ERE 120

07.12 -

Operating instructions

GB

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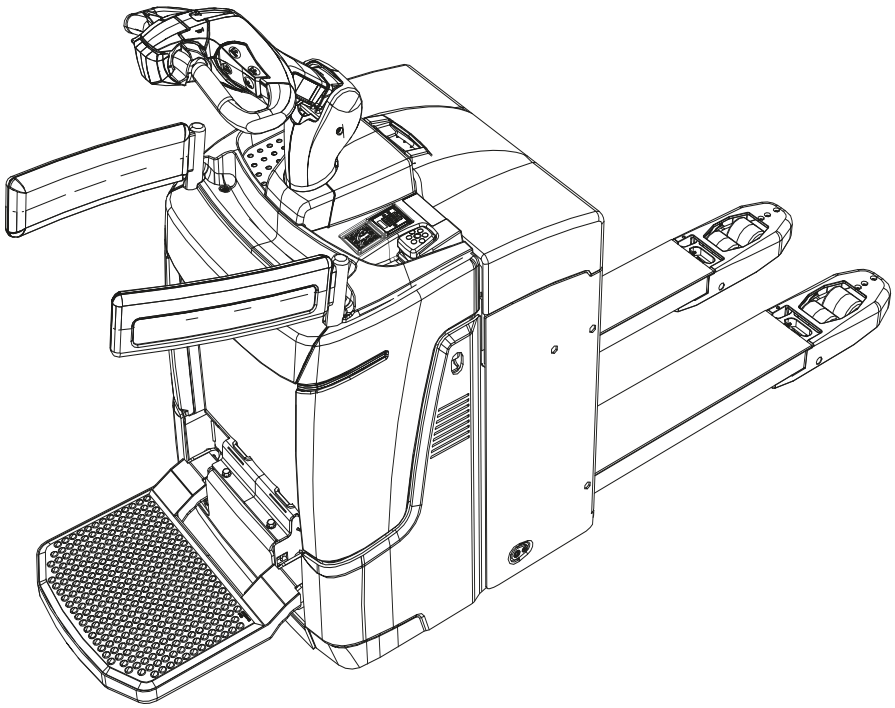
ERE 120
ERE C20



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

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

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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 "Lifting, transporting and depositing loads" on page 81.

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

The following operations are prohibited:
– Travelling with a raised load (>500 mm).
– Carrying and lifting passengers.
– Pushing or pulling 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 (○)

ERE 120 only, not on the ERE C20

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 "Charging the battery" on page 44.

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 industrial truck is a tiller operated electric pallet truck with a folding standing platform and side arms. It is designed for transporting goods on level surfaces. Open bottom pallets or pallets with transverse boards (provided that the boards are outside the perimeter of the load wheels) can be lifted.
The rated capacity of the truck is shown on the data plate or capacity plate Qmax.

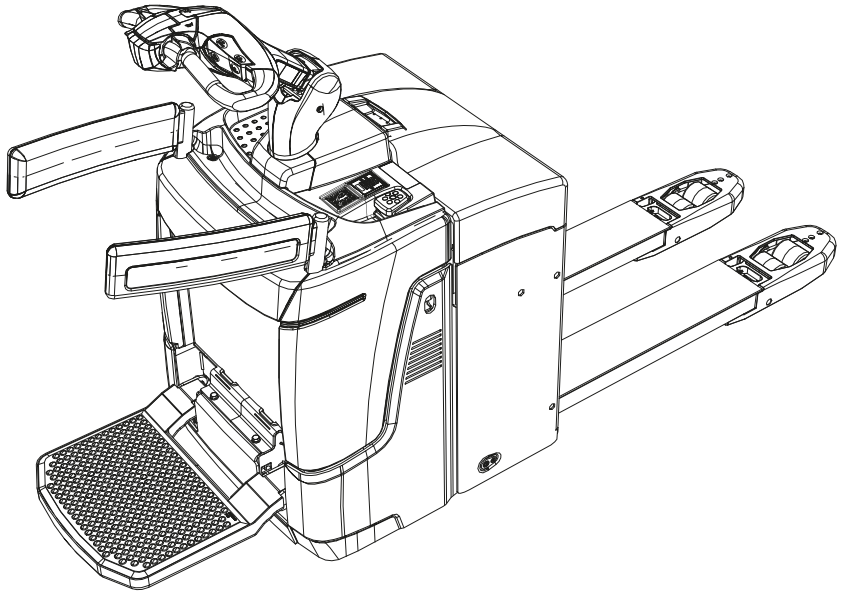
1.1 Truck models and rated capacity

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

ERE120

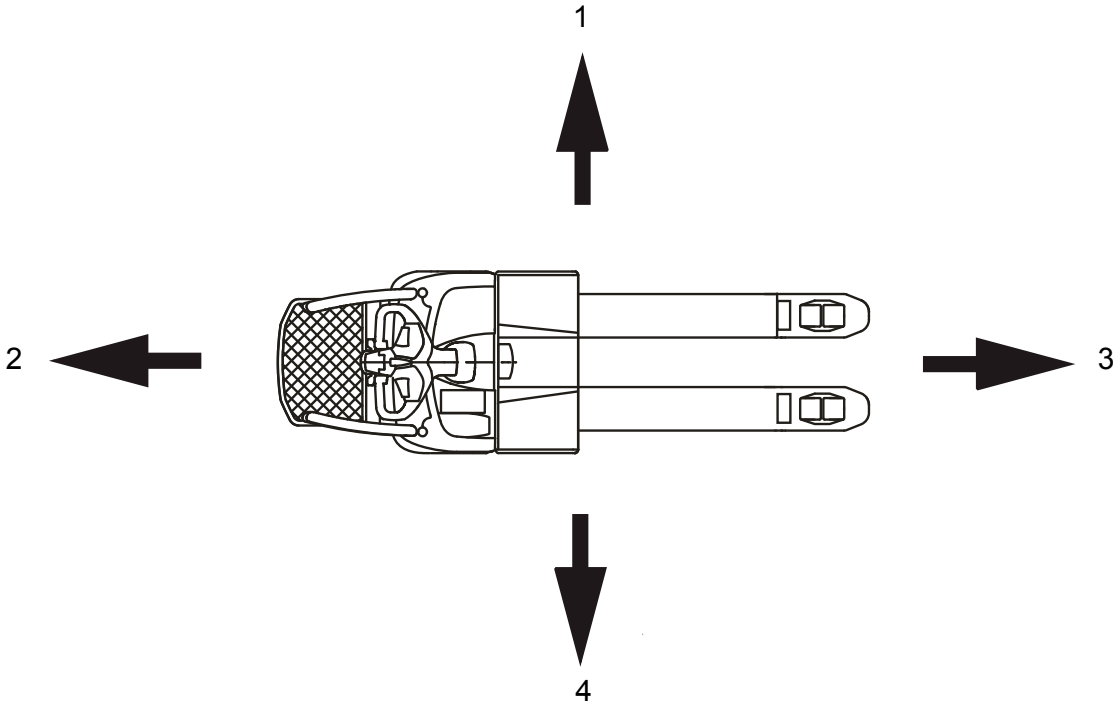
ERE	Model name
1	Series
20	Rated capacity x 100 kg

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



2 Travel direction definition

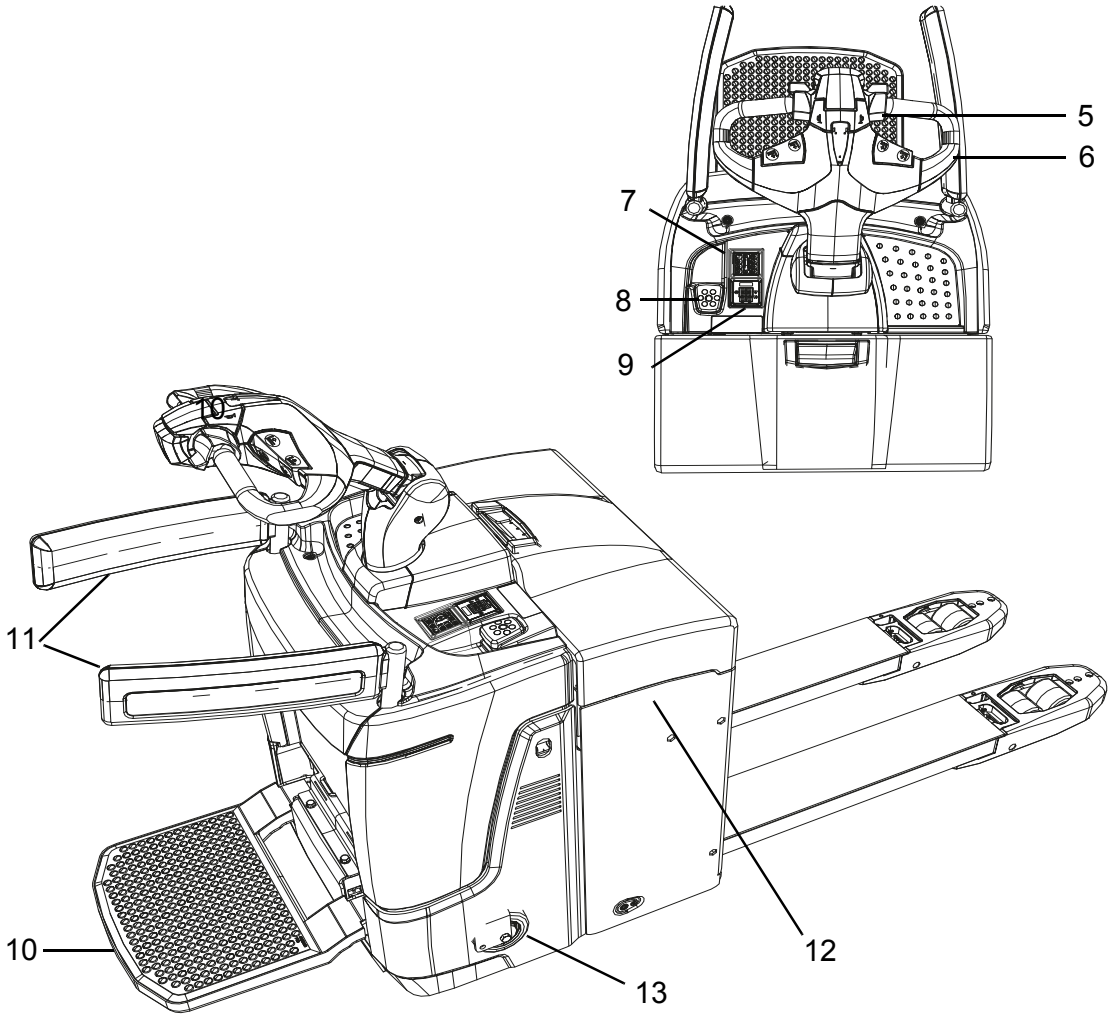
The following determinations have been made for travel direction specification:



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

3 Assemblies and Functional Description

3.1 Assembly Overview



Item		Component	Item		Component
5	●	Travel switch	9	○	CanDis
6	●	Tiller		●	Charge indicator
7	●	Key switch	10	●	Folding operator platform
	○	CanCode	11	○	Folding side restraint
	○	ISM	12	○	Mains cable (on-board charger)
8	●	Emergency Disconnect (main switch)	13	●	Support wheel
● = Standard version			○ = Option		

3.2 Functional Description

Safety Mechanisms

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

When released a gas pressure spring pushes the tiller up and activates braking.

If the truck touches a person, the red collision safety switch changes the travel direction in pedestrian mode when travelling in drive direction with the platform and the side restraints folded up (○). The truck brakes, travels away from the operator and stops. This prevents the operator from being hit.
The collision safety feature can also be activated for rider mode (○).

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

The protective mesh (○) protects the operator from sliding loads.

Emergency Stop safety feature

The Emergency Stop is activated by the traction controller. Each time the truck is switched on the system performed a self diagnosis. If an error is detected, the truck automatically brakes to a halt. Control displays in the CanDis display instrument (○) 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.
▶ In rider mode: Take up a stable standing position and hold on with both hands.
▶ In pedestrian mode: Remain at a suitable distance from the truck during operation.

Hydraulic system

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

Ergonomic lift (○) (ERE C20)

For lifting and lowering, the truck is equipped with support arm lift (initial lift) with the maximum lift capacity and mast lift (high lift) with a lower lift capacity.

Drive system

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

Tiller

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

Electrical system

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

Controls and displays

Ergonomic controls ensure fatigue-free operation for sensitive application of the travel and hydraulic operations. The battery discharge indicator shows the available battery capacity. The CanDis display (○) shows information which is important for the operator such as travel program, service hours, battery capacity and event messages.

3.2.1 Hourmeter

➔ Prepare the truck for operation, see "Preparing the truck for operation" on page 62 or see "CanCode Keypad (○)" on page 95.

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

– Tiller in travel zone "F", see "Travel" on page 72.
– "Lift" button, see page 80.
– "Lower" button, see page 80.

4 Technical Specifications

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

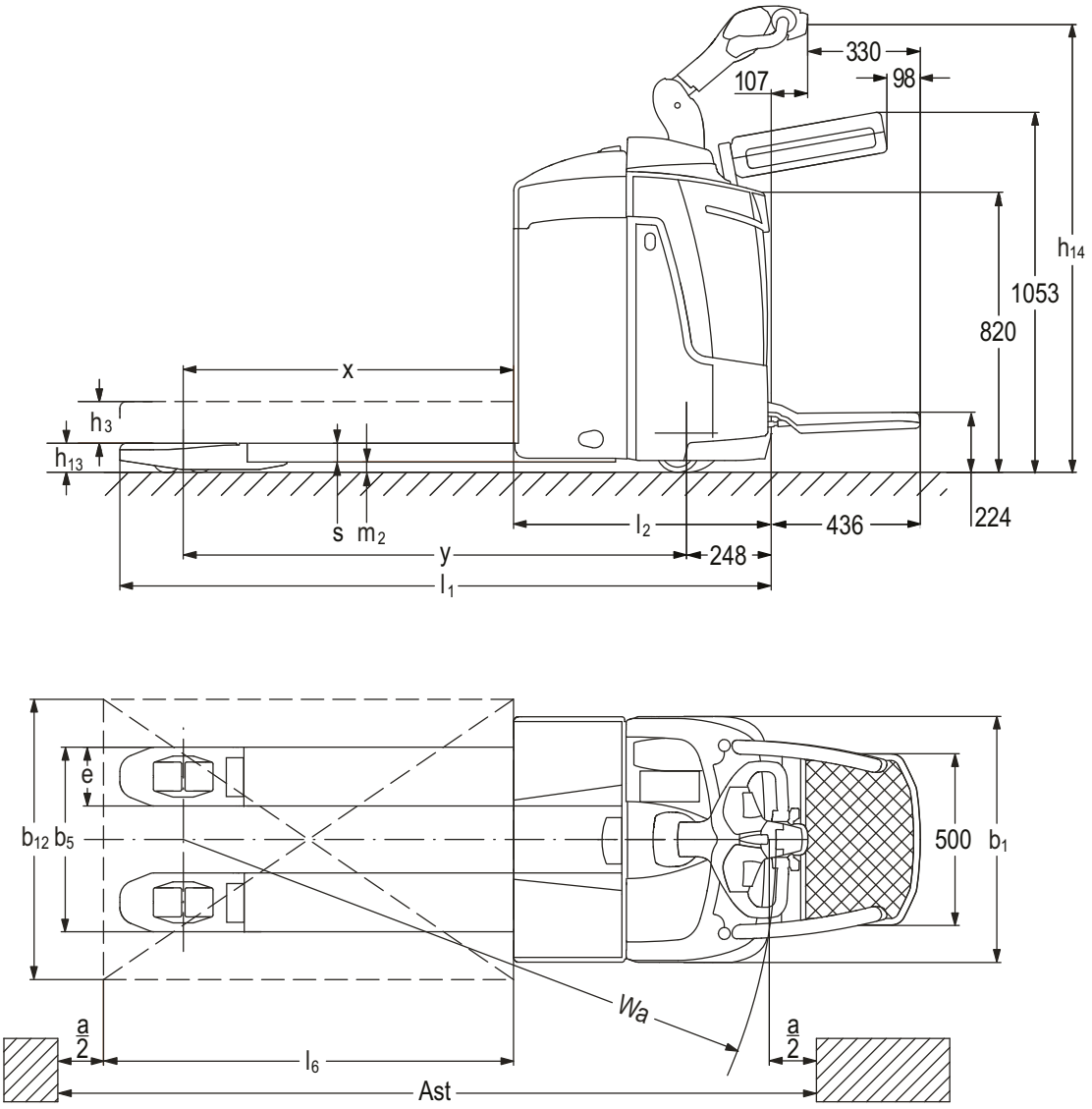
4.1 Performance data

	Description	ERE 120	ERE C20	
Q	Rated capacity	2000		kg
Q	Rated capacity (support arm lift / mast lift)[1)]		2000 / 700	kg
D	Load centre distance with standard fork length	600	600	mm
	Travel speed, pedestrian mode with/without rated load	4.2	4.2	km/h
	Travel speed, rider mode with/without rated load	7.5 / 8.5	6.0 / 6.0	km/h
	Lift time with/without rated load	3.3 / 2.9		s
	Lift time, support arm lift with/without rated load		3.6 / 2.7	s
	Lift time, mast lift with/without rated load		3.4 / 2.0	s
	Lift speed with/without rated load	0.4 / 0.4	0.16 / 0.27	m/s
	Lowering time with/without rated load	1.5 / 2.0		s
	Lowering time, support arm lift with/without rated load		6.0 / 8.6	s
	Lowering time, mast lift with/without rated load		3.1 / 3.6	s
	Lowering speed with/without rated load	0.06 / 0.06	0.17 / 0.15	m/s
	Max. gradeability (5 min) with/without rated load	8 / 16	8 / 16	%
	Drive motor S2 60 min	1.6	1.6	kW
	Lift motor S3 10%	2.2	2.2	kW

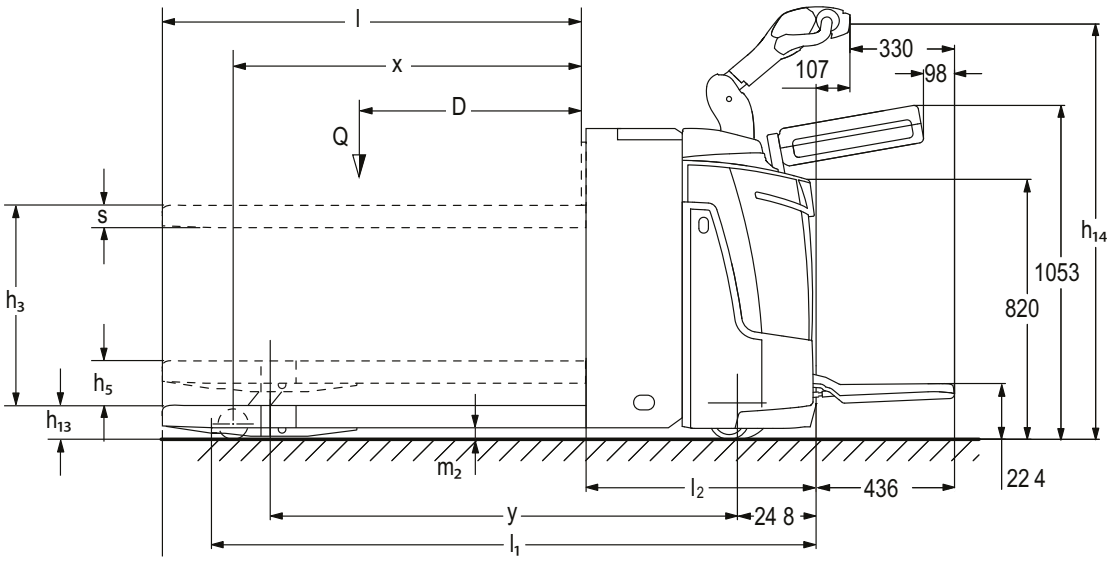
[1)] 2000 kg only with support arm lift h5 = 122 mm.
In mast lift h3 reduced capacity 700 kg.

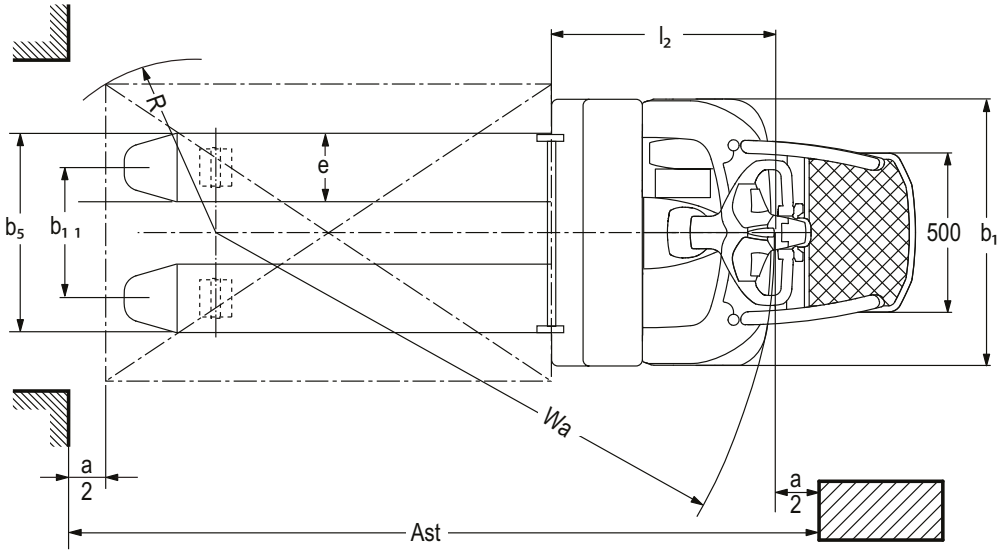
4.2 Dimensions

ERE 120



ERE C20





	Description	ERE 120	
h14	Tiller height in travel position	1146/1428	mm
h13	Lowered fork height	85	mm
h3	Rated lift	122	mm
b1/b2	Overall width	720	mm
b5	Width across forks	510/540/670	mm
b10	Track width, front	338/368/498	mm
b11	Track width, rear	500	mm
s/e/l	Fork dimensions	55/172/1150	mm
a	Safety clearance	200	mm
l1[4)]	Overall length (M/L)	1834/1906	mm
l2[4)]	Headlength (M/L)	682/754	mm
m2	Ground clearance, centre of wheelbase	30	mm
Ast[1)3)4)]	Aisle width for pallets 1000 x 1200 crossways (M/L)	2032/2104	mm
Ast[1)2)4)]	Aisle width for pallets 800 x 1200 lengthways (M/L)	2082/2154	mm
Wa1)	Turning radius (M/L)	1595/1667	mm
	Net weight:	See truck data plate	

1 Load section raised and platform folded in if load section lowered +55 mm

2 Diagonal in accordance with VDI +205 mm

3 Diagonal in accordance with VDI +369 mm

4 Dimensions with top battery removal / with side battery removal +72 mm

	Description	ERE C20	
h14	Tiller height in travel position	1146/1428	mm
h13	Lowered fork height	90	mm
h3	Mast lift	540	mm
h5	Support arm lift	122	mm
b1/b2	Overall width	720	mm
b5	Width across forks	540	mm
b10	Track width, front	508	mm
b11	Track width, rear	500	mm
s/e/l	Fork dimensions	60/187/1150	mm
a	Safety clearance	200	mm
l1[4)]	Overall length	1850	mm
l2[4)]	Length to fork face	700	mm
m2	Ground clearance, centre of wheelbase	30	mm
Ast[1)3)4)]	Aisle width for pallets 1000x1200 crossways	2114	mm
Ast[1)2)4)]	Aisle width for pallets 800 x 1200 lengthways	2164	mm
Wa1)	Turning radius	1614/1667	mm
	Net weight:	See truck data plate	

1 Load section raised and platform folded in if load section lowered +53 mm

2 Diagonal in accordance with VDI +205 mm

3 Diagonal in accordance with VDI +369 mm

4 Dimensions with battery removal from above

Aisle widths

ERE 120 / ERE C20

(all dimensions in mm)

l		l_1 3)4)	y 1)3)4)	x1)	l_6	b_{12}	W_a 1)2)3) 4)	A_{st} 2)3)4)
Battery compartment L - Headlength l_2 = 754 mm3)								
1000	186	1756	1269	763	1000	800	1517	1954
1150	186	1906	1419	913	1200	800	1667	2154
1200	186	1956	1469	963	1200	800	1717	2154
1400	186	2156	1669	1163	1400	700	1917	2354
1600	186	2356	1869	1363	1600	1200	2117	2554
1750	558	2506	1647	1141	1800	1000	1895	2754
1800	558	2556	1697	1191	1800	1000	1945	2754
1950	558	2706	1847	1341	2000	800	2095	2954
2150	558	2906	2047	1541	2100	700	2295	3054
2400	558	3156	2297	1791	2400	1200	2545	3354
2400	800	3156	2055	1549	2400	1200	2303	3354

l	Fork length
l_1	Overall length
y	Wheelbase
x	Load distance
l_6	Load length
b_{12}	Load width
W_a	Turning radius
A_{st}	Working aisle width requirements

1) Load section raised; if load section lowered +55 mm

2) In rider mode: +436 mm

3) Battery compartment L version / for battery compartment M version: -72 mm

4) Battery removal from the top; with battery removal from the side additional: +72 mm

$A_{st}=W_a+l_6-x+a$ (pallet length)

4.3 Weights

Description	ERE 120	
Net weight excl. battery (M/L)	440/443	kg
Axle loading, laden front/rear + battery (L)	1702/1043	kg
Axle loading, unladen front/rear + battery (L)	155/590	kg

Weights and axle loads vary depending on truck features.

Description	ERE C20	
Net weight excl. battery	503	kg
Axle loading, laden front/rear + battery	1258/1399	kg
Axle loading, unladen front/rear + battery	128/525	kg

Weights and axle loads vary depending on truck features.

4.4 Tyre type

Description	ERE 120	
Tyre size, front	230 x 65	mm
Tyre size, rear (single / tandem)	85 x 110 / 85 x 85	mm
Support wheel (twin roller)	125 x 54	mm
Wheels, number front / rear (x = driven)	2 or 4 / 1x + 2	

Description	ERE C20	
Tyre size, front	230 x 65	mm
Tyre size, rear (single / tandem)	82 x 70 / 82 x 100	mm
Support wheel (twin roller)	125 x 54	mm
Wheels, number front / rear (x = driven)	2 or 4 / 1x + 2	

4.5 EN norms

Continuous sound pressure level

– ERE 120 / ERE C20: 73 dB(A)

in accordance with EN 12053 as harmonised with ISO 4871.

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

➔ Noise levels can fluctuate depending on the floor composition and wheel lining.

Vibration

– ERE 120 / ERE C20: 0,94 m/s²

in accordance with EN 13059

➔ The vibration acceleration acting on the body in its operating position is the linearly integrated, weighted acceleration in the vertical axis according to the standard. It is calculated when travelling over thresholds at constant speed. These recordings were taken on a single occasion and must not be confused with the human vibrations of the "2002/44/EC/Vibrations" operator directive. The manufacturer offers a special service to measure these human vibrations, see "Human vibration measurement" on page 148.

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 "Internal Operation Combined with Brief External or Cold Store Operation (●)" on page 13
– with cold store equipment: operating at -28°C to +25°C, see "Internal Operation in Cold Stores with Cold Store Equipment (○)" on 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

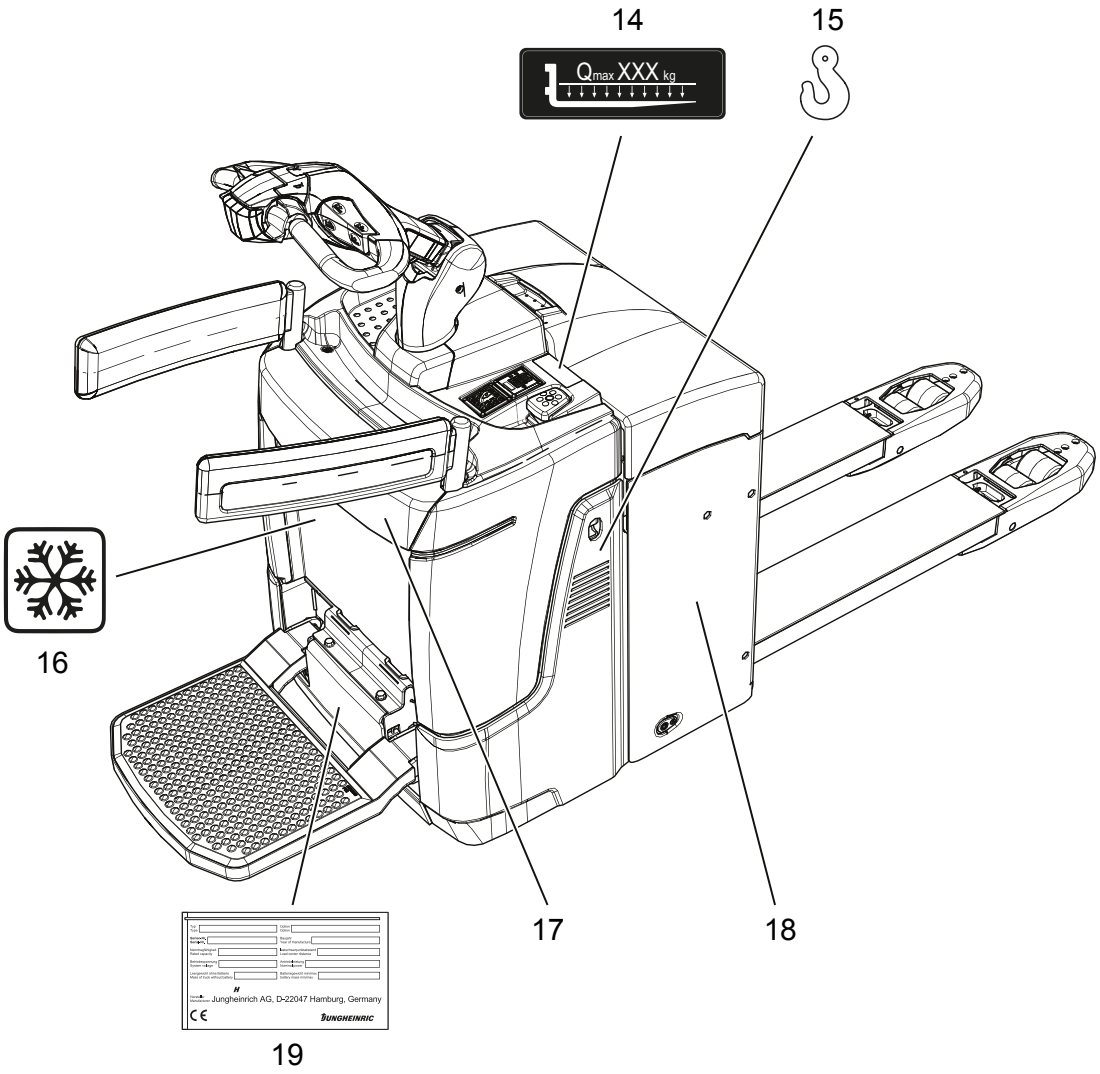
The manufacturer certifies compliance with the requirements for the design and manufacture of electrical equipment, according to EN 1175 "Industrial Truck Safety - Electrical Requirements", provided the truck is used according to its purpose.

5 Identification Points and Data Plates

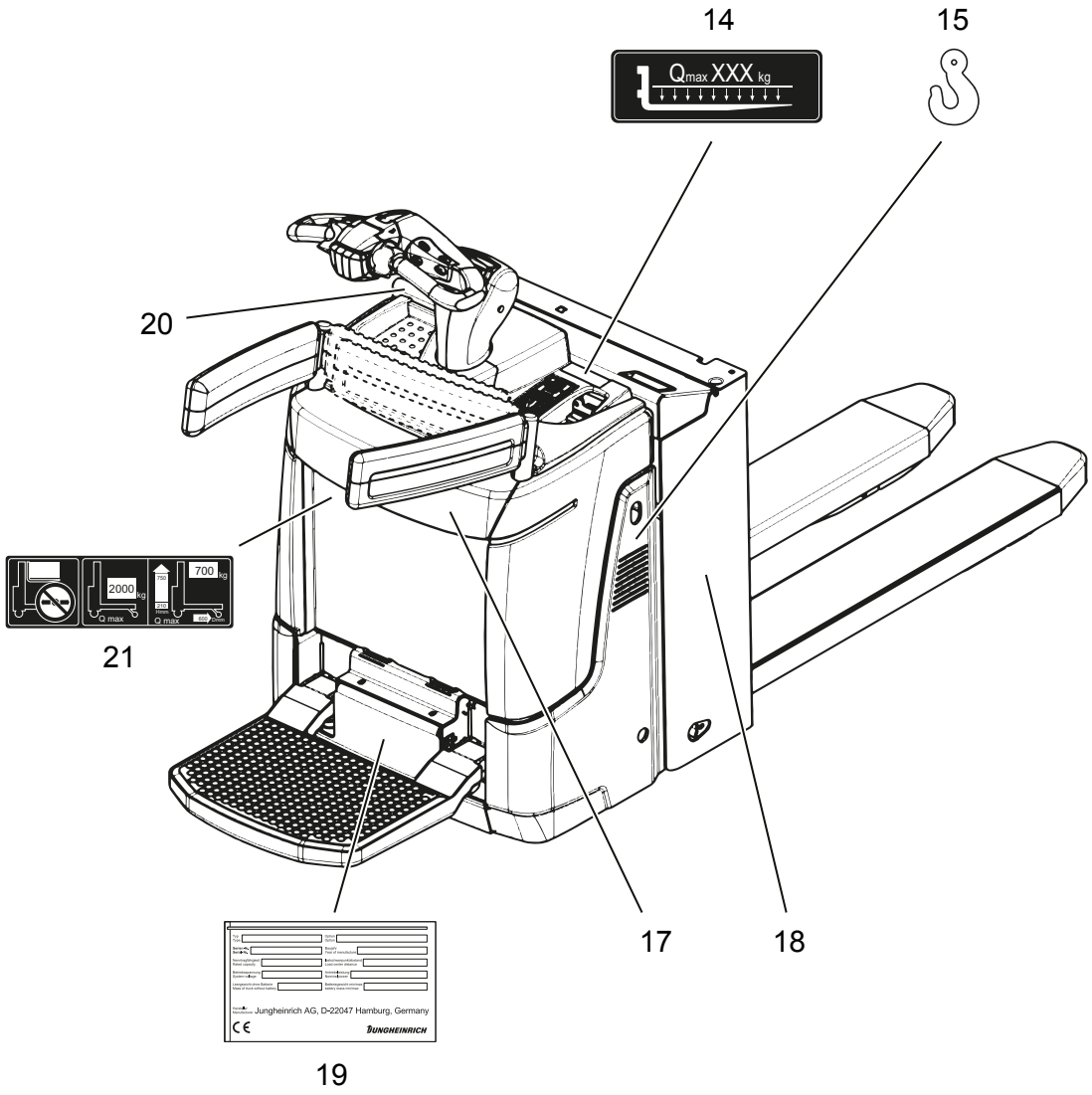
Warnings and notices such as capacity charts, strap points and data plates must be legible at all times. Replace if necessary.

5.1 Indication Points

ERE 120



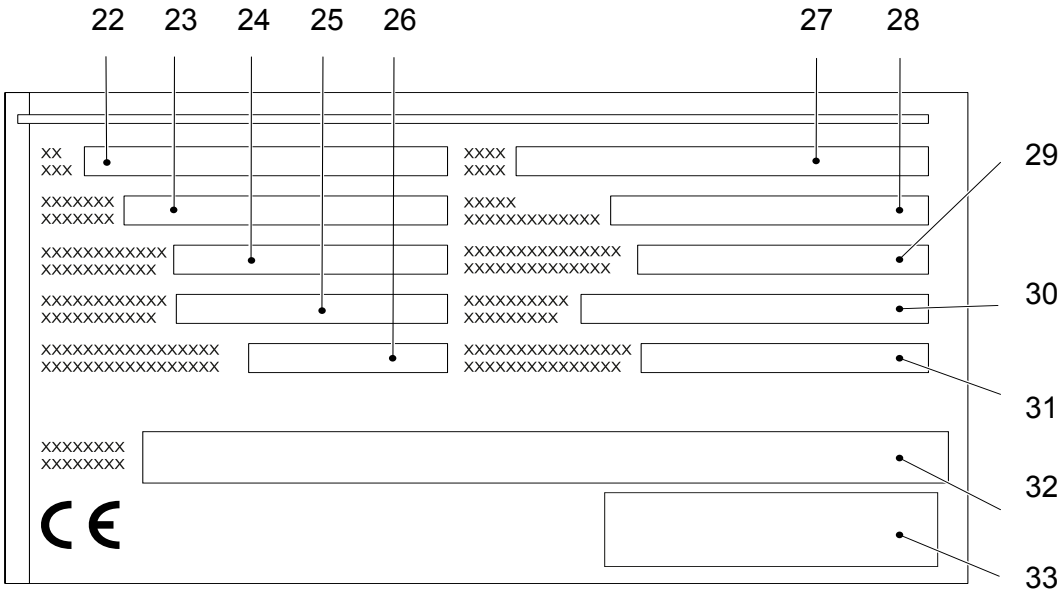
Item	Component
14	Capacity Qmax
15	Attachment points for lifting by crane
16	Cold store (○)
17	Model name
18	Battery data plate
19	Data plate



Item	Component
14	Capacity Qmax
15	Attachment points for lifting by crane
17	Model name
18	Battery data plate
19	Data plate
20	Serial number (etched into the truck chassis)
21	Ergonomic lift capacity plate

5.2 Data plate

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

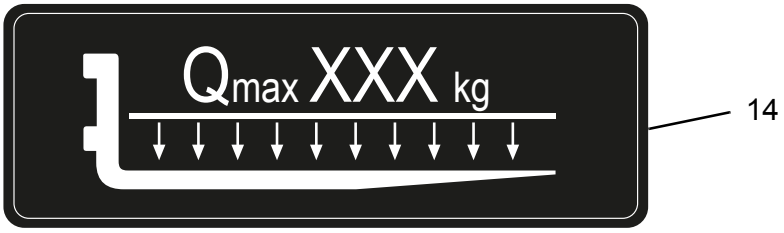


Item	Description	Item	Description
22	Type	28	Year of manufacture
23	Serial number	29	Load centre (mm)
24	Rated capacity (kg)	30	Output
25	Battery voltage (V)	31	Min./max. battery weight (kg)
26	Net weight w.o. battery (kg)	32	Manufacturer
27	Option	33	Manufacturer’s logo

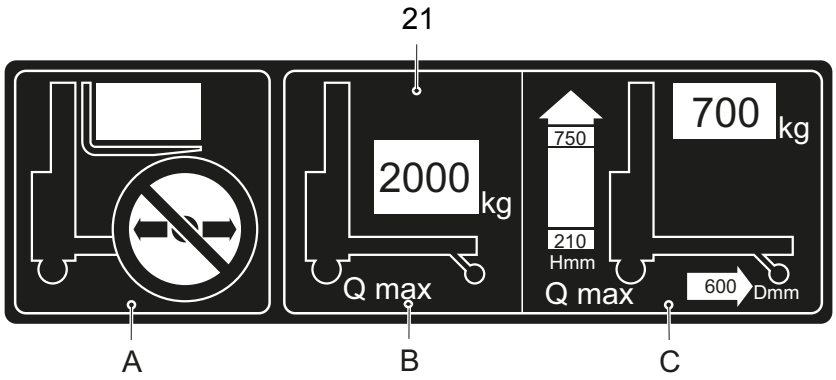
For queries regarding the truck or ordering spare parts always quote the truck serial number (23).

5.3 Truck capacity plate

The capacity plate (14) gives the maximum load-bearing capacity (Q) of the truck in kg assuming the load on the load handler is evenly distributed.



Capacity plate, ergonomic lift(○) (ERE C20)



A =	Travelling with a raised load prohibited
B =	Max. capacity for horizontal transporting with raised support arms without mast lift: 2000 kg
C =	High-level lift height: 210 - 750 mm Max. high-level lift capacity: 700 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.

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!

Incorrect lifting by crane can result in accidents

Improper use or use of unsuitable lifting gear and can cause the truck to fall when being lifted 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 should only be loaded by personnel trained in the use of lifting slings and tools.

▶ Wear personal protective equipment (e. g. safety shoes, safety helmet, hi-vis jacket, protective gloves, etc.) when loading by crane.

▶ Do not stand under suspended loads.

▶ Do not enter or stand in a hazardous area.

▶ Always use lifting gear with sufficient capacity (for truck weight see truck rating plate).

▶ Always attach the crane lifting gear to the prescribed strap points and prevent them from slipping.

▶ Use the lifting slings only in the prescribed loading direction.

▶ Crane slings should be fastened in such a way that they do not come into contact with any attachments when lifting.

Lifting the truck by crane

Requirements

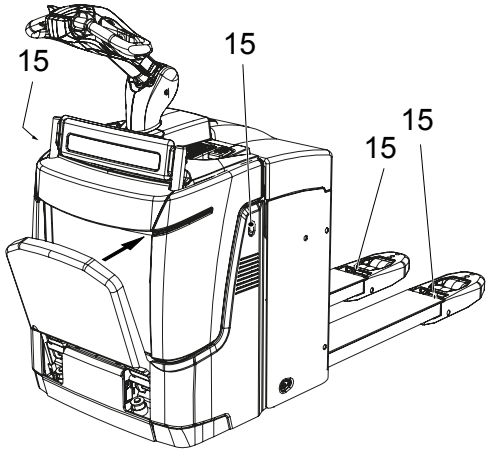
– Park the truck securely, see "Parking the truck securely" on page 65.

Tools and Material Required

– Lifting gear
– Crane lifting gear

Procedure

• Secure the lifting slings to the strap points (15).



The truck can now be lifted by crane.

2 Remove the transport lock

The transport lock ensures that the truck is braked during transport without the mass of the battery.

There is an instruction decal by the front cover for the transport lock (35). This must be removed once the battery has been installed.

Remove the transport retainer

Requirements

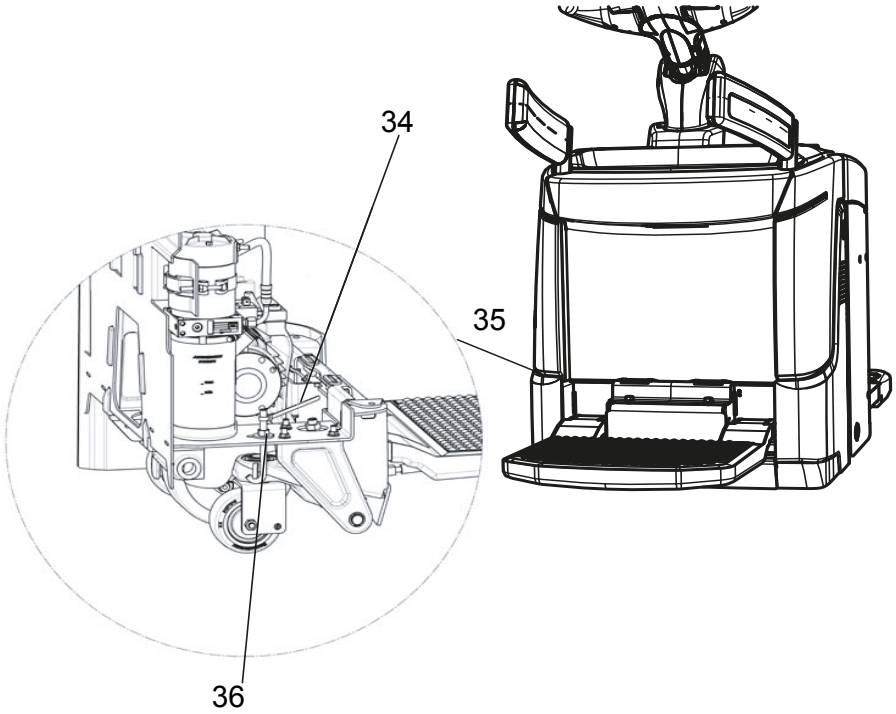
– Fold down the operator platform.
– Remove the front panel, see "Front cover disassembly" on page 137.

Procedure

- Remove the cable binder latch (34).
- Undo the nut (36) and remove the transport retainer.

The transport retainer is removed and the industrial truck can be started as specified, see "Starting up the truck" on page 61.

Leave the transport retainer on the truck for later transportation without a battery.



3 Transport

⚠ WARNING!

Uncontrolled movement during transport

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

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

Securing the industrial truck for transport

Requirements

– Load the truck.
– Park the truck securely, see "Parking the truck securely" on page 65.

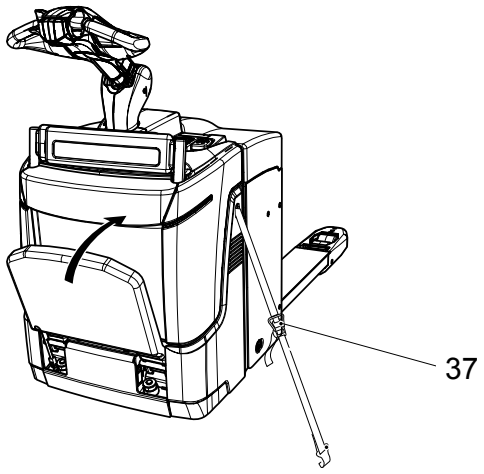
Tools and Material Required

– Lashing straps

Procedure

• Attach the lashing straps (37) to the industrial truck and the transport vehicle and tension sufficiently.

The truck can now be transported.



4 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 "Battery removal and installation" on page 51.
- Charge the battery, see "Charging the battery" on page 44.

The truck can now be started, see "Starting up the truck" on page 61.

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.

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

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 shoes must be clean, secure and have a light coating of dielectric grease.

⚠ CAUTION!

Short circuits can cause fires

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

▶ Before closing the battery cover make sure that the battery cables cannot be 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 "Parking the truck securely" on page 65).

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:

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.

ERE 120 Battery tray M

Battery type	Capacity (Ah)	Min. weight (kg)	Max. dimensions (mm)
24 volt battery	2PzV 200	204	624X212X628
24 volt battery	2PzW 230	204	624X212X628
24 volt battery	2PzS 250	204	624X212X628
24 volt battery	2PzS 250 Lib.Silver	204	624X212X628
24 volt battery	2PzM 250	204	624X212X628
24 volt battery	2PzV 220 Hawk	204	624X212X628
24 volt battery	XFC 158	204	624X212X628

ERE 120 Battery tray L

Battery type	Capacity (Ah)	Min. weight (kg)	Max. dimensions (mm)
24 volt battery	3PzV 300	273	624X284X628
24 volt battery	3PzW 330	273	624X284X628
24 volt battery	3PzS 375	273	624X284X628
24 volt battery	3PzS 345 Lib.Silver	273	624X284X628
24 volt battery	3PzS 375 Lib.Silver	273	624X284X628
24 volt battery	3PzM 375	273	624X284X628
24 volt battery	3PzV 330 Hawk	273	624X284X628
24 volt battery	XFC 316	273	624X284X628

ERE C20 Battery tray S

Battery type	Capacity (Ah)	Min. weight (kg)	Max. dimensions (mm)
24 volt battery	2PzB 200	166	662X147X686
24 volt battery	2PzVB 170	176	657X147X686
24 volt battery	2PzVB 142	133	652X147X560
24 volt battery	2PzB 150	144	662 x 147 x 592
24 volt battery	2PzB 150 Lib.Silver	144	662 x 147 x 592
24 volt battery	2PzB 200 Lib.Silver	176	657X147X686
24 volt battery	2PzMB 140	144	662 x 147 x 592
24 volt battery	2PzVB 162 Hawk	166	662X147X686
24 volt battery	2PzVB 134 Hawk	144	662 x 147 x 592
24 volt battery	XFC 158	144	662 x 147 x 592
24 volt battery	XFC 177	166	662X147X686

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.

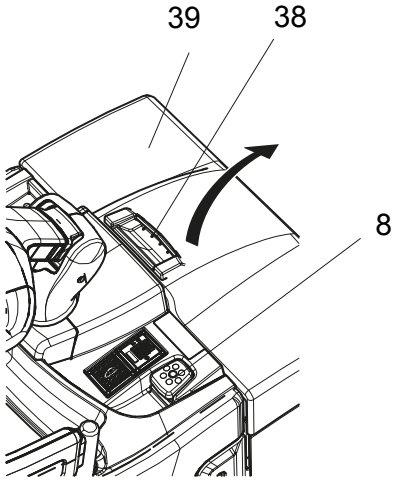
Requirements

– Park the truck on a level surface.
– Park the truck securely, see "Parking the truck securely" on page 65.

Procedure

- Depress the Emergency Disconnect (8).
- Pull up the battery panel (39) using the recess and lift it back (38).

The battery connector and battery retainer can be accessed



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.

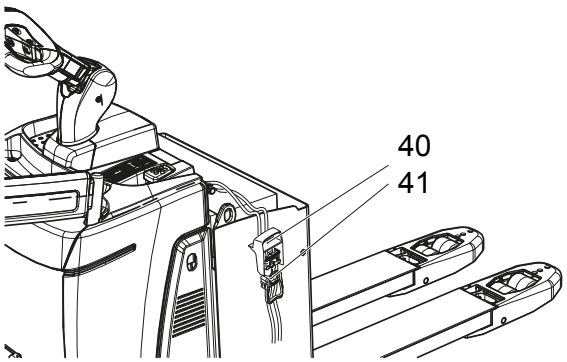
NOTE

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 "Exposing the battery" on page 43.

Procedure

- Disconnect the battery connector (40) from the truck connector.
- Connect the battery connector (40) to the charging cable (41) 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 (40) from the charging cable (41) of the stationary charger.
- Attach the battery connector (40) 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.

NOTE

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

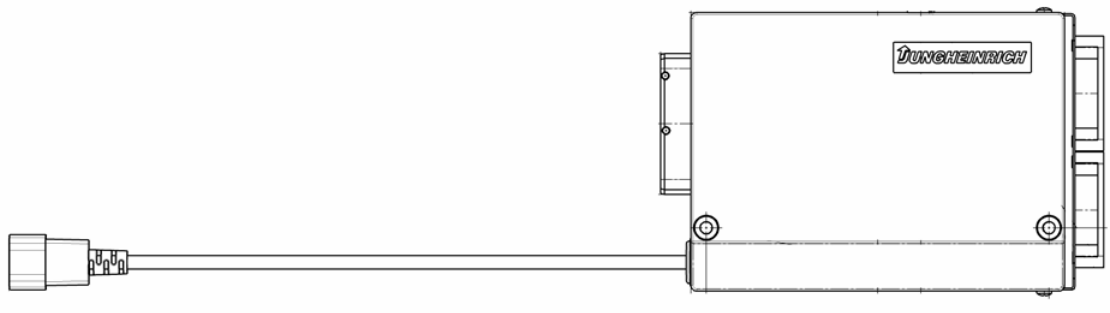
The on-board charger consisting of a battery charger and battery controller must not be opened. If faulty, contact the manufacturer's customer service department.

- ▶ 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)

The charging characteristics (ELH 2415 / 2425 / 2435) are set via parameter 1388 of the truck software, see "Set ELH 2415 / 2425 / 2435 Charger Characteristics with CanCode" on page 123.

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

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

Flashing sequence	Selected charging curves (characteristics)
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
3	Maintenance-free: PzV with 100 - 150 Ah
4	Maintenance-free: PzV with 151 - 200 Ah
5	Wet cell battery: PzS with pulse characteristic 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 curves 1 and 2 can be used.
- ▶ If a characteristic is set on ELH 2415 / 2425 that is not supported by the charger, the charge display is lit a steady red.
- ▶ All other characteristics (≥ 8) block the charger, and the battery is not charged.

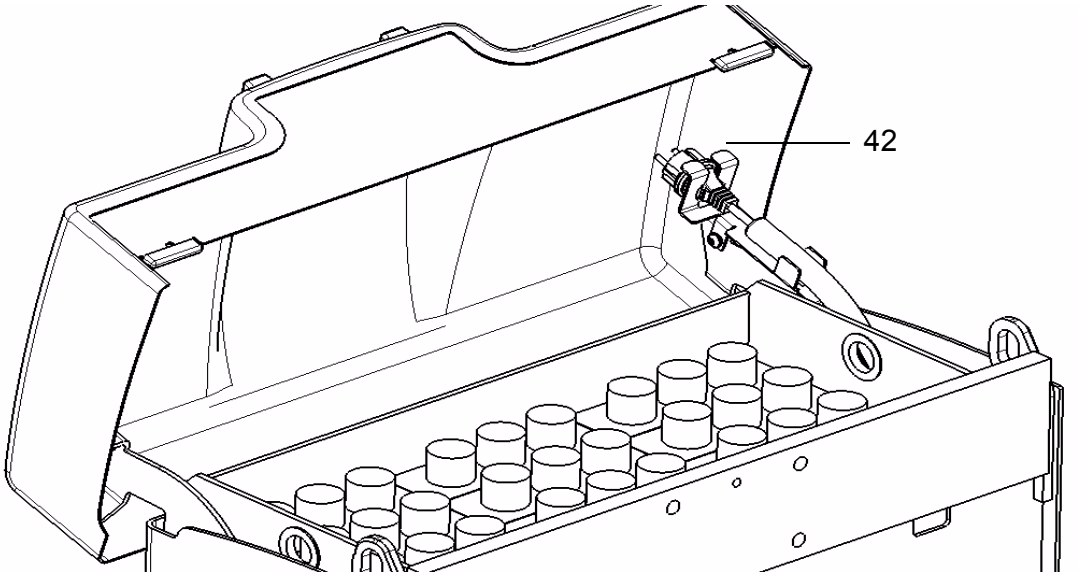
4.2.2 Charging the battery

Starting to charge with the on-board charger

– **ELH mains connection**

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

The mains connector of the charger (42) is integrated in the battery compartment (the illustration shows the battery compartment of the ERE 120).



Charging the battery

Requirements

– Park the truck securely, see "Parking the truck securely" on page 65.
– Expose the battery, see "Exposing the battery" on page 43.
– Correct charging program set on charger.

Procedure

- Remove any insulating mats from the battery.
- The battery connector must remain plugged.
- Attach the mains connector 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 now charged.

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

➔ When the mains connector is attached to the mains the battery connector cannot be disconnected.

Completing the battery charge, restoring the truck to operation

NOTE

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

Requirements

– Battery charging is complete.

Procedure

- Remove the mains connector from the socket and store it in the battery compartment with the cable.
- 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

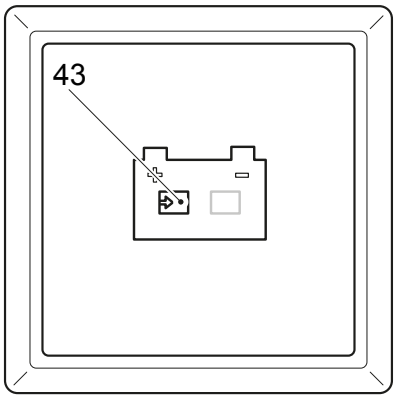
▶ Do not trap the mains cable when closing the battery panel.

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 (43)



Green LED (charge status)	
Lit	Charging complete, battery full. (Charge interval, float or compensation charge).
Slow flash	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	Charging characteristics or battery parameters invalid
Slow flash	1xflash with noticeable interval: Overvoltage detected before charging starts
	2xflash with noticeable interval: Max. charge time exceeded
	3xflash with noticeable interval: Max. charge capacity exceeded
	4xflash with noticeable interval: Control deviation Imax
	5xflash with noticeable interval: Overvoltage cutout
	6xflash with noticeable interval: Low voltage cutout
	7xflash with noticeable interval: Battery is faulty, battery error
	8xflash with noticeable interval: Fan error
	9xflash with noticeable interval: Battery disconnected from charger during charging.
	10xflash with noticeable interval: Equipment overtemperature

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 Removing the battery from the top

Battery removal

Requirements

– Park the truck securely, see "Parking the truck securely" on page 65.
– Expose the battery, see "Exposing the battery" on page 43.

Procedure

- Remove the battery panel on trucks with a protective grille (○).
- 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.

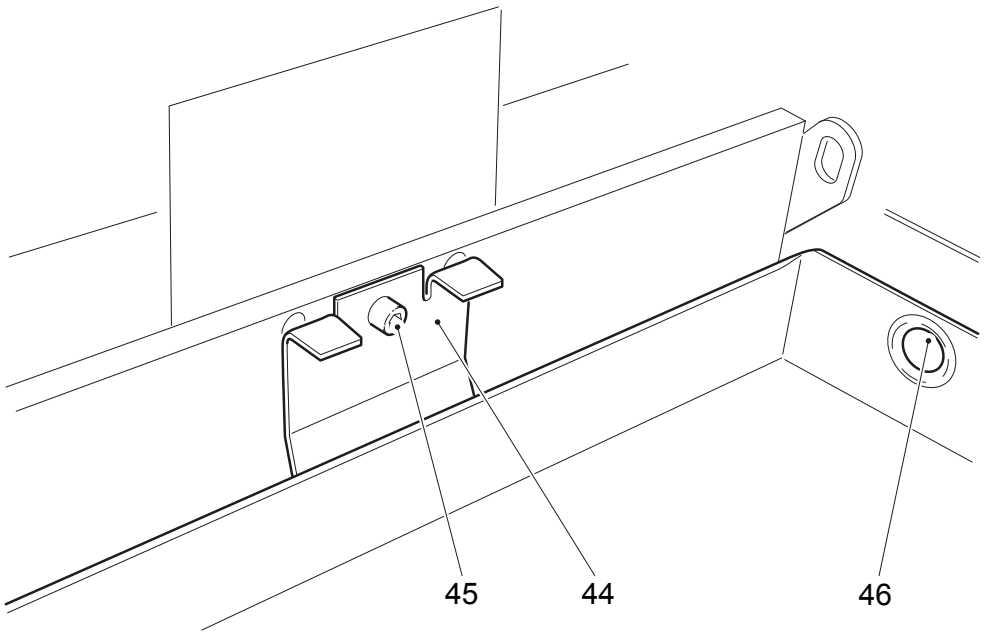
- Undo the screw (45) of the battery retainer and remove the battery retainer (44).
- Attach the crane lifting gear to the eyes (46).

➔ The crane lifting gear must exert a vertical pull. The hooks of the lifting gear must never fall onto the battery cells.

- Pull the battery up out of the battery compartment.

The battery has now been removed.

➔ Assembly is in the reverse order. Note the correct mounting position and make sure the battery is connected correctly.



5.2 Removing the battery from the side

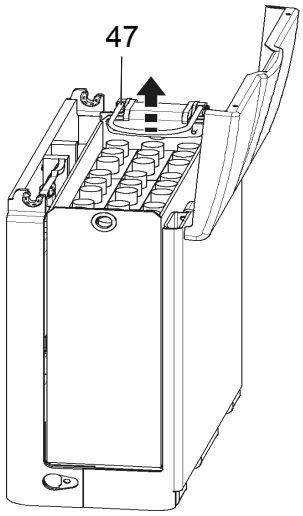
⚠ CAUTION!

Trapping hazard

Trapping hazard when removing and installing the battery.

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

Battery removal



Requirements

– Park the truck securely, see "Parking the truck securely" on page 65.
– Expose the battery, see "Exposing the battery" on page 43.

Tools and Material Required

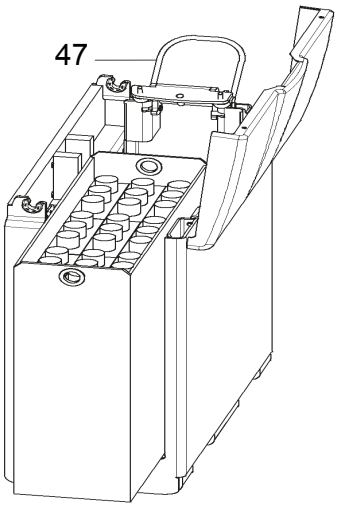
– Battery replacement station / trolley

Procedure

- Disconnect the battery connector (40) from the truck connector.
- Undo the battery lock (47).
- Move the battery replacement station / trolley up to the side of the truck.
- Turn the battery lock as far as the stop.
- Carefully push the battery from off the truck onto the battery replacement station / trolley.

The battery is now removed.

Battery installation



Requirements

– Park the truck securely, see "Parking the truck securely" on page 65.
– Expose the battery, see "Exposing the battery" on page 43.

Procedure

Installation is in the reverse order. When reinstalling the battery, note the proper installation position and make sure the battery is connected correctly.

E Operation

1 Safety Regulations for the Operation of the Forklift Truck

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 "Identification Points and Data Plates" on page 29) and warning instructions in the present operating instructions must be strictly observed.

⚠ WARNING!

Removing or disabling safety devices can cause accidents

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

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

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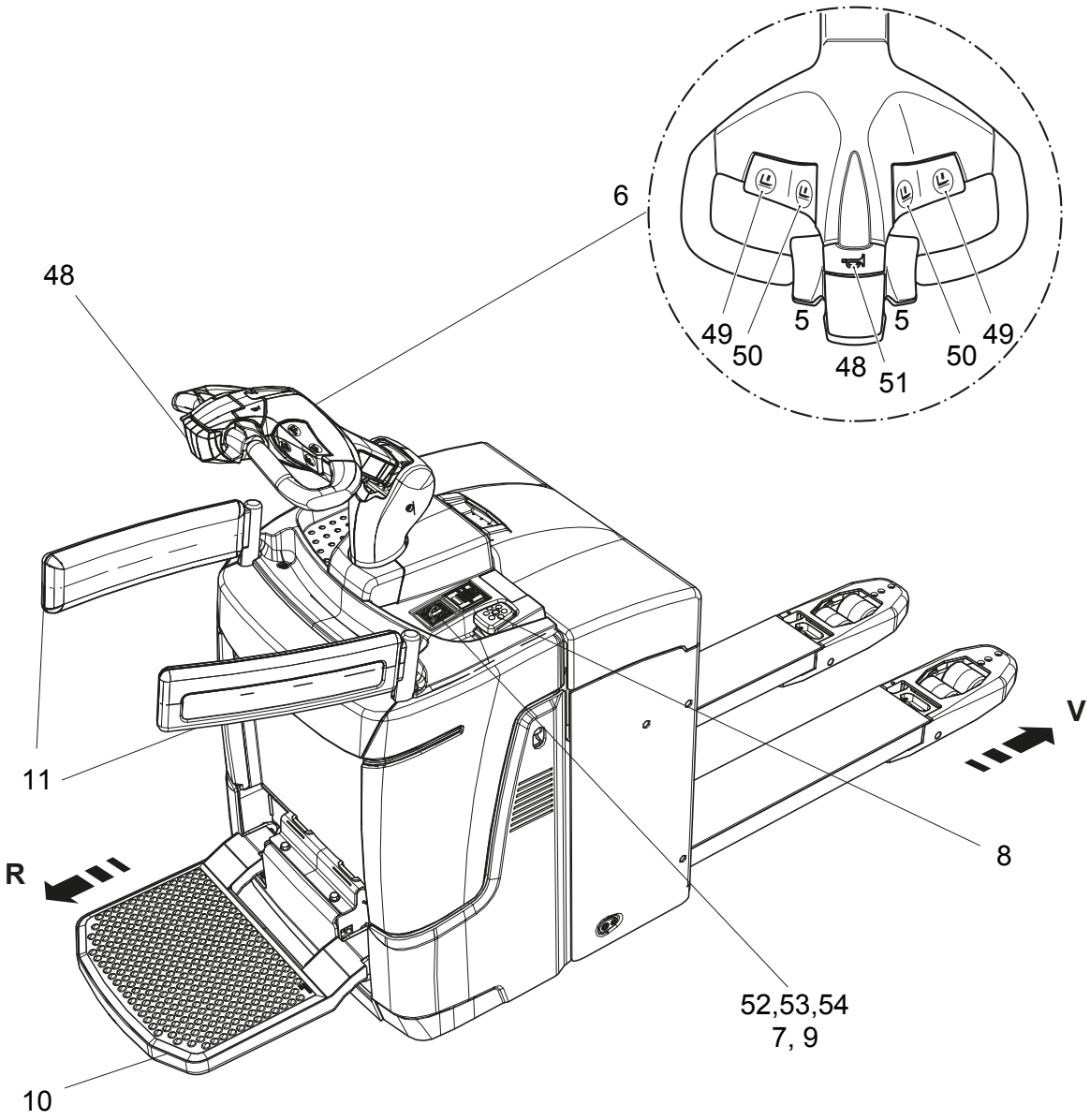
2 Displays and Controls



Item	Control /Display		Function
5	Travel switch	●	– Controls the direction of travel as well as the travel speed.
6	Tiller	●	– Set to brake zone (B) (see "Brakes" on page 77): The truck brakes mechanically. – Set to travel zone (F) (see "Brakes" on page 77): The mechanical brake is released and the truck is ready for operation.
7	Key switch and key	●	– Activates the truck by applying the control voltage – Removing the key prevents the truck from being switched on by unauthorised personnel
8	Emergency disconnect switch	●	Disconnects the battery supply – All electric functions are deactivated and the truck decelerates
9	CanDis	○	Display instrument for – Battery charge status – Service hours – Warning messages – Parameter setting
10	Folding operator platform	●	Pedestrian mode – Operator platform up: Travel speed restricted to max. 4.5 km/h. Rider mode, operator platform acts as a deadman switch: – Operator platform down and vacated: travel inhibited. – Operator platform folded down and laden by operator (both arms must be folded fully out or in): travel enabled.
11	Folding side restraint	○	When the side restraints are not unfolded and the standing platform is laden and unfolded: – Pedestrian travel speed restricted to max. 6 km/h.

Item	Control /Display		Function
48	Collision safety switch	●	Safety feature – Pedestrian mode: When applied, the truck travels for approx. 3 seconds in the fork direction. The parking brake then applies. The truck remains switched off until the travel switch is set to neutral. – Rider mode: No function (optional safety collision switch function as in pedestrian mode)
49	Lower button	●	– Lowers the lift mechanism.
		○	Ergonomic lift (ERE C20) – The lift mechanism is lowered: first the mast lift lowers, then the support arm lift.
50	Raise button	●	– Raises the lift mechanism.
		○	Ergonomic lift (ERE C20) – The lift mechanism is raised: first the support arm lift rises, then the mast lift.
51	Warning signal button (horn)	●	– Warning signal button
52	Charge status indicator	●	– Battery charge status
53	ISM	○	Replaces the key switch – Activates the truck via a card/ transponder – Indicates readiness for operation – Operational data acquisition – Data exchange with card / transponder
54	CanCode	○	Replaces the key switch – The truck is activated when you enter the appropriate code. – Travel program selection – Code setting – Setting parameters
● = 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.

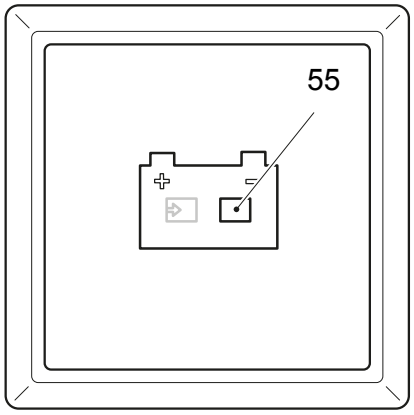
▶ Charge the battery at least every 2 months.

Charge the battery see "Charging the battery" on page 44.

If the residual capacity falls below the required level, lifting is inhibited. An alternating display (55) 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 (55) 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 Starting up the truck

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 severely worn forks.
- Check the drive wheel and load wheels for damage.
- Check that the markings and labels are present, clean and legible, see "Identification Points and Data Plates" on page 29.
- Check the protective mesh (○) and the attachment are secure and damage-free.
- 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 the tiller (damper) is restored to its normal position.
- Check the controls are automatically restored to zero after being applied.

3.2 Preparing the truck for operation

Switching on the truck

Requirements

– For checks and operations to be performed before starting daily operation, see "Checks and Operations to Be Performed Before Starting Daily Work" on page 61.

Procedure

- For rider mode, fold out the operator platform (10) and the side arms (○) (11).
- For rider mode, step on the operator platform.
- Pull out the emergency disconnect switch (8) until it engages.
- Switch on the truck, to do this
  - Insert the key in the key switch (56) and turn it as far to the right as it will go.
  - Enter the code in CanCode (○) (54).
  - 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 (○).

➔ For trucks with a folding platform the tiller (6) must be in the upper brake position "B". If event message "E-0914" is displayed in the CanDis display instrument (○), move the tiller to the upper brake zone "B", see "Travel" on page 72.

Truck is operational.

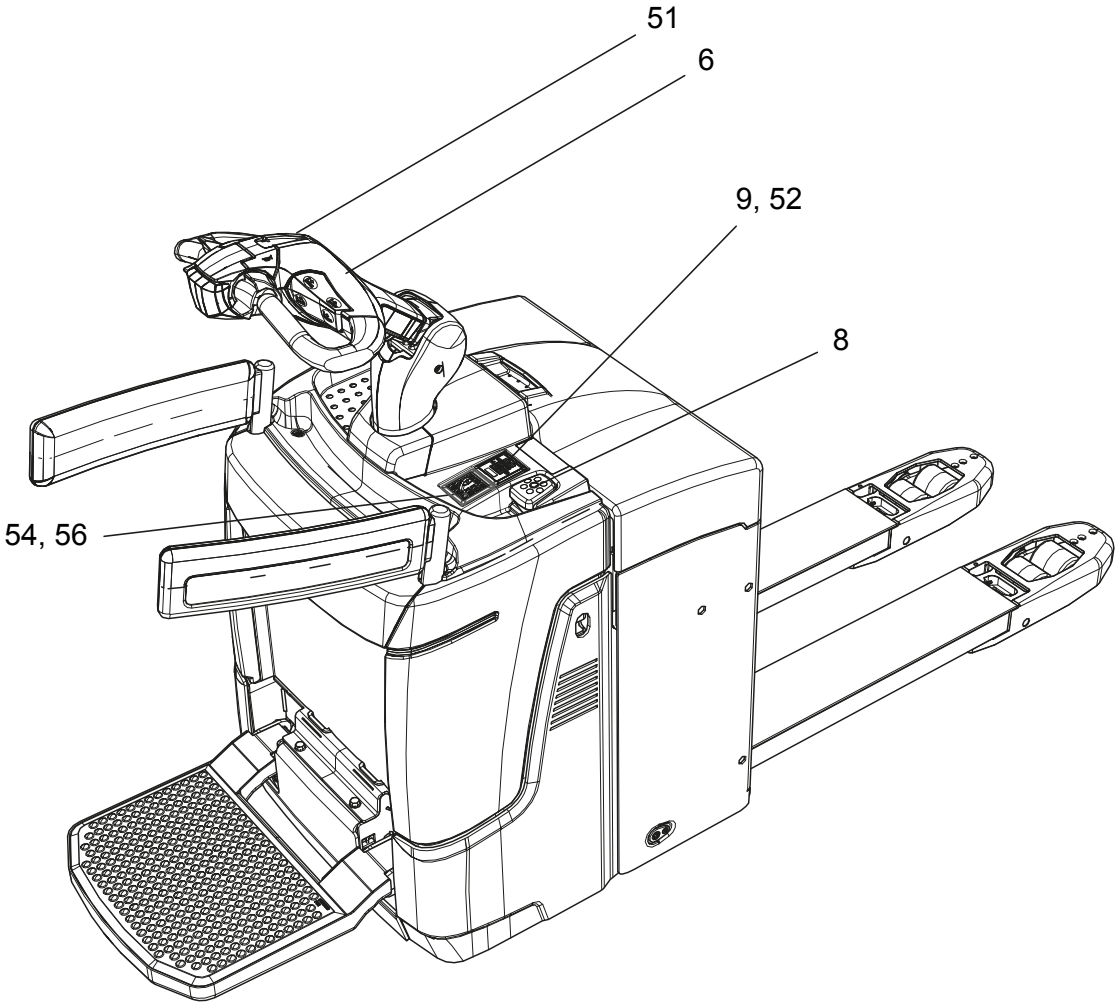
● The battery discharge indicator (52) shows the current battery charge status.

○ The CanDis display instrument (9) indicates the available battery capacity and the service hours.

⚠ WARNING!

Accidental truck movement can cause injury

Do not press the travel switch when entering or leaving the operator platform.



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 devices:
  - Test the emergency disconnect function by pressing the emergency disconnect switch. The main circuit is disconnected and no truck operations can be performed. Now pull the emergency disconnect switch to unlock it.
  - Test the horn by pressing the "warning signal" button.
  - Check braking efficiency, see "Brakes" on page 77.
  - Test the steering, see "Steering" on page 77.
  - Test the hydraulic system, see "Load handler raise/lower" on page 79.
  - Test travel operations, see "Travel" on page 72.
  - Test the safety collision switch by applying it while travelling in the drive direction in pedestrian mode.
- Test the controls and displays and check for damage, see "Displays and Controls" on page 57.

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 78. 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.

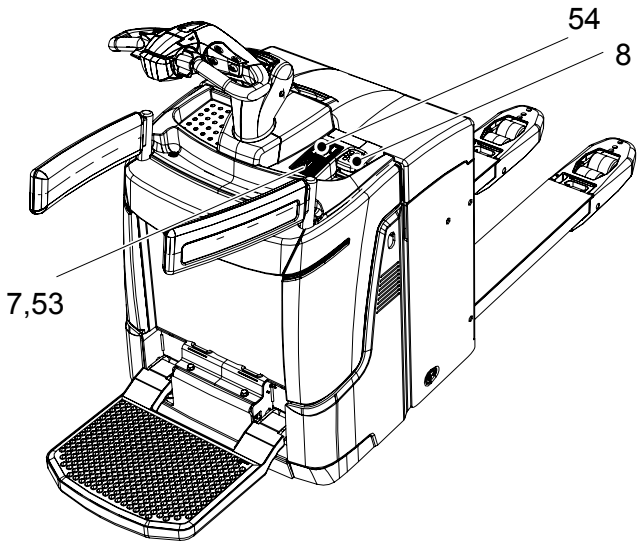
- ▶ Park the truck on a level surface. In special cases the truck may need to be secured with wedges.
- ▶ Fully lower the load handler when leaving the truck.
- ▶ Select a place to park where no other people are at risk of injury from the lowered load handler.
- ▶ If the brakes are not working, place 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.
  - Press the “Lower load handler” button.
- Using the tiller, set the drive wheel to "forward travel".
- Switch off the truck, to do this:
  - Turn the key in the key switch (7) anti-clockwise as far as it will go. Remove the key from the key switch.
  - For CanCode (54), press the O key (○).
  - Press the red key on the ISM access module (53) (○).
- Press the Emergency Disconnect switch (8).
- Fold in the side restraints (○).
- Lift up the folding platform.

The truck is parked.



4 Industrial Truck Operation

4.1 Safety regulations for truck operation

Travel routes and work areas

Only use lanes and routes specifically designated for truck traffic. Unauthorised third parties must stay away from work areas. Loads must only be stored in places specially designated for this purpose.
The truck must only be operated in work areas with sufficient lighting to avoid danger to personnel and materials. Additional equipment is necessary to operate the truck in areas of insufficient lighting.

⚠ DANGER!

Do not exceed the permissible surface and point loading on the travel lanes.
At blind spots get a second person to assist.
The driver must ensure that the loading dock /dock leveller cannot be removed or come loose during loading/unloading.

Travel conduct

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

Travel visibility

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

Negotiating slopes and inclines

Negotiating slopes and inclines up to 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 How to act in hazardous situations

⚠ CAUTION!

If the truck is in danger of tipping over or falling off a loading ramp, proceed as follows:

▶ Abandon the truck.

When travelling on a loading ramp, avoid steering and fold in the side arms as required to facilitate leaving the truck if it tips over.

4.3 Emergency Disconnect

⚠ CAUTION!

Applying maximum braking can result in accidents

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

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

⚠ CAUTION!

Faulty or non-accessible Emergency Disconnect switches can cause accidents

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

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

Press the Emergency Disconnect switch

Procedure

- Press the Emergency Disconnect (8).

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

➔ Press the Emergency Disconnect switch on in emergencies.

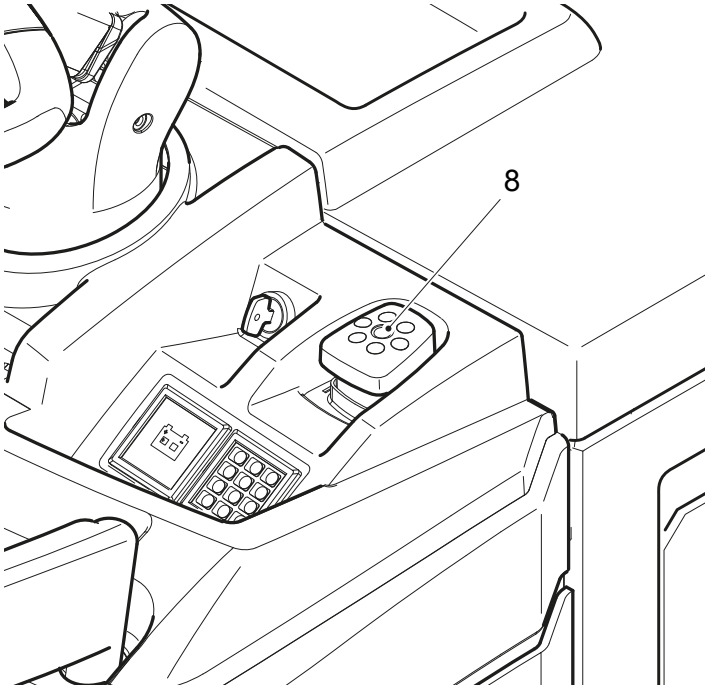
Releasing the Emergency Disconnect switch

Procedure

- Pull the Emergency Disconnect switch (8) to unlock it.

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

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



4.4 Automatic braking

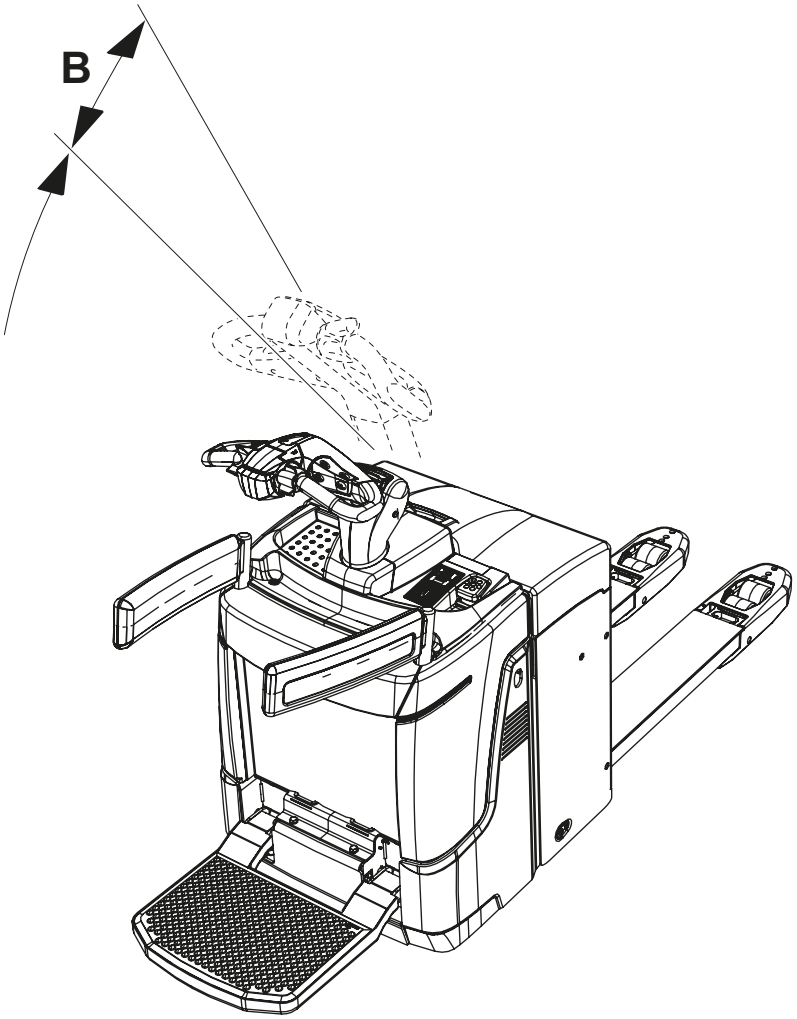
When the tiller is released, it returns automatically to the upper brake zone (B) and the brakes are applied automatically.

⚠ 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.



4.5 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.

⚠ WARNING!

Trapping hazard

Be extremely careful when driving and steering, especially if parts of your body extend outside the border of the truck.

- ▶ Do not reach between the standing platform and the truck frame when you fold up the platform.
- ▶ In pedestrian mode make sure you have sufficient distance from the industrial truck.

⚠ CAUTION!

Trapping hazard from the truck during pedestrian mode

In pedestrian mode the truck can pose a trapping hazard for the operator and other people.

- ▶ Wear personal protective equipment (e.g. safety shoes, ...).
- ▶ The truck must be operated with particular care and attention in pedestrian mode.
- ▶ Ensure there are no other people standing between the truck and obstacles when operating in pedestrian mode.

➔ It is recommended that safety shoes be worn at all times when using the truck in rider mode to avoid injuries.

➔ A truck without side arms (●) behaves like a truck with folded-in side arms.

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**l

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.

Industrial trucks with a folding standing platform and moving tiller

We distinguish between two travel modes:

– Travel in pedestrian mode
– Travel in rider mode

Travelling in pedestrian mode

Requirements

– Start up the truck, see "Starting up the truck" on page 61

Procedure

- Swing in both folding side arms (11) (○).

➔ Both side arms must always be folded in, otherwise all functions are deactivated (E-1926).

- Fold up the operator platform (10).
- Set the tiller (6) to the travel zone (F).
- Push the travel switch (5) to the desired travel direction: forward (V) or reverse (R).

➔ When the travel switch is released, it automatically returns to the neutral position.

- Control the travel speed with the travel switch (5).

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

➔ In pedestrian mode the truck can only operate at reduced speed.

Travelling in rider mode

Requirements

– Starting up the truck, see "Starting up the truck" on page 61

Procedure

- Swing out both folding side arms (11) (○).

  Both side arms must always be folded in or out; otherwise all functions are deactivated (E-1926).
- Fold down and step on the operator platform (10).
- Swing the tiller (6)in to the travel zone (F).
- Push the travel switch (5) to the desired travel direction: forward (V) or reverse (R).

  When the travel switch is released, it automatically returns to the neutral position.
- Control the travel speed with the travel switch (5).

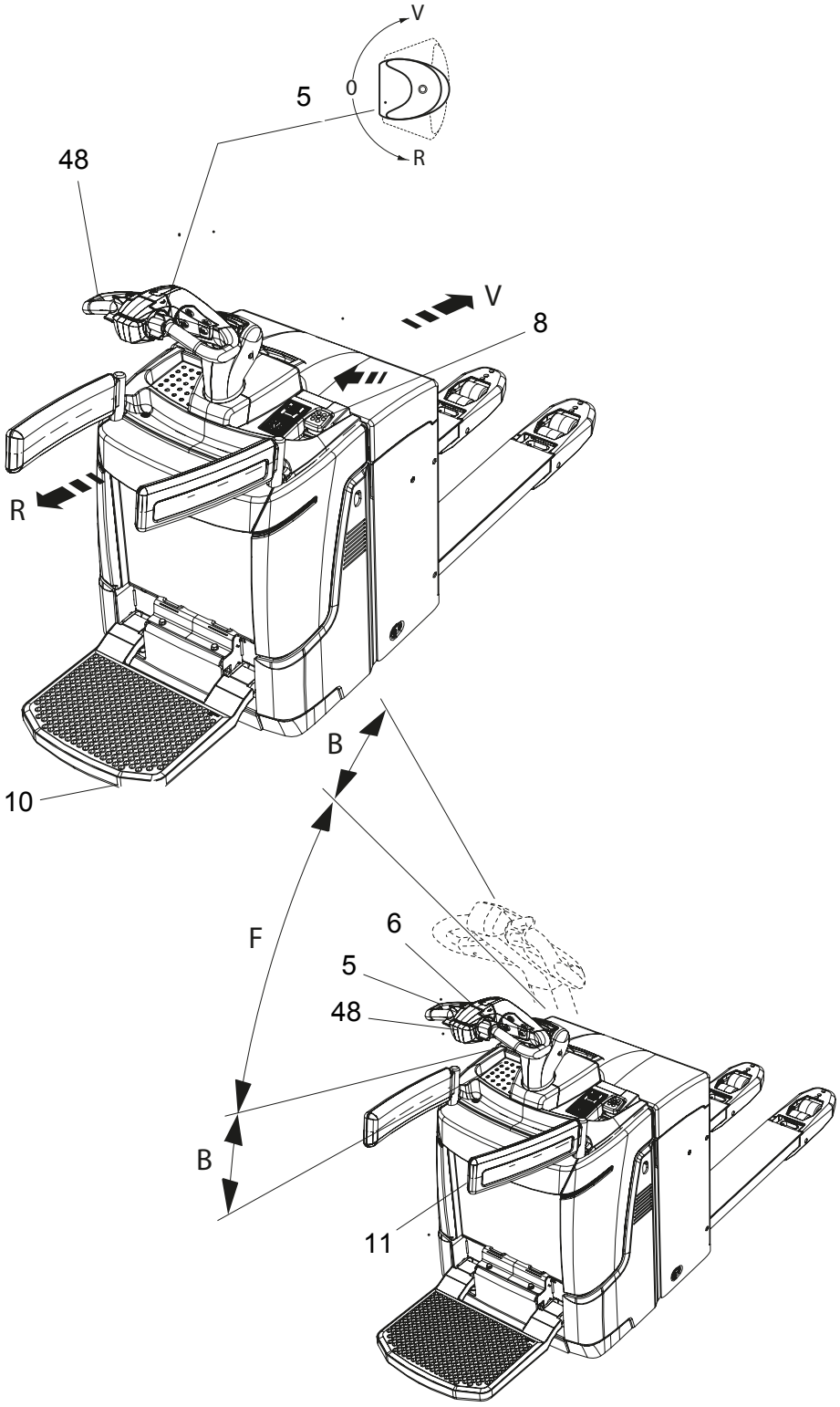
The brakes are released and the truck moves in the selected direction.

NOTE

▶ Travelling is inhibited when the operator platform is vacated and the side arms are not folded out.

▶ ERE 120: If the standing platform is occupied and the side arms are not folded out, the truck can only be operated at reduced speed.

▶ If the operator platform is occupied and only one side arm is folded out, travelling is inhibited.



4.5.1 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 (5) to the opposite direction while travelling.

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

4.6 Steering

Procedure

- Move the tiller (6) to the left or right.

The truck is steered in the required direction.

4.7 Brakes

⚠ WARNING!

Accident risk

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

▶ The operator must take into account the travel route conditions when braking.

▶ Brake with care to prevent the load from slipping.

▶ Allow for increased braking distance when travelling with an attached load.

▶ Use the service brake in emergencies.

⚠ CAUTION!

▶ In hazardous situations swing the tiller to the brake position or press the emergency disconnect switch.

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 (6) 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 (5) 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 (5) to the opposite direction while travelling, see "Changing direction during travel" on 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.
- ▶ 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.

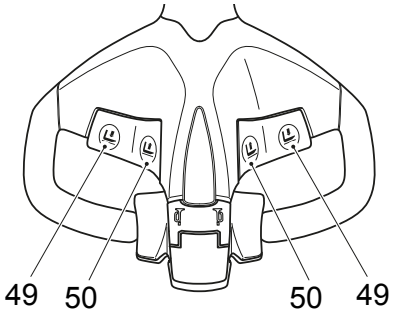
NOTE

If the operator platform is folded down, the driver must be standing on it in order for lifting and lowering to be enabled.

4.8.1 Raising the load handler

Requirements

– Prepare the truck for operation, see "Preparing the truck for operation" on page 62.



Procedure

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

NOTE

Risk of material damage to the hydraulic unit

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

The load handler is raised.

Ergonomic lift (○) (ERE C20)

When the "Load handler lift" (50) button is pressed when the load handler is loaded, support arm lift is raised first and then mast lift, see page 85.

4.8.2 Lowering the load handler

Requirements

– Prepare the truck for operation, see "Preparing the truck for operation" on page 62.

Procedure

- Press the “Lower load handler” button (49) until you reach the desired lift height.

The load handler is lowered.

Ergonomic lift (○) (ERE C20)

When the "Load handler lower" (49) button is pressed when the load handler is loaded, main lift is lowered first and then support arm lift, see page 85.

4.9 Lifting, transporting and depositing loads

⚠ WARNING!

Unsecured and incorrectly positioned loads can cause accidents.

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

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

⚠ CAUTION!

- ▶ Do not lift long loads at an angle.

NOTE

Adapt a slower speed when stacking and retrieving.

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 80).

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.

Ergonomic lift (○) (ERE C20)

When the "Load handler lift" (50) button is pressed when the load handler is loaded, support arm lift is raised first and then mast lift, see page 85.

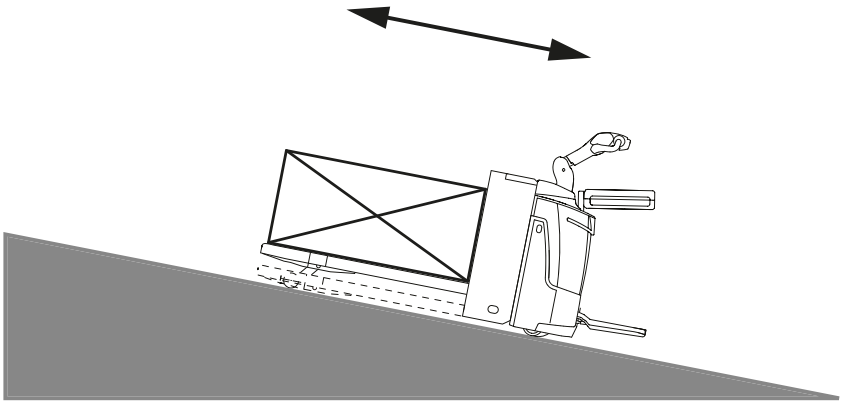
4.9.2 Transporting a load

Requirements

– Load raised correctly.
– ERE 120:
  Raise the forks completely from the ground to transport correctly (approx. 150 - 200 mm above the ground).
– ERE C20:
  Raise the forks completely from the ground to transport correctly (approx. 150 - 500 mm above the ground). Do not travel with a raised load (>500 mm).
– 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).



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 80).
- 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.

Ergonomic lift (○) (ERE C20)

When the "Load handler lower" (49) button is pressed when the load handler is loaded, main lift is lowered first and then support arm lift, see page 85.

4.10 Ergonomic Lift (○) (ERE C20)

For lifting and lowering, the truck is equipped with support arm lift (initial lift) with the maximum lift capacity and mast lift (high lift) with a lower lift capacity, see "Truck capacity plate" on page 32.

Raises the load handler

When the "Load handler lift" (50) button is pressed when the load handler is loaded, support arm lift is raised first and then mast lift, see "Raising the load handler" on page 80.

Lowers the load handler

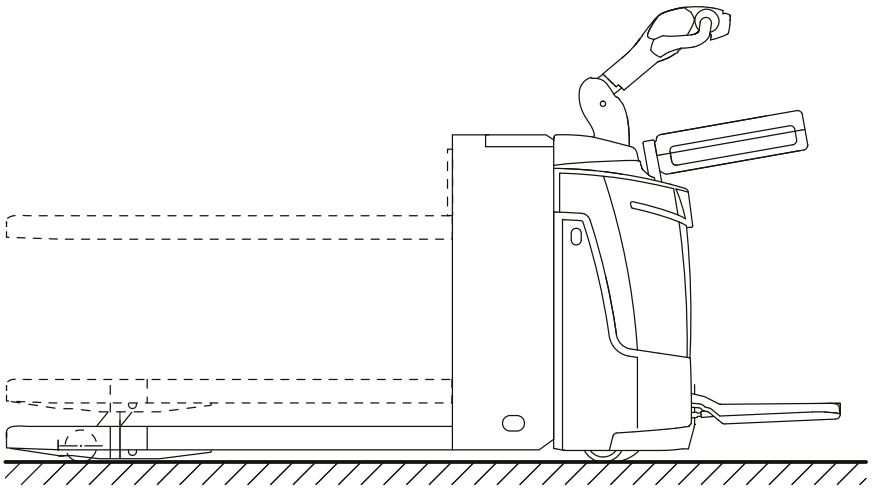
When the "Load handler lower" (49) button is pressed when the load handler is loaded, main lift is lowered first and then support arm lift, see "Lowering the load handler" on page 80.

Lifting, transporting and depositing loads

Do not travel with a raised load (>500 mm). Lower the forks for proper transport (approx. 150 - 500 mm above the ground), see page 83.
Raising, transporting and depositing loads see page 81.

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 86.



4.10.1 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 65.

⚠ 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 (50) 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	Corrective measures
Battery connector not plugged in.	Check the battery connector and connect if necessary.
Emergency disconnect switch pressed	Unlock the emergency disconnect switch
Key switch set to O	Set the key switch to “I”
Battery charge too low	Check battery charge, charge the battery if necessary
Faulty fuse	Check the fuses, see page 143
Incorrect ISM access module (○) transponder used	Use correct transponder
Incorrect CANCode (○) PIN entered	Enter correct PIN, see page 97
Tiller (folding platform) not in brake position when switching on the truck (for CanDis (○) the event message E-0914 appears)	Swing the tiller into the top or the bottom brake zone, see page 78
Only one side arm is folded out (with CanDis (○) the event message E-1926 is shown)	Fold both side arms in/out.
Operating sequence not observed (with CanDis (○) the event message E-1908 is shown)	1. Step on platform. 2. Press the travel switch and move the tiller into the working position if necessary.
"Raise load handler" / "Lower load handler" button not in home position when truck switched on (for CanDis (○) event message E-2951 appears)	Do not press button
Travel switch not in home position when truck switched on (for CanDis (○) event message E-1901 appears)	Do not apply travel switch
Collision safety switch applied when truck switched on (for CanDis (○) event message E-1914 appears)	Do not apply collision safety switch

5.2 Load cannot be lifted

Possible cause	Corrective measures
Truck not operational	Carry out all measures listed under “Truck does not start”
Hydraulic oil level too low	Check the hydraulic oil level, see page 142
Battery discharge monitor has switched off	Charge the battery, see page 44
Faulty fuse	Check the fuses, see page 143
Excessive load	Note maximum capacity, see data plate
Tiller (folding platform) not in brake position when switching on the truck (for CanDis (○) the event message E-0914 appears)	Set the tiller to the top or bottom brake zone, see page 78
Only one side arm is folded out (with CanDis (○) the event message E-1926 is shown).	Fold both side arms in/out.
Operating sequence not observed (with CanDis (○) the event message E-1908 is shown)	1. Step on platform. 2. Press the travel switch and move the tiller into the working position if necessary.
"Raise load handler" / "Lower load handler" button not in home position when truck switched on (for CanDis (○) event message E-2951 appears)	Do not press button
Travel switch not in home position when truck switched on (for CanDis (○) event message E-1901 appears)	Do not apply travel switch
Collision safety switch applied when truck switched on (for CanDis (○) event message E-1914 appears)	Do not apply collision safety switch

6 Operating the truck without its own drive system

With the right optional equipment (○) it is possible to switch the truck to emergency operation via the GF60 service key: The brakes are released electrically and the truck can move without its own drive system, see "Emergency operation with service key GF60" on page 93.

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.

⚠ CAUTION!

Open covers can cause injury and accidents

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

Releasing the brake

Tools and Material Required

– Two M5X16 screws
– Spanner wrench

Procedure

- Turn of the key switch, CanCode (○).
- Pull the Emergency Disconnect switch.
- Prevent the truck from rolling away.
- Lift up the front cover (70) and put it to one side, see "Front cover disassembly" on page 137.
- Insert two M5X16 screws as far as the stop and lift up the anchor plate (57).

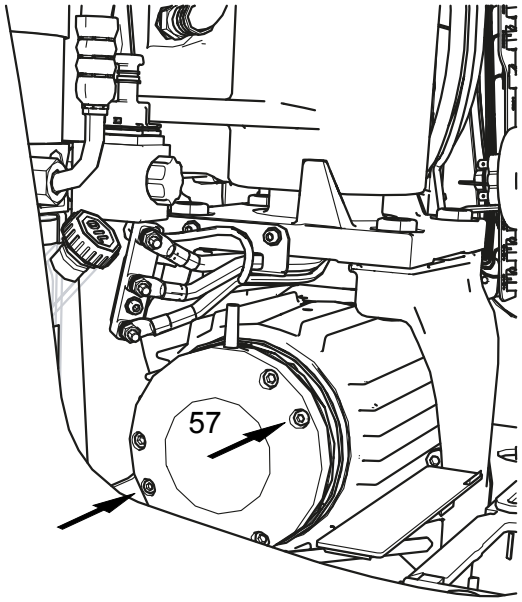
The brake is now released and the truck can be moved.

Applying the brake

Procedure

- Unscrew the two M5X16 screws again.
- Refit the front panel.

Braking is now restored again.



⚠ WARNING!

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

7 Optional equipment

7.1 Emergency operation with service key GF60

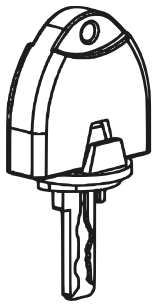
⚠ WARNING!

The truck can move accidentally when the brake is released

- ▶ The GF60 service key must not remain on the truck during normal operation.
- ▶ The service key should only be used by an authorised person (e.g. warehouse manager).
- ▶ Extreme caution is required on a ramp or incline as the truck could roll away when the brake is released.
- ▶ When the key switch is set to position 2 (brake released), the truck cannot brake through inversion braking or the tiller switch.

Operating the truck without its own drive system.

GF 60



Requirements

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

Tools and Material Required

– GF60 service key with lock bar

Procedure

- Insert the GF60 service key in the key switch.

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

⚠ CAUTION!

The brake is now released

- ▶ The truck can only brake by turning the service key to position 1 or pressing the Emergency Disconnect.

The truck can be operated without its own drive system.

Parking the truck securely

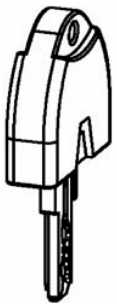
Procedure

- Set the key switch to the “0” position and remove the key.
  When you switch back from level 2 to level 1 the bar returns to its original position.

The brake is now activated again.

The GF30 key without a bar is designed for normal truck operation. It can be inserted on either side and can only be turned to position 1 of the key switch.

GF 30



7.2 CanCode Keypad (○)

7.2.1 Code lock

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

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

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

Parameter	Description
0-0-0	– Change master code (see "Changing the master code" on page 98)
0-0-1	– Add user codes (see "Add operator code" on page 100)
0-0-2	– Change a user code (see "Change operator code" on page 102)
0-0-3	– Delete a user code (see "Delete individual user codes" on page 104)
0-0-4	– Delete all user codes (see "Delete all user codes," on page 106)
0-1-0	– Switch on the truck automatically (see "Setting the automatic truck cutout (timeframe)" on page 108)
0-2-4	– Assign travel programs to the user codes (see "Assigning the travel program" on page 110)

Newly supplied trucks have the code indicated on a sticker. When using the truck for the first time change the master and user codes and remove the sticker.

– User code factory setting: 2-5-8-0
– Master code factory setting: 7-2-9-5

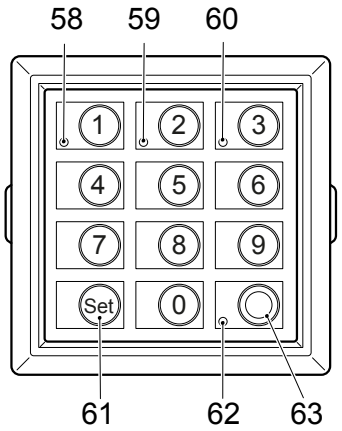
⚠ WARNING!

Lack of usage restrictions can result in accidents

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

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

The keypad consists of 10 digit keys, a Set key (61) and a ○ key (63).



Digit keys

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

The green LEDs of the digit keys 1, 2 and 3 (58, 59, 60) show the travel program setting.

○ key

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

The ○ key indicates the follow operating conditions via a red / green LED (62):
– Code lock function (commissioning the truck).
– Error display configuring the user code.
– Adjusting the travel program depending on the setting and truck.
– Setting and changing parameters.

SET key

When you change the parameters the SET key (61) acts as a confirmation key.

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

Preparing the truck for operation by entering a valid operator code

Procedure

- Pull the Emergency Disconnect to unlock it, see "Emergency Disconnect" on page 69.
  The LED (62) lights up red.

- Enter the operator code with the digit keys.
  When you have entered a valid operator code the LED (62) lights up green, the travel program selected is indicated by the corresponding LEDs (58,59,60) and the truck is switched on.

➔ If the LED (62) flashes red this means the wrong code has been entered. Enter the code again.
The Set key (61) has no function in operating mode.

7.2.3 Switching off the truck with the keypad (CanCode)

Switching off the truck

Procedure

- Press the O key (63).

The truck is switched off and the LED (62) is lit red.

➔ The truck can cut out automatically after a specified time. If no travel, steering or hydraulic operations are performed within a set time, the truck switches off automatically. When you enter a valid code again the truck will be operational. The code lock parameter responsible for automatic cutout must be set, see "Setting the automatic truck cutout (timeframe)" on page 108.

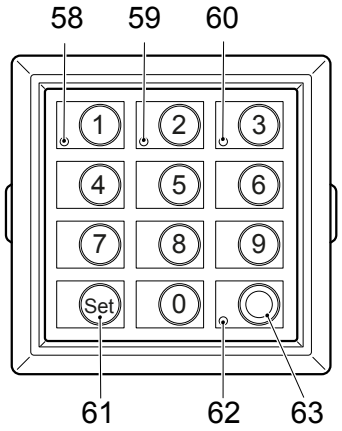
Fixed cutout time (○)

An automatic truck cutout is factory-set. The cutout time is factory-set to 5 minutes.

➔ This setting can be changed if required.

7.2.4 Changing the master code

To change the length of the master code you must follow the procedure in "Choose length of the new master code (4-6 digit) and add user codes", see "Choose length of the new master code (4-6 digit) and add user codes" on page 107. If there are still user codes stored in the code lock, the master code to be changed must be the same length as the saved user codes.



Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the valid master code the LED (62) flashes green.
- Enter the parameters 0-0-0 with the digit keys.
- Confirm with the SET key (61).
  The LEDs (58,62) flash green.
- Enter the valid master code again with the digit keys.
- Confirm with the SET key (61).
  The LEDs (59,62) flash green.
- Enter the valid master code with the digit keys.
  The new master code must be different from existing user codes.
- Confirm with the SET key (61).
  The LEDs (60,62) flash green.
- Enter the new master code again with the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. The setting is saved.
- Press the O key (63).
  The truck is switched off and the LED (62) is lit red.
- Check the new master code:
  - Switch on the truck with the new master code, see "Preparing the truck for operation with the keypad (CanCode)" on page 97
    When you enter the valid master code the LED (62) flashes green.
  - Press the O key (63).

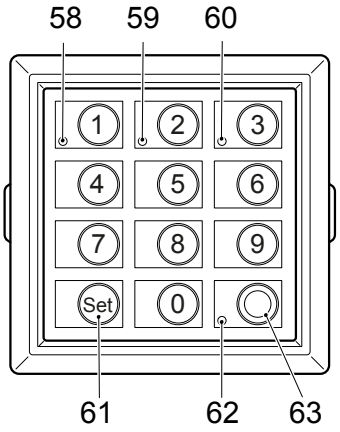
  The truck is switched off and the LED (62) is lit red.

Error displays changing the master code

For the following events the LED (62) flashes red:

Cause	Remedy
– New master code is already occupied by a user code	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Choose a different master code, see "Changing the master code" on page 98. – Change the user code so that the required master code can be used, see "Change operator code" on page 102. – Delete the user code so that the required master code can be used, see "Delete individual user codes" on page 104.
– The master codes to be changed do not match	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Enter the master code again, see "Changing the master code" on page 98.
– The master code entered is not the same length as the user code	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Repeat the entry, making sure that the length of the master code matches that of the user code.

7.2.5 Add operator code



Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the valid master code the LED (62) flashes green.
- Enter the parameters 0-0-1 with the digit keys.
- Confirm with the SET key (61).
  The LEDs (59,62) flash green.
- Enter the new user code with the digit keys.

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

- Confirm with the SET key (61).
  The LEDs (60,62) flash green.
- Enter the new user code again with the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. The setting is saved.
- Press the O key (63).
  The truck is switched off and the LED (62) is lit red.
- Check the new user code:
  - Switch on the truck with the new user code, see "Preparing the truck for operation with the keypad (CanCode)" on page 97
    After entering the valid user code the LED (62) lights up green, the travel program setting is shown by the illumination of the corresponding LEDs (58,59,60) and the truck is switched on.
  - Press the O key (63).

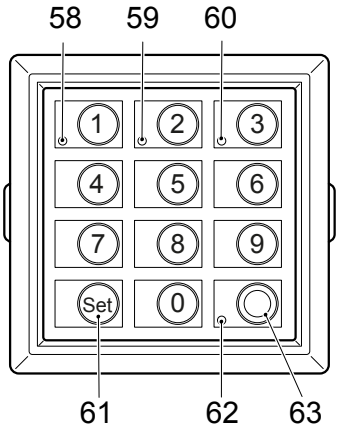
  The truck is switched off and the LED (62) is lit red.

Error displays adding a user code

For the following events the LED (62) flashes red:

Cause	Remedy
– The user code entered is not the same length as the master code	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Repeat the entry, making sure that the master code is the same length as the user code.
– New user code is already occupied by a master code	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Choose a different user code, see "Add operator code" on page 100.
– The newly entered user codes do not match	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Add the user code again, see "Add operator code" on page 100.
– Code log full.	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Delete individual user codes, see "Delete individual user codes" on page 104. – Delete all user codes, see "Delete all user codes," on page 106.

7.2.6 Change operator code



Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the valid master code the LED (62) flashes green.
- Enter the parameters 0-0-2 with the digit keys.
- Confirm with the SET key (61).
  The LEDs (58,62) flash green.
- Enter the user code to be changed with the digit keys.
- Confirm with the SET key (61).
  The LEDs (59,62) flash green.
- Enter the new user code with the digit keys.

  The length (4-6 digit) of the new user code must be the same as that of the previously entered master code. The new user code must also be different from the existing master code.
- Confirm with the SET key (61).
  The LEDs (60,62) flash green.
- Enter the new user code again with the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. The setting is saved.
- Press the O key (63).
  The truck is switched off and the LED (62) is lit red.
- Check the new user code:
  - Switch on the truck with the new user code, see "Preparing the truck for operation with the keypad (CanCode)" on page 97
    After entering the valid user code the LED (62) lights up green, the travel program setting is shown by the illumination of the corresponding LEDs (58,59,60) and the truck is switched on.
  - Press the O key (63).

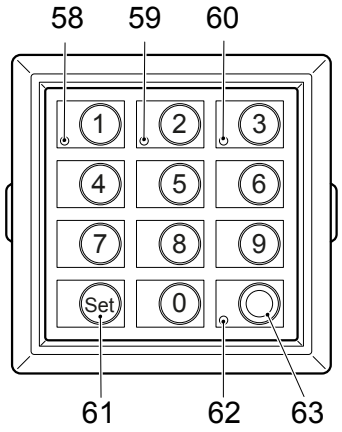
  The truck is switched off and the LED (62) is lit red.

Error displays changing a user code

For the following events the LED (62) flashes red:

Cause	Remedy
– The user code entered is not the same length as the master code	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Repeat the entry, making sure that the master code is the same length as the user code.
– Operator code to be changed does not exist.	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Check the user code entered.
– The user codes to be changed do not match	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Change the user code again, see "Change operator code" on page 102.
– Tried to change the operator code to another user code that already exists.	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Choose a different user code, see "Change operator code" on page 102.

7.2.7 Delete individual user codes



Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the valid master code the LED (62) flashes green.
- Enter the parameters 0-0-3 with the digit keys.
- Confirm with the SET key (61).
  The LEDs (59,62) flash green.
- Enter the user code to be deleted with the digit keys.
- Confirm with the SET key (61).
  The LEDs (60,62) flash green.
- Enter the user code to be deleted again with the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. The user code is now deleted.
- Press the O key (63).
  The truck is switched off and the LED (62) is lit red.
- Check that the user code has been deleted:
  - Switch the truck on with the user code to be deleted, see "Preparing the truck for operation with the keypad (CanCode)" on page 97
    After entering the user code the LED (62) flashes red and the truck remains switched off.
  - Press the O key (63).

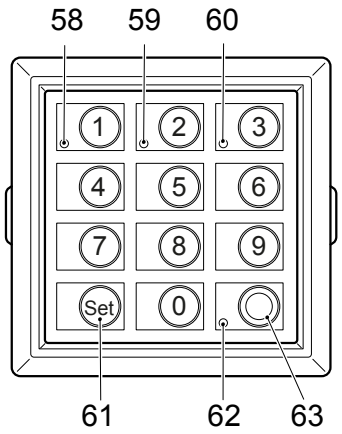
  The truck remains switched off and the LED (62) is lit red.

Error displays deleting individual user codes

For the following events the LED (62) flashes red:

Cause	Remedy
– The user code entered is not the same length as the master code	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Repeat the entry, making sure that the master code is the same length as the user code.
– Tried to delete an operator code that does not exist.	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Check the user code entered.
– The user codes to be changed do not match	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Delete the user code again, see "Delete individual user codes" on page 104.

7.2.8 Delete all user codes,



Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the valid master code the LED (62) flashes green.
- Enter the parameters 0-0-4 with the digit keys.
- Confirm with the SET key (61).
  The LEDs (60,62) flash green.
- Enter the code 3-2-6-5 with the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. All user codes are deleted.
- Press the O key (63).
  The truck is switched off and the LED (62) is lit red.
- Check that the user codes have been deleted:
  - Switch on the truck with a previous user code, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.
    After entering the user code the LED (62) flashes red and the truck remains switched off.
  - Press the O key (63).

  The truck remains switched off and the LED (62) is lit red.

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

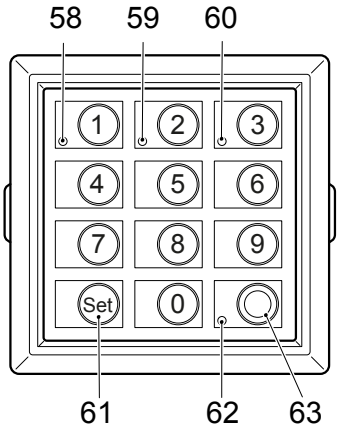
The master code is factory set to a four-digit entry: If necessary, the four-digit master code can be changed to a five or six-digit entry. Before the master code length can be changed, all user codes must be deleted. The length of the user code (4-6 digit) is always determined by the length of the master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

Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

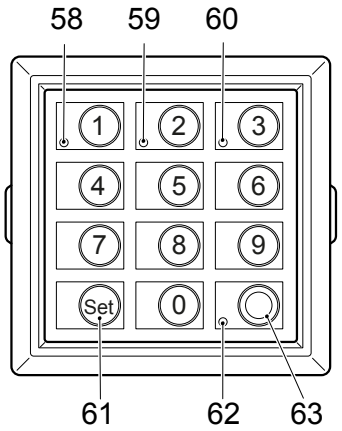
Procedure

- Delete all user codes, see "Delete all user codes," on page 106.
- Enter the new master code (4-6 digit), see "Changing the master code" on page 98.
- Add user codes again, see "Add operator code" on page 100.



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

7.2.10 Setting the automatic truck cutout (timeframe)



Requirements

– To prepare the truck for operation, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.

Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the correct master code the LED (62) flashes green.
- Enter the 0-1-0 parameter with the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green.
- Set the truck automatic cutout (time period) with the digit keys:
  - 00:
    Automatic truck cutout is deactivated.
  - 01 - 30:
    Set time period (in minutes) after which the truck automatically cuts out (minimum cutout time is 1 minute,
    maximum cutout time is 30 minutes).
  - 31:
    After 10 seconds the truck cuts out automatically.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. The setting is saved.
- Press the O key (63).
  The truck is switched off and the LED (62) lights up red.
- Checking the truck's automatic cutout:
  - Switch on the truck with a valid operator code, see "Preparing the truck for operation with the keypad (CanCode)" on page 97.
    When you have entered a valid operator code the LED (62) lights up green, the travel program selected is indicated by the corresponding LEDs (58,59,60) and the truck is switched on.
  - Do not perform any travel, steering or hydraulic operations with the truck.
  - Wait until the truck automatically cuts out at the end of the time period.

  The truck is switched off and the LED (62) lights up red.

Error displays setting the automatic cutout period of the truck

For the following events the LED (62) flashes red:

Cause	Remedy
– Cutout time entered is out of range	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Enter the time again while making sure it is within range.

Fixed cutout time (○)

An automatic truck cutout is factory-set. The cutout time is factory-set to 5 minutes.

➔ This setting can be changed if required.

7.2.11 Assigning the travel program

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

The starting travel program is the travel program that is activated when the truck is switched on and is displayed by the (58,59,60) LEDs.
LED (58) lit = travel program 1 activated
LED (59) lit = travel program 2 activated
LED (60) lit = travel program 3 activated

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

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

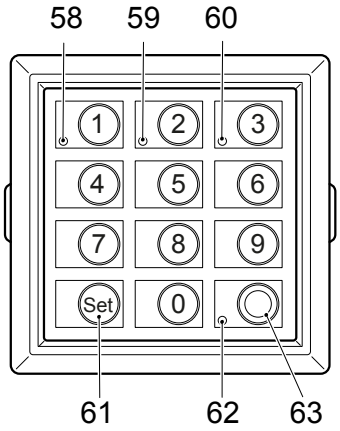
When you add or change a user code all travel programs are enabled, the starting travel program is travel program 2.

Specifying a configuration code:

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

The default setting for the travel program configuration code is:
1-1-1-2.
Meaning:
Travel programs 1, 2 and 3 are enabled.
When the truck has been switched on with the selected user code, travel program 2 is activated

Adapting the travel program configuration to the user code



Procedure

- Press the O key (63).
- Enter the valid master code with the digit keys.
  When you enter the valid master code the green LED (62) flashes green.
- Enter the parameters 0-2-4 with the digit keys.
- Confirm with the SET key (61).
  The LEDs (58,62) flash green.
- Enter the valid user code with the digit keys.
- Confirm with the SET key (61).
  The LEDs (59,62) flash green.
- Enter the configuration code (4 digit) for the travel programs.
- Confirm with the SET key (61).
  The LEDs (60,62) flash green.
- Enter the configuration code (4 digit) for the travel programs again using the digit keys.
- Confirm with the SET key (61).
  Wait until the LED (62) flashes green. The travel programs are now assigned to the user code.
- Press the O key (63).
  The truck is switched off and the LED (62) is lit red.
- Checking the travel program configuration to the user code:
  - Switch on the truck with the configured user code, see "Preparing the truck for operation with the keypad (CanCode)" on page 97
    After entering the valid user code the LED (62) lights up green, the travel program setting is shown by the illumination of the corresponding LEDs (58,59,60) and the truck is switched on.
  - Press the O key (63).

  The truck is switched off and the LED (62) is lit red.
- If necessary, repeat the procedure for other user codes.

Error displays configuring the travel programs

For the following events the LED (62) flashes red:

Cause	Remedy
– Blocked travel program defined as start travel program	– Switch off the truck, see "Switching off the truck with the keypad (CanCode)" on page 97. – Try again, making sure the configuration code is entered correctly.

7.3 Setting the truck parameters with CanCode

⚠ CAUTION!

Faulty entry

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

⚠ CAUTION!

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

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

▶ Carry out a test run in a secure environment.

▶ This requires greater attention on the part of the operator.

Parameter setting example

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

Acceleration example

Procedure

- Enter four-digit parameter number "0256" and confirm with the SET key (61).
- Enter sub-index (enter "2") and confirm with the SET key (61).

➔ The parameter and sub index are displayed alternately with the current reading (0256-2<->0000-3).

- Enter the parameter according to the parameter list and confirm with the Set key (61).

➔ The LED (62) of the O key (63) switches briefly to steady light and start flashing again after approx. 2 seconds.

➔ If the entry is incorrect, the LED (62) of the O key (63) turns red. Enter the parameter number again to repeat the setting.

➔ The parameter and sub index are displayed alternately with the entry (0256-2<->0000-5).

The travel parameter is now set.

Repeat the procedure to enter further parameters as soon as the LED (62) of the O key (63) flashes.

➔ Travel is disabled while the parameters are being entered.

Checking the settings in programming mode

Procedure

- Select the travel program to be worked on after changing the parameter value, and confirm with the Set key (61).

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

To continue setting, confirm with the Set key (61) again.

Saving travel parameters

Requirements

– Enter all parameters.

Procedure

- Run "SaveParameters" by pressing 1-2-3-Set.
- Confirm with the O key (63).

7.4 Parameters

Travel program 1

No.	Function	Setting range	Standard setting	Comments
0256	Acceleration	0 - 9 (0.13 - 1.88 m/s^2)	4 0.67 m/s^2	Platform folded out, side arms folded out
0264	ERE 120: Maximum speed in drive direction using travel switch	0 - 9 (4.5 - 9.0 km/h)	3 6.0 km/h	
	ERE C20: Maximum speed[1] in drive direction using the travel switch	0 - 9 (4.5 - 6.0 km/h)	3 6.0 km/h	
0268	ERE 120: Maximum speed in load direction using travel switch	0 - 9 (4.5 - 9.0 km/h)	3 6.0 km/h	
	ERE C20: Maximum speed[1] in load direction using travel switch	0 - 9 (4.5 - 6.0 km/h)	3 6.0 km/h	
0257	Acceleration in pedestrian mode	0 - 9 (0.09 - 0.31 m/s^2)	8 0.27 m/s^2	Platform folded in, side arms folded in
0265	Pedestrian speed in drive direction using travel switch	0 - 9 (1.5 - 4.5 km/h)	8 4.2 km/h	
0269	Pedestrian speed in load direction using travel switch	0 - 9 (1.5 - 4.5 km/h)	8 4.2 km/h	
0267	Special travel speed in drive direction	0 - 9 (1.5 - 6.0 km/h)	9 6.0 km/h	Platform folded out, side arms folded in
0271	Special travel speed in load direction	0 - 9 (1.5 - 6.0 km/h)	9 6.0 km/h	

1. The maximum speed of the ERE C20 is limited to 6,0 km/h.

➔ Settings and controls under 6,0 km/h are not influenced.

➔ Settings and controls above 6,0 km/h are limited to 6,0 km/h.

Travel program 2

No.	Function	Setting range	Standard setting	Comments
0272	Acceleration	0 - 9 (0.13 - 1.88 m/s^2)	6 1.08 m/s^2	Platform folded out, side arms folded out
0280	ERE 120: Maximum speed in drive direction using travel switch	0 - 9 (4.5 - 9.0 km/h)	8 8.5 km/h	
	ERE C20: Maximum speed[1] in drive direction using the travel switch	0 - 9 (4.5 - 6.0 km/h)	8 6.0 km/h	
0284	ERE 120: Maximum speed in load direction using travel switch	0 - 9 (4.5 - 9.0 km/h)	8 8.5 km/h	
	ERE C20: Maximum speed[1] in load direction using travel switch	0 - 9 (4.5 - 6.0 km/h)	8 6.0 km/h	
0273	Acceleration in pedestrian mode	0 - 9 (0.09 - 0.31 m/s^2)	8 0.27 m/s^2	Platform folded in, side arms folded in
0281	Maximum pedestrian speed in drive direction using travel switch	0 - 9 (1.5 - 4.5 km/h)	8 4.2 km/h	
0285	Pedestrian speed in load direction using travel switch	0 - 9 (1.5 - 4.5 km/h)	8 4.2 km/h	
0283	Special travel speed in drive direction	0 - 9 (1.5 - 6.0 km/h)	9 6.0 km/h	Platform folded out, side arms folded in
0287	Special travel speed in load direction	0 - 9 (1.5 - 6.0 km/h)	9 6.0 km/h	

1. The maximum speed of the ERE C20 is limited to 6,0 km/h.

➔ Settings and controls under 6,0 km/h are not influenced.

➔ Settings and controls above 6,0 km/h are limited to 6,0 km/h.

Travel program 3

No.	Function	Setting range	Standard setting	Comments
0288	Acceleration	0 - 9 (0.13 - 1.88 m/s^2)	8 1.62 m/s^2	Platform folded out, side arms folded out
0296	ERE 120: Maximum speed in drive direction using travel switch	0 - 9 (4.5 - 9.0 km/h)	8 8.5 km/h	
	ERE C20: Maximum speed[1] in drive direction using the travel switch	0 - 9 (4.5 - 6.0 km/h)	8 6.0 km/h	
0300	ERE 120: Maximum speed in load direction using travel switch	0 - 9 (4.5 - 9.0 km/h)	8 8.5 km/h	
	ERE C20: Maximum speed[1] in load direction using travel switch	0 - 9 (4.5 - 6.0 km/h)	8 6.0 km/h	
0289	Acceleration in pedestrian mode	0 - 9 (0.09 - 0.31 m/s^2)	8 0.27 m/s^2	Platform folded in, side arms folded in
0297	Maximum pedestrian speed in drive direction using travel switch	0 - 9 (1.5 - 4.5 km/h)	8 4.2 km/h	
0301	Pedestrian speed in load direction using travel switch	0 - 9 (1.5 - 4.5 km/h)	8 4.2 km/h	
0299	Special travel speed in drive direction	0 - 9 (1.5 - 6.0 km/h)	9 6.0 km/h	Platform folded out, side arms folded in
0303	Special travel speed in load direction	0 - 9 (1.5 - 6.0 km/h)	9 6.0 km/h	

1. The maximum speed of the ERE C20 is limited to 6,0 km/h.

➔ Settings and controls under 6,0 km/h are not influenced.

➔ Settings and controls above 6,0 km/h are limited to 6,0 km/h.

Battery parameters

No.	Function	Range	Standard setting	Comments
1377	Battery type (normal / high performance / dry)	0 - 5 7 9	1	0 = Normal (wet) 1 = High performance (wet) 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)

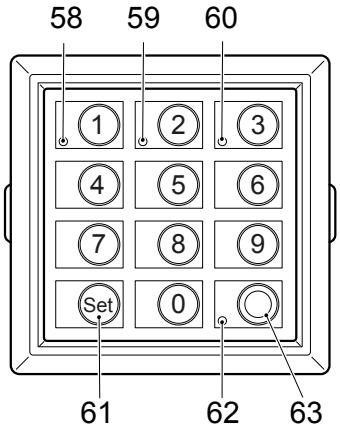
No.	Function	Range	Standard setting	Comments
1388	ELH charger characteristic curve	0 - 6	1	0 = No charging function 1 = PzS wet cell batteries 100 - 300 Ah and PzM batteries from 0 - 179 Ah 2 = PzS wet cell batteries with pulse characteristics 200 - 400 Ah and PzM batteries from 180 - 400 Ah 3 =PzV batteries, 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

7.5 Setting the Battery Parameters with CanCode

⚠ WARNING!

Altering parameters can cause accidents

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



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

Requirements

– CanCode and CanDis are available.

Procedure

- Press the O key (63).
- Enter the master code.
- Enter the four-digit parameter number "1377" and confirm with the Set key.
- Enter sub index "2" and confirm with the Set key.
  The parameter with subindex are displayed alternately with the current reading. E.g. (1377-2<->0000-1--corresponds to battery type „high-performance (wet)”.
- Enter parameter "2" according to the parameter list and confirm with the Set key.
  The LED of the O key switches briefly to continuous light and starts flashing again after approx. 2 seconds.
  If the entry is incorrect, the LED of the O key turns red. Enter the parameter number again to repeat the setting.
  The parameter and subindex are displayed alternately with the current reading (1377-2<->0000-2).

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

Travel is disabled while the parameters are being entered.

Storing the parameter

Requirements

– The parameter is now entered.

Procedure

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

The parameter is now saved.

Testing an altered parameter

Requirements

– The parameter is now saved.

Procedure

- Press the O key (63).
- Enter the master code.
- Enter the four-digit parameter number "1377" and confirm with the Set key.
- Enter sub index "2" and confirm with the Set key.
  The parameter with subindex are displayed alternately with the current reading. E.g. (1377-2<->0000-2--corresponds to the "dry - maintenance-free" battery type.
- Press the O key.

The parameter has now been checked.

7.6 Set ELH 2415 / 2425 / 2435 Charger Characteristics with CanCode

Parameter setting example

The following example shows the charging characteristics parameter setting for a maintenance-free battery with 201 - 300 Ah.

Requirements

– CanCode and CanDis are available.

Procedure

- Press the O key (63).
- Enter the master code.
- Enter the four-digit parameter number "1388" and confirm with the SET key.
- Enter sub-index (enter "2") and confirm with the SET key.

The parameter and sub index are displayed alternately with the current reading. E.g. (1388-2<->0000-1) corresponds to the 100 - 300 Ah PzS wet cell battery or PzM charging characteristic.

- Enter parameter "5" according to the parameter list and confirm with the SET key.

The LED of the O key (63) switches briefly to steady light and start flashing again after approx. 2 seconds.

If the entry is incorrect, the LED of the O key (63) turns red. Enter the parameter number again to repeat the setting.

The parameter and sub index are displayed alternately with the current reading (1388-2<->0000-5).

Charging characteristics for the maintenance-free battery with 201 - 300 Ah are set.

Travel is disabled while the parameters are being entered.

Storing the parameter

Requirements

– The parameter is now entered.

Procedure

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

The parameter is now saved.

Testing an altered parameter

Requirements

– The parameter is now saved.

Procedure

- Press the O key (63).
- Enter the master code.
- Enter the four-digit parameter number "1388" and confirm with the Set key.
- Enter sub index "2" and confirm with the Set key.

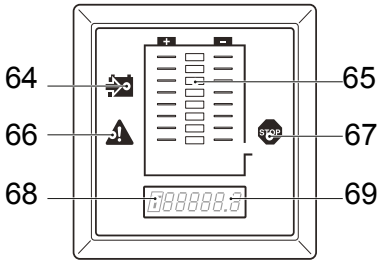
The parameter with sub index are displayed alternately with the current reading. E.g. (1388-2<->0000-5) corresponds to the charging characteristics for the maintenance-free battery with 201 - 300 Ah.

- Press the O key.

The parameter has now been checked.

7.7 CanDis Display Instrument (○)

The instrument indicates:



64	Battery charge display (on board charger only)
65	LED bars for battery charge status
66	"Warning" symbol (yellow), Battery charge recommended
67	"Stop" symbol (red); lift cutout, Battery charge essential
68	No symbol when battery type set to normal or enhanced performance wet cell battery "T" symbol appears steadily during operation when battery type set to maintenance-free "T" symbol appears flashing during operation when battery type set to special, such as XFC
69	6 digit LCD display: – Service hours – Settings entry and changes – Event messages

Charge status display

The charge status is shown through eight LED bars.

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

When the "Attention" symbol (66) starts to flash, it is advisable to charge the battery.

If the "Attention" symbol (66) is lit steadily, the battery must be charged.

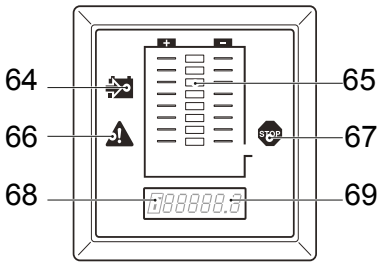
If the "Stop" symbol (67) is lit steadily, the battery must be **charged** immediately. If activated, the discharge monitor function is applied in this case, see "Discharge monitor function" on page 126.

The point at which the "Attention" (66) and "Stop" (67) symbols start to light up differs depending on the battery type.

7.7.1 Discharge monitor function

The discharge limit has been reached when the "Stop" symbol (67) lights up. When the discharge monitor function is activated lifting operations are disabled. Travel and lowering are still possible.

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



7.7.2 Service hour display

The service hour display range is between 0.0 and 99,999.0 hours. The display (69) has background lighting.

➔ For maintenance-free batteries a "T" (68) symbol is shown in the display.

➔ For special batteries the "T" (68) symbol flashes in the service hour display.

7.7.3 Event Messages

The service hours display is also used to display event messages. The event messages overwrite the service hour display. Event message start with an ”E” for Event and a four-digit error number.
The event message is displayed as long as the fault persists. If there are several event messages they are displayed consecutively. Most event messages result in the Emergency Stop being activated.

➔ Remedies, see "Troubleshooting" on page 88.

7.7.4 Power up test

Once the truck has become operational the following displays appear:

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

7.8 ISM access module (○)

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

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 "Restoring the truck to service after maintenance and repairs" on page 145).

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 "Maintenance and repairs" on page 136.

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 "Parking the truck securely" on page 65).
- ▶ 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. 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.

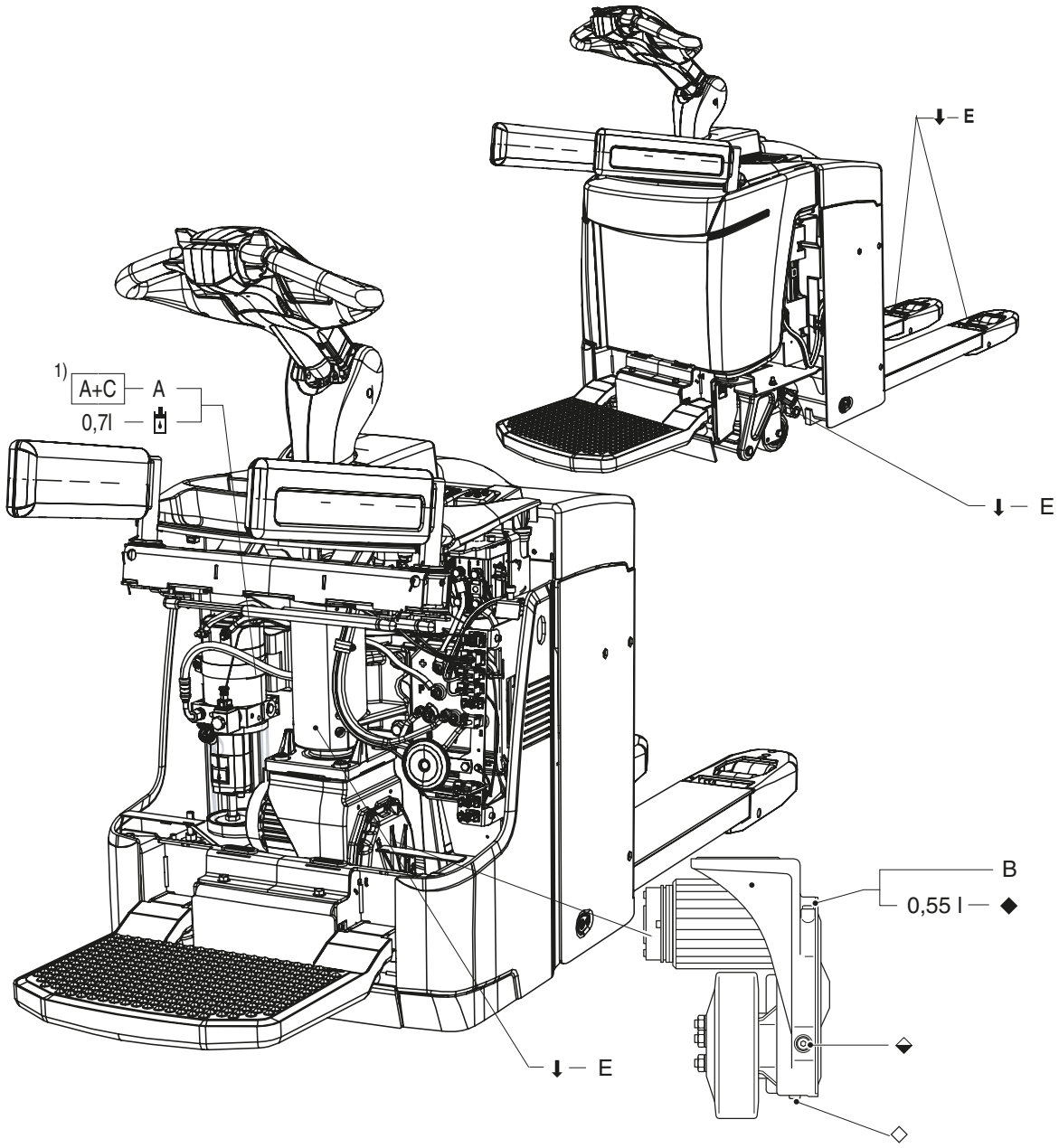
⚠ CAUTION!

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	□	Cold Store Application
⬇	Grease nipple	◆	Transmission oil filler neck
⬙	Transmission oil overflow and dipstick	◇	Transmission oil drain plug
	Hydraulic oil filler neck		

1 Compound ratio for cold store usage 1:1

3.3 Consumables

Code	Order no.	Quantity	Description	Used for
A	51132827	5.0 L	Jungheinrich Hydraulic oil*	Hydraulic system
	51132826	1.0 l		
			HVLP 32, DIN 51524	
B	50380904	5.0 L	Titan Gear HSY 75W-90	Transmission
C	51081875	5.0 L	Renolin MR 310	Hydraulic system Cold-store hydraulic oil Additive for use in cold stores
E	29202050	1.0 kg	Grease, Polylube GA 352P	Lubrication service
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 Prepare 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 "Parking the truck securely" on page 65.
- 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 "Transport and Commissioning" on page 33. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with wedges).

4.2 Front cover disassembly

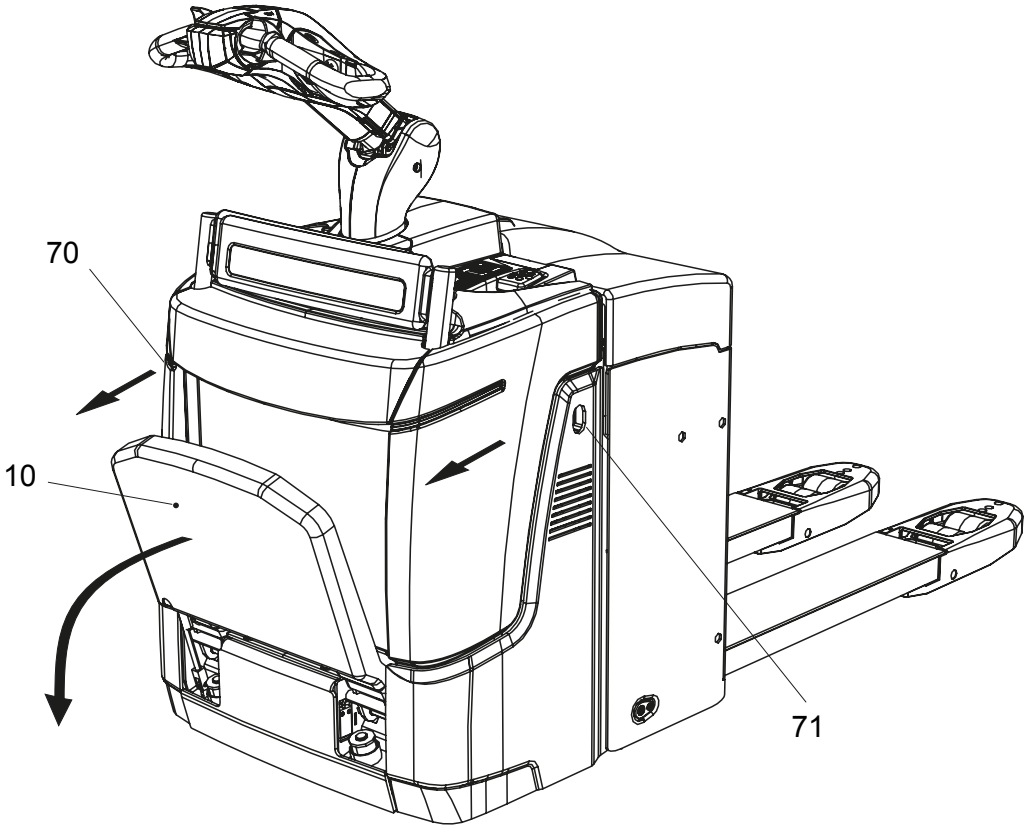
Front cover disassembly

Procedure

- Fold down the operator platform (10).
- Release the compartment panel latch using a spanner (width 8) and expose the panel latch.
- Release the panel latch (71) using a spanner (width 8).
- Remove the front cover (70) and set it down next to the industrial truck.

The front cover is now disassembled.

Assembly is the reverse order.



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 "Transport and Commissioning" on page 33.
- ▶ When jacking up the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).

Raising and jacking up the truck securely

Requirements

– Prepare the truck for maintenance and repairs (see "Prepare the truck for maintenance and repairs" on page 136).

Tools and Material Required

– Jack
– Hard wooden blocks

Procedure

- Place the jack against the contact point.

  Jack contact point, see "Identification Points and Data Plates" on page 29.
- Raise the truck.
- Support the truck with hard wooden blocks.
- Remove the jack.

The truck is now securely raised and jacked up.

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 "Identification Points and Data Plates" on page 29).
- ▶ Do not clean the truck with pressurised water.

Cleaning the truck

Requirements

– Prepare the truck for maintenance and repairs (see "Prepare the truck for maintenance and repairs" on page 136).

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 "Restoring the truck to service after maintenance and repairs" on page 145).

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 "Prepare the truck for maintenance and repairs" on page 136).

Tools and Material Required

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

Procedure

- Expose the electrical system, see "Front cover disassembly" on page 137.
- 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 "Front cover disassembly" on page 137.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" (see "Restoring the truck to service after maintenance and repairs" on page 145).

The electrical system assemblies are now clean.

4.5 Replacing the drive wheel

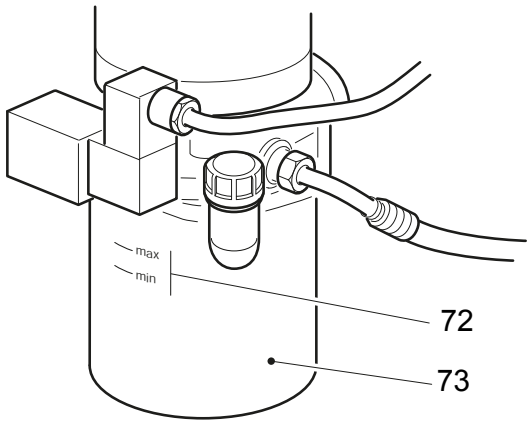
The drive wheel must only be replaced by authorised service personnel.

4.6 Checking the hydraulic oil level

Check oil level

Requirements

– Lower the load handler.
– Prepare the truck for maintenance and repairs, see "Prepare the truck for maintenance and repairs" on page 136.
– Remove the front panel, see "Front cover disassembly" on page 137.



Procedure

- Check the oil level in the hydraulic reservoir (73).

With the load handler lowered the hydraulic oil level in the reservoir should lie between the min. and max. markings (72).

- If necessary add transmission oil of the correct grade, see "Consumables" on page 135, (see also table).

The oil level is now checked.

4.7 Checking electrical fuses

Check fuses

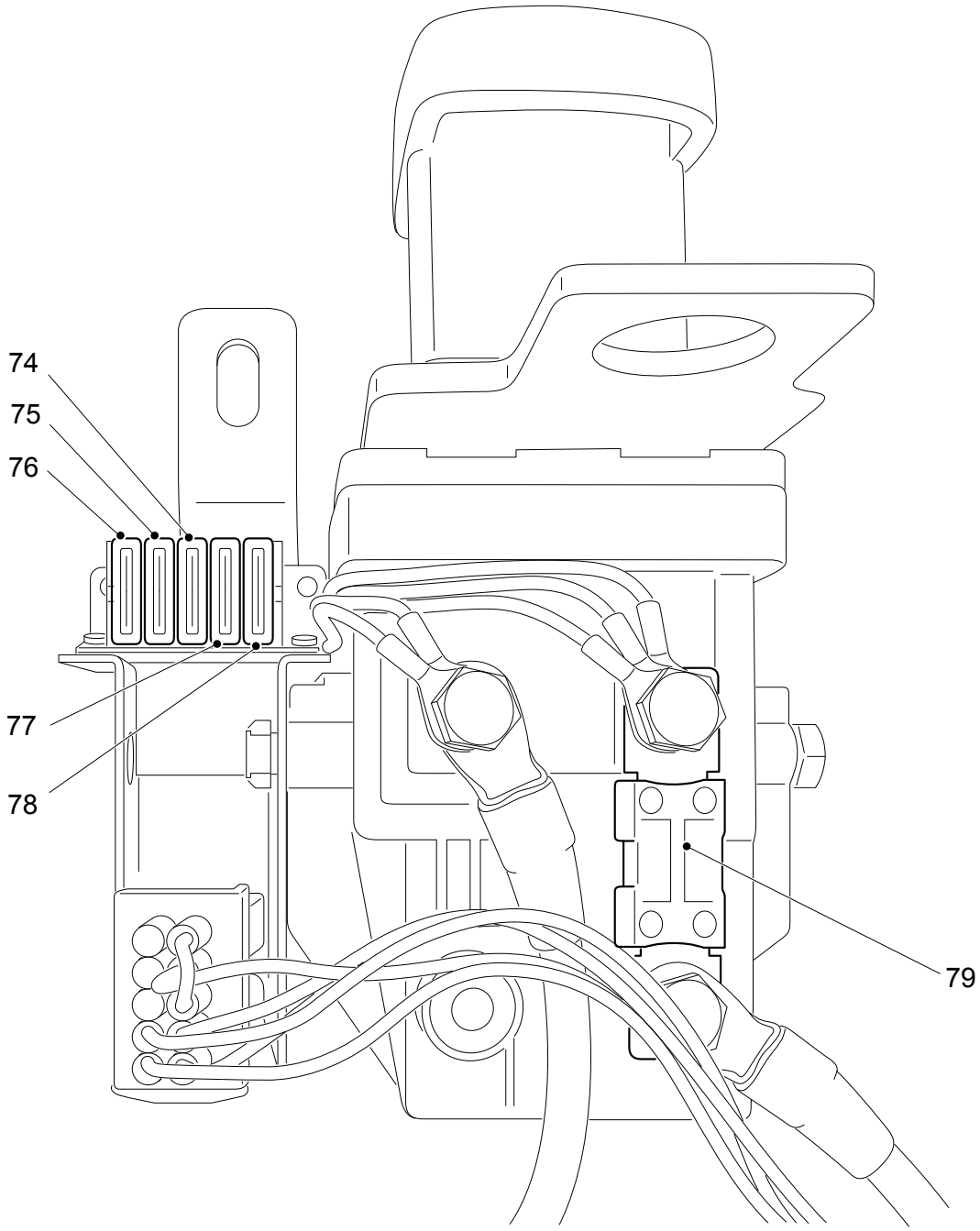
Requirements

– Truck prepared for maintenance and repairs, see "Prepare the truck for maintenance and repairs" on page 136.
– Front cover removed, see "Front cover disassembly" on page 137.

Procedure

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

The fuses are now checked.



Item	Component	To protect	Rating (A)
76	9F22	Control fuse 2 (after main contactor)	10
75	6F1	Display / battery hour meter	2
74	F1	Control fuse 1 (before main contactor)	10
77	3F6	Spare	30
78	F17	Spare for option	10
79	F15	Drive / lift motor main fuse	200

4.8 Restoring the truck to service after maintenance and repairs

Procedure

- Thoroughly clean the truck, see "Cleaning the truck" on page 139.
- Lubricate the truck according to the lubrication schedule, see "Lubrication Schedule" on page 134.
- Clean the battery, grease the terminals and connect the battery.
- Charge the battery, see "Charging the battery" on page 44.
- Replace transmission oil. Condensation water could have formed.
- Replace hydraulic oil. Condensation water could have formed.

  The manufacturer's customer service department is specially trained to carry out these operations.
- Start up the truck, see "Starting up the truck" on page 61.

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 "Lifting and jacking up the truck safely" on page 138.

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 "Cleaning" on page 139.
- Prevent the truck from rolling away accidentally.
- Check the hydraulic oil level and replenish if necessary, see "Checking the hydraulic oil level" on page 142.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Lubricate the truck according to the lubrication schedule, see "Lubrication Schedule" on page 134.
- Charge the battery, see "Charging the battery" on page 44.
- 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 "Charging the battery" on page 44.

5.3 Restoring the truck to service after decommissioning

Procedure

- Thoroughly clean the truck, see "Cleaning" on page 139.
- Lubricate the truck according to the lubrication schedule, see "Lubrication Schedule" on page 134.
- Clean the battery, grease the terminals and connect the battery.
- Charge the battery, see "Charging the battery" on page 44.
- Replace transmission oil. Condensation water could have formed.
- Replace hydraulic oil. Condensation water could have formed.

  The manufacturer's customer service department is specially trained to carry out these operations.
- Start up the truck, see "Starting up the truck" on page 61.

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.

9 Servicing 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.

During the run-in period,after approx. 100 service hours, the owner must check the wheel nuts/bolts and re-tighten if necessary.

10 Maintenance checklist

10.1 Operating Company

10.1.1 Standard Equipment

Braking		W	A	B	C
1	Test brakes.	●			

Electrical		W	A	B	C
1	Test warning and safety devices in accordance with operating instructions.	●			
2	Test emergency disconnect switch.	●			

Power supply		W	A	B	C
1	Check battery cable connections are secure, check for dirt and grease terminals if necessary.	●			
2	Check battery and battery components.	●			
3	Check battery connector for damage, proper function and secure mounting.	●			

Travel		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 make sense.	●			

Hydraulic Operations		W	A	B	C
1	Test hydraulic system.	●			
2	Check the hydraulic oil level and top up if necessary.	●			
3	Check the forks or load handler for wear and damage.	●			

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

10.1.2 Optional Equipment

Automatic crawl speed

Travel		W	A	B	C
1	Check that sensors/switches are secured, not damaged, clean and operational.	✳			

On-board charger 35A

Battery charger		W	A	B	C
1	Check mains connector and mains cable.	●			

Standard on-board charger

Battery charger		W	A	B	C
1	Check mains connector and mains cable.	●			

10.2 Customer Service

10.2.1 Standard Equipment

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

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

Power Supply		W	A	B	C
1	Check battery cable connections are secure, check for dirt and grease terminals if necessary.			●	
2	Check battery and battery components.			●	
3	Check acid density, acid level and battery voltage.			●	
4	Check battery connector for damage, proper function and secure mounting.			●	

Travel		W	A	B	C
1	Check transmission oil level or grease filling of the transmission and top up if necessary.			●	
2	Check drivetrain mountings and bearings.			●	
3	Check transmission for noise and leakage.			●	
4	Note: Replace transmission oil after 10000 service hours.				
5	Check wheels for wear and damage.			●	
6	Check wheel suspension and attachment.			●	

Chassis and Superstructure		W	A	B	C
1	Check chassis and screw connections for damage.			●	
2	Check doors and/or covers.			●	
3	Check labels are legible, complete and make sense.			●	
4	Test the operator platform and check for damage.			●	
5	Check operator mat and steps are non-slip and damage-free.			●	

Hydraulic Operations		W	A	B	C
1	Test "hydraulic" controls and make sure their labels are legible, complete and plausible.			●	
2	Test lifting mechanism, check for wear, damage and test the settings.			●	
3	Check cylinders and piston rods for damage and leaks, and make sure they are secure.			●	
4	Test hydraulic system.			●	
5	Replace hydraulic oil filter, ventilation/discharge filter.			✳	●
6	Check that hydraulic connections, hoses and pipes are secure and check for leaks and damage.			●	
7	Check the hydraulic oil level and top up if necessary.			●	
8	Test relief valve and adjust if necessary.			●	
9	Replace hydraulic oil.			✳	●
10	Check the forks or load handler for wear and damage.			●	
11	Check tie/plunger rods.			●	

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

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

10.2.2 Optional Equipment

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.			●	

Automatic crawl speed

Travel		W	A	B	C
1	Check that sensors/switches are secured, not damaged, clean and operational.			●	

Battery refill system

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

On-board charger 35A

Battery charger		W	A	B	C
1	Check mains connector and mains cable.			●	
2	Test the immobiliser on trucks with an on-board charger.			●	
3	Test fan and check for dirt and damage.			●	
4	Check that cables and electrical connections are secure and not damaged.			●	
5	Carry out a potential measurement on the chassis while charging is in progress.			●	

Standard on-board charger

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

Entry skids / rollers

Hydraulic Operations		W	A	B	C
1	Check entry skids or entry rollers for damage and wear, and test operation.			●	

Electrolyte recirculation

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

Ergonomic lift

Hydraulic Operations		W	A	B	C
1	Test the lift sensors in the mast and initial lift and check for damage.			●	
2	Check settings and wear levels of slide pieces and stops and adjust the slide pieces if necessary.			●	
3	Check load chain setting and tension if necessary.			●	
4	Check lateral clearance of the mast connections and the fork carriage.			●	
5	Visually inspect the mast rollers and check contact surface wear level.			●	
6	Test emergency lowering system.			●	
7	Test lift and lowering speeds.			●	

Lift cutout

Hydraulic Operations		W	A	B	C
1	Test lift cutout, check for damage and make sure it is secure.			●	

Impact sensor / data recorder

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

Lateral Battery Removal

Power supply		W	A	B	C
1	Test battery lock / battery attachment.			●	

Access module

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

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A Traction Battery Appendix

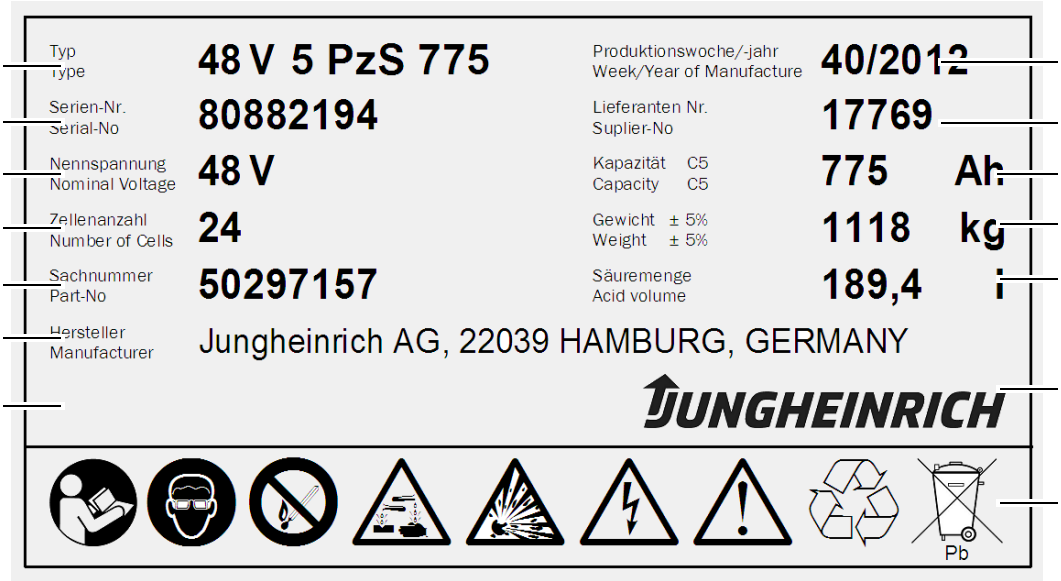
Contents

1 Correct Use and Application

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

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

2 Data plate



1	Battery name
2	Battery type
3	Production week/year manf.
4	Serial number
5	Supplier number
6	Rated voltage
7	Rated capacity
9	Battery weight in kg
8	Number of cells
15	Electrolyte volume in litres
10	Battery number
11	Manufacturer
13	Manufacturer's logo
12	CE mark only for batteries beyond 75 volts
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. 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. batteries. Always wash your hands after completing the work. Use insulated tools only. Do not physically alter 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.

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 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 conform to DIN 43530 Part 2 purity regulations.

4.1.1 Battery nominal data

1.	Product	Traction battery
2.	Nominal voltage	2.0 V x no. 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

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 terminal screw torques (M10 = 23 ±1 Nm) of the terminal conductors and connectors.
- Charge up the battery.
- Check the electrolyte level.

➔ The electrolyte level must be above the cell baffle or the top of the separator.

- Add electrolyte with distilled water up to the nominal level.

Checks completed.

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. Recharge a discharged battery immediately.

4.2.4 Charging the battery

⚠ WARNING!

The gases produced during charging can cause explosions

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

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

NOTE

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

➔ The electrolyte temperature rises by approx. 10 K 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

– Electrolyte temperature min. 10°C to max. 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.

Battery 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

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.

4.3.1 Daily

– Charge the battery after each discharge.
– After charging, check the electrolyte level.
– If necessary, add purified water up to the rated level after charging.

➔ The height of the electrolyte level should not be below the cell baffle or above the top of the separator, or the "Min" and "Max" electrolyte markings respectively.

4.3.2 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.

4.3.3 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.

4.3.4 Annually

– Measure the truck insulation resistance in accordance with EN 1175-1.
– Measure the battery insulation resistance in accordance with 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.

5.1.1 Battery nominal data

1.	Product	Traction battery
2.	Nominal voltage	2.0 V x no. 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 terminal screw torques (M10 = 23 ±1 Nm) of the terminal conductors and connectors.
- Re-charge the battery.
- Charge the battery.

Check completed.

5.2.2 Discharging the battery

➔ To achieve an optimum useful life avoid operational discharges of more than 60% of nominal capacity.

➔ If the battery is discharged during operation by more than 80% of rated capacity the useful life of the battery will reduce significantly. Fully or partially discharged batteries must be re-charged immediately and not left unattended.

5.2.3 Charging the battery

⚠ WARNING!

The gases produced during charging can cause explosions

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

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

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 cells.

- ▶ 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 limit currents in the gassing area in accordance with DIN EN 50272-3.

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 K 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 K.

Battery 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.

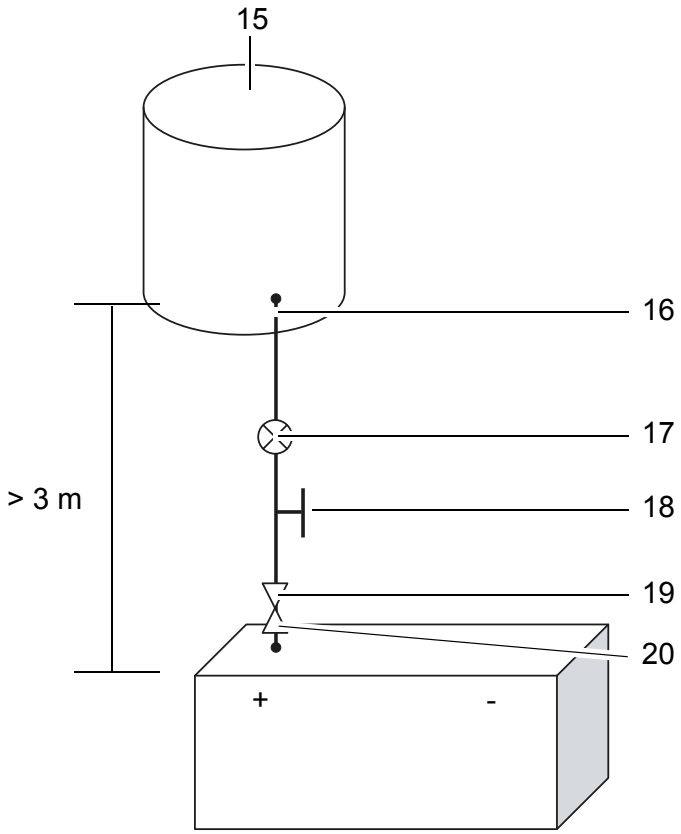
5.3.4 Annually

– Measure the truck insulation resistance in accordance with EN 1175-1.
– Measure the battery insulation resistance in accordance with 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



15	Water container
16	Tap connection with ball cock
17	Flow indicator
18	Shut-off cock
19	Locking coupling
20	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 such as:
- Battery air coupling not connected to circulation module (if coupling is separate) or faulty.
- Leaky or faulty hose connections on battery or
- Intake filter contaminated

a visual error message appears on the charger.

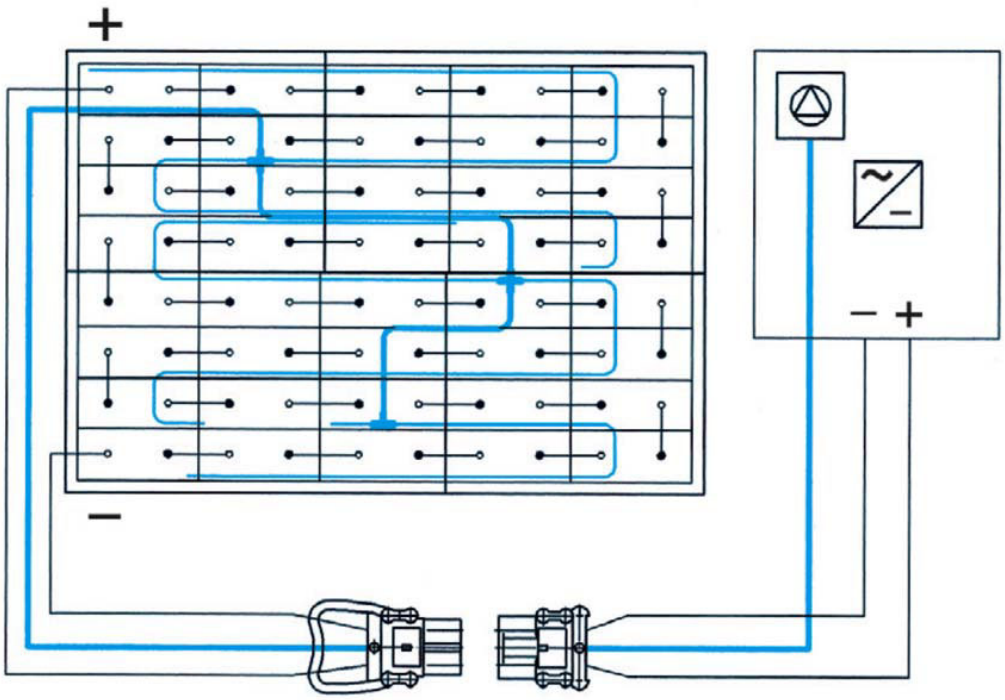
NOTE

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 on the battery side and through-coupling on 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 box 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 3-monthly full charge for PzV batteries.
– Trickle charge for a charge voltage of 2.23 volts x no. of cells for PzS, PzM and PzB batteries or 2.25 volts x no. 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.