromagnetic Compatibility - EMC) including amendments as well as the legislative decree to incorporate the directives in national law. The signatories are in each case individually authorised to compile the technical documents.

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.

NOTE

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

➔ Used before notices and explanations.

- ● Indicates standard equipment
- ○ Indicates optional equipment

Jungheinrich Aktiengesellschaft

Friedrich-Ebert-Damm 129
22047 Hamburg - Germany

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

www.jungheinrich.com

08.16 EN

Contents

Appendix

JH Traction Battery Operating Instructions

These operating instructions apply only to Jungheinrich battery models. If using another brand, refer to the manufacturer's operating instructions.

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

NOTE

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 83.

– Lifting and lowering loads.
– Stacking / retrieving loads.
– Transporting lowered loads.
– Do not travel with a raised load (>500 mm).
  In double-decker mode the load handler must not be raised higher than 1800 mm.
  The bottom load must be heavier than the upper load.
– Do not transport or lift passengers.
– Do not push or pull loads.

3 Approved application conditions

– 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 16 %.
– 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.

NOTE

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.

NOTE

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 EJC 112z is a four-wheel, tiller-operated electric stacker with a steered drive wheel.
It is designed for use on level floors to lift and transport goods. Open bottom pallets or roll cages can be lifted. The rated capacity is shown on the data plate. The capacity with respect to lift height and load centre of gravity is indicated on the capacity plate.

1.1 Truck models and rated capacity

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

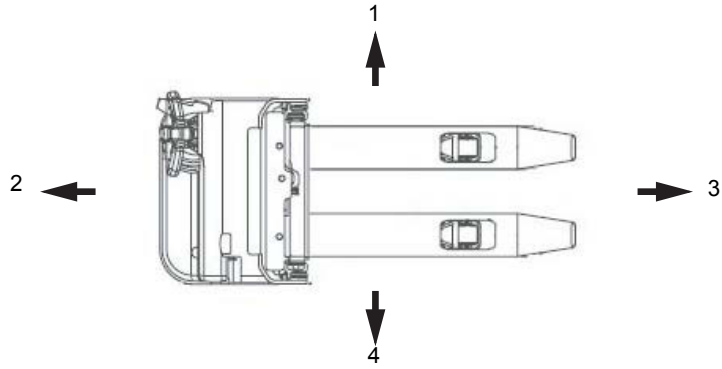
EJC 112z

EJC 112z	Model name
1	Series
12	Rated capacity x 100 kg
z	Initial lift

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

2 Travel direction definition

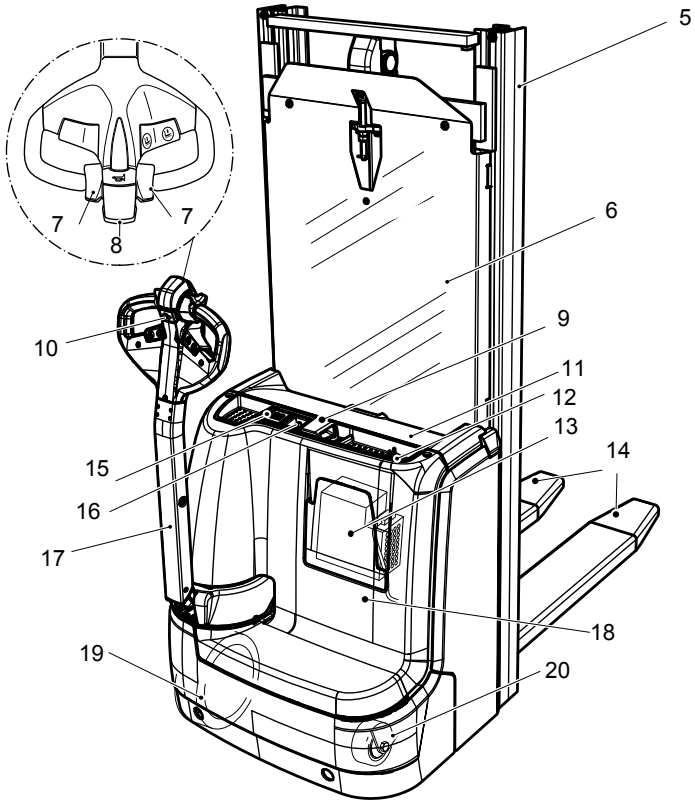
The following determinations have been made for travel direction specification:



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	●	Mast	14	●	Load handler
6	●	Protective screen panel		○	Double-deck
	○	Protective grille (for cold store application)			
7	●	Travel switch	15	●	Charge status indicator
				○	Display unit (2-inch display)
8	●	Collision safety switch	16	●	Key switch
9	●	Emergency disconnect switch		○	ISM access module
10	●	Slow-travel button		○	Keypad
11	●	Battery panel		○	Transponder reader
12	○	Mains plug (on-board charger)	17	●	Tiller
13	○	On-board battery charger	18	●	Front panel
			19	●	Drive wheel
			20	●	Support wheel
● = Standard version			○ = Option		

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 strut 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.

The mast protection pane or grille (○) protect the operator from moving mast parts and the load.

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. Control displays 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

Lifting and lowering are activated via the lift and lower buttons. Pressing the lifting button starts the pump unit, supplying hydraulic oil from the oil reservoir to the lift cylinder. With the two-stage Duplex mast (ZZ) (○) or three-stage telescopic mast (DZ) (○) a short, centre-mounted free lift cylinder initially lifts the load handler (free lift) without changing the overall height of the truck.

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 display unit (2-inch display) (○) shows the operator key information such as travel program, service hours, battery capacity and event messages.

Mast

The maximum strength steel sections are narrow, allowing for outstanding load handler visibility in particular with the three-stage mast. The lift rails and the fork carriage run on permanently-lubricated and hence maintenance-free angled rollers.

Load backrest (○)

A load backrest is recommended as an additional protective mechanism to move low or small item loads above the mast protection frame or grille (○). The load backrest is mounted on the load handler and protects the operator and truck against falling loads.

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

⚠ WARNING!

Risk of injury from falling loads

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

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

3.2.1 Hourmeter

➔ Prepare the truck for operation, see page 66 or see page 110.

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

– Tiller in travel zone "F", see page 74.
– "Slow travel button", see page 77.
– "Lift" button, see page 81.
– "Lower" button, see page 82.

4 Technical Specifications

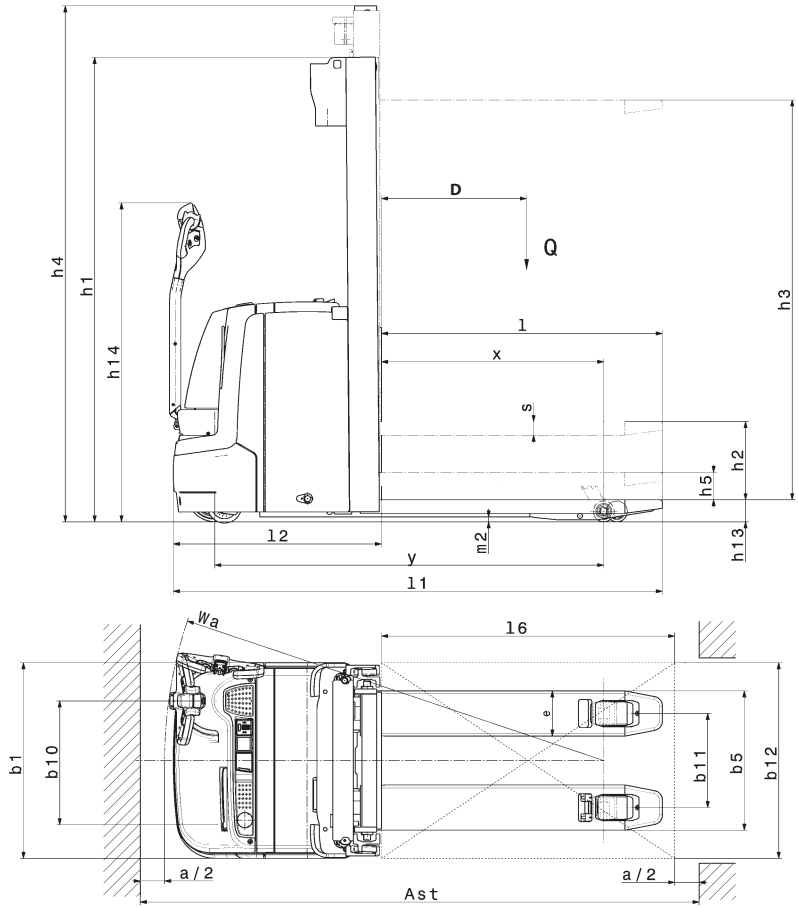
The technical specifications comply with the German "Industrial Truck Data Sheet" Guidelines.
Technical modifications and additions reserved.

4.1 Performance data

	Description[1]	**EJC 112z**	
Q	Rated capacity	1200	kg
D	Load centre distance	600	mm
	Travel speed with / without load	6.0 / 6.0	km/h
	Lift speed with / without load (ZT mast)	0.13 / 0.22	m/s
	Lowering speed with / without load (ZT mast)	0.49 / 0.39	m/s
	Max. gradeability with / without load	8 / 16	%
	Drive motor, output S2 60 min	1.0	kW
	Lift motor, output S3 %	2.2 / 6%	kW
	Energy consumption according to VDI cycle	0.92	kWh/h

1. Values for standard mast 290 ZT with battery

4.2 Dimensions



	Description	EJC 112z	
h1	Height	1950	mm
h2	Free lift	100	mm
h3	Lift	2880	mm
h4	Mast height extended	3375	mm
h5	Initial lift		mm
h13	Forks lowered	90	mm
h14	Tiller height in travel position [2]	850 / 1305	mm
x	Load distance raised	910 [3] [9]	mm
y	Wheelbase raised	1502 [9]	mm
l1	Truck length [3]	1933	mm
l2	Headlength [3]	783	mm
b1	Truck width	800	mm
b5	Width across forks	570	mm
b10	Front track	507	mm
b11	Rear track	415	mm
m2	Ground clearance	20	mm
s / e / l	Fork dimensions	56 / 185 / 1150	mm
Ast	Aisle width [4] [5] 800 x 1200 lengthways (in accordance with VDI)	2267 [7] [3]	mm
Ast	Aisle width [4] [6] 1000 x 1200 transversely (in accordance with VDI)	2168 [8] [3]	mm
Wa	Turning radius [4] Support arms raised	1728 [9]	mm

1) Values for standard mast 290 ZT

2) min / max

3) DZ: x - 42 mm; l1 + 42 mm; l2 + 42 mm

4) Tiller upright (slow travel)

5) l6 = 1200; b12 = 800

6) l6 = 1150; b12 = 1200 (forks protruding)

7) Diagonal in accordance with VDI +368 mm

8) Diagonal in accordance with VDI +204 mm

9) Lowered +54 mm

4.3 Weights

	EJC 112z	
Net weight incl. battery	980	kg
Axle load with load, front / rear incl. battery	1216 / 1232	kg
Axle load without load, front / rear incl. battery	273 / 287	kg
Battery weight	185	kg

4.4 Tyre type

	EJC 112z	
Tyre size, drive system	230 x 70	mm
Tyre size, load section (single / tandem)	Ø 85 x 95 / Ø 85 x 75	mm
Support wheel	140 x 54	mm
Wheels, number front / rear (x = driven)	1 x + 1/2	

4.5 EN norms

Continuous sound pressure level

– EJC 112z: 64 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.

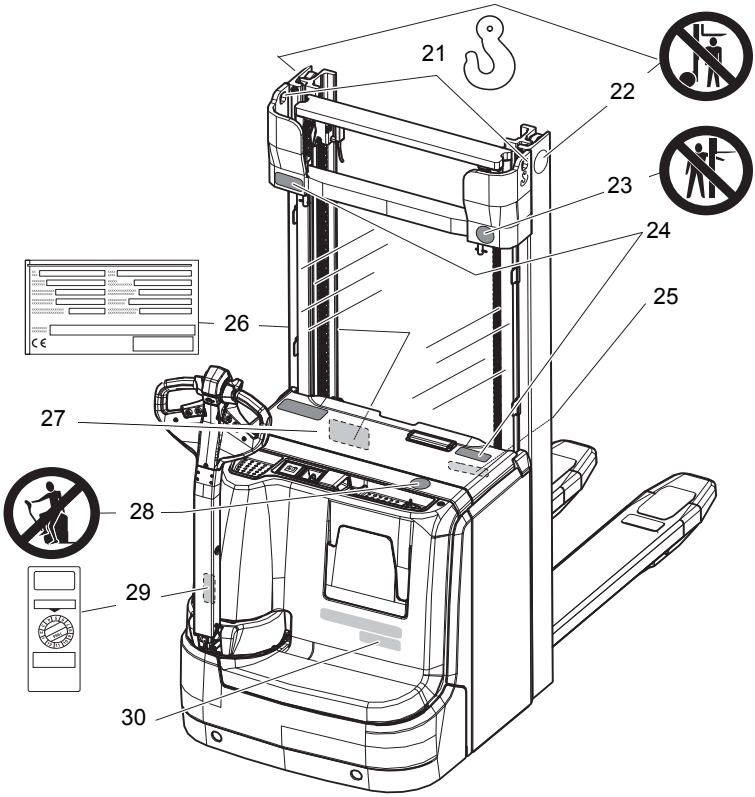
4.7 Electrical Requirements

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.

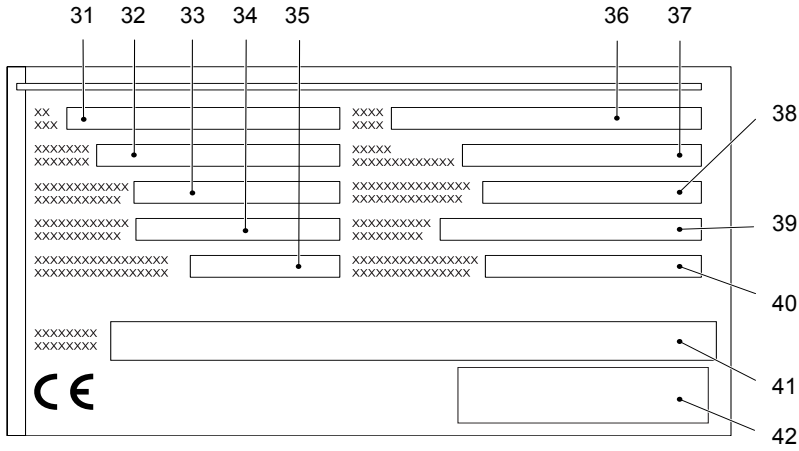
5.1 Indication Points



Item	Description
21	Attachment points for loading by crane
22	Prohibition plate: "Do not step under the load handler"
23	Prohibition plate: "Do not reach through the mast"
24	Truck capacity plate
25	Serial number
26	Truck data plate
27	Capacity plate for stacking and transport operations or stacking, double-deck and transport operations (○)
28	Prohibition plate: "No passengers"
29	Inspection plaque
30	Truck model identification

5.2 Data plate

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

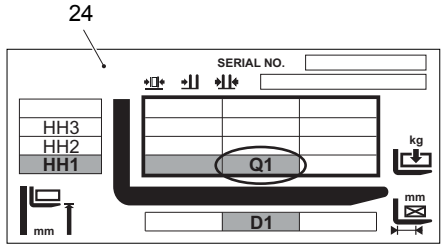


Item	Description	Item	Description
31	Type	37	Year of manufacture
32	Serial number	38	Load centre distance (mm)
33	Rated capacity (kg)	39	Nominal power
34	Battery voltage (V)	40	Min./max. battery weight (kg)
35	Net weight without battery (kg)	41	Manufacturer
36	Option	42	Manufacturer's logo

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

5.3 Truck capacity plate

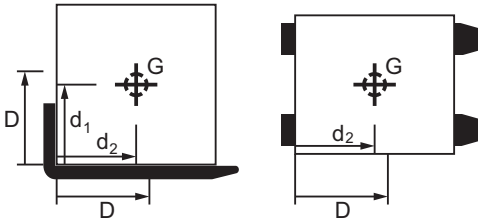
Current capacity plate



The capacity plate (24) indicates the maximum capacity Q (in kg) for a given load centre distance D (in mm) and corresponding lift height H (in mm) for the truck when raising a load.

Example of how to calculate the maximum capacity:
The maximum capacity is Q1 at a load centre G within the load centre distance D1 and a lift height up to HH1.

Load centre distance



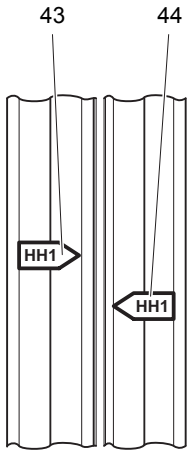
The load centre distance D of the load handler is specified as the horizontal distance from the front face and the vertical distance from the upper edge of the load handler.

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

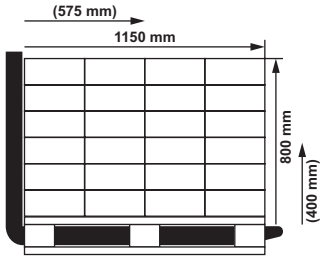
The distances d_1 and d_2 depicted in the illustration between the load handler and the actual centre of gravity G of the load must be smaller or equal to the load centre distance D ($d_1 \leq D$ and $d_2 \leq D$) to avoid the risk of overturning, see page 83.

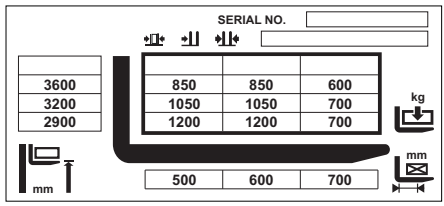
Lift height limits

The arrow shaped markings on the outer mast (43) and on the inner mast (44) indicate to the operator when the height limits specified on the capacity plate have been exceeded.



5.3.1 Example of Use of Capacity Plate





Example load (palletised):

– several cardboard boxes of the same size and same weight
– Load height: 800 mm
– Load length: 1150 mm
– Distances between the load centre distance and the load handler:
  400 mm vertical, 575 mm horizontal

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

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

Load centre distance of the load handler:

– The capacity plate specifies valid load centre distances for the load handler of 500 mm, 600 mm and 700 mm.
– The second load centre distance suits the example load: At 600 mm it is greater than the distances of 400 mm and 575 mm between the load centre of gravity and the load handler .

Capacities as specified in the capacity plate depending on the lift heights at a load centre distance of 600 mm:

– At a lift height of 2900 mm the maximum capacity is 1200 kg.
– At a lift height of 3200 mm the maximum capacity is 1050 kg.
– At a lift height of 3600 mm the maximum capacity is 850 kg.

5.4 Wind loads

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

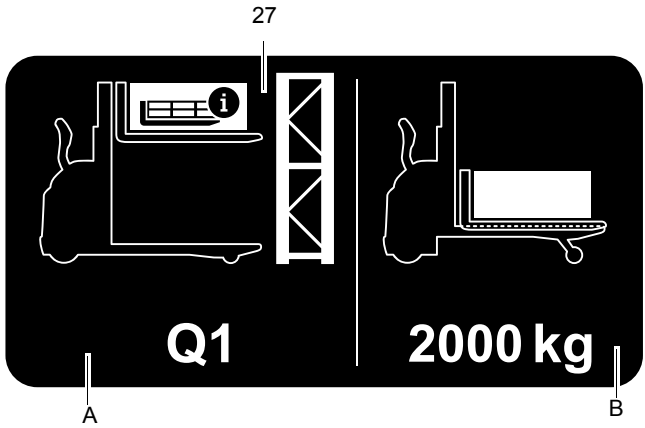
Light loads must be especially secured when they are subjected to wind forces. This will prevent the load from sliding or falling.

Stop the truck in both cases.

5.5 Capacity Plate for Stacking and Transport Operations

➔ Not for double-decker option

The capacity plate for stacking and transport operations (27) specifies the truck capacity (Q in kg) during stacking and transport operations:



A=	Stacking operations (storing and retrieving loads): During high-level lifting (mast lift), observe the capacity depending on the lift height, see page 30.
B=	Transport operations: Maximum capacity when transporting loads horizontally 2000 kg with the support arms raised and without high-level lift (mast lift).

➔ During stacking operations with the low-level lift (support arm lift) raised, loads can be stored and retrieved up to a lift height of 1800 mm. For lift heights above 1800 mm, the low-level lift (support arm lift) must be lowered.

➔ Do not transport loads when they are raised (>500 mm).

5.6 Capacity Plate for Stacking, Transport and Double-Deck Operations

For double decker option only

⚠ CAUTION!

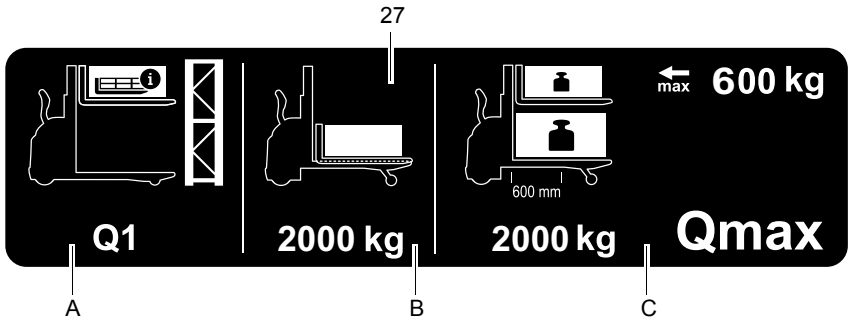
Risk to operational stability

In order not to jeopardize the operational stability, pay attention to the weight when transporting two pallets so that the truck does not tip over.

▶ In order not to jeopardize the operational stability, the heavier pallet should always be transported underneath.

Current capacity plate

The capacity plate for stacking, transport and double-deck operations (27) specifies the truck capacity Q (in kg) during stacking, transport and double-deck operations:



A=	Stacking operations (storing and retrieving loads): During high-level lifting (mast lift), observe the capacity depending on the lift height, see page 30.
B=	Transport operations: Maximum capacity when transporting loads horizontally 2000 kg with the support arms raised and without high-level lift (mast lift).
C=	Double-deck operations: Max. capacity for high-level lifting (mast lift) is 600 kg. Maximum capacity for concurrent high-level lifting (mast lift) and low-level lifting (support arm lift) is 2000 kg.

During stacking operations with the low-level lift (support arm lift) raised, loads can be stored and retrieved up to a lift height of 1800 mm. For lift heights above 1800 mm, the low-level lift (support arm lift) must be lowered.

Do not transport loads when they are raised (>500 mm).

The maximum lift height for double-deck operations is 1800 mm.

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.

EJC 112z with ZT mast

Loading the truck by crane

Requirements

– Park the truck securely, see page 68.

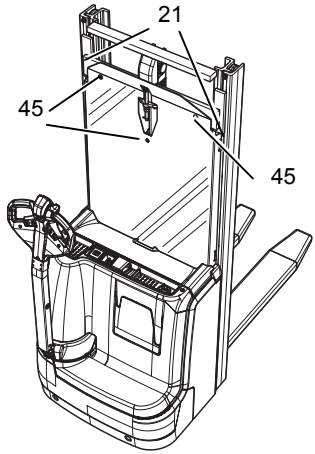
Tools and Material Required

– Lifting gear
– Crane lifting gear
– Spanner

Procedure

- Unscrew the six M 6x12 or M 8x16 bolts (45) and remove the protective screen panel.
- Secure the crane lifting gear to the attachment points (21).

The truck can now be loaded by crane.



➔ Refit the protective screen panel once the truck has been loaded.

EJC 112z with ZZ/DZ mast

Loading the truck by crane

Requirements

– Park the truck securely, see page 68.

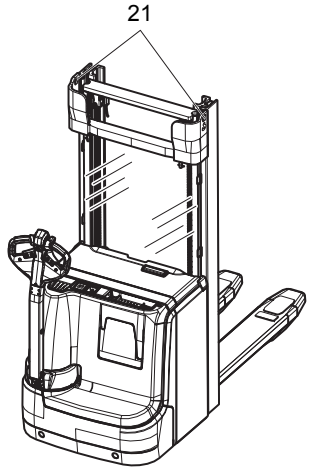
Tools and Material Required

– Lifting gear
– Crane lifting gear

Procedure

- Secure the crane lifting gear to the attachment points (21).

The truck can now be loaded by crane.



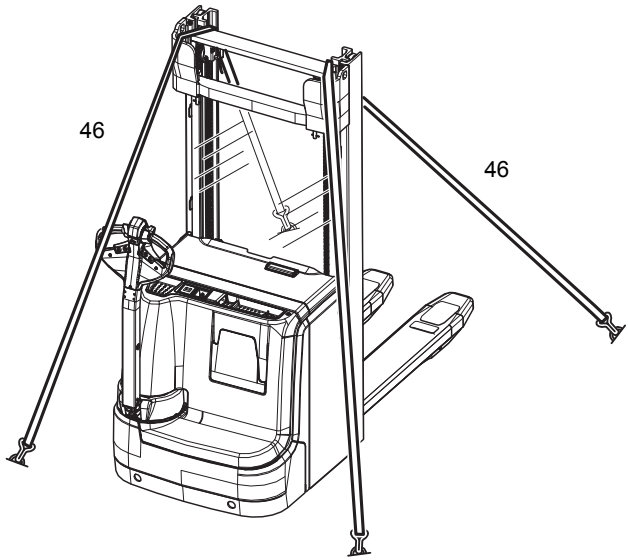
2 Transport

⚠ 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 industrial truck for transport

Requirements

– Load the truck.
– Park the truck securely, see page 68.

Tools and Material Required

– Lashing straps

Procedure

• Attach the lashing straps (46) to the industrial truck and the transport vehicle and tension sufficiently.

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.

Procedure

- Check the equipment is complete.
- If necessary, install the battery, see page 53.
- Charge the battery, see page 45.

The truck can now be started, see page 65.

NOTE

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

NOTE

Cold store trucks

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

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

⚠ CAUTION!

Poor visibility through the protector

The mast protection pane protector can impair the operator's visibility.

▶ Remove the protector (transport retainer) from both sides of the mast protection pane.

Wheel flattening

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

D Battery - Servicing, Recharging, Replacement

1 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 68).

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:

EJC 112z

Battery type	Capacity (Ah)	Min. weight (kg)	Max. dimensions (mm)
24-volt battery	2 PzB 130	133	652 x 148.5 x 560
24-volt battery	2 PzV-BS 142 - wf Exide	133	652 x 148.5 x 560
24-volt battery	2 PzVB 134 HAWK.	144	662 x 148.5 x 592
24-volt battery	2 PzMB 140	144	662 x 148.5 x 592
24-volt battery	2 PzB 150	144	662 x 148.5 x 592
24-volt battery	2 PzB 150 Lib. Silver	144	662 x 148.5 x 592
24-volt battery	XFC 158	144	622 x 148.5 x 592
24-volt battery	2 PzV - BS 170 - wf Exide	176	657 x 148.5 x 686
24-volt battery	2 PzB 200 Lib. Silver	176	657 x 148.5 x 686
24-volt battery	2 PzVB 162 HAWK.	166	662 x 148.5 x 686
24-volt battery	XFC 177	166	662 x 148.5 x 686
24-volt battery	2 PzMB 180	166	662 x 148.5 x 686
24-volt battery	2 PzB 200	166	662 x 148.5 x 686
24-volt battery	3 PzB 225	200	646 x 207 x 583
24-volt battery	XFC 158	238	646 x 207 x 686
24-volt battery	3 PzVB 243 HAWK.	238	646 x 207 x 686
24-volt battery	3 PzV-BS 255 - wf Exide	238	646 x 207 x 686
24-volt battery	3 PzMB 270	238	646 x 207 x 686
24-volt battery	3 PzB 300	238	646 x 207 x 686

➔ Optionally, the truck can be fitted with a lithium-ion battery, see "Li-Ion battery 24V - 110 Ah/240 Ah/360 Ah" operating instructions.

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

3 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.

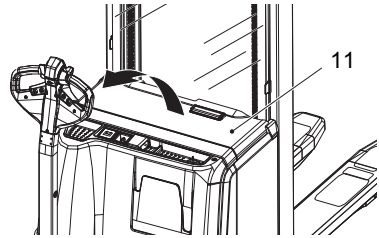
– Park the truck securely, see page 68.

Procedure

• Open the battery panel (11).

• 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.

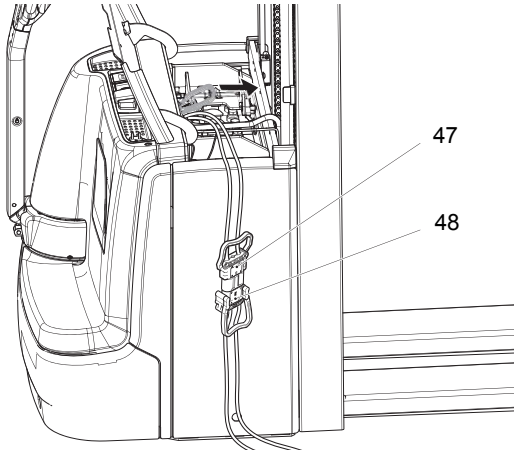
- ▶ Switch the charging station and truck off first before connecting/disconnecting the charging cable of the battery charging station to/from the battery connector.
- ▶ The charger must match the battery in terms of voltage, charge capacity and battery type.
- ▶ Before charging, check all cables and 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.

NOTE

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 (47) from the truck connector.
- Connect the battery connector (47) to the charging cable (48) 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

NOTE

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 (47) from the charging cable (48) of the stationary charger.
- Attach the battery connector (47) 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.

⚠ WARNING!

Risk of damage to the on-board battery charger or live attachments

Damage to the on-board battery charger or live attachments (mains cable, plug) can cause a short circuit or electric shock.

- ▶ Do not trap the mains cable when closing the battery panel.
- ▶ Report any defects immediately to your supervisor.
- ▶ Notify the customer service department.
- ▶ Mark the defective truck and take it out of service.
- ▶ Do not return the industrial truck to service until you have identified and rectified the fault.

NOTE

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.

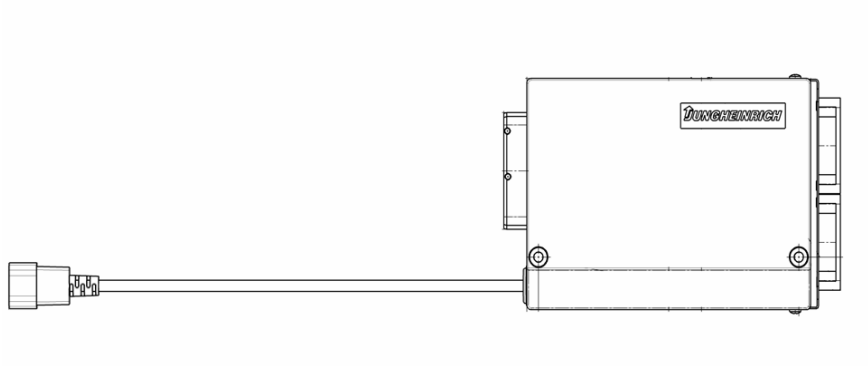
- ▶ The charger must only be used for batteries supplied by Jungheinrich or other approved batteries provided it has been adapted by the manufacturer's customer service department.
- ▶ Batteries must never be swapped from truck to truck.
- ▶ Do not connect the battery to two chargers simultaneously.

4.2.1 Setting the charging characteristics (ELH 2415 / 2425 / 2435)

EJC 110 / 112 / 212 with mechanical steering
EJC 212 with electric steering (○) from week 18/2014

The charging characteristics (ELH 2415 / 2425 / 2435) are set via parameter 1388 of the truck software, see page 125.

The CanCode and CanDis option is necessary to set the charging characteristics. Otherwise, the setting may only be performed by the manufacturer's customer service department.



Flashing sequence / charging curve assignment (ELH 2415/2425/2435)

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	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
3	Maintenance-free: PzV with 100 - 150 Ah
4	Maintenance-free: PzV with 151 - 200 Ah
5	Maintenance-free: PzV with 201 - 300 Ah
6	Maintenance-free: PzV 301 - 330 Ah
7	Cold store

NOTE

- ▶ If parameter 1388 is incorrectly set, the charger will be inhibited and the battery will not charge.
- ▶ With PzS 200-300 Ah wet-cell batteries, both characteristic curve 1 and characteristic curve 2 can be used.
- ▶ If a characteristic curve is set on the ELH 2415 / 2425 that is not supported by the charger, the charge display is lit a steady red.
- ▶ All other characteristic curves (≥ 8) block the charger, and the battery is not charged.

4.2.2 Charging the battery

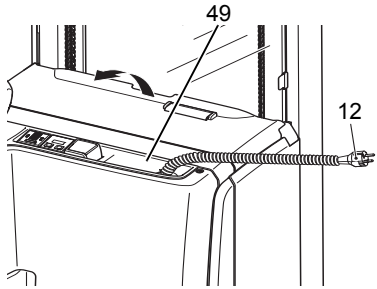
Starting to charge with the on-board battery charger

– **ELH mains connection**

Mains voltage: 230 V / 115 V (+15/-10%)
Mains frequency: 50 Hz / 60 Hz

The mains cable and mains connector (12) of the battery charger are contained in the front panel or the battery compartment (49).

Charging the battery



Requirements
– Park the truck securely, see page 68.
– Expose the battery, see page 44.
– Correct charging program set on battery charger.

Procedure
- Remove any insulating mats from the battery.
- The battery connector must remain plugged in.
- Attach the mains connector (12) 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 being charged.

➔ When the mains connector (12) is attached to the mains, all the truck electrical functions are disconnected (electric immobiliser). The truck cannot be operated.

Completing battery charging, restoring the truck to operation

NOTE

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

Requirements

– The battery is fully charged.

Procedure

- Remove the mains connector (12) from the mains socket and store it along with the cable in the storage compartment (49).
- 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

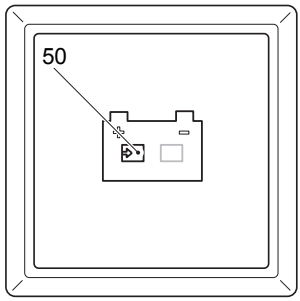
▶Do not trap the mains cable when closing the battery panel.

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 (50)



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.
- ▶ Park the truck on a level surface to prevent the battery from sliding out.
- ▶ Make sure the crane slings have sufficient capacity to replace the battery.
- ▶ Use only approved battery replacement devices (battery roller stand, replacement trolley etc.).
- ▶ Make sure the battery is securely located in the truck's battery compartment.

⚠ CAUTION!

Trapping hazard

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 68.
– Expose the battery, see page 44.

Tools and Material Required

– Crane lifting gear

Procedure

- Disconnect the battery connector from the truck connector.

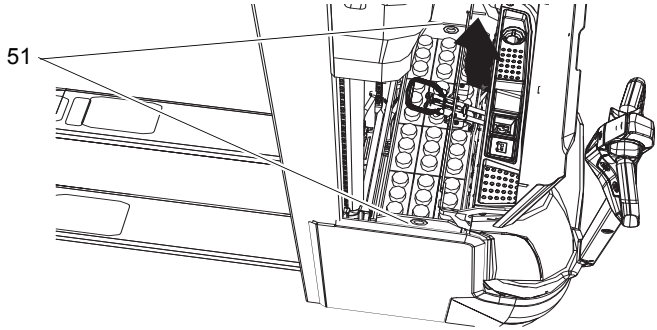
➔ Place the battery cable on the tray so that it cannot be severed when the battery is pulled out.

- Attach the crane lifting gear to the eyes (51).

➔ 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

Requirements

– Park the truck securely, see page 68.

Procedure

➔ Installation is the reverse order. When reinstalling the batteries, make sure they are installed in the correct position and properly connected.

➔ 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 cover.

The battery is now installed.

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

5.2 Battery Stop for S Battery Compartment

⚠ CAUTION!

Battery stop

Removing the battery stop can result in trapping and injury. The battery must only be placed on the right-hand side of the truck. The battery stop on the left-hand side serves to prevent the battery from sliding.

▶ The battery stop on the left-hand side of the truck must not be removed if the battery has a length below 655 mm.

Installing the battery stop

Requirements

– S battery compartment
– Park the truck securely, see page 68.
– Remove the battery, see page 54

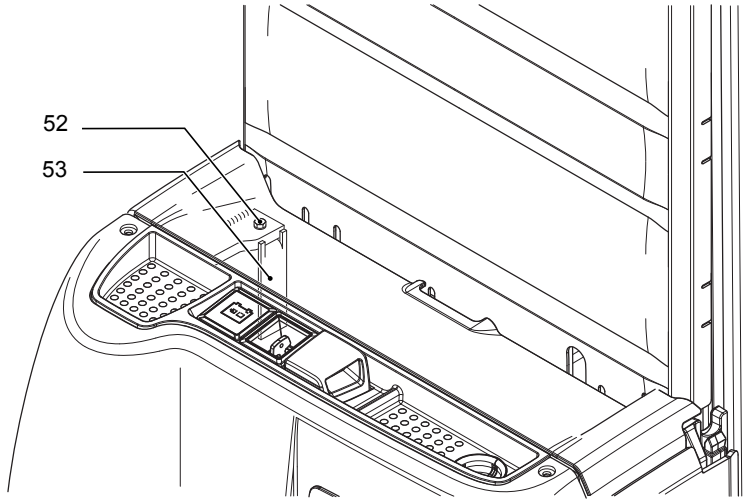
Procedure

• Screw on the battery stop (53) with 23 Nm (52).

If the battery is longer than 655 mm, the battery stop (53) can be removed.

• Install the battery, see page 54

The battery stop is now installed.



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

⚠ WARNING!

Removing or disabling safety devices can cause accidents

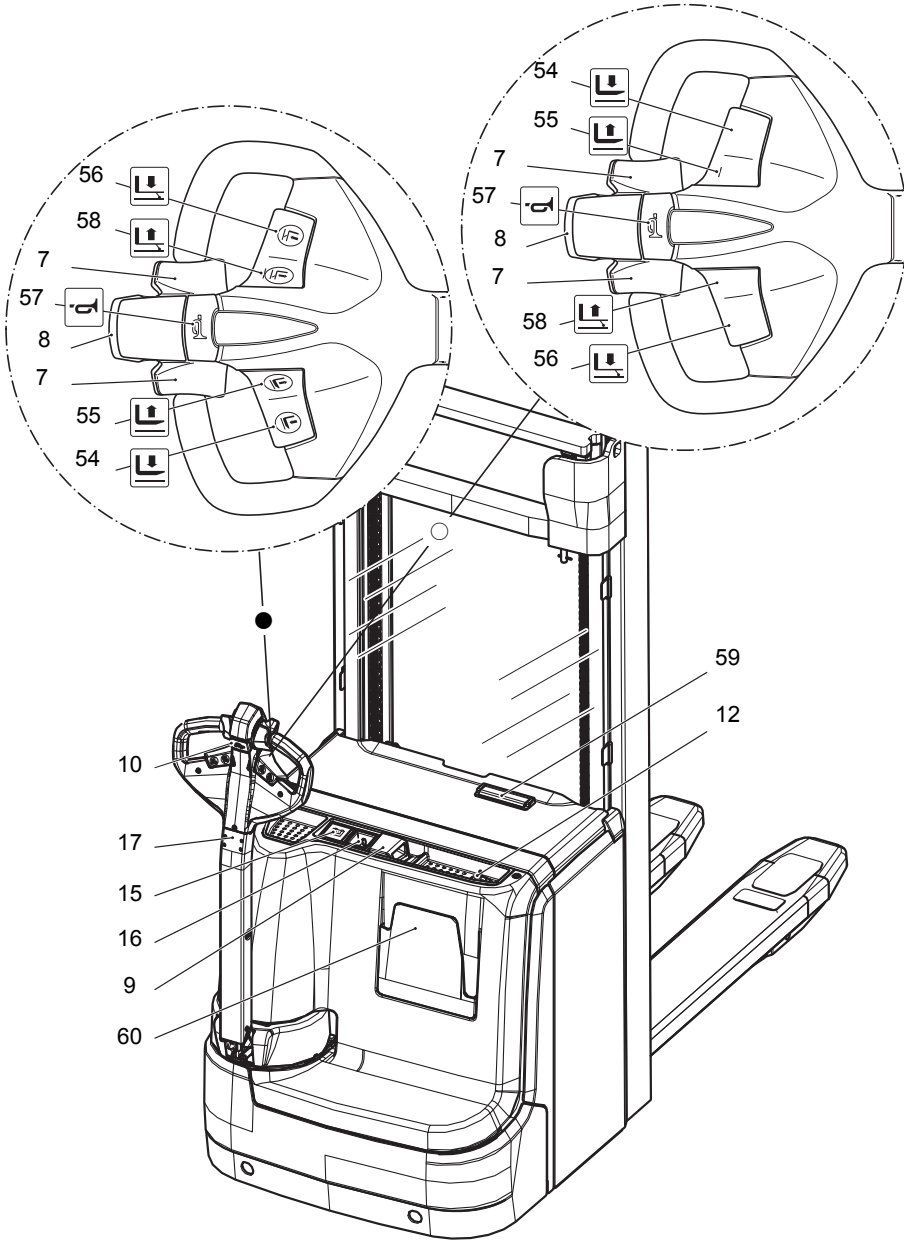
Removing or disabling safety devices such as the Emergency Disconnect switch, key switch, buttons, horn, strobe lights, mast protection pane, mast grille, sensors, panels etc. can result in accidents and injury.

- ▶ 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.

---

2 Displays and Controls

EJC 112z



Item	Control/display		Function
7	Travel switch	●	– Travel direction and speed
8	Collision safety switch	●	Safety feature, drive direction travel only – When applied, the truck travels for approx. 3 seconds in the load direction. The parking brake is then applied. The truck remains switched off until the travel switch is set to neutral.
9	Emergency disconnect switch	●	Disconnects the battery supply – All electrical functions are cut out and the truck is braked.
10	Slow-travel button	●	– If the tiller is in the upper braking zone, braking can be overridden by pressing the button, and the truck can move at reduced speed (slow travel), see page 77.
17	Tiller	●	– Used for steering and braking.
15	Charge status indicator	●	– Indicates the charge/discharge status of the battery.
● = Standard equipment			○ = Optional equipment

Item	Control/display		Function
15	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	○	Selection of: – Travel program – Options
		○	Replaces the key switch – Truck release by entering master and access codes
16	Key switch	●	– Activates the truck by switching on the control voltage – Removing the key prevents the truck from being switched on by unauthorised personnel
	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
	ISM access module	○	Replaces the key switch – Activates the truck via a card/ transponder – Displays readiness for operation – Operational data logging – Data exchange with card/transponder
60	Document storage compartment	●	– Used to store the operating instructions
54	Fork lowering button	●	Lowers the forks – The lowering speed can be infinitely controlled by the stroke of the switch (8 mm).
55	Fork lifting button	●	Lifts the forks – The lift speed can be infinitely controlled via the stroke of the switch (8 mm).

Item	Control/display		Function
56	Support-arm lowering button	●	– Lowers the support arms at a constant speed
57	Warning signal button	●	– Warning signal button
58	Support-arm lift button	●	– Raises the support arms at a constant speed
59	Clip pad	●	– Used to hold paper
● = Standard equipment			○ = Optional equipment

2.1 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.

NOTE

Full discharge can damage the battery

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

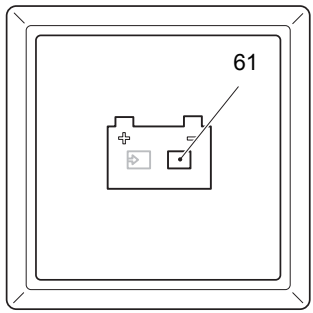
▶ Charge the battery at least every 2 months.

Charge the battery see page 45.

If the residual capacity falls below the required level, lifting is inhibited. An alternating display (61) appears. Lifting is only released when the battery connected is at least 70% charged.

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 (61) 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.

3 Preparing the Truck for Operation

3.1 Checks and Operations to Be Performed Before Starting Daily Work

⚠ WARNING!

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

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

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

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

Inspection before daily operation

Procedure

- Check the whole of the outside of the truck for signs of damage and leaks. Damaged hoses must be replaced immediately.
- Check 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 28.
- Check the protection screen / grille and their attachments are secure and undamaged.
- Make sure the drive panels and covers are secure and check for damage.
- With the load handler lowered, check the mast chains are tensioned and secured correctly.
- Check tiller return function.
- Check the controls automatically return to the neutral position after use.
- Safety cutoff height switch (mast), check cable connections and magnet attachment.

3.2 Preparing the truck for operation

Switching on the truck

Requirements

– Checks and operations to be performed before starting daily work, see page 65.

Procedure

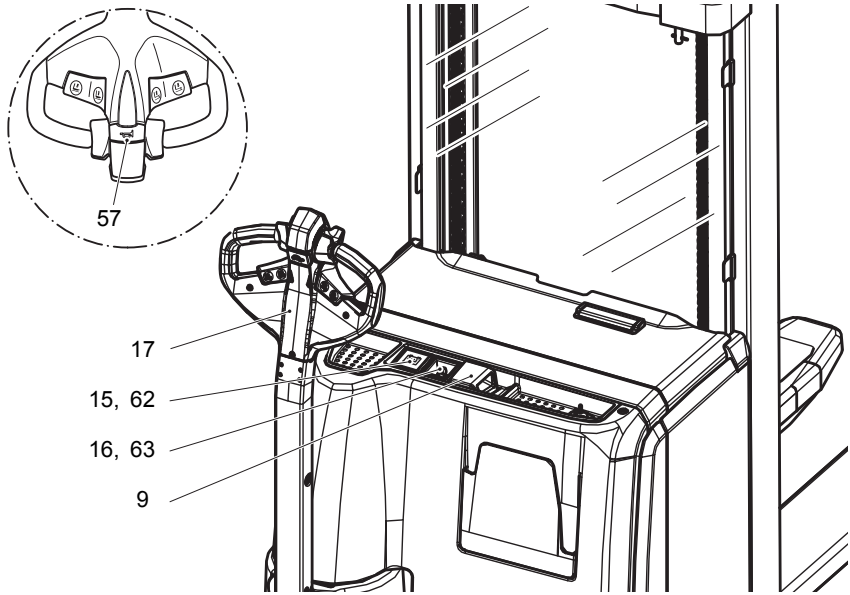
- Pull the emergency disconnect switch (9) to unlock it.
- To switch on the truck:
  - Insert the key in the key switch (16) and turn it as far to the right as it will go.
  - Enter the code in the display unit (2-inch display) (○) (63).
  - Hold the card or transponder in front of the ISM access module and, depending on the setting, press the green button on the ISM access module (○).

➔ The tiller (17) must be in the upper braking zone "B". If event message "E-0914" is displayed 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 (15) shows the current battery charge status.

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



3.3 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 equipment:
  - Test the emergency disconnect function by pressing the emergency disconnect switch. The main circuit is disconnected and no truck operations can be performed. Now pull the emergency disconnect switch to unlock it.
  - Test the horn by pressing the "warning signal" button.
  - Check braking efficiency, see page 78.
  - Test the steering, see page 78.
  - Test the hydraulic system, see page 80.
  - Test travel operations, see page 74.
  - 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.

3.4 Parking the truck securely

⚠ WARNING!

An unsecured truck can cause accidents

Do not leave an unsecured truck.

▶ Park the truck securely when leaving it.

▶ Exception: If the operator intends to remain in the immediate vicinity and is leaving the truck for only a short while, the applied parking brake is sufficient to hold the truck, see page 79. Immediate vicinity is when the operator is able respond to malfunctions or attempts to use the truck by unauthorised persons immediately.

⚠ WARNING!

An unsecured truck can cause accidents

Do not park the truck on an incline. Do not park the truck without the brakes engaged. Do not park and leave the truck with the load handler raised.

▶ Park the truck on a level surface. In special cases the truck may need to be secured with wedges.

▶ Fully lower the load handler when leaving the truck.

▶ 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.

Parking the truck securely

Procedure

- Park the truck on a level surface.
- Fully lower the load handler (56):
  - Press the lower button (54).
- Using the tiller (17), turn the drive wheel to the "straight ahead" position.
- Switch off the truck. To do this:
  - Turn the key in the key switch (16) anti-clockwise as far as it will go. Remove the key from the key switch (16).
  - For the display unit (2-inch display) (○) (63), press the soft key under the "Off" symbol (○).
  - Press the red key on the ISM access module (○).
- Press the emergency disconnect switch (9).

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.

⚠ WARNING!

Do not exceed the permissible surface and spot load limits on the travel routes.
At blind spots get a second person to assist.

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 16 % 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 (9).

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

➔ Press the Emergency Disconnect switch on in emergencies.

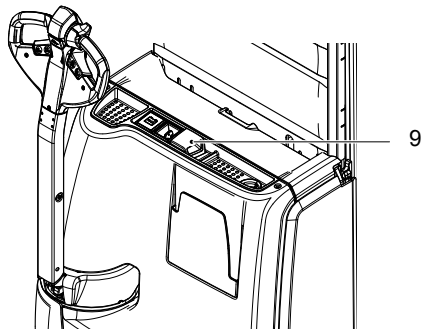
Releasing the Emergency Disconnect switch

Procedure

- Pull the Emergency Disconnect switch (9) 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 a display unit (2-inch display) (○) and ISM access module remain switched off.



4.3 Automatic braking

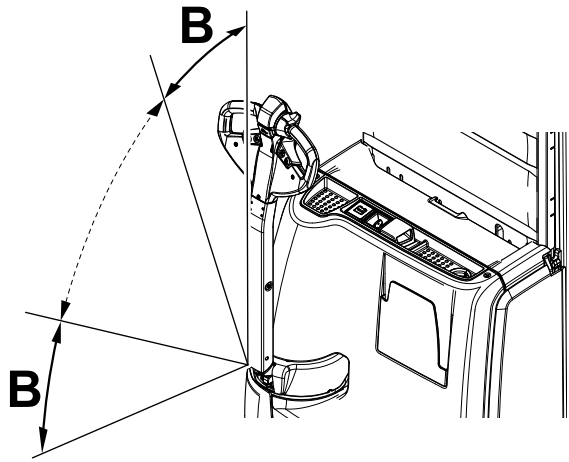
When the tiller is released, it returns automatically to the upper brake zone (B) and the brakes are applied automatically.

⚠ 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 be 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 65.

Procedure

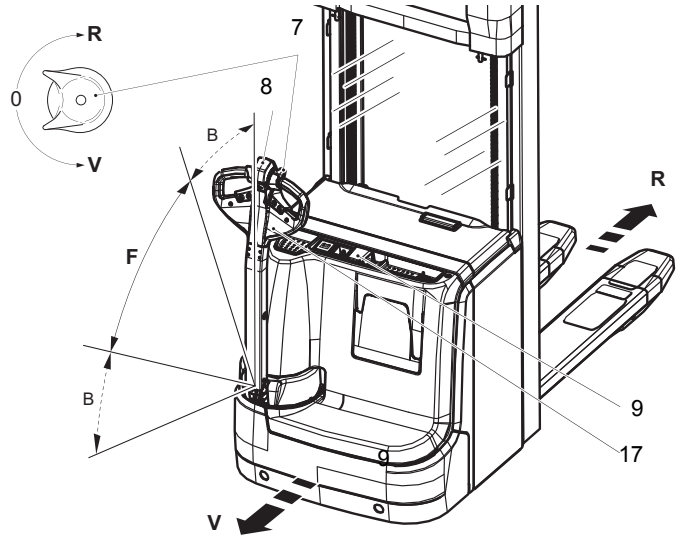
- Set the tiller (17) to the travel zone (F).
- Control the travel direction with the travel switch (7):
  - Rotate the travel switch (7) slowly in the load direction (3):
    Travel in load direction:
  - Rotate the travel switch (7) slowly in the drive direction (2):
    Travel in drive direction:
- Control the travel speed with the travel switch (7):
  - The further the travel switch (7) is rotated, the greater the travel speed.
- Control the travel speed by rotating the travel switch (7) further or less.

➔ After releasing the travel switch (7), 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 (EJC 112z only)**

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 Changing direction during travel

⚠ 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 (7) 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 (17) (e. g. in confined spaces / elevators).

Switch on the slow travel function

Procedure

- Press and hold down the "slow travel" button (10).
- Rotate the travel switch (7) in the required travel direction.

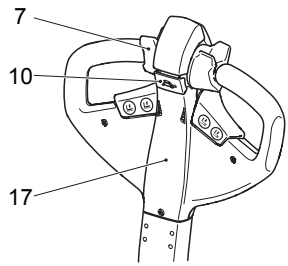
The brake is released. The truck travels at slow speed.

Switching off slow travel

Procedure

- Release the "slow travel" button (10).
  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 (7).

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



4.6 Steering

Procedure

- Move the tiller (17) to the left or right.

The truck is steered in the required direction.

Electric steering (○) is easier to operate due to less activation force required.

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 set the tiller to the brake position.

The truck can brake in three different ways:

– By using the service brake (brake zone B).
– With the coasting brake.
– By inversion braking (braking and changing direction).

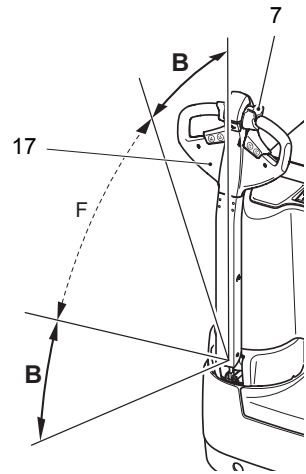
4.7.1 Braking with the service brake

Procedure

- Move the tiller (17) up or down to one of the brake zones (B).

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

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



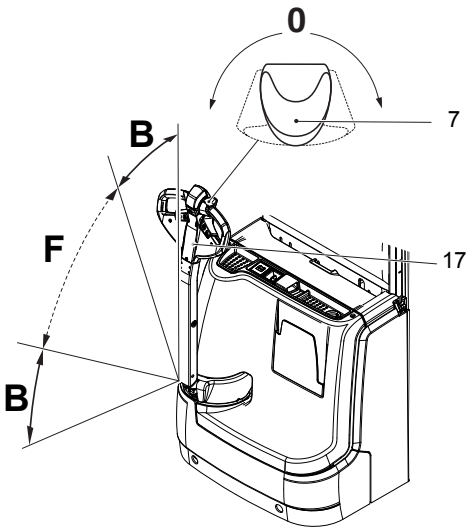
4.7.2 Braking with the coasting brake

Procedure

- If the travel switch (7) 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 Inversion braking

Procedure

- Set the travel switch (7) to the opposite direction while travelling, see page 76.

The truck brakes regeneratively until it starts to move in the opposite direction.

4.7.4 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.
- ▶ Never stand underneath a raised load handler.
- ▶ 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.

NOTE

Adapt a slower speed when stacking and retrieving.

NOTE

Lift heights > 1800 mm are only enabled when the support arms have been lowered manually. This ensures the truck remains stable. Above a lift height of 1800 mm, the support arms can no longer be raised (EJC 112z only).

Hydraulic function lock: The default setting of the control enables lifting only when the tiller is in the travel range (F) or when the "slow travel" button is pressed. This does not affect lowering.
The default setting can be changed via a parameter, see page 125.

4.8.1 Raising the load handler

Requirements

– Prepare the truck for operation, see page 66.

Procedure

• Press the “Raise load handler” button (55) until you reach the desired lift height.

NOTE

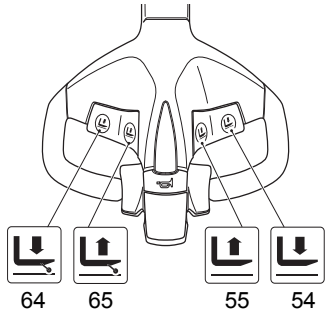
Risk of material damage to the hydraulic unit

When you have reached the mechanical stops of the load handler, do not press the "Raise load handler" button any more. Otherwise the hydraulic unit could suffer material damage.

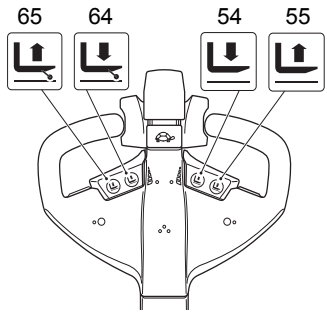
The lift/lower speed can be infinitely controlled via the movement of the button (approx. 8 mm).
Short stroke = slow lift / lower
Long stroke = fast lift / lower

The load handler is raised.

Tiller from above



Tiller from below



Use as an elevated work table

The raised load handler can be used as an elevated work table when the truck is switched off, see page 91.

4.8.2 Lowering the load handler

Requirements

– Prepare the truck for operation, see page 66.

Procedure

- Press the "Lower load handler" button (54) until you reach the desired lift height.

➔ The lowering speed can be infinitely adjusted via the travel of the button (approx. 8 mm).
Short switch stroke = slow lower
Long switch stroke = fast lower

The load handler is lowered.

4.8.3 Raising the wheel arms

Requirements

– Prepare the truck for operation, see page 66.

Procedure

- Press the “support arm raise” button (65) until you reach the desired support arm lift.

The support arms are raised.

4.8.4 Lowering the wheel arms

Requirements

– Prepare the truck for operation, see page 66.

Procedure

- Press the “support arm lower” button (64) until you reach the desired support arm lift.

The support arms are lowered.

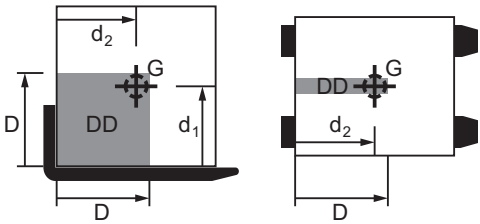
4.9 Lifting, transporting and depositing loads

⚠ WARNING!

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

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

- ▶ Observe load centre distances and capacities of the load handler, see page 30.
- ▶ Pick up the load so that its centre of gravity lies between the load arms of the load handler.
- ▶ Preferably, the load should be configured and picked up so that its centre distance lies within the load centre distance of the load handler ($d_1 \leq D$ and $d_2 \leq D$, see area DD in the illustration).
- ▶ A load with a centre of gravity outside of the load centre distance of the load handler ($d_1 > D$ and/or $d_2 > D$) should only be moved very carefully, as this load case has not been checked on a truck tested according to the test guideline.



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

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

⚠ WARNING!

Unsecured and incorrectly positioned loads can cause accidents.

Before lifting a load 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.

NOTE

With the two-stage Duplex mast (ZZ) and the three-stage Triplex mast (DZ) a short, centre-mounted free lift cylinder initially lifts the load carriage (free lift) without changing the overall height of the truck.From a truck-specific lift height, travel is automatically reduced. It increases again when the load is lowered.

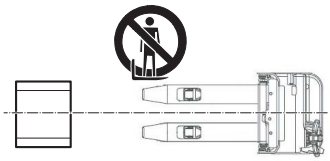
NOTE

Above a lift height of > 1800 mm the truck's travel speed is reduced to 2.5 km/h. The truck's acceleration is reduced above a lift height of 1800 mm.

4.9.1 Raising a load

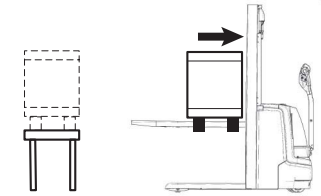
Requirements

– 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 81).

The load is being raised.

NOTE

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.

The lifting/lowering speed can be infinitely controlled via the movement of the button (approx. 8 mm).

Short stroke = slow lift / lower

Long stroke = fast lift / lower

With the low-level lift (support arm lift) raised, loads can be stored and retrieved up to a lift height of 1800 mm. For lift heights above 1800 mm, the low-level lift (support arm lift) must be lowered.

Two palletised loads can only be lifted on top of each other if the corresponding optional equipment is available, see page 88.

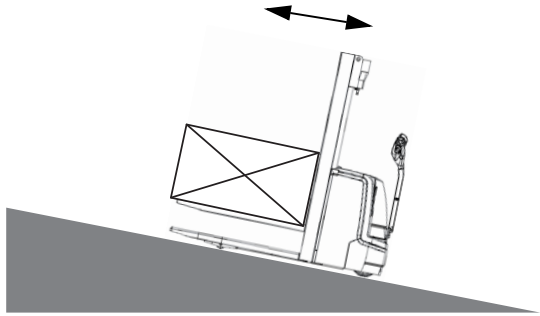
4.9.2 Transporting a load

Requirements

– Load raised correctly.
– Mast lowered for proper transport (approx. 150 - 500 mm above the ground). Do not travel with a raised load (>500 mm).
  In double decker mode (○): Load handler lowered as far as possible but without touching the lower load, see page 89.
– Good 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).



Two palletised loads can only be transported on top of each other if the corresponding optional equipment is available, see page 89.

4.9.3 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 82).
- Carefully drive the load handler out from beneath the pallet.

The load is deposited.

NOTE

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

NOTE

The "soft landing" feature reduces the lowering speed of the load just before it reaches the ground (approx. 100 - 300 mm).

The “soft landing" feature is an optional extra.

Two palletised loads transported on top of each other can only be lowered if the corresponding optional equipment is available, see page 90.

4.9.4 Lifting two palletised loads

For double decker option only

⚠ CAUTION!

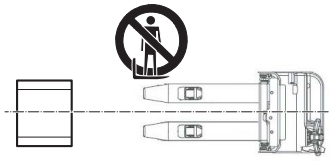
Risk to operational stability

In order not to jeopardize the operational stability, pay attention to the weight when transporting two pallets so that the truck does not tip over.

▶ In order not to jeopardize the operational stability, the heavier pallet should always be transported underneath.

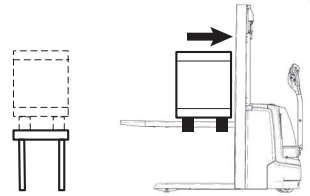
Requirements

– Load correctly palletised.
– Load weight matches the truck's rated capacity.
– Load handler evenly laden for heavy loads.



Procedure

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



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

- Raise the load handler until you reach the desired height, (see page 81).

In double-decker mode the load handler must not be raised higher than 1800 mm. The bottom load must be heavier than the upper load.

- Insert the support arms under the second pallet.
- Raise the support arms with the "Support arm lift" button.

Both pallets are raised.

4.9.5 Transporting two palletised loads above each other

For double decker option only

⚠ CAUTION!

Risk to operational stability

In order not to jeopardize the operational stability, pay attention to the weight when transporting two pallets so that the truck does not tip over.

▶ In order not to jeopardize the operational stability, the heavier pallet should always be transported underneath.

Requirements

– Load raised correctly.
– Load handler lowered as far as possible but without touching the lower load.
– Good 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.
- Watch out for other traffic at crossings and passageways.
- Always travel with a lookout at blind spots.
- On slopes and inclines always carry the load facing uphill, never approach at an angle or turn.

4.9.6 Lowering two palletised loads in turn

For double decker option only

⚠ CAUTION!

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

Requirements

– Storage location suitable for storing the load.

Procedure

- Drive the truck carefully up to the first storage location.
- Lower the support arms until the load is resting on the floor.
- Carefully move the support arms out of the pallet.
- Lower the load handler, see page 86.
- Drive the truck carefully up to the second 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 82).
- Carefully drive the load handler out from beneath the pallet.

Both pallets are lowered.

4.10 Use as a Lift Work Table

The load handler can remain in a raised position to be used as a lift work table when the truck is switched off, provided the operator is close to the truck.

➔ Immediate vicinity of the truck is when the operator is able to respond to malfunctions or attempts to use the truck by unauthorised persons immediately.

Observe national regulations and local operating conditions.

⚠ WARNING!

A raised load handler can cause accidents

A stationary truck with a raised load handler is potentially hazardous in work areas.

▶ Prevent any risk to personnel and materials.

▶ Never load or discharge loads manually with a raised load handler in areas that are hazardous, with limited visibility or insufficient lighting.

▶ Park the truck securely when leaving it, see page 68.

⚠ WARNING!

Risk of accident when the raised load handler slowly lowers of its own accord

The raised load handler can lower independently due to internal leakage. According to DIN EN ISO 3691-1 the load handler may lower by up to 100 mm during the first 10 minutes at the rated capacity with the hydraulic oil at normal operating temperature.

▶ Never stand underneath a raised load handler.

⚠ WARNING!

Risk of injury from falling loads

Falling loads can cause injuries.

▶ Never stand underneath a raised load handler.

▶ Never manually load or unload loads that could fall on the operator without additional safety devices at heights greater than 1800 mm.

▶ Always load loads so that they cannot fall off or accidentally shift.

▶ Secure low or small-item loads e.g. by wrapping them in film.

▶ Do not manually load or unload loads that are not correctly packed or have shifted as well as loads with damaged pallets or damaged stacking containers.

Use as a lift work table

Requirements

– Storage spare suitable for manual loading or discharging of loads.

Procedure

- Drive the truck carefully up to the storage location.
- Press the “Raise load handler ” button (55) until you reach the desired lift height.
- Switch off the truck.

Loads can be loaded or discharged manually with the load handler raised.

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 71
Key switch in position "O"	Set the key switch to position "I"
Battery charge too low	Check battery charge and charge the battery if necessary
Faulty fuse	Check the fuses, see page 150
Incorrect transponder for ISM access module (○) or transponder reader (○) used	Use correct transponder
Incorrect code entered in display unit (2-inch display) (○) or keypad (○)	Enter correct code, see page 110
Tiller not in brake position when the truck is switched on (for display unit (2-inch display) (○), event message E-0914 appears)	Set the tiller to the top or bottom brake zone, see page 78
"Raise load handler" button/"Lower load handler" button not in home position when truck switched on (for display unit (2-inch display) (○), event message E-2951 appears)	Do not actuate the button
Travel switch not in home position when truck switched on (for 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 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 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 146
Battery discharge monitor has switched off	Charge the battery, see page 45
Faulty fuse	Check the fuses, see page 150
Excessive load	Observe the maximum capacity, see data plate
Tiller not in brake position when the truck is switched on (for display unit (2-inch display) (○), event message E-0914 appears)	Set the tiller to the top or bottom brake zone, see page 78
"Raise load handler" button/"Lower load handler" button not in home position when truck switched on (for display unit (2-inch display) (○), event message E-2951 appears)	Do not actuate the button
Travel switch not in home position when truck switched on (for 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 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 display unit (2-inch display) (○), event message E-1901 appears)	Do not actuate the button
Switch in mast implausible (for display unit (2-inch display) (○), event message E-2124 appears)	– Lowering and travelling possible up to 1,5 km/h – Park the truck securely, see page 68 – Contact the manufacturer's customer service department

6 Operating the truck without its own drive system

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.

Releasing the brake

Tools and Material Required

– Two M5x35 screws

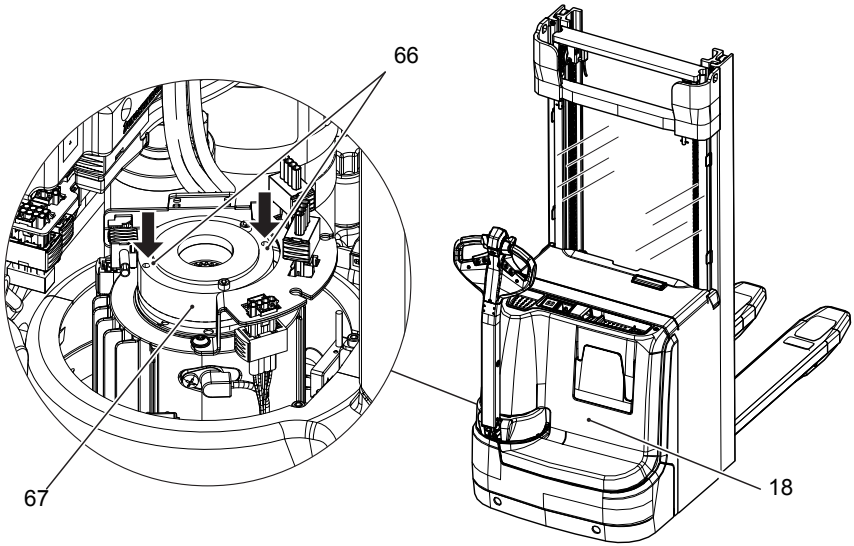
– Spanner

Procedure

- Switch off the truck. To do this:
  - Turn the key in the key switch (16) anti-clockwise as far as it will go. Remove the key from the key switch (16).
  - For the display unit (2-inch display) (○) (63), press the soft key under the "Off" symbol.
  - Press the red button on the ISM access module (○).
- Press the emergency disconnect switch (9).
- Open the battery panel, see page 44.
- Disconnect the battery.
- Remove the front panel (18), see page 141.
- Use chocks (for example) to prevent the truck from moving.
- Fully screw two M5x35 screws (66) into the brake (67) and lift up the anchor plate.

  The two M5x35 screws (66) are used to tension (unlock) the compression springs that activate the parking brake, so that the truck does not brake when de-energised.
- Remove the chocks.

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 M5x35 screws (66) from the brake (67).

⚠ CAUTION!

Open covers can cause injury and accidents

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

- Install the front panel (18), see page 141.

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 Load handler emergency lowering

⚠ WARNING!

Load handler emergency lowering

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

7.1 EJC 112z

Load handler emergency lowering

Requirements

– Load handler is not in the rack.

Tools and Material Required

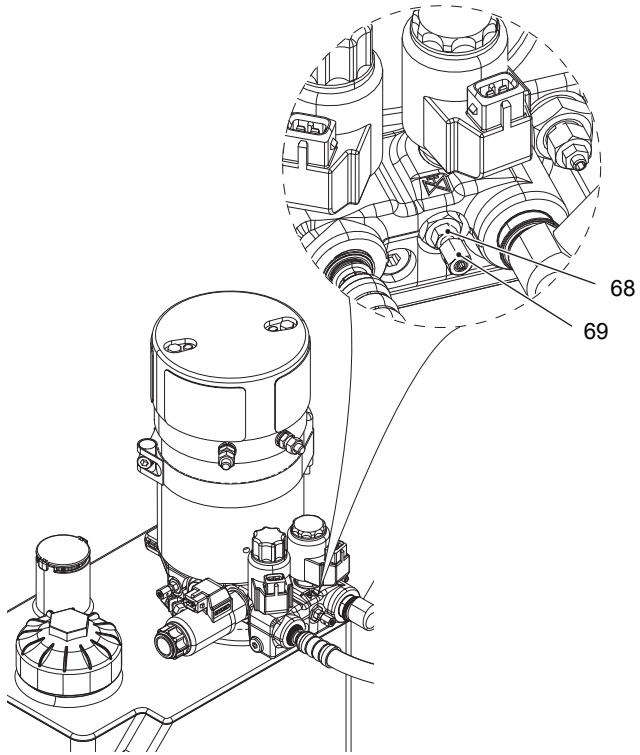
– Key (SW8)
– Torque wrench setting range 1-4 Nm

Procedure

- Park the truck securely, see page 68.
- Open the front panel, see page 141.
- Loosen the lock nut (68) on the valve block.
- Remove the valve screw (69) in stages (anti-clockwise).

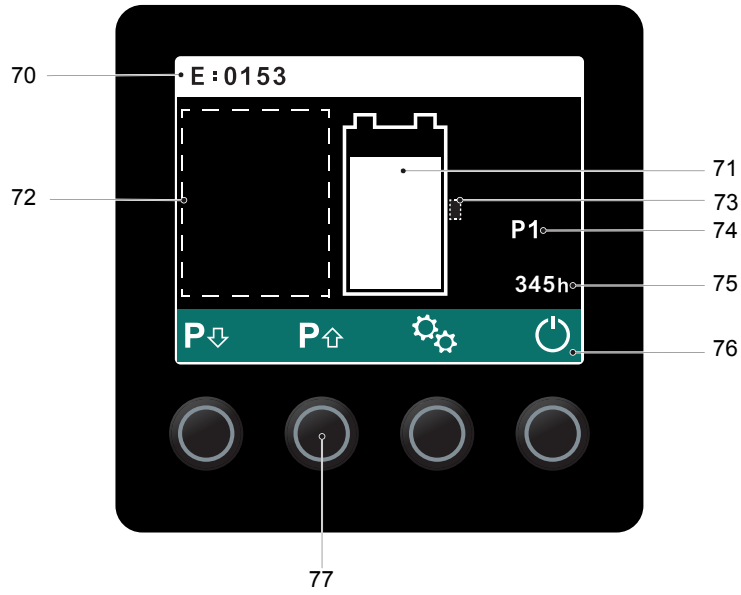
The load handler is lowered.

➔ *After the emergency lowering insert the valve screw (69) as far as the stop (1.5 Nm +0.5 Nm) and secure with the lock nut (68).*



8 Optional equipment

8.1 Display unit (2 inch display)



Item	Control or display	Function
70	Information field	Displays event messages
71	Battery capacity display	Battery discharge status
72	Icon field	Displays the icons, see page 104.
73	Battery type (characteristics)	Shows the set battery type or characteristics[1] 1 = Maintenance-free gel/dry battery 2 = Special battery, for example XFC
74	Travel program	Shows the travel program selected.
75	Service hours	see page 21
76	Key allocation	see page 102
77	Keys	Selection keys for the corresponding functions.

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

8.1.1 Button allocation of the display

Key allocation in main menu

Symbol	Meaning
	Travel program down: To switch the travel program down
	Travel program up: To switch the travel program up
	Settings (○): To change to the menu to administer the codes or transponders
	Switch off (○): Allows the truck to be switched off Switch off is only available in the display if the truck is switched on with an access code.

Key allocation in menu for managing codes or transponders (○)

Symbol	Meaning
	Change Set-Up Code: To change the set-up code and to activate the keypad or the transponder reader.
	Edit access code / transponder: To add or delete access codes and transponders.
	Up selection: To select access codes or transponders.
	Down selection: To select access codes or transponders.
	Clear: To delete selected access codes.
	Add: To add new access codes.
	Back: Cancels the current procedure and returns to the previous menu.
	Confirm: To confirm an entry or a transponder code.

8.1.2 Symbols in the display

Any number of pictograms can be displayed in the pictogram field (72). Which pictograms are shown in the pictogram field depends on the operating and truck status.

Symbol	Meaning	Colour	Function
	Stop notice	red	Functions deactivated due to truck malfunction
	Warning	yellow	Operating error
		red	Truck malfunction detected. Travel is restricted to slow travel or lift, lower and travel functions are reduced.
	Battery indicator, low residual capacity	yellow	Residual capacity ≤ 30% The battery must be charged soon.
		Red	Residual capacity ≤ 20% The battery must be charged immediately.
	Overtemperature	yellow	Overtemperature detected. Lifting, lowering and travel functions reduced.
		Red	Overtemperature detected. Lifting, lowering and travel functions deactivated.
	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.
	Side arm	yellow	Illuminates if both side arms are not folded in or both are not folded out.
	Operator platform Deadman switch	yellow	Illuminates if the fixed or folded out stand-on platform is not under load with the travel switch operated.
	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.

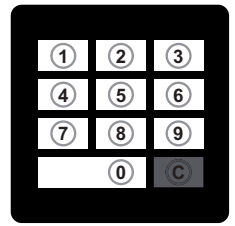
Symbol	Meaning	Colour	Function
	Support arm lift lifting limit	yellow	Illuminates if "Lift support arms" button pressed if the support arm lift lifting limit has been reached.
	Support arm lift lowering limit	yellow	Illuminates if "Lower support arms" button pressed if the support arm lift lowering limit has been reached.
	Charging process	Green	Battery charge display (on-board charger only): – Flashing: Charging in progress – Steady light: Charging complete
		Red	Charging interrupted

8.2 Keyless Access System

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

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

78



79

80

Item	Description
78	Display unit (EasyAccess Softkey): – Description, see page 101 – Entry of 4-digit set-up and access codes – Up to 10 access codes can be stored – For set-up and access codes with the numbers 1 to 4
79	Keypad (EasyAccess PINCode): – Consists of keys 0 to 9 and C (clear) – Entry of 4-digit set-up and access codes – Up to 100 access codes can be stored
80	Transponder reader (EasyAccess Transponder): – Up to 100 transponders can be stored

8.3 General Information about the Use of Keyless Access Systems

The default code is to be found on a sticker. When using for the first time, change the set-up code and remove the sticker!

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

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

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

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

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

8.4 Commissioning the Keypad and the Transponder Reader

If the truck is equipped with a keypad or a transponder reader, it can only be operated using the keys in the display unit. The keypad and the transponder reader have to be activated by the operating company.

8.4.1 Activating the keypad

Procedure

- Release the emergency disconnect switch, see page 71.
- Enter the default code 1-2-3-4 using the keys below the display unit (78).

  The truck is switched on.

- Press the key below the "Settings" symbol (81).
- Press the key below the "Change set-up code" symbol (82).
- Enter the set-up code 2-4-1-2 using the keypad (79).

  The set-up code entered is displayed.

When starting the truck for the first time, change the set-up code. The new set-up code must not be the same as the default set-up code or an access code.

- Press the key below the "Delete" symbol (83).

  The set-up code is deleted.

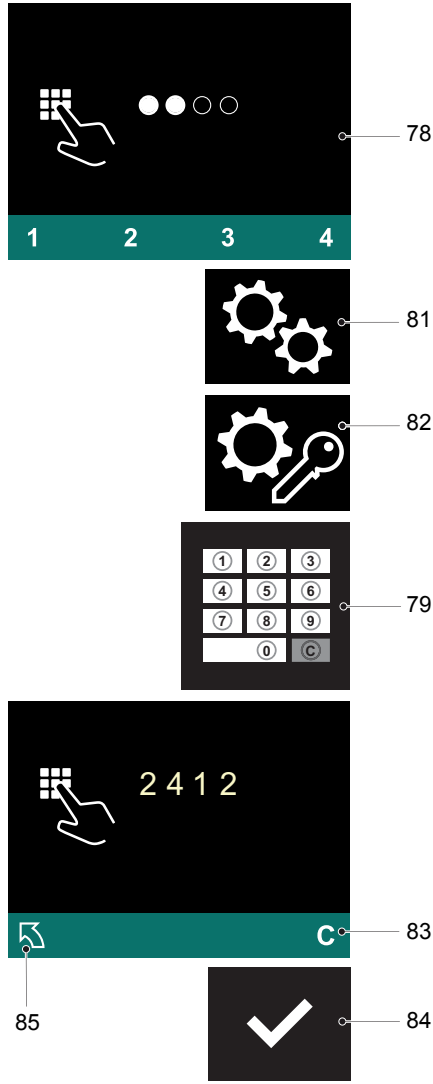
- Enter the new set-up code using the keypad (79).
- Press the key below the "Confirm" symbol (84).

  The new set-up code is displayed.

If the new set-up code was entered incorrectly, the procedure can be repeated using the key below the "Delete" symbol (83).

- To return to the main menu, press the key below the "Back" symbol (85).
- Delete the default code, see page 118.
- Create access codes, see page 117.

The keypad is active.



8.4.2 Activating the transponder reader

Procedure

- Release the emergency disconnect switch, see page 71.
- Enter the default code 1-2-3-4 using the keys below the display unit (78).
  The truck is switched on.
- Press the key below the "Settings" symbol (81).
- Press the key below the "Change set-up code" symbol (82).
- Enter the set-up code 2-4-1-2 using the keys below the display unit (78).
  The set-up code entered is displayed.
- Press the key below the "Delete" symbol (83).
  The set-up code is deleted.
- Hold a transponder in front of the transponder reader (80).
  This transponder thus becomes the set-up transponder.
- Press the key below the "Confirm" symbol (84).
  The code for the set-up transponder is displayed.

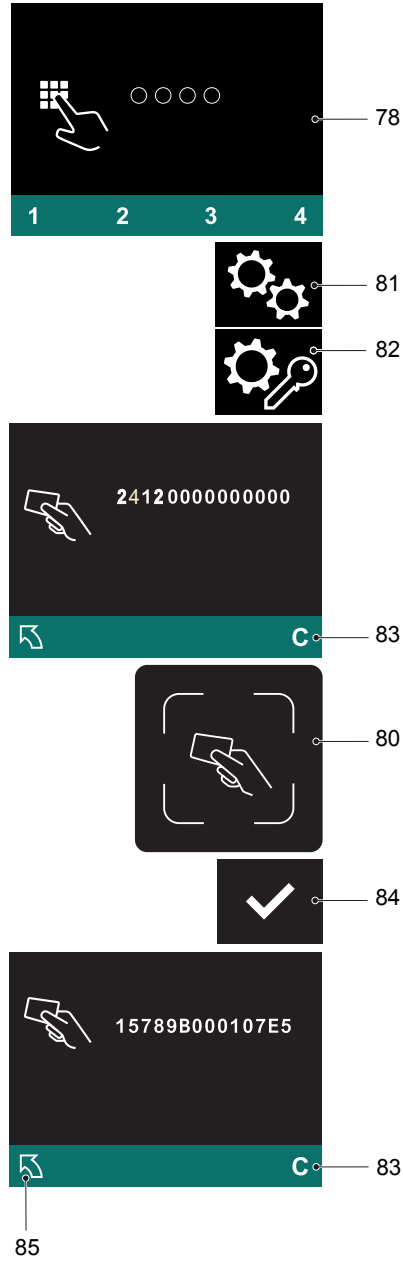
If the wrong transponder has been used, the procedure can be repeated using the key below the "Delete" symbol (83).

- To return to the main menu, press the key below the "Back" symbol (85).

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

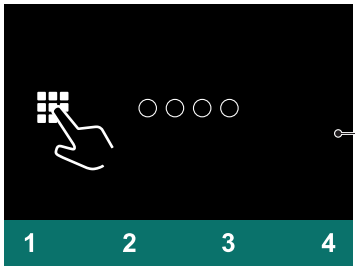
- Delete the default code, see page 123.
- Add new transponders, see page 122.

The transponder reader is now active.



8.5 Using the Display:

8.5.1 Switch on the truck with the access code.



Procedure

- Release the emergency disconnect switch, see page 71.
- Enter the access code with the buttons below the display (78).

The truck is switched on.

8.5.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (86) in the display unit.
- Press the Emergency Disconnect switch, see page 71.

The truck is switched off.

8.5.3 Changing the Set-up Code

Requirements

– The truck is switched on, see page 115.

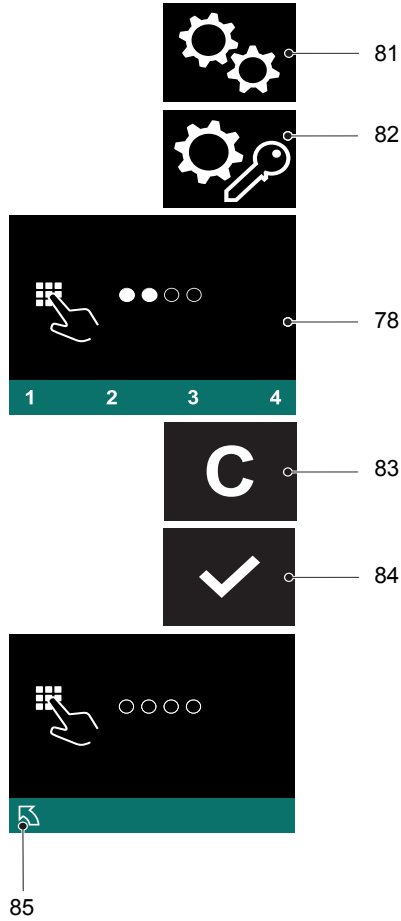
Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Change set-up code" symbol (82).
- Enter the set-up code using the keys below the display unit (78).
  The set-up code entered is shown as filled-in circles.
- Press the key below the "Delete" symbol (83).
  The set-up code is deleted.
- Enter the new set-up code using the keys below the display unit (78).

  The new set-up code must be different from existing access codes.
- Press the key below the "Confirm" symbol (84).
  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 (85).

The set-up code has been changed.



8.5.4 Adding a new access code

Requirements

– The truck is switched on, see page 115.

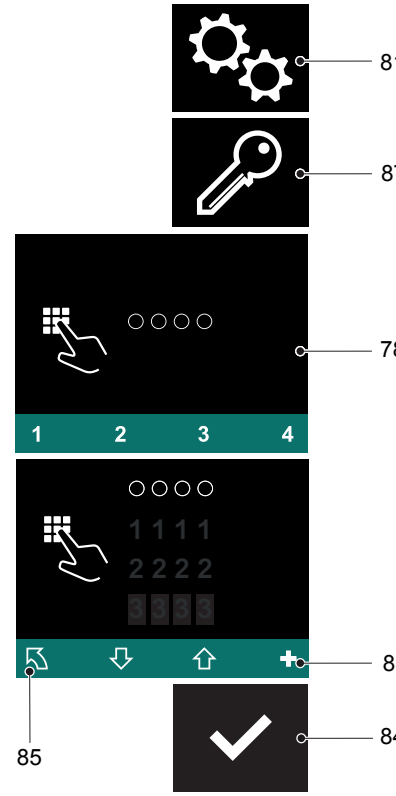
Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Edit access code" symbol (87).
  The set-up code is requested.
- Enter the set-up code using the keys below the display unit (78).
  All the access codes are displayed.
- Press the key below the "Add" symbol (88).
- Enter the new access code using the keys below the display unit (78).

  The new access code must be different from existing access codes.
- Press the key below the "Confirm" symbol (84).
  The new access code is displayed.

  If the new access code has been entered incorrectly, delete it, see page 118, and add an access code again.
- To return to the main menu, press the key below the "Back" symbol (85).

A new access code has been added.



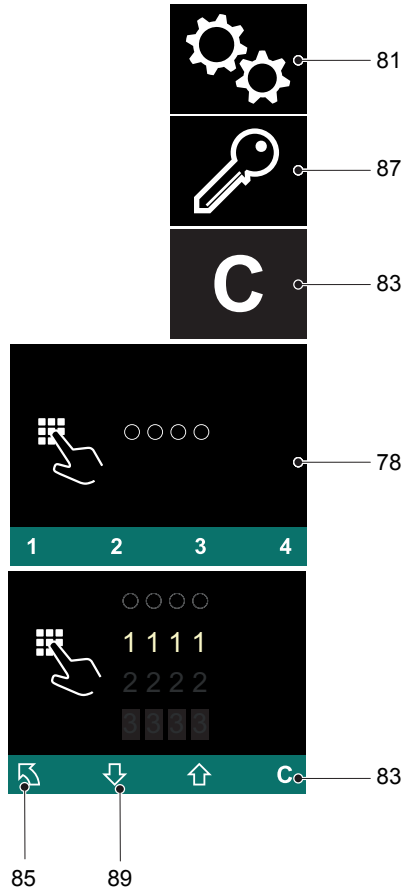
8.5.5 Deleting an access code

Requirements

– The truck is switched on, see page 115.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Edit access code" symbol (87).
  The set-up code is requested.
- Enter the set-up code using the keys below the display unit (78).
  All the access codes are displayed.
- Select the access code to be deleted using the key below the "Down selection" symbol (89).
- Press the key below the "Delete" symbol (83).
  The access code has been deleted.
- To return to the main menu, press the key below the "Back" symbol (85).



8.5.6 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.

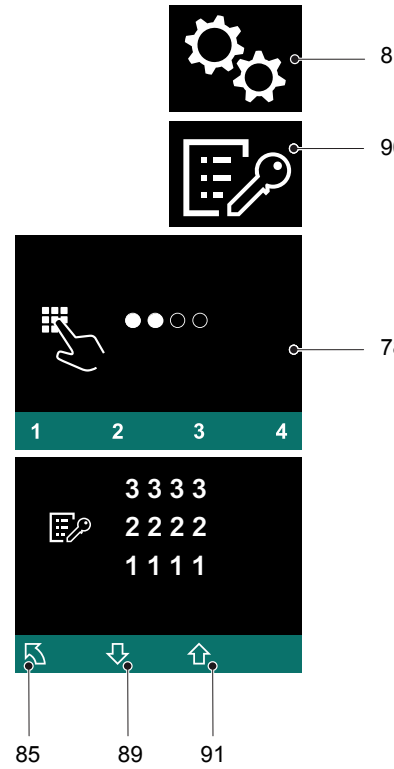
Requirements

– The truck is switched on, see page 110.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Log-in process" symbol (90).
- Enter the set-up code using the keys below the display unit (78).
  The set-up code entered is shown as filled-in circles.
- To scroll forward, press the button under the "Down selection" symbol (89) 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 (91) 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 (85).

The log-in process is displayed.



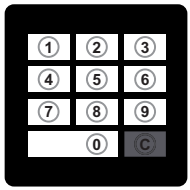
8.6 Using the Keypad

8.6.1 Switch on the truck with the access code.

Procedure

- Release the emergency disconnect switch, see page 71.
- Enter the access code with the keypad (79).

The truck is switched on.



79

Procedure

- Press the key under the "Switch off" symbol (86) in the display unit.
- Press the Emergency Disconnect switch, see page 71.

The truck is switched off.

8.6.2 Switching off the truck

Procedure

- Press the key under the "Switch off" symbol (86) in the display unit.
- Press the Emergency Disconnect switch, see page 71.

The truck is switched off.


86

8.6.3 Changing the Set-up Code

Requirements

– The truck is switched on, see page 115.

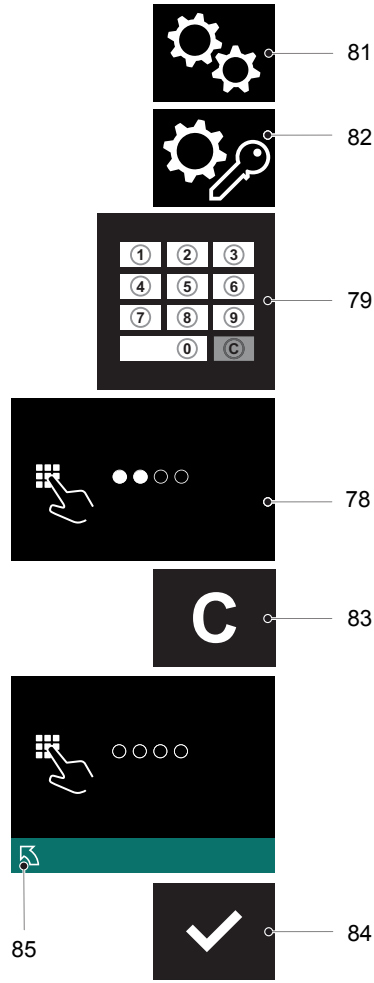
Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Change set-up code" symbol (82).
- Enter the set-up code using the keypad (79).
  The set-up code entered is shown in the display unit (78) as filled-in circles.
- Press the key below the "Delete" symbol (83).
  The set-up code is deleted.
- Enter the new set-up code using the keypad (79).

  The new set-up code must be different from existing access codes.
- Press the key below the "Confirm" symbol (84).
  The new set-up code is displayed.

  If the new set-up code has been entered incorrectly, delete it and enter the correct set-up code.
- To return to the main menu, press the key below the "Back" symbol (85).

The set-up code has been changed.



8.6.4 Adding a new access code

Requirements

– The truck is switched on, see page 115.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Edit access code" symbol (87).
  The set-up code is requested.
- Enter the set-up code using the keypad (79).
  All access codes are shown on the display unit (78).
- Press the key below the "Add" symbol (88).
- Enter a new access code using the keypad (79).

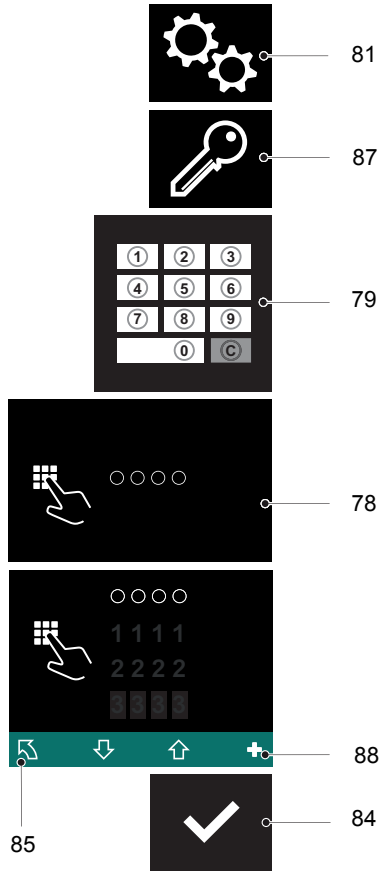
The new access code must be different from existing access codes.

- Press the key below the "Confirm" symbol (84).
  The new access code is shown on the display unit (78).

If the new access code has been entered incorrectly, delete it, see page 118, and enter the correct access code.

- To return to the main menu, press the key below the "Back" symbol (85).

A new access code has been added.



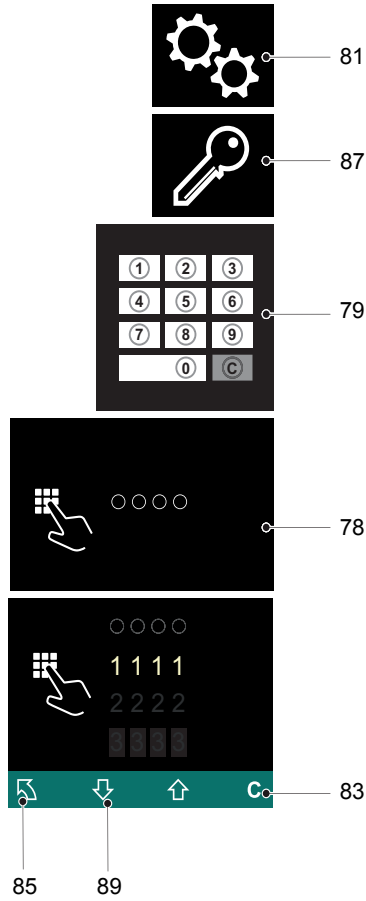
8.6.5 Deleting an access code

Requirements

– The truck is switched on, see page 115.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Edit access code" symbol (87).
  The set-up code is requested.
- Enter the set-up code using the keypad (79).
  All access codes are shown on the display unit (78).
- Select the access code to be deleted using the key below the "Down selection" symbol (89).
- Press the key below the "Delete" symbol (83).
  The access code has been deleted.
- To return to the main menu, press the key below the "Back" symbol (85).



8.6.6 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.

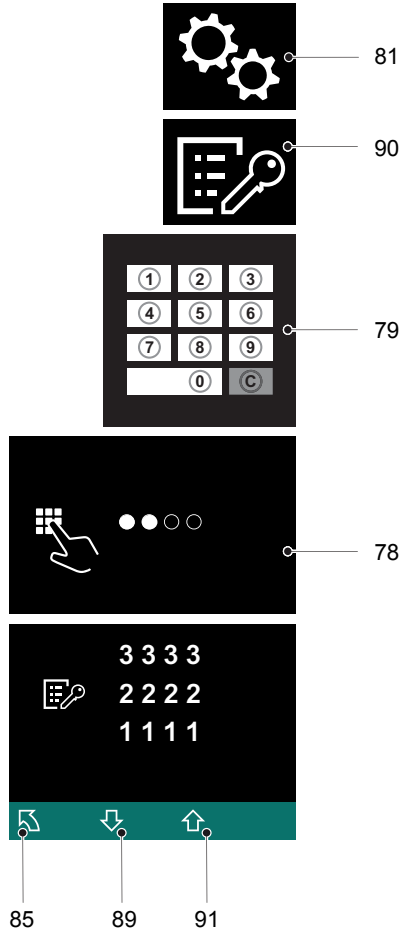
Requirements

– The truck is switched on, see page 115.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Log-in process" symbol (90).
- Enter the set-up code using the keypad (79).
  The set-up code entered is shown in the display unit (78) as filled-in circles.
- To scroll forward, press the button under the "Down selection" symbol (89) 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 (91) 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 (85).

The log-in process is displayed.



8.7 Operating the transponder reader

NOTE

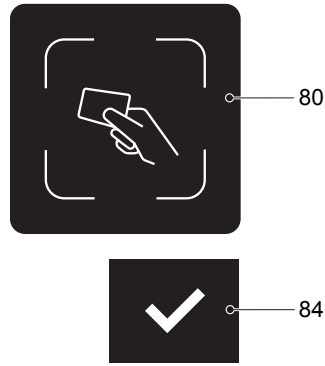
Take care not to damage the transponder. If the transponder is damaged, the truck cannot be switched on.

8.7.1 Switching on the truck with the transponder

Procedure

- Release the Emergency Disconnect switch, see page 71.
- Hold the transponder in front of the transponder reader (80).
  A green tick appears and remains until the transponder has been confirmed. If there is no confirmation within 20 seconds the access prompt appears.
- Press the button below the "Confirm" symbol (84).

The truck is switched on.



The truck can only be switched on when the display unit (78) is lit. If the display unit is in standby the code or transponder will not be recognised. Pressing any key cancels standby mode.

8.7.2 Switching the truck off (transponder reader)

Procedure

- Press the key under the "Switch off" symbol (86) in the display unit.
- Press the Emergency Disconnect switch, see page 71.

The truck is switched off.

8.7.3 Changing the Set-up Transponder

Requirements

– The truck is switched on, see page 120.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Change set-up code" symbol (82).
- Place the set-up transponder on the transponder reader (80).
  The code of the set-up transponder is shown on the display unit (78).
- Press the key below the "Delete" symbol (83).
  A dashed line is shown.
- Place the new set-up transponder on the transponder reader (80).

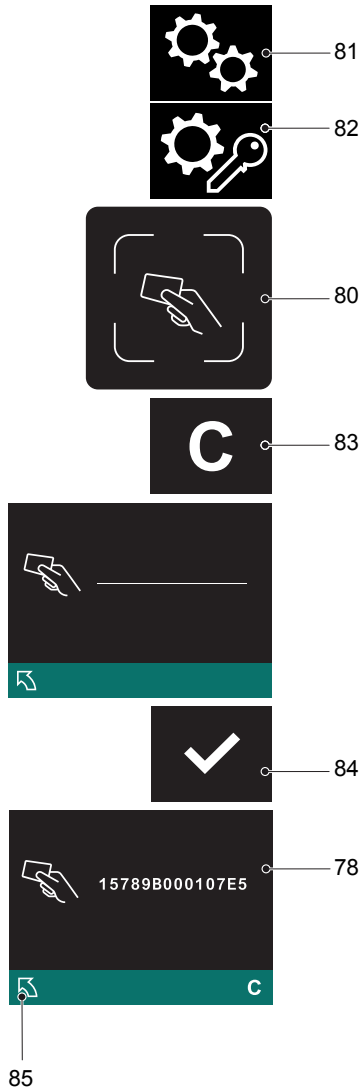
The new set-up transponder code must be different from existing transponder codes.

- Press the key below the "Confirm" symbol (84).
  The new code for the set-up transponder is displayed.

If the wrong transponder has been used, the procedure can be repeated using the key below the "Delete" symbol (83).

- To return to the main menu, press the key below the "Back" symbol (85).

The set-up transponder has been changed.



8.7.4 Adding a new transponder

Requirements

– The truck is switched on, see page 120.

Procedure

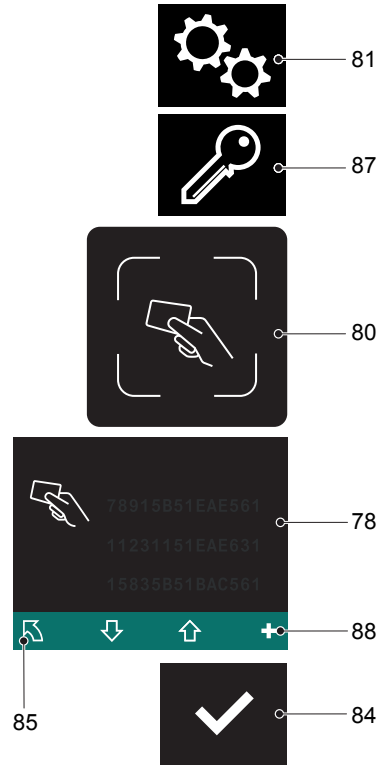
- Press the key below the "Settings" symbol (81).
- Press the key below the "Edit transponder" symbol (87).
  The set-up transponder is requested.
- Place the set-up transponder on the transponder reader (80).
  All transponder codes are shown on the display unit (78).
- Press the key below the "Add" symbol (88).
- Place the new transponder on the transponder reader (80).

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

- Press the key below the "Confirm" symbol (84).
  The new transponder code is displayed.

If the wrong transponder has been used, delete it, see page 123, and add a correct transponder.

- To return to the main menu, press the key below the "Back" symbol (85).



A new transponder has been added.

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

8.7.5 Deleting transponders

Requirements

– The truck is switched on, see page 120.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Edit transponder" symbol (87).
  The set-up transponder is requested.
- Place the set-up transponder on the transponder reader (80).
  All transponder codes are shown on the display unit (78).
- Select the transponder code to be deleted using the key below the "Down selection" symbol (89).
- Press the key below the "Delete" symbol (83).
  The transponder has been deleted.
- To return to the main menu, press the key below the "Back" symbol (85).

8.7.6 Displaying the Log-in Process

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

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

Requirements

– The truck is switched on, see page 115.

Procedure

- Press the key below the "Settings" symbol (81).
- Press the key below the "Log-in process" symbol (90).
- Place the set-up transponder on the transponder reader (80).
- To scroll forward, press the button under the "Down selection" symbol (89) 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 (91) 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 (85).

The log-in process is displayed.

8.8 ISM access module (○)

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

8.9 Parameters

These parameters can be adjusted by the manufacturer's customer service department.

Travel program 1

Function	Setting range	Standard setting
Acceleration	20 - 200 (0.2 - 2.0 m/s^2)	40 (0.4 m/s^2)
Coasting brake	20 - 330 (0.2 - 3.3 m/s^2)	50 (0.5 m/s^2)
Reversing brake	20 - 160 (0.2 - 1.6 m/s^2)	130 (1.3 m/s^2)
Maximum speed in drive direction via travel switch	0 - 60 (0 - 6.0 km/h)	40 (4.0 km/h)
Maximum speed in load direction via travel controller	0 - 60 (0 - 6.0 km/h)	40 (4.0 km/h)

Travel program 2

Function	Setting range	Standard setting
Acceleration	20 - 200 (0.2 - 2.0 m/s^2)	50 (0.5 m/s^2)
Coasting brake	20 - 330 (0.2 - 3.3 m/s^2)	80 (0.8 m/s^2)
Maximum speed in drive direction via travel switch	0 - 60 (0 - 6.0 km/h)	56 (5.6 km/h)
Maximum speed in load direction via travel controller	0 - 60 (0 - 6.0 km/h)	56 (5.6 km/h)

Travel program 3

Function	Setting range	Standard setting
Acceleration	20 - 200 (0.2 - 2.0 m/s^2)	100 (1.0 m/s^2)
Coasting brake	20 - 330 (0.2 - 3.3 m/s^2)	80 (0.8 m/s^2)
Maximum speed in drive direction via travel switch	0 - 60 (0 - 6.0 km/h)	60 (6.0 km/h)
Maximum speed in load direction via travel controller	0 - 60 (0 - 6.0 km/h)	60 (6.0 km/h)

Common parameters

Function	Setting range	Standard setting	Comments
Reduction brake	20 - 120 (0.2 - 1.2 m/s^2)	40 (0.4 m/s^2)	Deceleration for travel switch setting reduction
Service brake	150 - 330 (1.5 - 3.3 m/s^2)	175 (1.75 m/s^2)	Deceleration for tiller in brake position
Body protection brake	50 - 200 (0.5 - 20 m/s^2)	200 (2.0 m/s^2)	Speed reduction when body protection switch applied
Standard travel program	0 - 3	2	0 = No travel program 1 = Slow 2 = Medium 3 = Fast

Battery parameters

No.	Function	Range	Standard setting	Comments
1377	Battery type (normal / high-performance / dry-cell)	0 – 5 7 9	1	0 = Normal (wet-cell) 1 = High performance (wet-cell) 2 = Dry (maintenance-free) 3 = US "Flat Plate" type 4 = US "Pallet Pro" type 5 = US "Tubular Plate" type 7 = Exide GF12063Y (Dry battery) 9 = XFC (Special battery)

No.	Function	Range	Standard setting	Comments
1388	ELH battery charger charging characteristic	0 – 6	1	0 = No charging function 1 = PzS wet-cell batteries 100 - 300 Ah and PzM batteries from 0 - 179 Ah 2 = PzS wet-cell batteries with pulse characteristic 200 - 414 Ah and PzM batteries from 180 - 400 Ah 3= PzV batteries, maintenance-free 100 - 150 Ah 4= PzV batteries, maintenance-free 151 - 200 Ah 5= PzV batteries, maintenance-free 201 - 300 Ah 6= PzV batteries, maintenance-free 301 - 333 Ah
1389	Discharge monitor function	0 / 1	1	0 = Not active 1 = Active

Hydraulic function lock settings

No.	Function	Range	Standard setting	Comments[1,2]
2338	Lift Lower	0 - 15	1	0 = Lifting and lowering always released 1 = Lifting only with authorisation 2 = Lifting only when stationary 3 = Lifting only with authorisation and only when stationary 4 = Lowering only when stationary 5 = Lifting and lowering only with authorisation 6 = Lifting only when stationary, lowering only with authorisation 7 = Lowering only with authorisation, lowering only with authorisation 8 = Lowering only when stationary 9 = Lifting only with authorisation, lowering only when stationary 10 = Lifting and lowering when stationary 11 = Lifting only with authorisation and only when stationary, lowering only when stationary 12 = Lowering only with authorisation and only when stationary

1. With authorisation = with tiller in travel range (F) or with "slow travel" switch applied
2. Stationary = No travel operations performed

No.	Function	Range	Standard setting	Comments[1,2]
2338	Lift Lower	0 - 15	1	13 = Lifting and lowering only with authorisation, lowering only when stationary 14 = Lifting and lowering only when stationary, lowering only with authorisation 15 = Lifting and lowering only with authorisation and only when stationary

1. With authorisation = with tiller in travel range (F) or with "slow travel" switch applied
2. Stationary = No travel operations performed

F Industrial Truck Maintenance

1 Operational Safety and Environmental Protection

The checks and servicing operations contained in this chapter must be performed in accordance with the maintenance checklist service intervals.

⚠ WARNING!

Risk of accidents and component damage

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

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

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

NOTE

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

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

On completion of inspection and service work, carry out the operations listed in the “Recommissioning the truck after cleaning or maintenance work” section (see page 151).

2 Maintenance Safety Regulations

Maintenance and repair personnel

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

Truck maintenance and repair work must only be carried out by specially trained personnel. The following operations are assigned to the following target groups.

Customer Services

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

Operating company

The maintenance personal of the operating company has the technical expertise and experience to perform the activities in the maintenance check list for the operating company. The maintenance and repair work to be performed by the operating company are also written down, see page 140.

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 68).
- ▶ Disconnect the battery.
- ▶ Remove any rings, metal wrist bands 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.

NOTE

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.

2.5 Lift Chains

⚠ WARNING!

Non-lubricated and incorrectly cleaned lift chains can cause accidents

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

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

3 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.

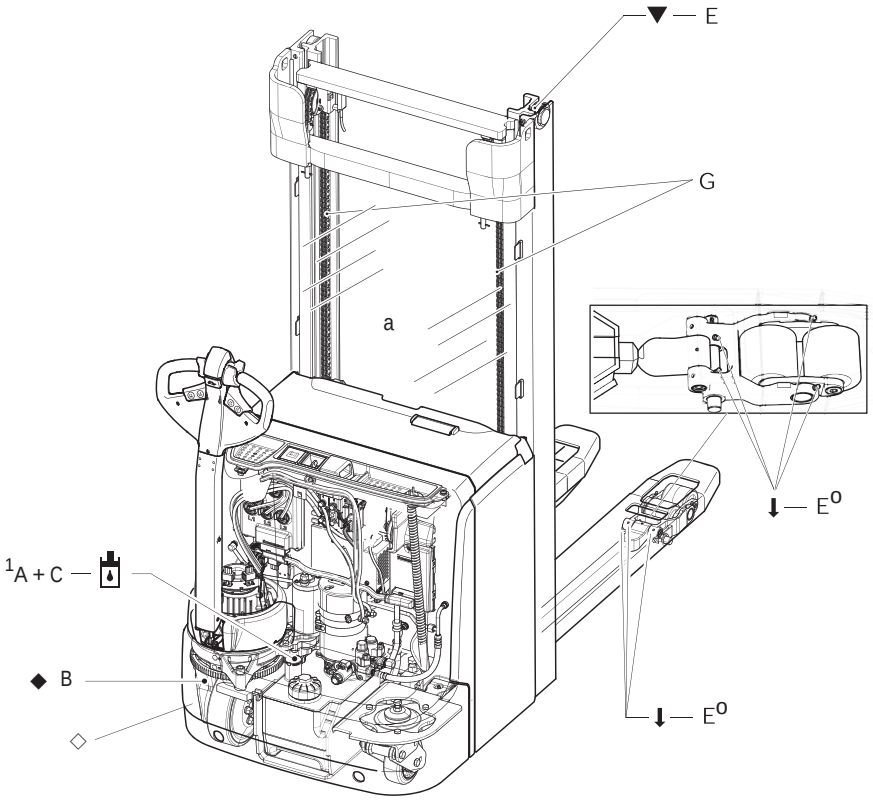
⚠ CAUTION!

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



▼	Contact surfaces	◇	Transmission oil drain plug
⬇	Grease nipple	□	Cold-store application
	Hydraulic-oil filler plug	◆	Transmission oil filler neck
○	Lifting kinematics of initial lift (EJC 112z only)		

1 Mixture ratio for cold-store usage 1:1

2 Transmission oil is a guideline. The spur wheel should be dipped approx. 2 mm into the transmission oil.

3.3 Consumables

Code	Order no.	Package quantity	Component	Used for
A	51132827 *	5.0 L	Jungheinrich Hydraulic oil	Hydraulic System
	51132826 *	1.0 L		
	29200670	5.0 L	H-LP 46, DIN 51524	
B	50380904	5.0 L	Titan Gear HSY 75W-90	Transmission
C	51081875 *	5.0 L	H-LP 10, DIN 51524 Cold store hydraulic oil	Hydraulic System Additive for cold store operation
E	29202050	1.0 kg	Polylube GA 352P	Lubrication
G	29201280	0.51 L	Chain spray	Chains

Grease guidelines

Code	Saponification -	Dew point °C	Worked-penetration at 25 °C	NLG1 class	Application-temperature °C
E	Lithium	>220	280 - 310	2	-35/+120

*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.

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 68.
- 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 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 Front cover disassembly

Removing the front cover

Requirements

– Prepare the truck for maintenance and repairs, see page 140.

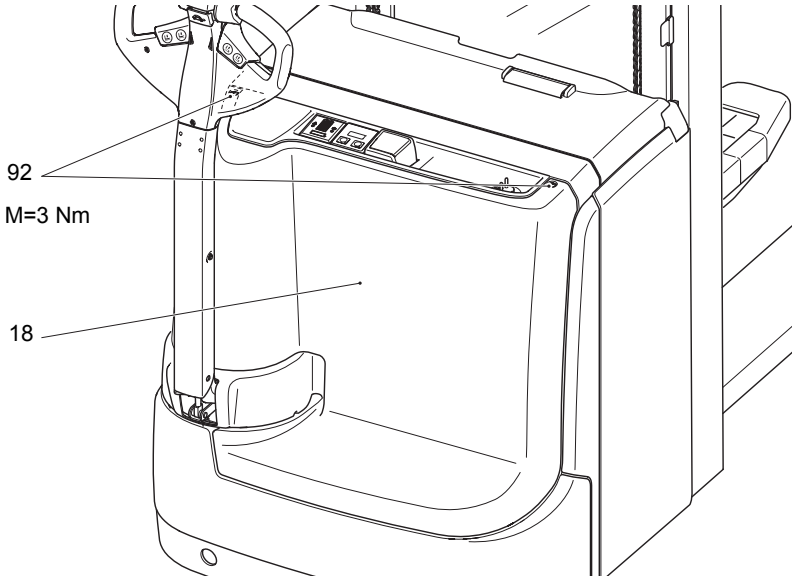
Tools and Material Required

– Allen key opening 5

Procedure

- Turn or slightly tilt tiller towards the edge of the truck.
- Remove the screws (92) with the Allen key.
- Carefully remove the front panel (18) and put it to one side.

The front cover has been removed.



4.3 Lifting and jacking up the truck safely

⚠ WARNING!

Lifting and jacking up the truck safely

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

You may only work under a raised load handler if it has been secured with a sufficiently strong chain or the fastening bolt.

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

- ▶ Jack up the truck only on a level surface and prevent it from moving accidentally.
- ▶ Always use a jack with sufficient capacity. When jacking up the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).
- ▶ In order to raise the truck, the lifting gear must only be secured to the points specially provided for this purpose, see page 35.
- ▶ When jacking up the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).

4.4 Cleaning

4.4.1 Cleaning the truck

⚠ CAUTION!

Fire hazard

Do not use flammable liquids to clean the industrial truck.

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

⚠ CAUTION!

Risk of component damage when cleaning the truck

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

- ▶ Cover all electronic system assemblies (controllers, sensors, motors etc.) before cleaning the truck with a pressure washer.
- ▶ Do not hold the jet of the pressure washer by the marked points to avoid damaging them (see page 28).
- ▶ Do not clean the truck with pressurised water.

Cleaning the truck

Requirements

– Prepare the truck for maintenance and repairs (see page 140).

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 151).

The truck is now clean.

4.4.2 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 140).

Tools and Material Required

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

Procedure

- Expose the electrical system, see page 141.
- 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 141.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" (see page 151).

The electrical system assemblies are now clean.

4.5 Checking the hydraulic oil level

Check oil level

Requirements

– Lower the load handler.
– Prepare the truck for maintenance and repairs, see page 140.

Procedure

- Lift off the front panel, see page 141
- Check the oil level in the hydraulic reservoir.

➔ There are markings on the hydraulic reservoir. The oil level must be checked when the load handler and support-arm lift are lowered.

- If necessary, add transmission oil of the correct grade, see page 139(refer to table).

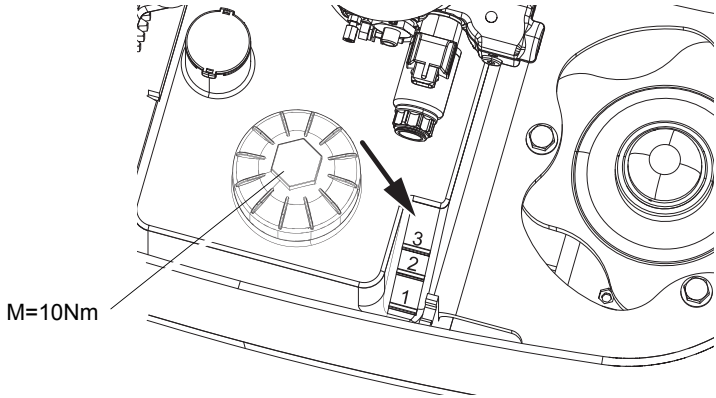
➔ For the first filling approximately 0,6 l more hydraulic oil should be added.

The oil level has now been checked.

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

Marking	Litres	Lift heights (h_3)		
		ZT	ZZ	DZ
3	Approx. 8.3	-	-	-
2	Approx. 7.5	-	-	EJC 112z
1	Approx. 6.5	EJC 112z	EJC 112z	EJC 112z

➔ After adding hydraulic oil tighten the lock to 10 Nm.



4.6 Check wheel attachment and wear

➔ Replace the wheels if the wear limit (93) has been reached.

➔ The wheel nuts on the drive wheel must be retightened in accordance with the maintenance intervals indicated in the maintenance checklist, see page 155.

Tightening the wheel nuts

Requirements

– Prepare the truck for maintenance and repairs, see page 140.

Tools and Material Required

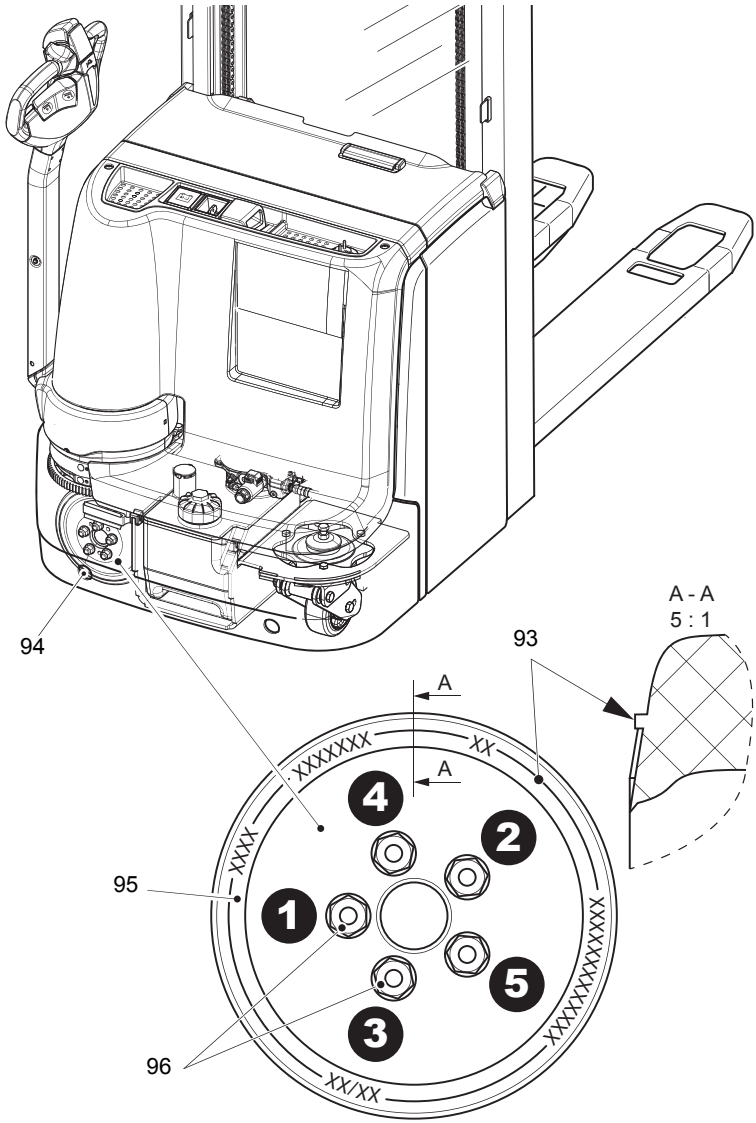
– Torque wrench

Procedure

- Position the drive wheel (95) so that the wheel nuts (96) can be pulled through the hole (94).
- Tighten all the wheel nuts (96) through the hole (94) 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.


94
93
A - A
5 : 1
A
A
XXXXXXX
XX
XXXX
95
1
2
3
4
5
XXXXXXXXXXXX
96
XX/XX

4.7 Checking electrical fuses

Check fuses

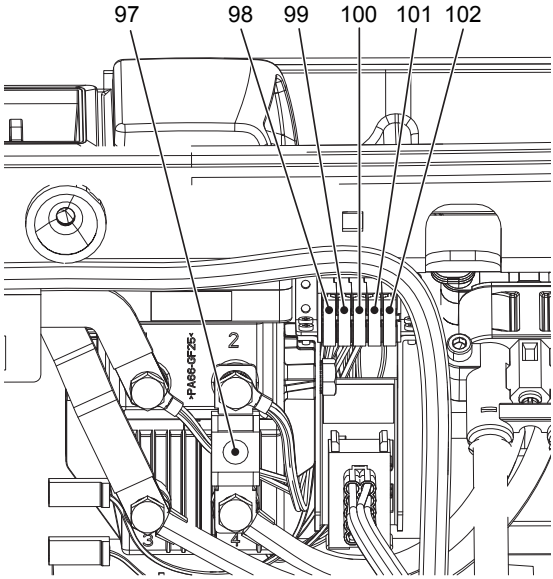
Requirements

– Truck prepared for maintenance and repairs, see page 140.
– Front cover removed, see page 141.

Procedure

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

The fuses are now checked.



Item	Description	To protect	Rating (A)
97	F15	Drive / lift motor	200
98	F1	Overall control circuit fuse	4
99	6F1	Battery indicator	2
100	9F22	Electromechanical components	4
101	3F6	Steer motor	30
102	F17	Radio data (○)	4

4.8 Restoring the truck to service after maintenance and repairs

Procedure

- Thoroughly clean the truck, see page 143.
- Lubricate the truck according to the lubrication diagram, see page 138.
- Clean the battery, grease the terminals and connect the battery.
- Charge the battery, see page 45.
- Start up the truck, see page 65.

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 142.

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 143.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see page 146.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication schedule, see page 138.
- 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

NOTE

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 143.
- Lubricate the truck according to the lubrication schedule, see page 138.
- Clean the battery, grease the terminal screws and connect the battery.
- Charge the battery, see page 45.
- Start up the truck, see page 65.

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 in must be performed in accordance with the regulations of the country of use. In particular, regulations governing the disposal of batteries, consumables and electronic and electrical systems must be observed.

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

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 and Inspection

⚠ WARNING!

Lack of maintenance can result in accidents

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

▶ Thorough and expert servicing is one of the most important requirements for the safe operation of the industrial truck.

The application conditions of an industrial truck have a considerable impact on component wear. The following service intervals are based on single-shift operation under normal operating conditions. They must be reduced accordingly if the equipment is to be used in conditions of extreme dust, temperature fluctuations or multiple shifts.

NOTE

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

The following maintenance checklist lists the activities to be performed and the respective intervals to be observed. Maintenance intervals are defined as:

W	=	Every 50 service hours, at least weekly
A	=	Every 500 service hours
B	=	Every 1000 service hours, or at least annually
C	=	Every 2000 service hours, or at least annually
●	=	Standard maintenance interval
✳	=	Cold store maintenance interval (in addition to standard maintenance interval)

"W" maintenance interval operations should be performed by the operating company.

1 Maintenance checklist

1.1 Owner

1.1.1 Standard equipment

Brakes		W	A	B	C
1	Test the brakes.	●			

Electrics		W	A	B	C
1	Test warning and safety devices in accordance with operating instructions.	●			
2	Test the displays and controls.	●			
3	Test the emergency disconnect switch.	●			

Power supply		W	A	B	C
1	Check battery and battery components.	●			
2	Check battery cable connections are secure, check for dirt and grease terminals if necessary.	●			
3	Check battery connector for damage, test it and make sure it is secure.	●			

Driving		W	A	B	C
1	Check wheels for wear and damage.	●			

Chassis and superstructure		W	A	B	C
1	Check doors and/or covers.	●			
2	Check labels are legible, complete and plausible.	●			
3	Check protective screen panel/protective grille for damage.	●			

Hydr. movements		W	A	B	C
1	Check the lubrication of the load chains and lubricate the load chains if necessary.	●			
2	Test hydraulic system.	●			
3	Check hydraulic oil level and top up if necessary.	●			
4	Check forks or load handler for wear and damage.	●			

Steering		W	A	B	C
1	Check the tiller return function.	●			

1.2 Customer Service

1.2.1 Standard equipment

Brakes		W	A	B	C
1	Test the brakes.			●	
2	Check the air gap of the magnetic brake.			●	

Electrics		W	A	B	C
1	Check the cables and motor mounting are secure.			●	
2	Test warning and safety devices in accordance with operating instructions.			●	
3	Test the displays and controls.			●	
4	Test the emergency disconnect switch.			●	
5	Check contactors and/or relays.			●	
6	Check fuse ratings.			●	
7	Carry out a chassis insulation-resistance test.			●	
8	Check the carbon brushes, replace if necessary. Note: When replacing the carbon brushes apply compressed air to the motor.			●	
9	Check electrical wiring for damage (insulation damage, connections). Make sure cable connections are secure.			●	

Power supply		W	A	B	C
1	Check acid density, acid level and battery voltage.			●	
2	Check battery and battery components.			●	
3	Check battery cable connections are secure, check for dirt and grease terminals if necessary.			●	
4	Check battery connector for damage, test it and make sure it is secure.			●	

Driving		W	A	B	C
1	Check drivetrain mountings and bearings.			●	
2	Check transmission for noise and leakage.			●	
3	Note: Replace transmission oil after 10,000 service hours.				
4	Check the wheels for wear and damage. Make sure they are secure and check the air pressure if necessary.			●	
5	Check wheel suspension and attachment.			●	

Chassis and superstructure		W	A	B	C
1	Check chassis connections and screw connections for damage.			●	
2	Check doors and/or covers.			●	
3	Check labels are legible, complete and plausible.			●	
4	Check mast mounting/bearings.			●	
5	Check protective screen panel/protective grille for damage.			●	

Hydr. movements		W	A	B	C
1	Test "hydraulic" controls and make sure their labels are legible, complete and plausible.			●	
2	Test initial lift cutout.			●	
3	Test the lift sensors in the mast and initial lift and check for damage.			●	
4	Check cylinders and piston rods for damage and leaks, and make sure they are secure.			●	
5	Check settings and wear levels of slide pieces and stops and adjust or replace the slide pieces as required.			●	
6	Check load chain setting and tension if necessary.			●	
7	Check the lubrication of the load chains and lubricate the load chains if necessary.			●	
8	Check the load chain fasteners and check the chain bolts for wear and damage.			●	
9	Check lateral clearance of the mast connections and the fork carriage.			●	
10	Visually inspect the mast rollers and check the running surfaces for wear.			●	
11	Replace hydraulic oil filter and breather filter.			✳	●
12	Test hydraulic system.			●	
13	Check that hydraulic ports, hose and pipe lines are secure, check for leaks and damage.			●	
14	Test emergency lowering system.			●	
15	Check hydraulic oil level and top up if necessary.			●	
16	Replace the hydraulic oil.			✳	●
17	Test the pressure relief valve and adjust if necessary.			●	
18	Check forks or load handler for wear and damage.			●	
19	Check the tie/plunger rods.			●	
20	Test lift and lowering speeds.			●	

Agreed performance		W	A	B	C
1	Carry out a test run with the rated load and, if necessary, with a customer-specific load.			●	
2	Demonstration after maintenance.			●	
3	Lubricate the truck according to the lubrication schedule.			●	

Steering		W	A	B	C
1	Check the tiller return function.			●	

1.2.2 Optional equipment

Standard on-board charger

Charger		W	A	B	C
1	Check mains plug and mains cable.			●	
2	Test the immobiliser on trucks with an on-board charger.			●	
3	Carry out a potential measurement on the chassis while charging is in progress.			●	
4	Check the wires and electrical connections are secure and not damaged.			●	

Electrolyte circulation

Power supply		W	A	B	C
1	Check hose connections and test the pump.			●	
2	Replace air-filter wadding.			●	

Aquamatik

Power supply		W	A	B	C
1	Test Aquamatik plug, hose connections and float and check for leaks.			●	
2	Test flow indicator and check for leaks.			●	

Load backrest

Hydr. movements		W	A	B	C
1	Check the attachment is properly secured to the truck and check the load-bearing components.			●	

Battery refill system

Power supply		W	A	B	C
1	Test battery refill system and check for leaks.			●	

Shock sensor / data recorder

Electrics		W	A	B	C
1	Check shock sensor / data recorder are secure and check for damage.			●	

Access module

Electrics		W	A	B	C
1	Test the access module, check for damage and make sure it is secure.			●	

Cold-store application

Driving		W	A	B	C
1	Replace the transmission oil in the cold-store application.				●

Hydr. movements		W	A	B	C
1	Note: In cold-store applications, we recommend replacing the hydraulic oil every 1000 service hours or once a year.				

Issued on: 05.04.2016 16:05:42

Foreword

Notes to the operating instructions

The present ORIGINAL OPERATING INSTRUCTIONS are designed to provide sufficient instruction for the safe operation of the traction battery. The information is presented in a precise and clear manner. The chapters are arranged by letter and the pages are numbered continuously.

The operating instructions detail different battery variants and their optional equipment. When operating and servicing the battery, make sure that the particular section applies to your battery model.

Our traction batteries and their optional equipment are subject to ongoing development. We reserve the right to alter the design, features and technical aspects of the equipment. No guarantee of particular features of the traction battery 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.

NOTE

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

➔ Used before notices and explanations.

- ● Indicates standard equipment
- ○ Indicates optional equipment

Jungheinrich Aktiengesellschaft

Friedrich-Ebert-Damm 129
22047 Hamburg - Germany

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

www.jungheinrich.com

02.16 EN

Contents

A Traction battery

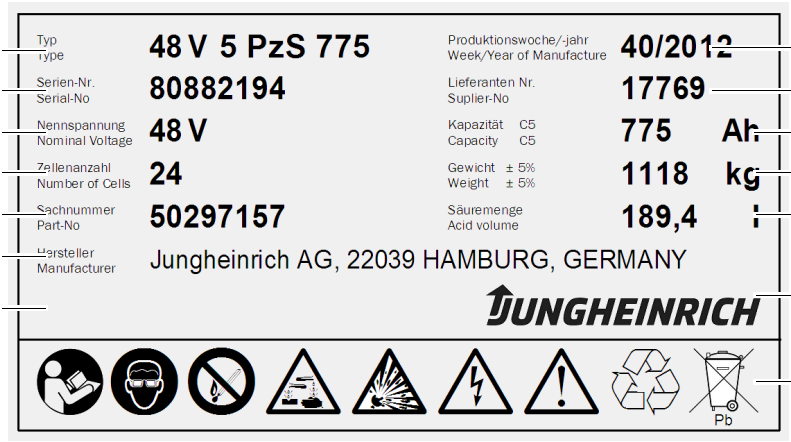
1 Correct Use and Application

This appendix does not apply to trucks with lithium-ion batteries. Further documentation for lithium-ion batteries can be obtained from the supplied documents.

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



1	Model (battery name)
2	Production week / production year
3	Serial number
4	Supplier number
5	Rated voltage
6	Capacity
7	Number of cells
8	Weight
9	Part no.
10	Acid quantity
11	Manufacturer
12	Manufacturer's logo
13	CE mark (for batteries above 75 V only)

14	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 – Lead acid battery with extended maintenance interval – Battery cell width: 198 mm
PzM	

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[1]	1.29 kg/l
6.	Nominal temperature[2]	30 °C
7.	System rated electrolyte level	up to "Max" electrolyte level marking
	Limit temperature[3]	55 °C

1. Reached within the first 10 cycles.
2. Higher temperatures shorten the useful life, lower temperatures reduce the available capacity.
3. Not permissible as operating temperature.

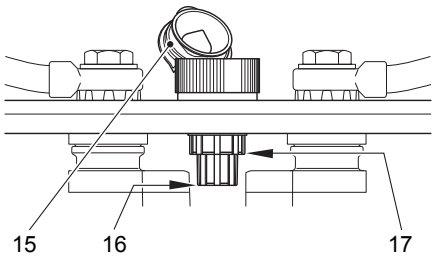
4.2 Operation

4.2.1 Commissioning unfilled batteries

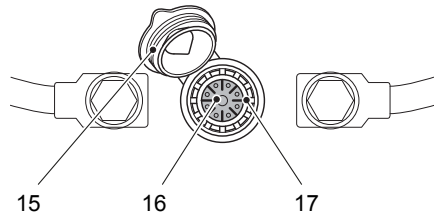
The operations required must be carried out by the manufacturer's customer service department or a customer service organisation authorised by the manufacturer.

4.2.2 Commissioning filled and charged batteries

Battery cell cross section



Top view of a battery cell



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 13.
- Check the electrolyte level of each battery cell after charging and top up if necessary:
  - Open the plug (15).
    The electrolyte level should not be less than the "Min" electrolyte marking (16) and must not exceed the "Max" (17) marking.
  - If necessary, add electrolyte with pure water up to the "Max" electrolyte level marking (17), see page 15.
  - Close the plug (15).

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 2000 mm 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.

NOTE

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.

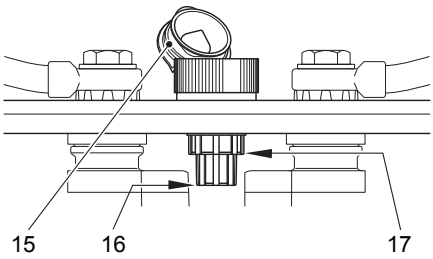
4.3 Servicing lead-acid batteries with armour plated cells

4.3.1 Quality of Water for Adding Electrolyte

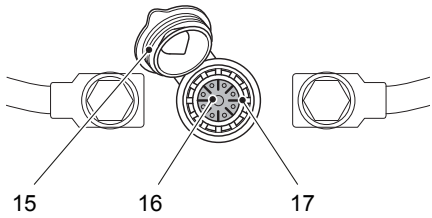
The quality of the water used to add electrolyte must correspond to purified or distilled water. Purified water can be produced through distillation or ion exchangers and is then suitable for the production of electrolyte.

4.3.2 Daily

Battery cell cross section



Top view of a battery cell



– Charge the battery after each discharge.
– After charging, check the electrolyte level of each battery cell and replenish as required:
  – Open the plug (15).
  – If necessary, add electrolyte with pure water up to the "Max" electrolyte level marking (17).
  – Close the plug (15).

The electrolyte level should not be less than the "Min" electrolyte marking (16) and must not exceed the "Max" (17) 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[1]	45°C, not permissible as operating temperature
6.	Rated density of the electrolyte	Cannot be measured
7.	System rated electrolyte level	Cannot be measured

1. 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 18.

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 2000 mm 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.

NOTE

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 curents 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.

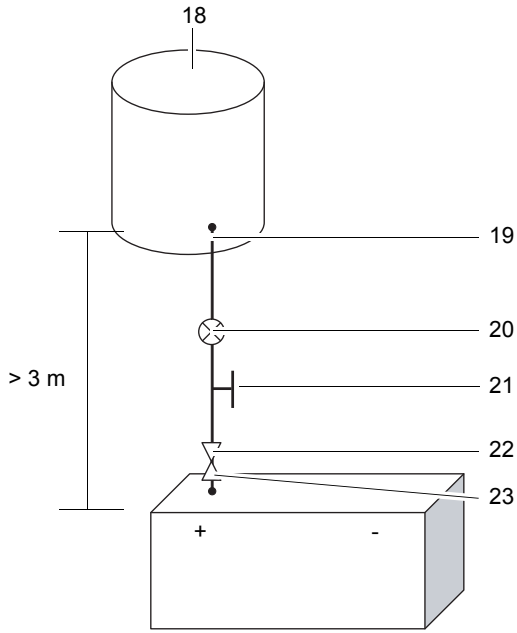
5.3.4 Annually

– 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



18	Water container
19	Tap connection with ball cock
20	Flow indicator
21	Shut-off cock
22	Locking coupling
23	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°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

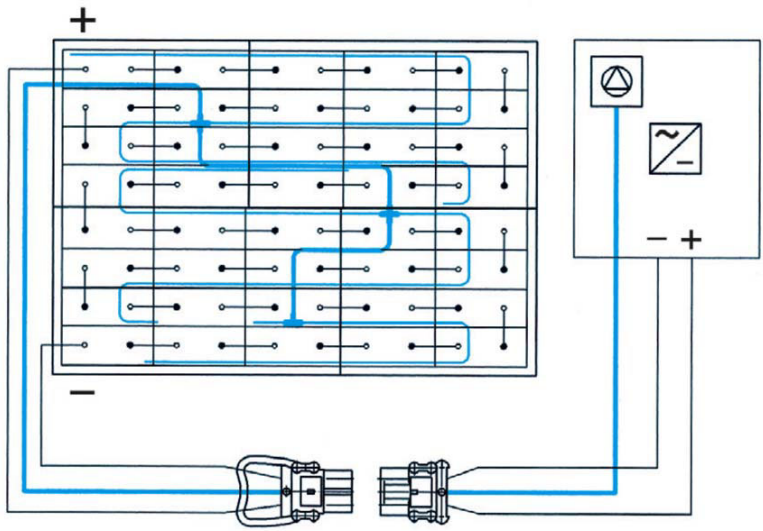
NOTE

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

NOTE

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 V x number of cells for PzS, PzM and PzB batteries or 2.25 V x 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.