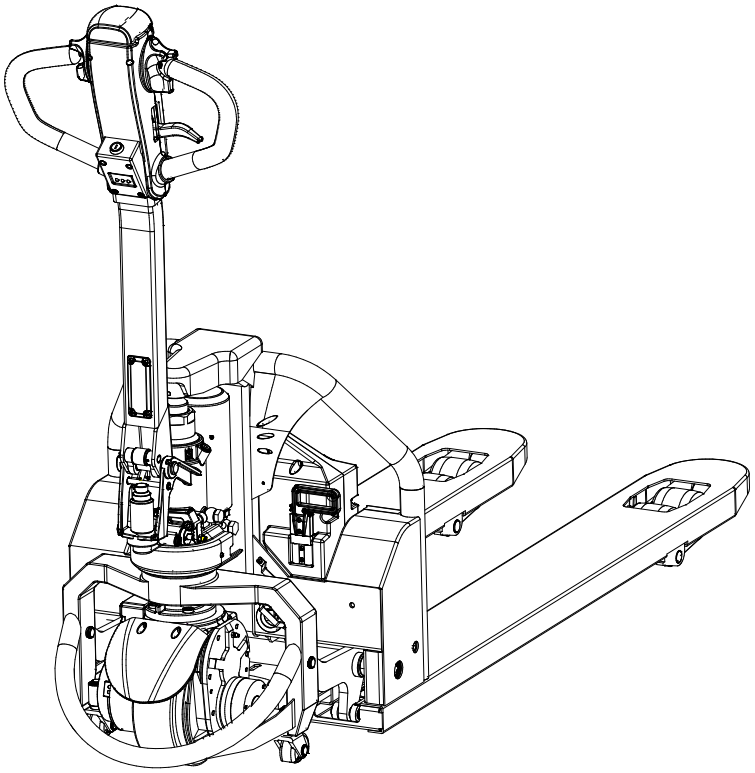
PTE 1.3 Li-Ion

Operating instructions

en-GB



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PTE 1.3 Li-Ion

Declaration of Conformity

CE

Manufacturer

Ningbo Ruyi Joint Stock Co., LTD., No. 656 North Taoyuan Road, 315600 Ninghai, Zhejiang, P.R. China

Imported by (for all countries besides China) / Authorized by (for China)

Jungheinrich AG, Friedrich-Ebert-Damm 129, D-22047 Hamburg, Germany

Type	Option	Serial No.	Year of manufacture
PTE 1.3 Li-Ion			

Additional information

On behalf of

Date

en-GB EU Conformity Declaration

The undersigned hereby declare that the powered industrial truck described below in detail complies with the European Directives 2006/42/EC (Machinery Directive) and 2004/108/EEC (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 authorized 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 presented in a precise and clear manner. The chapters are arranged by letter and the pages are numbered continuously.

The operating instructions detail different industrial truck models. When operating and checking the industrial truck, make sure that the particular section applies to your truck model.

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

Safety notices and text mark-ups

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

⚠ DANGER!

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

⚠ WARNING!

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

⚠ CAUTION!

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

NOTICE

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

➔ Used before notices and explanations.

●	Indicates standard equipment
○	Indicates optional equipment

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03.20 en-GB

Contents

A Correct Use and Application

1 General

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

2 Correct application

NOTICE

The maximum load and load distance are indicated on the capacity plate and must not be exceeded.
The load must rest on the load handler or be lifted by an attachment approved by the manufacturer.
The load must be fully raised, see page 76.

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

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

3 Approved application conditions

– Operation in industrial and commercial environments.
– Average ambient temperature for continuous duty: +25°C
– Maximum ambient temperature (short time use up to 1 hour): +40°C
– Lowest ambient temperature for industrial trucks intended for use in normal indoor conditions: +5°C
– Lowest temperature for industrial trucks intended for use in normal outdoor conditions (short time use up to 30 minutes): -20°C
– Altitude: up to 2000 m
– 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.
– Travel on inclines up to a maximum of 5 %.
– Do not travel across or at an angle on inclines. Travel with the load facing uphill.

⚠ 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.

4 Proprietor responsibilities

For the purposes of the present operating instructions the “operating company” is defined as any natural or legal person who either uses the industrial truck himself, or on whose behalf it is used. In special cases (e.g. leasing or renting) the proprietor is considered the person who, in accordance with existing contractual agreements between the owner and user of the industrial truck, is charged with operational duties.
The proprietor must ensure that the industrial truck is used only for the purpose it is intended for and that danger to life and limb of the user and third parties are excluded. Furthermore, accident prevention regulations, safety regulations and operating, servicing and repair guidelines must be followed. The operating company must ensure that all users have read and understood these operating instructions.

NOTICE

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

5 Adding attachments and/or optional equipment

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

6 Removal of components

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

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

7 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.

B Truck Description

1 Application

This forklift series is the tiller operated truck. Support wheels in the drive compartment ensure stability when steering.

It is designed for use on level surfaces to lift and transport palletized goods. Open bottom pallets or roll cages can be lifted.

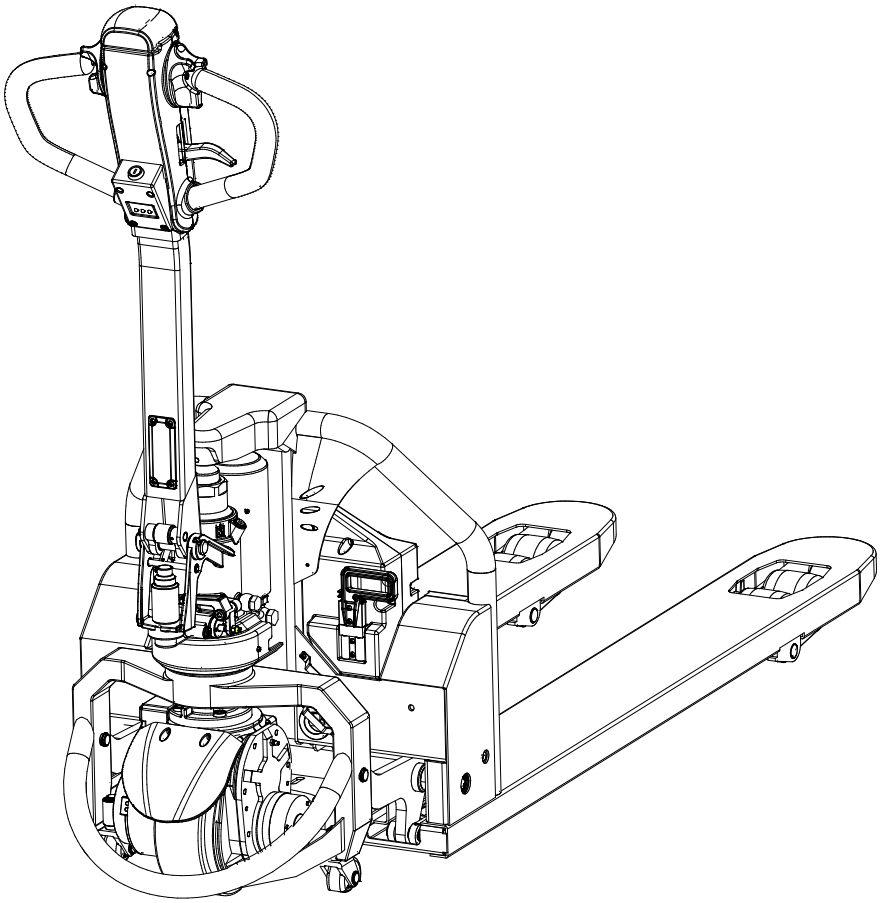
➔ The PTE 1.3 Li-Ion is designed for light-duty operations; the maximum continuous operation time is 4 hours.

2 Truck models and rated capacity

The rated capacity can be derived from the model name.

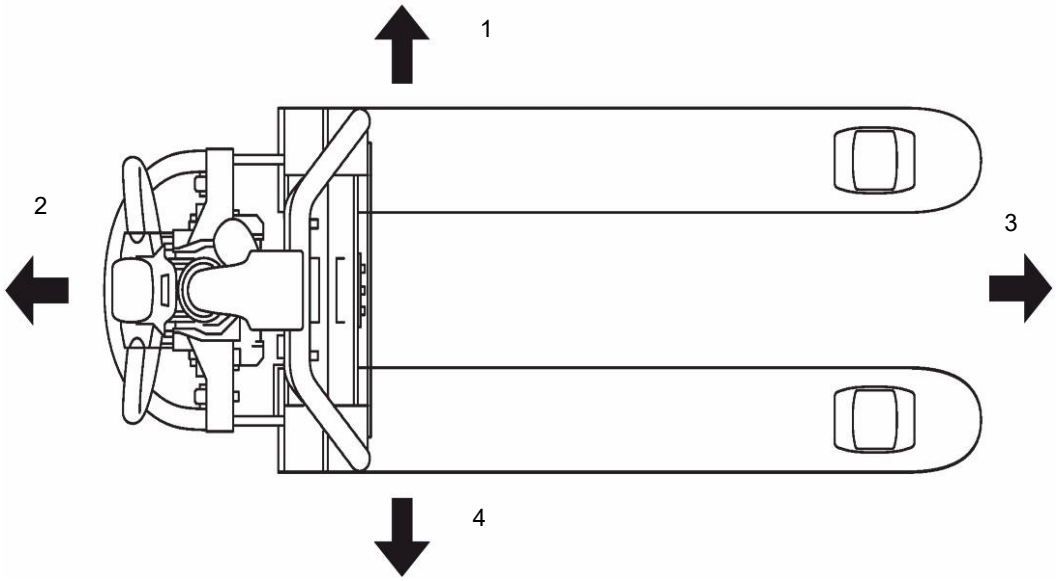
PTE 1.3 Li-Ion: 1.300 kg

The rated capacity does not generally match the permissible capacity. The capacity can be found on the capacity plate attached to the truck.



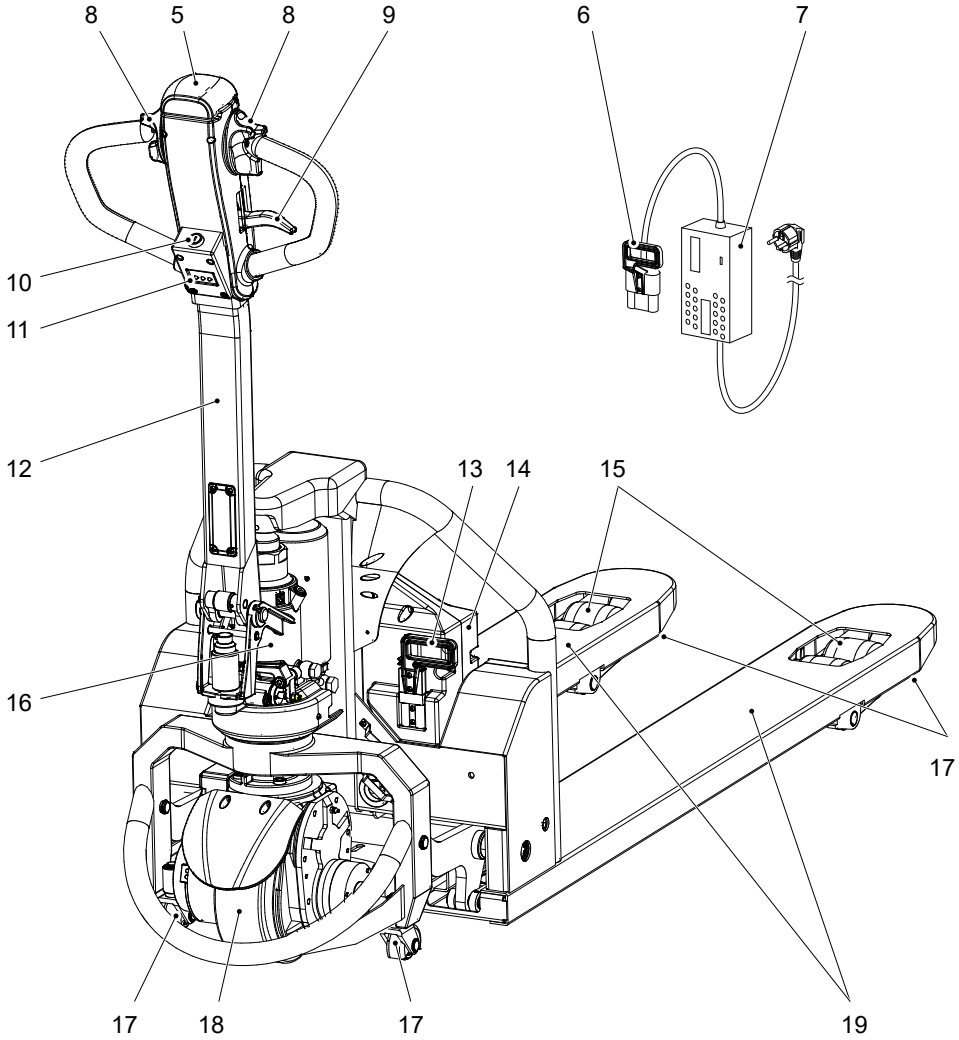
3 Travel direction definition

The following determinations have been made for travel direction specification:



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

4 Assembly description



Item	Description	Item	Description
5	Collision safety switch	13	Battery connector plug (Emergency disconnect)
6	Charge connector	14	Battery
7	Battery charger	15	Load wheels
8	Travel switch	16	Hydraulic cylinder
9	Lower handle	17	Support wheels
10	Key switch	18	Drive wheel
11	Charge status indicator	19	Load handler
12	Tiller and tiller head		

5 Functional Description

Safety equipment

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

Pulling out the battery connector plug (emergency disconnect) cuts out all electrical functions in hazardous situations.

Hydraulic system

Lifting and lowering are activated via the lift button or the lower lever.

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

Drive system

The motor drives the drive wheel through the gearbox. The electric traction controller ensures smooth drive motor speed control and hence smooth travel, powerful acceleration and electrically controlled braking.

Tiller

The user steers with an ergonomic tiller. All travel and lift operations can be performed sensitively without taking a hand from the tiller.

Electrical systems

The industrial truck has an electronic traction controller. The operating voltage of the truck's electrical system is 48 V.

Controls and displays

Ergonomic controls ensure fatigue-free operation for sensitive application of the travel and hydraulic operations. The charge status indicator displays the available battery capacity.

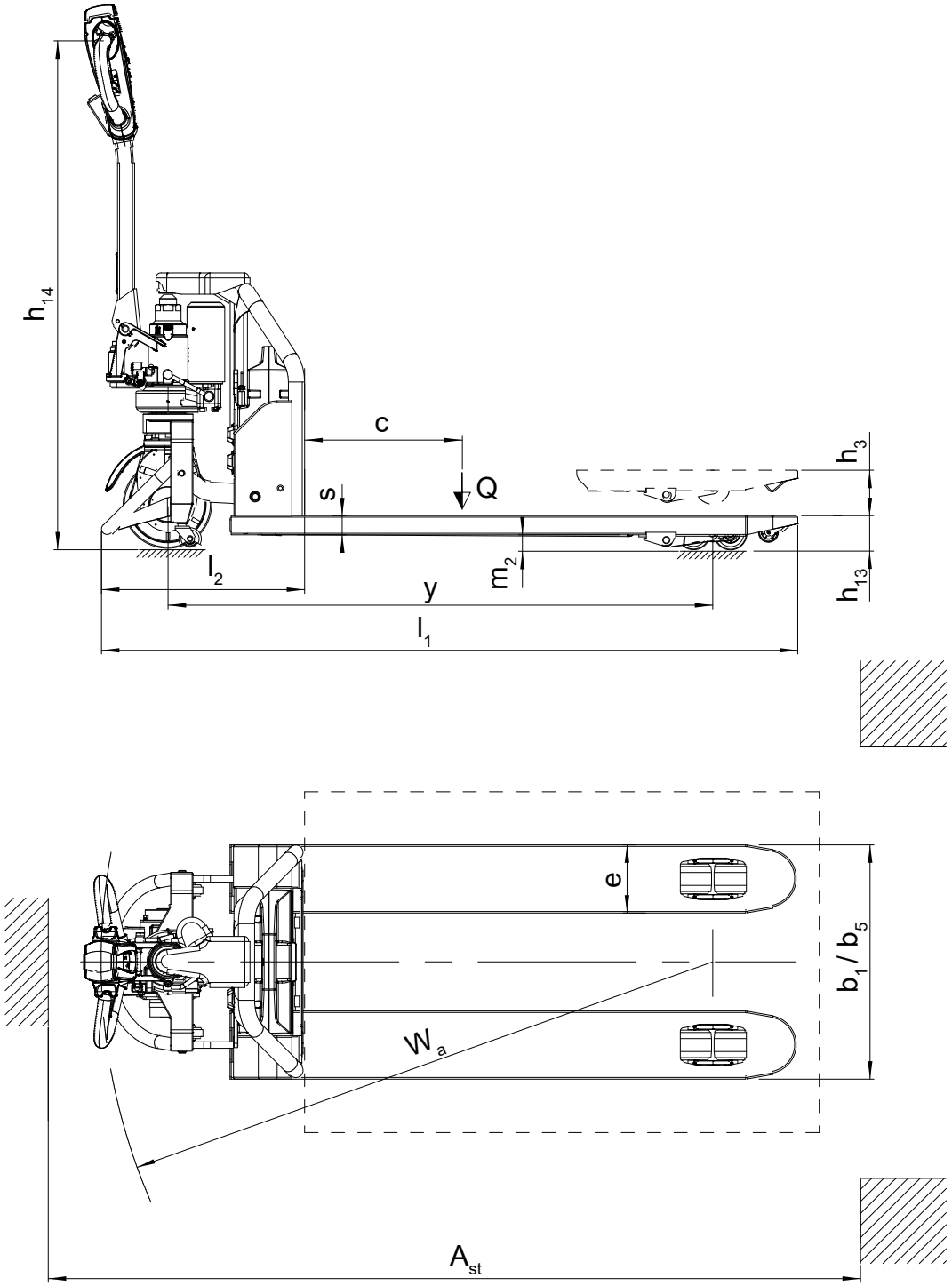
6 Technical Specifications

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

6.1 Performance data

	Description	PTE 1.3 Li-Ion	Unit
Q	Rated capacity	1300	kg
	Travel speed with / without load	4.8 / 5.0	km/h
	Lift speed with / without load	0.03 / 0.035	m/s
	Lowering speed with / without load	0 - 0.6	m/s
	Drive motor, power S2 60 min	0.65	kW
	Lift motor, power at S3 15%	0.8	kW
S2	Gradient performance with / without load	5 / 20	%

6.2 Dimensions



	Description	PTE 1.3 Li-Ion	Unit
h_3	Lift height	110	mm
h_{13}	Forks lowered	80	mm
h_{14}	Tiller height in min./max. travel position.	635 / 1200	mm
y	Wheelbase	1269 / 1339	mm
l_1	Overall length	1623 / 1693	mm
l_2	Headlength	473	mm
b_1	Truck width	550 / 685	mm
b_5	Width across forks	550 / 685	mm
s	Fork height	45	mm
e	Fork width	160	mm
l	Fork length	1150 (1220)	mm
m_2	Ground clearance	35	mm
A_{st}	Aisle width 1000x1200 transv.	2226 / 2294	mm
A_{st}	Aisle width 800x1200 longit.	2095 / 2132	mm
W_a	Turning radius in slow travel mode (tiller vertical)	1424 / 1494	mm
c	Load center distance with standard fork length	600	mm

6.3 Weights

Description	PTE 1.3 Li-Ion	Unit
Truck weight	135 kg	kg

6.4 Battery

The battery used in this industrial truck is a lithium-ion battery. It is an environment-friendly battery without chemical mercury or cadmium.

Battery type	Voltage	Capacity	Weight	Size
Lithium-ion	48 V	20 Ah	8.5 kg	260x187x72 mm

The industrial truck must only operated in conjunction with an approved lithium-ion battery.

6.5 Battery charger

Description	Value
Type	QQE288-10CH112-L
Manufacturer	QQE Technology Co., Ltd.
Input voltage	110 VAC to 220 VAC
Input current	5 A
Frequency	50/60 Hz
Output voltage	48 VDC
Output current	6 A
Efficiency	> 80 %
Working mode	Microprocessor control
Charging mode	Microprocessor control with CC/CV (Constant Current / Constant Voltage)
Output protection	– Output short circuit protection – Output voltage and current limiting protection – Charging time limiting protection – Reverse battery connection protector
Temperature	0°C to +40°C
Humidity	5 % to 95 %
Status LED display	refer to the instruction on the battery charger

The battery charger QQE288-10CH112-L is designed for Lithium-ion batteries only.

6.6 Tyre type

Description	Material / Size	Unit
Wheel	PU	
Wheel size, front	ø 210 x 70	mm
Wheel size, rear	ø 80 x 70	mm
Wheel number, front/rear (x = driven)	1x-2/4	

6.7 EN standards

Continuous sound pressure level

– PTE 1.3 Li-Ion: 70 dB(A)

in accordance with EN 12053 as harmonised with ISO 4871.

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

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

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.

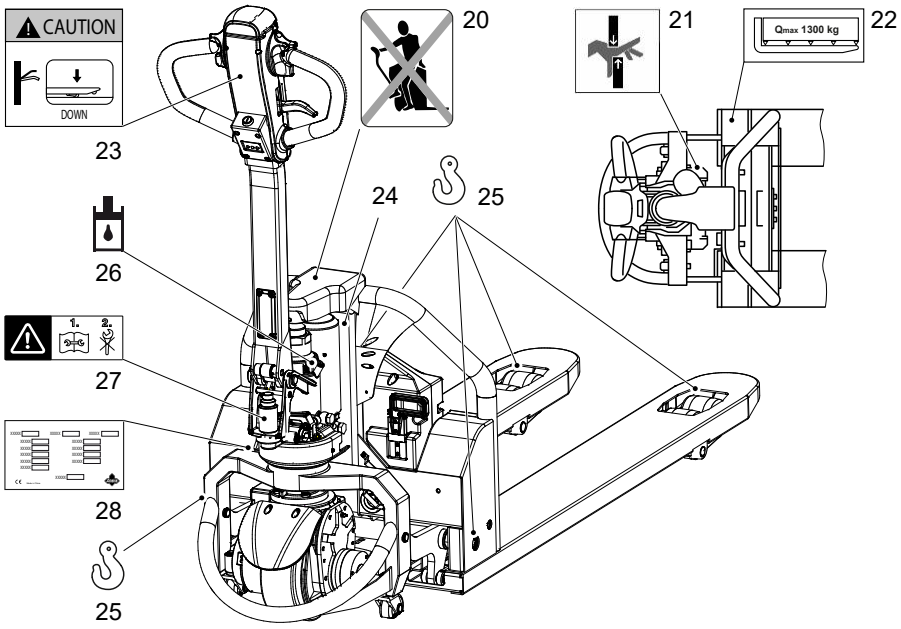
6.8 Electrical Requirements

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

7 Identification Points and Data Plates

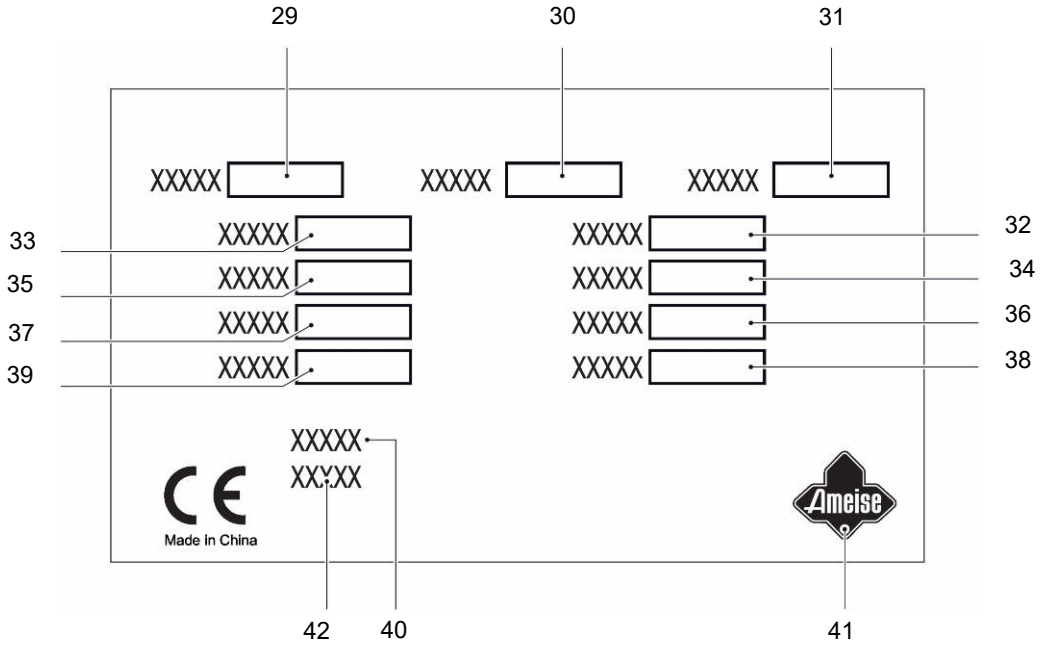
7.1 Overview of marking points

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



Item	Description	Item	Description
20	Prohibition plate: „No passengers“	25	Strip points for crane lifting
21	Risk of crushing	26	Filler neck for hydraulic oil
22	Capacity plate	27	Repair warning
23	Lower handle operation label	28	Data plate
24	Serial number		

7.2 Data plate



Item	Description	Item	Description
29	Type	36	Nominal power
30	Option	37	Battery voltage
31	Serial number	38	Battery mass
32	Year of manufacture	39	Mass of truck without battery
33	Name	40	Importer
34	Load centre distance	41	Logo
35	Rated capacity	42	Manufacturer

For queries regarding the industrial truck or ordering spare parts always quote the truck serial number (31).

C Transport and Commissioning

1 Lifting by crane

⚠ WARNING!

All persons involved in loading by crane must be trained

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

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

⚠ WARNING!

Improper loading by crane can result in accidents

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

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

▶ The truck may be loaded only by people who are trained in using lifting accessories and lifting gear.

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

▶ Do not stand under suspended loads.

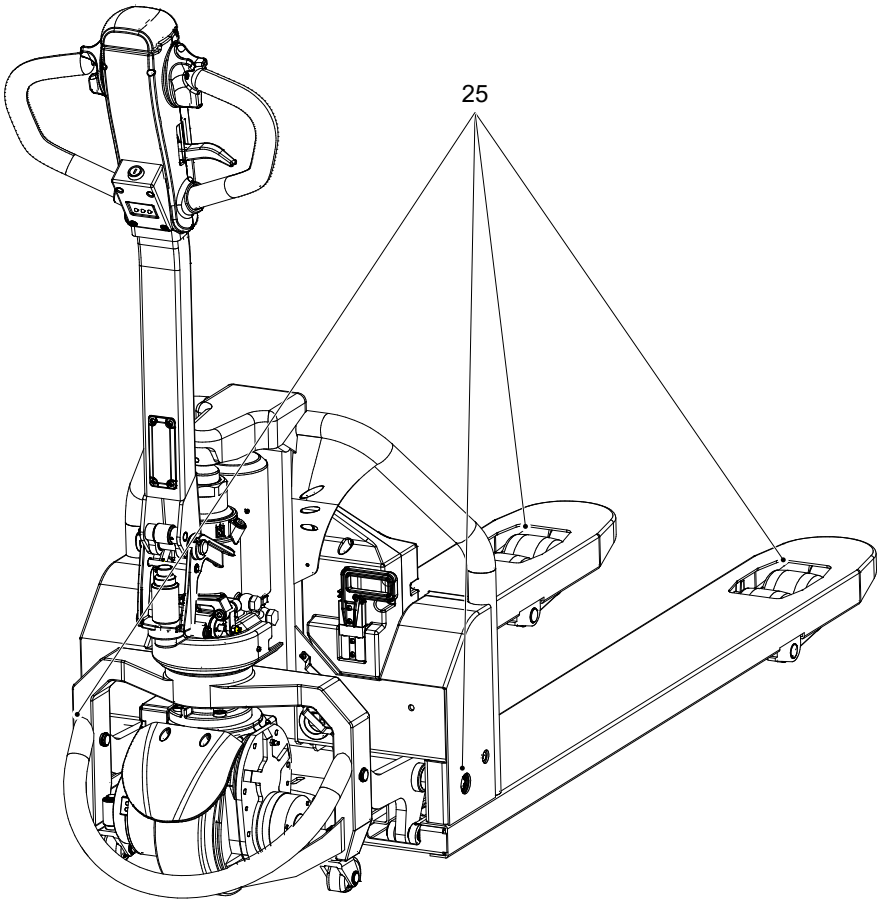
▶ Do not walk into or stand in a hazardous area.

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

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

▶ Use the lifting accessories only in the prescribed load direction.

▶ Crane lifting gear must be fastened in such a way that it does not come into contact with any attachments when lifting.



The strap points (25) under the frame and at the fork tips are intended for lifting the truck with crane lifting gear.

Lifting the truck by crane

Requirements

– Park the truck securely, see page 66.

Tools and Material Required

– Lifting gear
– Crane lifting gear

Procedure

• Attach the crane lifting gear to the strap point (25).

The truck can now be lifted by crane.

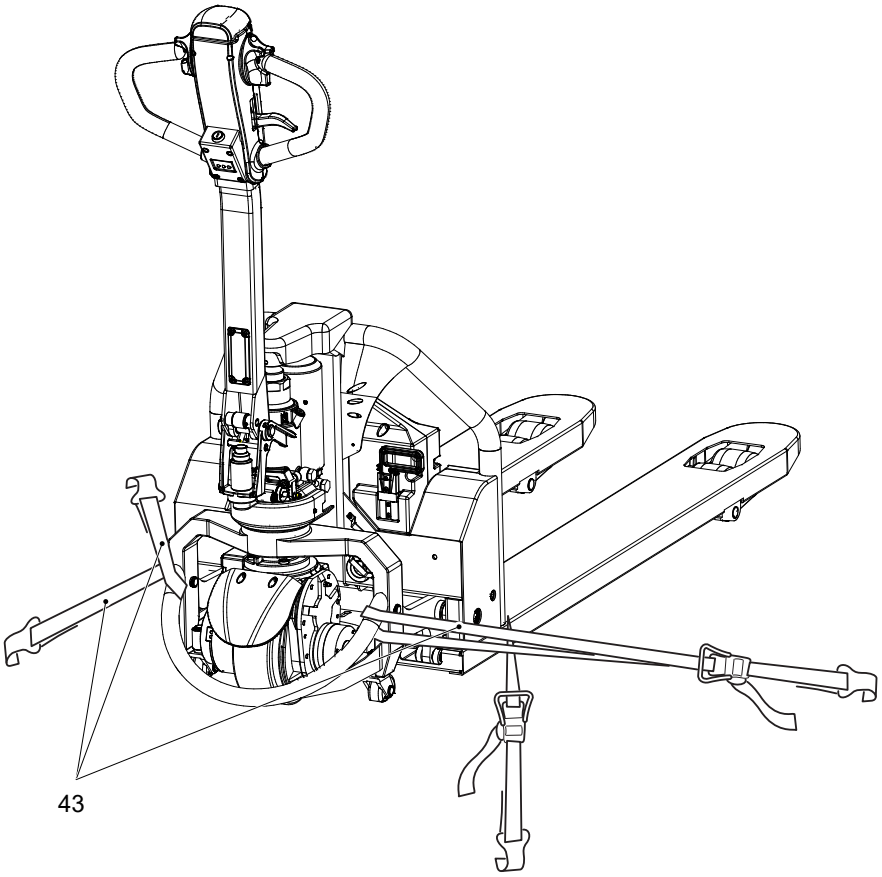
2 Transport

⚠ WARNING!

Accidental movement during transport

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

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



Securing the industrial truck for transport

Requirements

– Load the truck.
– Park the truck securely, see page 66.

Tools and Material Required

– Tensioning belts / tie down straps

Procedure

- Sling the tensioning belt (43) around the truck and attach it to the fastening rings of the transporting vehicle.
- Tighten the tensioning belt with the tensioner.

The truck can now be transported.

3 Using the Truck for the First Time

⚠ WARNING!

The use of unsuitable energy sources can be hazardous

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

▶The truck must only be operated with battery current.

Procedure

- Check the equipment is complete.
- If necessary. mount the tiller, see page 32.
- If necessary, install the battery, see page 60.
- Charge the battery, see page 54.

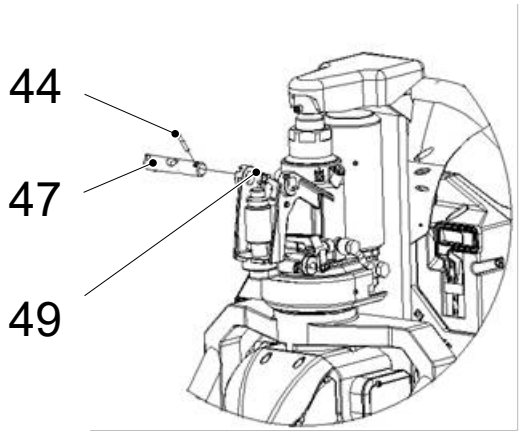
The truck can now be started, see page 64.

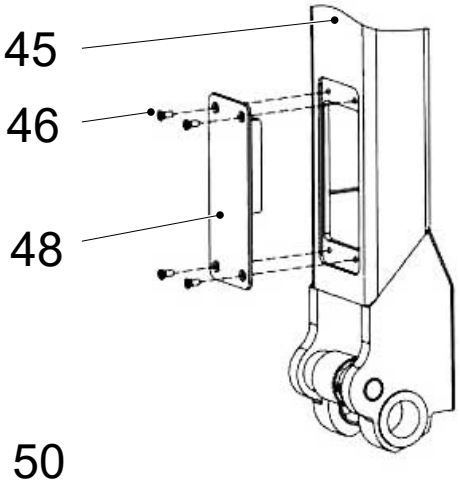
Wheel flattening

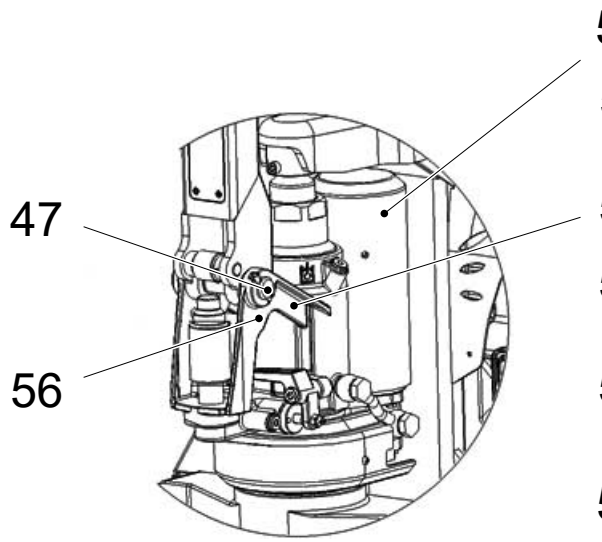
If the truck has been parked for a long period, the wheel surfaces may tend to flatten. This flattening has a negative effect on the safety and stability of the truck. Once the truck has covered a certain distance, the flattening will disappear.

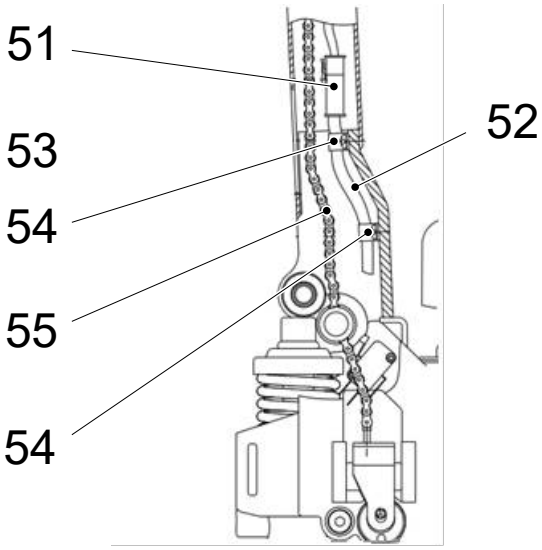
4 Mounting the tiller

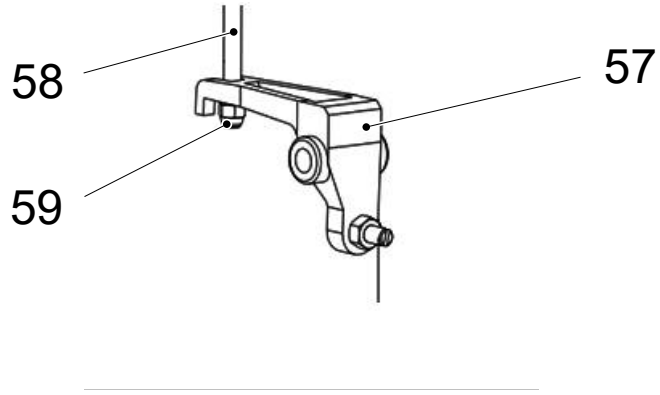
If the tiller is supplied separately, the tiller must be installed by authorised and trained personnel prior to commissioning.











Mounting the Tiller

Tools and Material Required

– Phillips screwdriver

Procedure

- Removing bolt
  - Remove pin (44) from bolt (47).
  - Pull out bolt (47).
- Removing cover plate
  - Remove screws (46).
  - Remove cover plate (48).
- Mounting the tiller
  - Insert tiller (45) into the bracket (49).
  - Connect tiller (45) to the arms (53) at the pump body (50) by bolt (47).
  - Thread the chain (55) through the hole of bolt (47).
  - Push tiller (45) to horizontal position.
  - Pull out pin (56).

➔ The pin serves to simplify the installation of the tiller and must be removed after installation.

- Installing electrical connections
  - Thread the connection cable (52) from below into the tiller (45).
  - Connect plug and socket (51) of the connection cable (52) and make sure the connection is engaged.
  - Fasten the connector cable (52) with cable clamps (54).
- Mounting components
  - Mount screw and nut (59) at the chain pin (58) into the groove of the lever plate (57).
  - Put pin (44) into bolt (47).
  - Install cover plate (48).

The tiller is mounted. The industrial truck is ready for commissioning.

D Battery - Servicing, Recharging, Replacement

1 Description of the lithium-ion battery

The lithium-ion battery is a battery with rechargeable high-performance energy cells.

Temperatur range for using the battery

Optimum battery useful life is achieved at the battery temperatures of +5°C to +40°C.

Low temperatures reduce the available battery capacity, high temperatures reduce the batteries useful life.

40°C is the maximum temperature for batteries, at which point the truck can be operated.

Product	Lithium-ion battery
Nominal voltage	48 V
Rated capacity C5	20 Ah
Charge current	6 A (only with charger QQE288-10CH112-L)
Operational application temperature	-10°C up to +40°C
Charging application temperature	0°C to 45°C
Storage temperature	0°C to +30°C
Electro-chemical system	Lithium-ion
Battery weight	8.5 kg

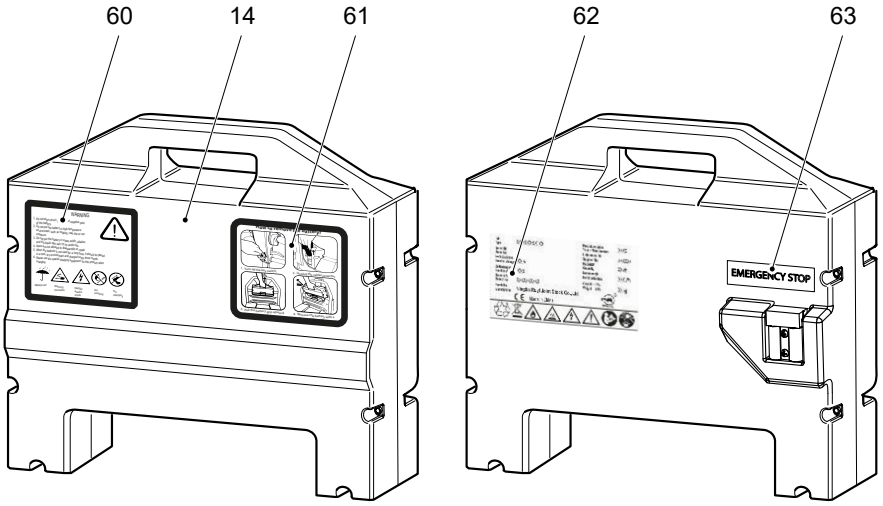
Disconnecting the battery from the truck

When the industrial truck is parked securely (see page 66) the battery can be disconnected from the industrial truck by pulling out the battery connector plug (Emergency disconnect), see page 17.

1.1 Accessories

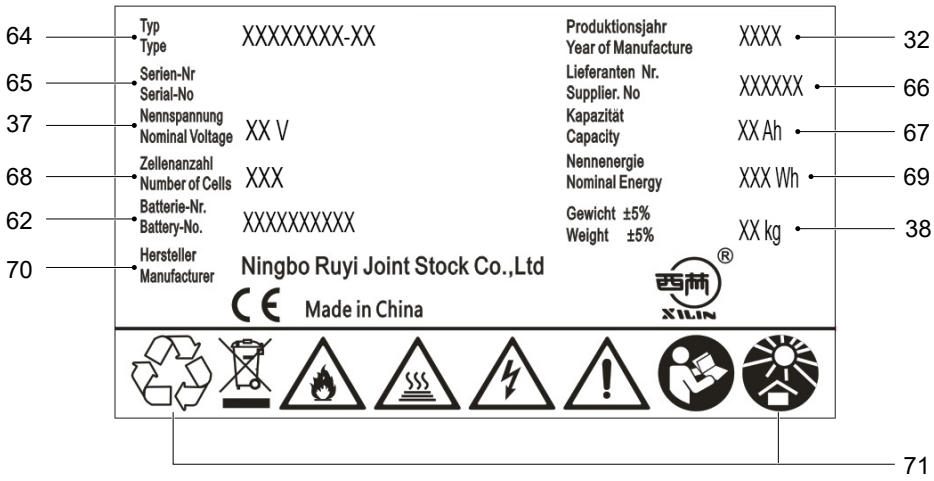
When charging the lithium-ion battery use only the battery charger QQE288-10CH112-L.

1.2 Battery Decals



Item	Description	Item	Description
14	Battery	62	Data plate
60	Safety instructions	63	Emergency Stop
61	Battery removing instruction		

1.3 Battery data plate



Item	Description	Item	Description
32	Year of manufacture	66	Supplier-No.
37	Nominal Voltage	67	Capacity
38	Battery weight	68	Number of cells
62	Battery-No.	69	Nominal energy
64	Type	70	Manufacturer
65	Serial-No.	71	Warning symbols, see page 40

2 Safety Instructions, Warning Indications and other Notes

2.1 Safety regulations for handling lithium-ion batteries

Do not carry out any repairs on the lithium-ion battery.

Replace defective lithium-ion battery by customer service.

⚠ WARNING!

Risk of electric shock and burning

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

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

⚠ WARNING!

Unsuitable batteries that have not been approved by the manufacturer 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 the manufacturer, 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 manufacturer-approved batteries may be used on the truck.
- ▶ Battery equipment may only be replaced with the agreement of the manufacturer.
- ▶ 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.

⚠ WARNING!

Any damage and other defects to the charger can result in accidents.

If any safety-related modifications, damage or other defects are discovered on the charger or during operation, the charger must be taken out of service until it has been repaired.

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

NOTICE

Risk of material damage due to improper charging

Improper use of external charger can cause material damage

- ▶ It is necessary to apply the lithium-ion charger of our company.
- ▶ The operation voltage of the charger is 48 V; the maximum charging voltage is 54.6 V, the charging current is 6 A.
- ▶ The charger must only be used for batteries supplied by the manufacturer or other approved batteries provided it has been adapted by the manufacturer's service department.
- ▶ Reverse charge of the battery is prohibited.
- ▶ If the battery is heated obviously during charging, stop charging immediately. Charge again after it has been cooled down.
- ▶ Hold the puller when pulling the connectors. It is not allowed to pull the wires directly.

NOTICE

Intermediate charging of the lithium-ion battery

Intermediate charging of the lithium-ion battery is possible, i.e. a battery that is not fully discharged can be charged or partially charged at any time.

- ▶ The lithium-ion battery should be fully charged before use.
- ▶ To ensure reliable operation of the lithium-ion battery, it must be fully charged at least every 12 weeks with frequent intermediate charging.
- ▶ Turn off the battery charger before disconnecting the lithium-ion battery from the charger.

2.2 Potential hazards

No hazards are anticipated if the equipment is used correctly.

The following hazards can arise in the event of improper use:

– Physical damage:
  This can occur if a battery falls or is deformed through pressure (e.g. truck forks penetrate the battery housing).
  Mechanical damage includes cracks, breakage, splinters or holes in the battery housing. This type of damage may be caused by a short circuit inside the battery, which may result in harmful materials leaking, fire or battery explosion.
– Short circuits:
  These may be caused by connecting the two battery terminals (e.g. battery immersed in water)
– Temperature effects:
  High temperatures caused for example by sunlight or being store in warm locations (e.g. near ovens) can result in harmful materials leaking, fire or battery explosion.

In order to avoid fire, explosion and leakage of harmful materials, a safe place for storing batteries until the manufacturer's customer service department arrives on site must satisfy the following criteria:

– Do not store in places often frequented by personnel.
– Do not store in places where valuable objects (e.g. cars) are stored.
– A PM12i burning metal fire extinguisher or a Co2 fire extinguisher must be available to put out any fires.
– There should not be any fire or smoke detectors in the vicinity in order to ensure that an automatic fire detection system is only activated in the event of actual danger (e.g. naked flames).
– Small amounts of discharge from a single battery are not critical to the environment. Above-average natural ventilation is required in this case.
– No ventilation intake pipes should be in the vicinity, as discharged content could spread within a building.

Examples of where to store a non-functional battery:

– Roofed outdoor position.
– Ventilated container.
– Covered box with pressure and smoke discharge option.

2.2.1 Symbols - Safety and Warnings

	Used lithium-ion batteries must be treated as hazardous waste. Lithium-ion batteries marked with the recycling symbol and the sign showing a crossed-out waste bin must not be disposed of with ordinary household waste. Buy-back terms and type of recycling are to be agreed with the manufacturer in accordance with the Battery Directive 2006/66/EG.
	Avoid fire and short circuits due to overheating. Do not ignite or position an open flame, glowing embers, or sparks near the lithium-ion battery. Keep lithium-ion batteries away from strong heat sources.
	Hot surfaces. Battery cells can generate very high short-circuit currents, causing them to become hot.
	Dangerous electrical voltage! Battery cells can generate very high short-circuit currents, causing them to become hot. Caution! The metal parts of the battery cells are constantly under voltage, so do not place any foreign objects or tools on the lithium-ion battery. Observe the accident prevention regulations and DIN EN 50272-3.
	Wear personal protective equipment (e.g. safety goggles and safety gloves) when handling damaged battery cells and lithium-ion batteries. Use only insulated tools. If the contents leak out, do not inhale the fumes. Always wash your hands after completing the work. Do not mechanically machine the lithium-ion battery, strike, crush, compress, notch, dent or modify it in any way. Do not open, damage, penetrate, bend, heat the lithium-ion battery or allow it to become hot, do not throw it into a fire, short circuit it or immerse it in water. Do not store it or operate it in pressurised containers.
	Follow the operating instructions and keep them in a visible position in the charging area. If any faults are found on the lithium-ion battery, contact the manufacturer's customer service department immediately. Do not carry out any actions on your own. Do not open the lithium-ion battery.
	Protect the lithium-ion battery from solar radiation or other forms of heat radiation. Do not expose the lithium-ion battery to heat sources.

2.2.2 Marking of packages with lithium-ion batteries

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

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

72

73

Item	Description
72	Danger label class 9A for lithium-ion batteries
73	Marking of packages with lithium-ion batteries in accordance with the dangerous goods regulations GGVS/ADR appendix 9 for the transport of hazardous goods

2.2.3 Explosion and fire hazard

⚠ WARNING!

Physical damage, thermal effects or incorrect storage in the event of a defect can result in explosions or fire.
The battery materials can be flammable.

2.2.3.1 Particular hazard from combustion products

The lithium ion battery may be damaged by a fire in the vicinity of the lithium ion battery. When fighting a lithium-ion battery fire, the following dangers and information must be taken into consideration.

⚠ WARNING!

Contact with combustion products can be hazardous

Fires produce combustion products.
Combustion is a chemical process by which a flammable material combines with oxygen under heat and light (fire).
The resulting combustion products can occur in the form of smoke, through leaking fluids, escaping gases, debris as well decomposition products of certain chemicals.
These combustion products are substances that enter the body through the respiratory tract and / or the skin, where they can produce and adverse effects such as choking.

▶ Avoid contact with combustion products.

▶ Use protective equipment.

- Hydrogen fluoride (HF) Hydrofluoric acid = extremely corrosive
- Risk of toxic substances produced by pyrolysis
- Risk of highly flammable gas mixtures.
- Other combustion products: Carbon monoxide & -dioxide, manganese, nickel and cobalt oxides.

2.2.3.2 Special fire fighting protective equipment

– Use self-contained breathing apparatus.
– Wear protective overalls.

2.2.3.3 Additional fire fighting instructions

To prevent secondary fires from occurring, the lithium-ion battery must be cooled from the outside. Fluids or solids must never be directed into the lithium-ion battery.

Suitable extinguishing agents
– Carbon dioxide extinguisher (CO_2)
– Water (not on mechanically opened or damaged batteries!)

Unsuitable extinguishing agents
– Foam
– Grease fire extinguishing agents
– Powder extinguishers
– Metal fire extinguishers (PM 12i extinguishers)
– Metal fire powder PL-9/78 (DIN EN 3SP-44/95)
– Dry sand

2.2.3.4 Instructions for cooling an overheated, non physically damaged battery

This type of damage may be caused by a short circuit inside the battery, which may result in harmful materials leaking, fire or battery explosion.
Endangered unopened batteries can be cooled using a water jet.

2.2.4 Material discharge

⚠ WARNING!

Battery electrolyte fluid can be hazardous

Electrolyte fluid can be discharged if the battery is physically damaged. Electrolyte fluid is harmful and must not come into contact with the skin or eyes.

- ▶ If it does, rinse the affected parts with plenty of water and seek medical assistance immediately.
- ▶ In the event of skin irritation or if any substances are breathed in, seek medical assistance immediately.
- ▶ In the event of inhalation bring the affected person into the fresh air and keep them still.

2.2.4.1 Precautionary measures for personnel

- Keep personnel away and facing the wind.
- Block off the affected area.
- Ensure there is adequate ventilation.
- Wear personal protective equipment.
- If vapours / dust / aerosols are present, use self-contained breathing apparatus.

2.2.4.2 Precautionary measures for the environment

Do not allow spilled fluids to enter the water system, drainage system or the underground
water.

2.2.4.3 Cleaning measures

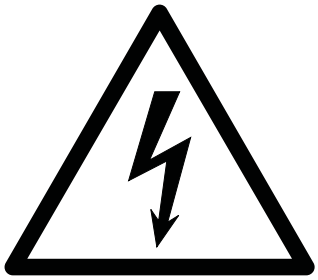
The leaked fluid must be removed professionally by the operating company on the basis of a risk assessment and disposed of in the correct manner. The fire brigade, the Agency for Technical Relief or similar institutions must be used. Absorb residues with liquid-absorbent material (such as vermiculite, sand, universal binders and pebble grain).

2.2.5 Touch voltage hazard

⚠ WARNING!

Hazardous contact voltages only arise in the event of a technical or physical defect. The batteries are normally charged. There is still some residual voltage in a discharged battery. This must be considered as a hazardous contact voltage.

With this kind of defect the battery must not be touched and must not come into contact with metal objects see page 39.



2.3 Battery lifetime and maintenance

The lithium-ion battery is wear-free. The components are maintenance-free, as a result there are no maintenance intervals planned for this battery.

2.4 Charging the battery

⚠ DANGER!

Explosion risk when charging unsuitable battery types

Charging a battery that is not suitable for this charger can result in damage to the charger and battery. The battery could expand or burst.

▶ The lithium-ion battery must only be charged with the battery charger QQE288-10CH112-L provided for this battery.

⚠ WARNING!

Warning: hazardous electrical voltage!

The charger is an electric component conducting voltages and currents that are hazardous to people.

▶ The charger must only be operated by trained technicians.

▶ Disconnect the mains supply and the battery connector before carrying out any work on the charger.

▶ The charger should only be opened and serviced by trained electricians.

⚠ WARNING!

The use of a different charger can result in overheating, fire or a battery explosion.

NOTICE

Damage to the lithium-ion battery due to discharge

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

▶ Fully charge the battery before extended downtimes.

▶ To ensure a long service life of the lithium-ion battery, it must be fully charged every 12 weeks when not in use.

If the battery is fully discharged or if the battery temperature is below the permissible level, the battery will not charge. Fully discharged batteries cannot be charged by the user (faulty). Contact the manufacturer's customer service department.

2.5 Storage / safe handling / faults

2.5.1 Storing the battery

NOTICE

Damage to the lithium-ion battery due to discharge

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

▶ Fully charge the battery before extended downtimes.

▶ To ensure a long service life of the lithium-ion battery, it must be fully charged every 12 weeks when not in use.

2.5.2 Instructions for safe handling

NOTICE

In new condition, the lithium-ion battery is transported and stored with a charge level of 100 %.

– Do not physically machine or modify the battery.
– Do not open, damage, penetrate or bend the battery.
– Do not throw the battery into a fire.
– Protect the battery from high temperatures and overheating.
– Protect the battery from solar irradiation.
– Keep the battery away from radiant sources and strong heat sources.
– The specified charging, operating and storage temperature ranges must be observed.

Failure to comply with these safety instructions can result in fire and explosion or the leakage of harmful materials.

2.5.3 Faults

If any damage is found to the battery or battery charger QQE288-10CH112-L contact the manufacturer's customer service department immediately. The operating company must not carry out any remedial work on its own.

Independent attempts to tamper with or repair the battery may invalidate the warranty. A service agreement with the manufacturer will help identify faults.

⚠ WARNING!

Do not open the battery.

2.6 Disposal and transport of a lithium-ion battery

2.6.1 Instructions for disposal

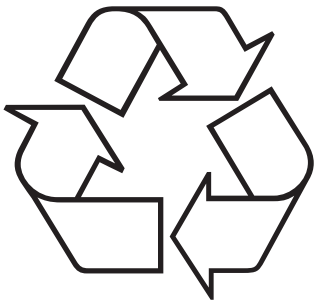
NOTICE

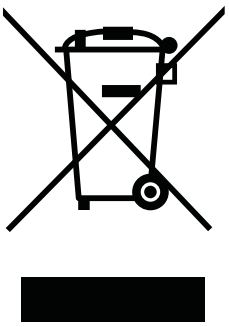
Lithium-ion batteries must be disposed of in accordance with the relevant national environmental protection regulations.

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

Used cells and lithium-ion batteries are recyclable economic goods. In accordance with the marking showing a crossed-out waste bin, these lithium-ion batteries may not be disposed of as domestic waste.

Return or recycling of batteries must be ensured in accordance with the Battery Directive 2006/66/EG.





Used lithium-ion batteries must be treated as hazardous waste.

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

Buy-back terms and type of recycling are to be agreed with the manufacturer.

2.6.2 Shipping information

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

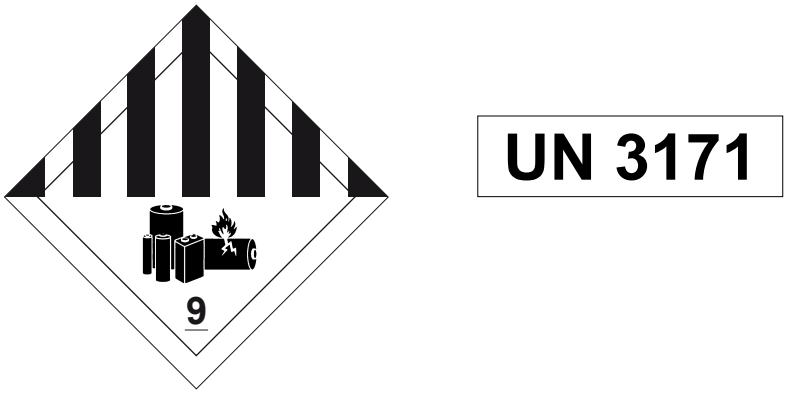
➔ ADR = Accord européen relatif au transport international des marchandises Dangereuses par Route

2.6.2.1 Shipping functional batteries

Functioning batteries can be shipped in accordance with the following regulations:

Classification according to ADR (road transport)	UN 3171 lithium-ion battery class 9
- Classification code	M4 lithium battery
- Danger label	 UN 3171
- ADR limited quantity	LQ:0

IMDG classification (sea transport)	UN 3171 lithium-ion battery class 9
- EMS	F-A, S-I
- Danger label	 UN 3171
- IMDG limited quantity	LQ: -

IATA classification (air transport)	UN 3171 lithium-ion battery class 9
- Danger label	

Exposure scenario	Not specified.
Substance safety rating	Not specified.
Marking	Product does not require marking under EC Directive / HazMatR.

NOTICE

In new condition, the lithium-ion battery is transported with a charge level of 100 %.

2.6.2.2 Shipping faulty batteries

To transport these faulty lithium-ion batteries, contact the manufacturer's customer service department. Faulty lithium-ion batteries must not be transported independently.

2.7 Hazard and Safety Instruction Phrases

Hazard and safety instruction phrases are codified hazard and safety instruction phrases for hazardous materials used as part of the globally harmonised system for the grading and identification of chemicals.
The following H phrases describe the hazards arising from the battery cells and their contents.
The P phrases describe the safety measures to be applied.

2.7.1 Hazard Instruction Phrases (H phrases)

2.7.1.1 Physical hazards (H200 range)

H242	Heating can result in fire.

2.7.2 Safety Instruction Phrases (P phrases)

2.7.2.1 General (P100 range)

P102	Keep out of reach of children.

2.7.2.2 Prevention (P200 range)

P201	Obtain special instructions before use.
P202	Read and understand all safety instructions before use.
P233	Keep containers sealed.
P235 + P410	Keep cool. Protect against direct sunlight.
P251	Do not penetrate or burn, even after use.
P261	Avoid inhalation of dust, smoke, gas, steam, vapours or aerosols.

2.7.2.3 Reaction (P300 range)

P314	Seek medical advice or assistance if feeling unwell.
P304 + P340	In case of inhalation: Bring the person into fresh air and ensure he or she can breath unhindered.
P313 + P332	For skin irritation: Seek medical advice or assistance.
P313 + P337	For persistent eye irritation: Seek medical advice or assistance.
P370 + P378	In the event of fire: Use CO_2 to extinguish.
P370 + P380	In the event of fire: Clear the area.

2.7.2.4 Storage (P400 range)

P410 + P412	Protect against direct sunlight and do not subject to temperatures in excess of 40 °C.
P411 + P235	Keep cool and do not store in temperatures in excess of 50 °C.

2.7.2.5 Disposal (P500 range)

P502	Obtain information on recycling or reuse from the manufacturer or supplier.

3 Charging the battery

3.1 Correct Use and Application

The operating instructions are a major component of the charger.

The owner shall ensure that the operating instructions are kept permanently in the vicinity of the charger, and that operating personnel shall be aware of the guidelines mentioned in the instructions.

The owner shall add further instructions regarding national accident prevention and environmental protection regulations to the operating instructions, including information on supervisory and reporting obligations, taking into account particular company practices e.g. in terms of work organization, work processes and the personnel employed.

Apart from the operating instructions and the current accident prevention regulations in force in the country and place of use, generally recognised technical regulations for safe and proper use shall be observed.

Charging the battery

The lithium-ion battery may only be charged with an approved charger within the permissible temperature range,see page 22.

The truck should not be stored without battery compensation charge for more than 12 weeks.

NOTICE

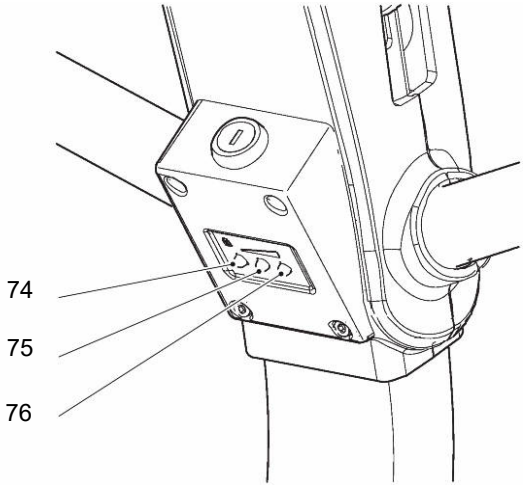
Damage to the lithium-ion battery due to improper connection

Unsuitable connector plugs of industrial trucks or battery chargers used with the lithium-ion battery can damage the battery connector.

▶Operate the lithium-ion battery only with appropriate trucks and battery chargers.

3.2 Charge Status Indicator

LED	Charge status
green light on (76)	70% - 100%
yellow light on (75)	40% - 70%
red light on (74)	10% - 40%
red light flashing (74)	none



When the red light is on, take the industrial truck to the charging area to charge it, see page 56.

The red light flashing is a warning, indicating the industrial truck is about to stop operating. Charge the battery immediately.

If continue using it, there will be power-off protection inside the lithium-ion battery. The truck will not be able to travel.

Self-discharge (for example when the switch lock is switched on) can lead to complete discharge, see page 47.

3.3 Charging the Battery with External Charger

Maintenance personnel

Batteries may only be serviced, charged 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.

Park the truck securely before carrying out any work on the batteries (see page 66).

General information

- The charge status of the battery is shown by LEDs at the battery charger.
- The charging time depends on the battery charge status. It takes approximately 3 hours to charge a nearly discharged battery.
- The lithium-ion battery can also be used in a intermediate charging status. The operating time is reduced in that case.
- Charging continues automatically after a mains failure. Charging can be interrupted by removing the mains plug and continued as partial charging.

NOTICE

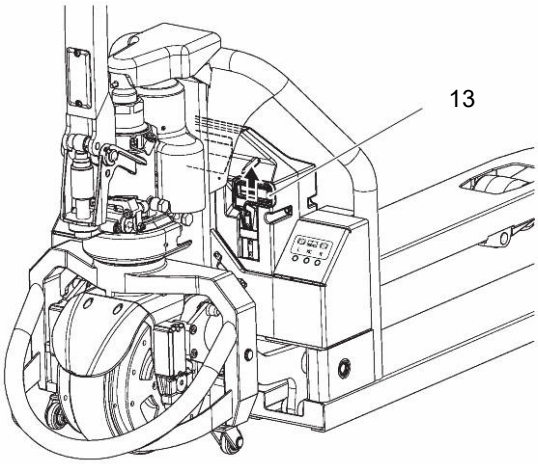
The battery temperature rises by approx. 10°C during charging. Battery charging should only start when the battery temperature is below 45°C. The battery temperature before charging should be at least 0°C as otherwise it will affect the charge.

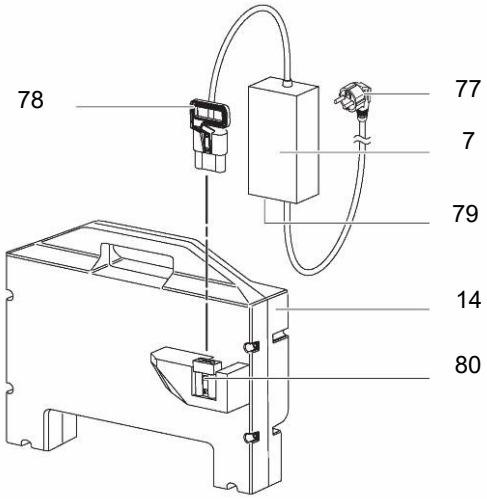
Meaning of the LEDs on the battery charger QQE288-10CH112-L

When the battery charger is connected to the power supply, the LED is steady green. When the battery charging process begins, the LED flashes yellow.

The charging process is complete when the LED is steady green.

A red LED indicates an error, see page 78.





Charging the battery

Requirements

– Park the truck securely, see page 66.
– The battery charger is approved for the battery type.

Tools and Material Required

– Battery charger

Procedure

- Remove the battery connector plug (13) from the battery (14).
- Connect the charging plug (78) of the battery charger (7) to the battery (14).
- Attach the mains plug (77) of the battery charger (7) to a mains socket.
- Switch on the battery charger (7).
- Check the charge status, see also instructions at the battery charger (7).
- If the battery (14) is charged as required disconnect the battery charger (7), see page 58.

The battery is now charged.

3.4 Disconnecting the Charger from the Mains Supply

Disconnecting the charger

Requirements

– The battery charging is complete.

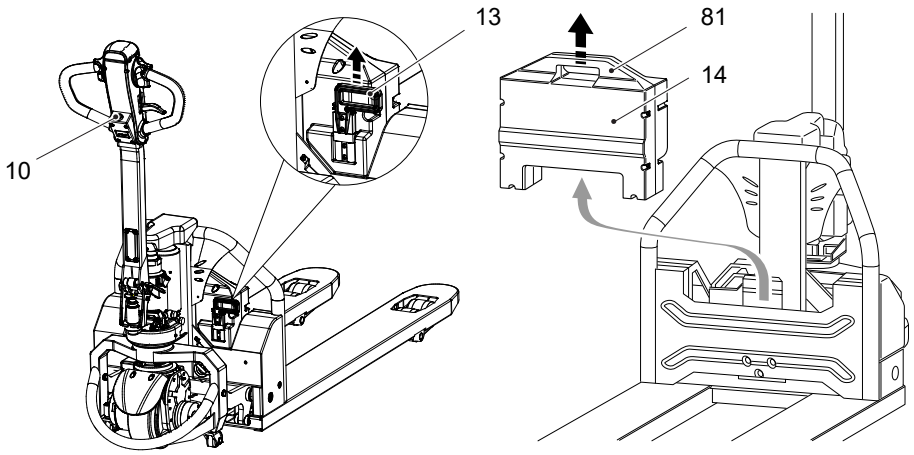
Procedure

- Switch off the battery charger (7).
- Remove the mains plug (77).
- Remove the charging plug (78).
- Connect the battery connector plug (13) with the battery (14). Insert it fully in place.

The industrial truck is now ready for operation.

4 Battery replacement

4.1 Removing the battery



Remove the battery

Requirements

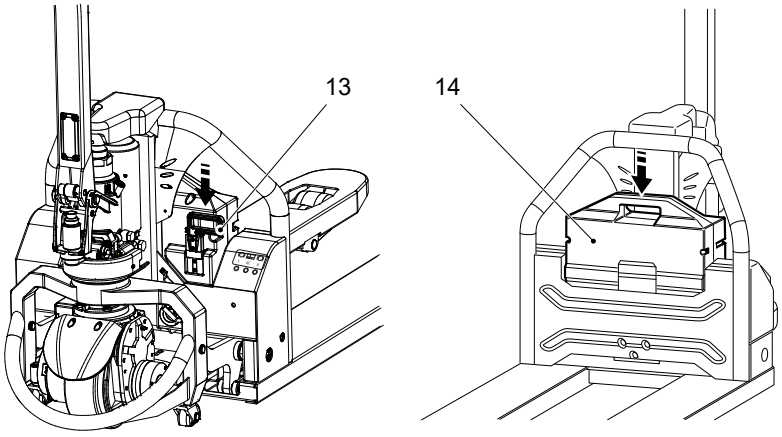
– Park the truck securely, see page 66.

Procedure

- Turn off the key switch (10).
- Remove the battery connector plug (13).
- Pull the battery grip (81) upward.
- Remove the battery (14) with a 45° angle.

The battery is now removed.

4.2 Battery installation



Insert the battery

Requirements

– Park the truck securely, see page 66.
– In case of battery replacement, make sure that the new battery is of the right type.

Procedure

- Observe the right position for inserting the battery (14).
- Insert the battery with a 45° angle into the mounting groove.
- Check the cable for damage.
- Connect the battery connector (13) with the battery. Insert it fully in place.

The battery is now inserted.

E Operation

1 Safety Regulations for the Operation of Forklift Trucks

Driver authorisation

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

Operator's rights, responsibilities and rules of conduct

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

Unauthorised use of truck

The operator is responsible for the truck during the time it is in use. The operator must prevent unauthorised persons from driving or operating the truck. Do not carry passengers or lift other people.

Damage and faults

The supervisor must be informed immediately of any damage or faults to the truck or attachment. Trucks which are unsafe for operation (e.g. wheel or brake problems) must not be used until they have been rectified.

Repairs

The operator must not carry out any repairs or alterations to the truck without authorisation and the necessary training to do so. The operator must never disable or adjust safety mechanisms or switches.

Hazardous area

⚠ WARNING!

Risk of accidents/injury in the hazardous area of the truck

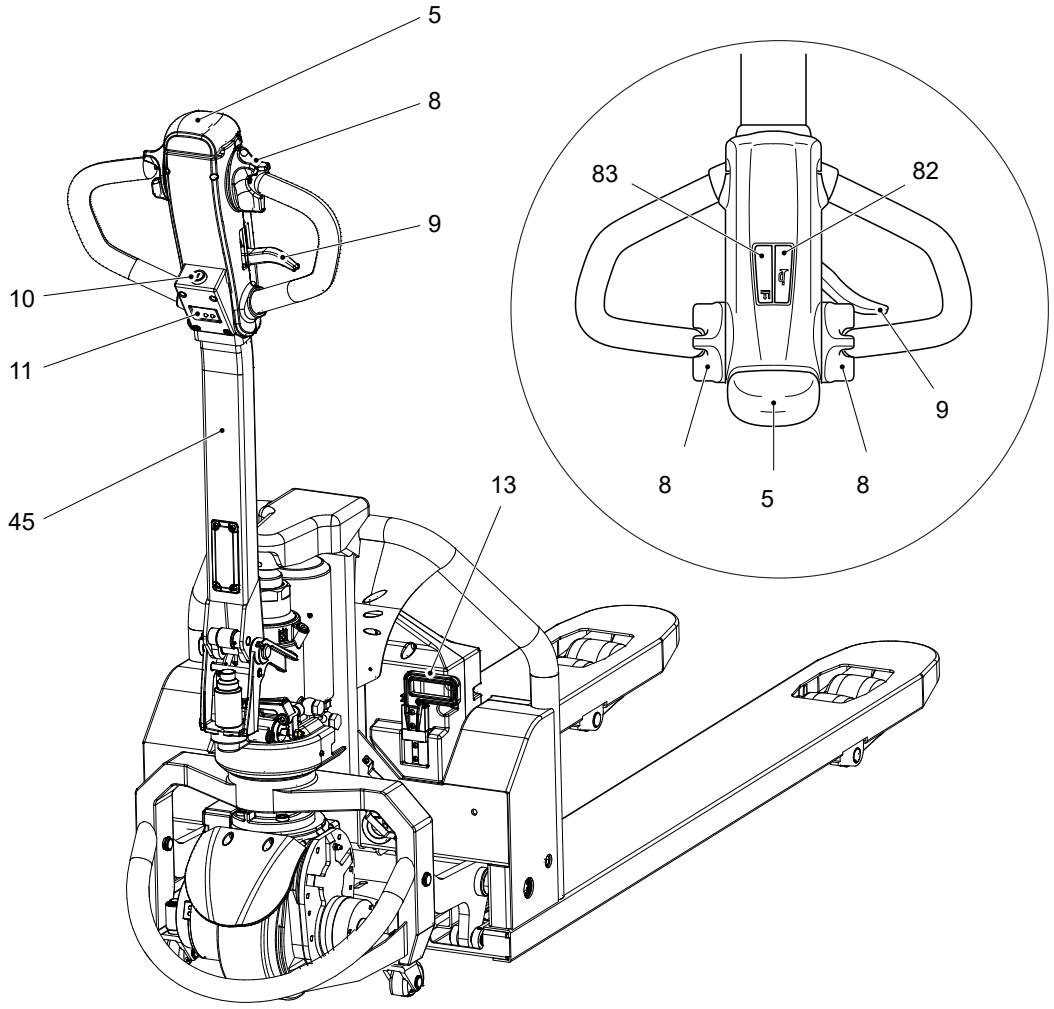
A hazardous area is defined as the area in which people are at risk due to travel or lifting operations of the truck, its load handler or the load. This also includes the area within reach of falling loads or lowering/falling operating equipment.

- ▶ Instruct unauthorised persons to leave the hazardous area.
- ▶ In case of danger to third parties, give a warning signal in good time.
- ▶ If unauthorised persons are still within the hazardous area, stop the truck immediately.

Safety devices, warning signs and warning instructions

Safety devices, warning signs (see page 24) and warning instructions in the present operating instructions must be strictly observed.

2 Displays and Controls



Item	Control/display	Function
5	Collision safety switch	– When pressed the truck travels in the fork direction until release or up to 3 seconds. The parking brake then applies. the truck remains unavailable until release.
8	Travel switch	– to control the travel direction and travel speed
9	Lower handle	– to control the lowering of the forks
10	Key switch	– to turn on/off the power supply
11	Charge status indicator	– to indicate battery charge status
13	Emergency disconnect (Battery connector)	– for emergency stop
45	Tiller	– for steering and braking
82	Horn button	– to activate an audible warning
83	Lift handle	– to control the lifting of the forks

3 Preparing the Truck for Operation

3.1 Checks and operations to be performed before starting daily operation

⚠ WARNING!

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

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

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

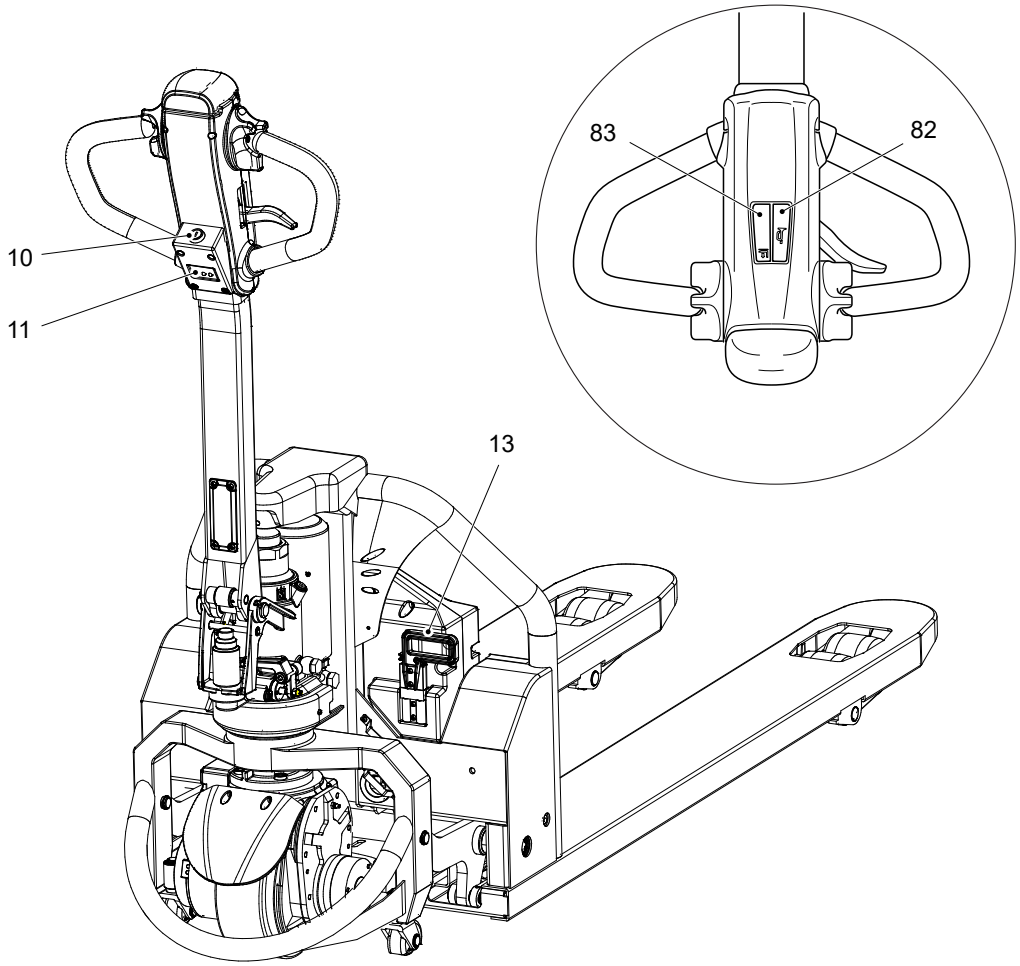
▶ Do not return the industrial truck to service until you have identified and rectified the fault.

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 panel is secure and damage-free.
- Test the hydraulic system.
- Test the brakes.
- Test the collision safety switch and the emergency disconnect switch.
- Check that the battery is securely mounted and that the cable connections are free of damage and firmly secured.
- Check battery and battery components.
- Check the battery connector is secure.
- Check the load handler for visible signs of damage such as cracks, bent or severe wear.
- Check the drive wheel and load wheels for damage.
- Check the markings and labels for completeness and legibility, see page 24.
- Check the tiller return function.
- Check the controls automatically return to the neutral position after actuation.
- Test the warning signal.

3.2 Preparing the truck for operation



Switching on the truck

Requirements

– Visual inspections and activities prior to daily commissioning were carried out, see page 64.

Procedure

- Insert the battery connector plug (emergency disconnect) (13).
- Insert the key in the key switch (10) and turn it as far right as it will go.
- Test the horn button (82).
- Test the lifting operation (83).
- Test the steering.
- Test the brake function of the tiller (45).

The truck is now ready for operation.

The charge status indicator (11) shows the current battery charge status, see page 55.

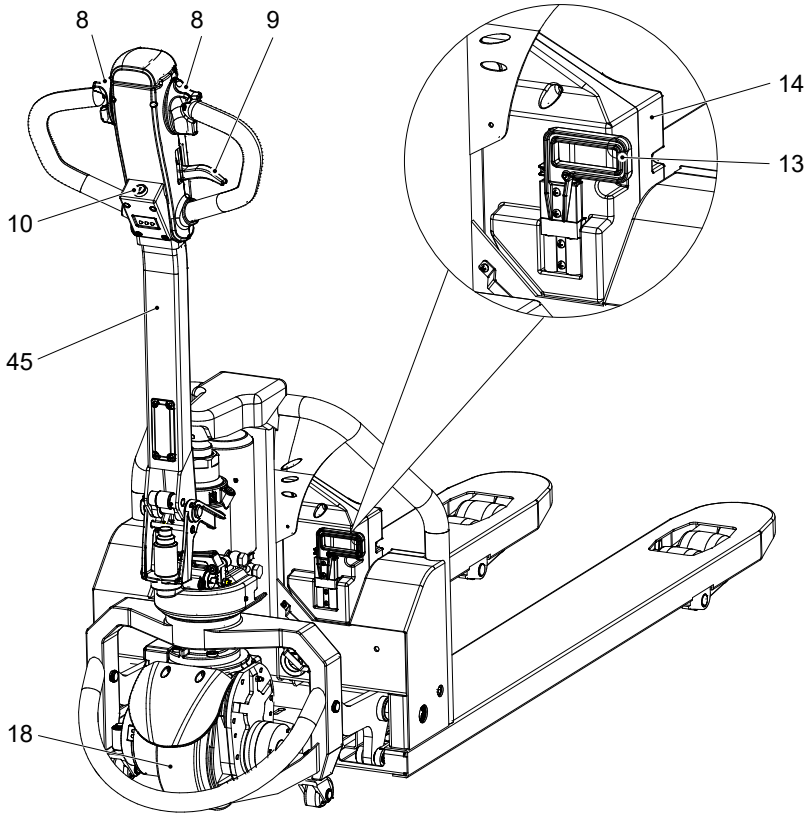
3.3 Parking the truck securely

⚠ WARNING!

An unsecured truck can cause accidents

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

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



Parking the truck securely

Procedure

- Park the truck on a level surface.
- Release the travel switch (8) to stop the industrial truck from traveling.
- Press the lower handle (9) to lower the load fully.
- Using the tiller (45) to turn the drive wheel (18) to "forward travel".
- Turn off the key switch (10).
- If parking for an extended period of time, remove the battery connector plug (13) from the battery (14).

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 4% (unloaded) or 20% (loaded) is only permitted if they are specifically designed as travel routes, are clean and have a non-slip surface and providing they can be safely traveled along in accordance with the industrial truck's technical specifications. 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 and 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.

Nature of the load to be carried on the loading platform

The operator must make sure that the load is in a satisfactory condition. Loads must always be positioned safely and carefully. Use suitable precautions, e.g. securing to the lashing rings, to prevent parts of the load from tipping or falling down.

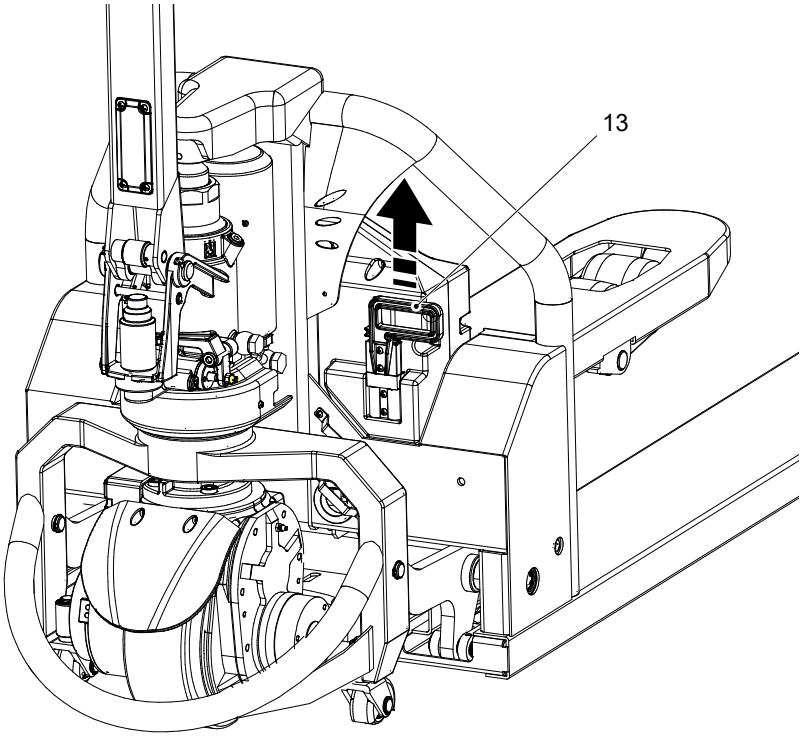
⚠ WARNING!

Electromagnetic influence can result in accidents

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

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

4.2 Emergency Disconnect



Removing the emergency disconnect plug

Procedure

⚠ CAUTION!

Risk of accident

The operation of the emergency disconnect plug must not be affected by any objects placed in its way.

➔ Do not use the emergency disconnect plug (13) as a service brake.

Remove the emergency disconnect plug (13) from the battery.

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

Reconnecting the emergency disconnect plug

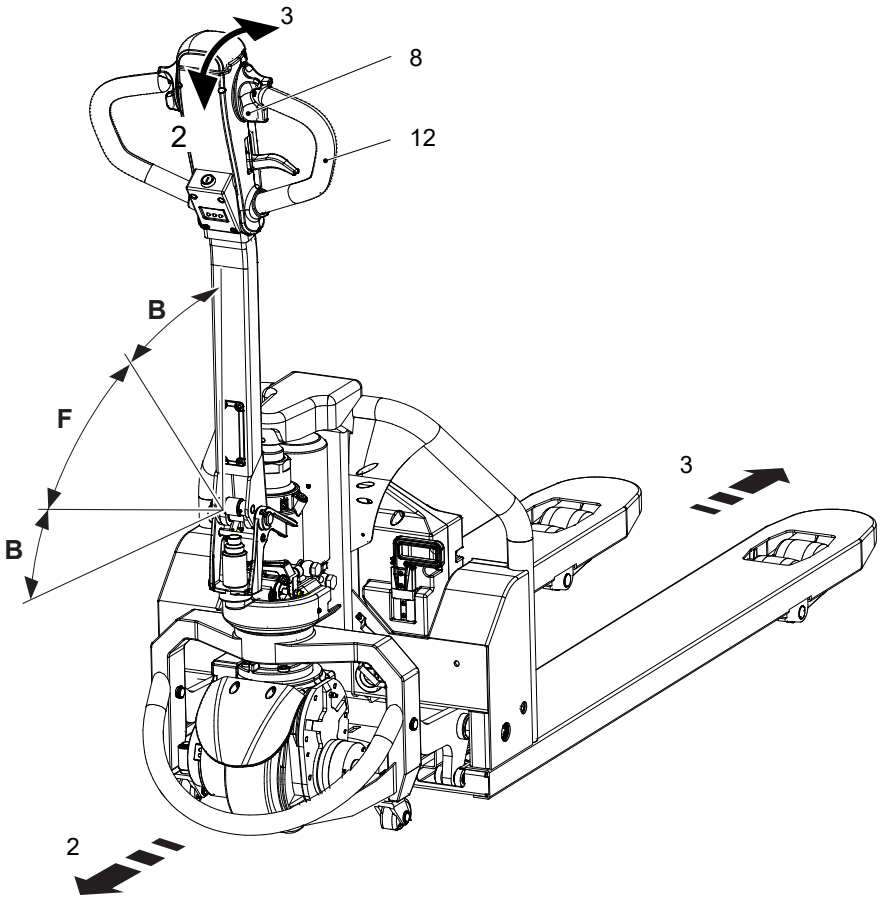
Procedure

- Connect the emergency disconnect plug (13) to the battery. Insert it fully in place.

All electrical functions are switched on and the industrial truck is operational again.

4.3 Brakes

4.3.1 General



Item	Description
B	Brake zone
F	Travel zone
2	Drive direction
3	Load direction
8	Travel switch
12	Tiller head and tiller

The truck can brake in three ways:

– With the service brake (brake zones B).
– With the inversion brake
– By regenerative braking (coasting brake).

⚠ 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.

⚠ WARNING!

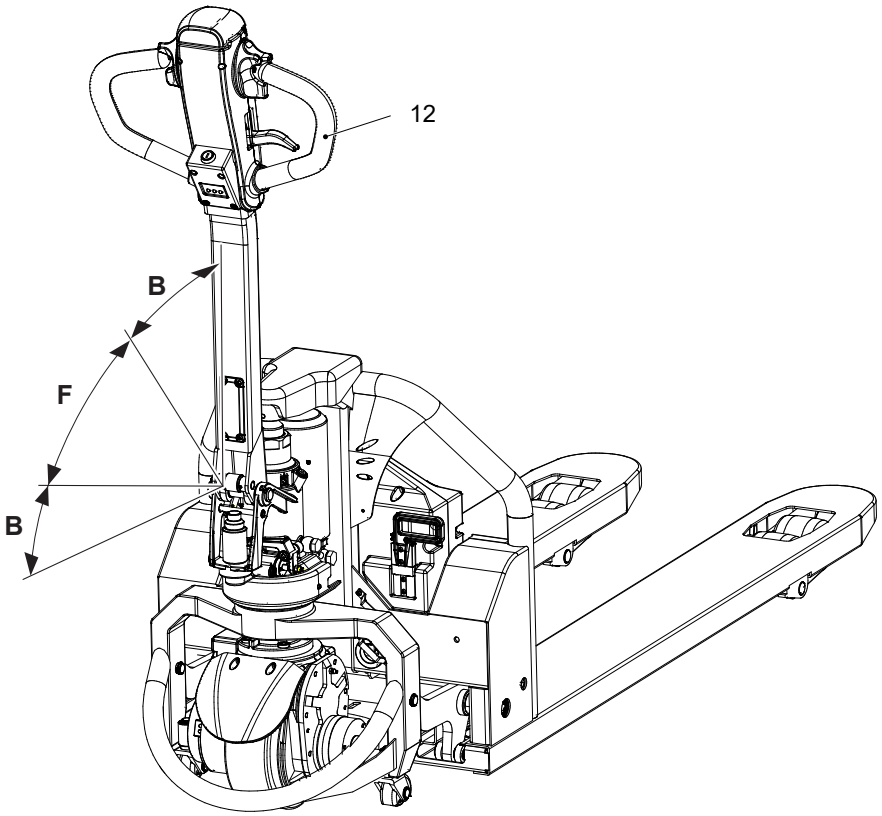
Accident risk while braking

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

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

▶ Brake with care to prevent the load from slipping.

4.3.2 Braking with the service brake



Procedure

- Move the tiller (45) up or down to one of the brake zones (B).

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

4.3.3 Inversion braking

Inversion braking

Procedure

- During travel, set the travel switch (8) to the opposite direction.

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

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

4.3.4 Regenerative braking

Procedure

- If the travel switch (8) is set to (0), the truck automatically brakes regeneratively.

The truck brakes to a halt regeneratively via the coasting brake. the mechanical brake applies below 1km/h.

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

4.3.5 Parking brake

When the truck has come to a halt the parking brake applies automatically. The parking brake is electrically released and actuated through spring pressure. The parking brake prevents the truck from accidentally rolling away.

4.4 Travel

⚠ WARNING!

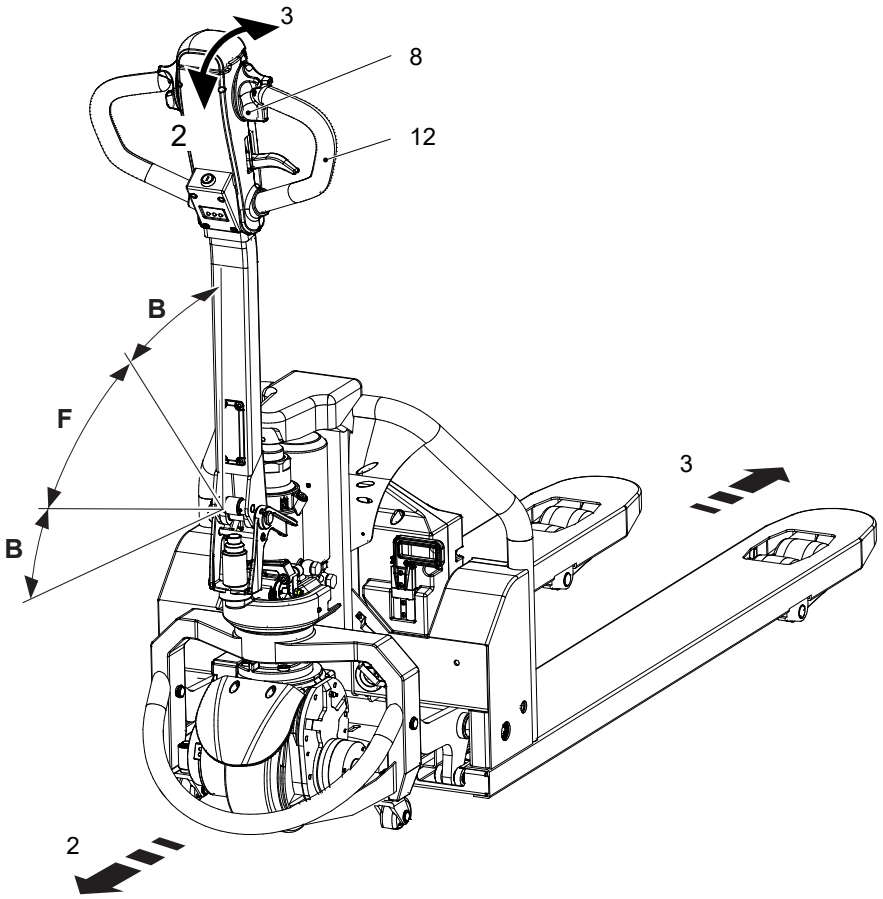
Risk of injury or trapping from the truck

Be extremely careful when driving and steering, especially if parts of your body extend beyond the truck. The operator's legs and feet could get injured or trapped.

▶Wear personal protective equipment (e.g. safety shoes, ...).

▶In pedestrian mode make sure you have sufficient distance from the truck.

▶Make sure there is nobody between the truck and any obstacles.



Item	Description
B	Brake zone
F	Travel zone
2	Drive direction
3	Load direction
8	Travel switch
12	Tiller head and tiller

Requirements

– Commissioning carried out, see page 64.

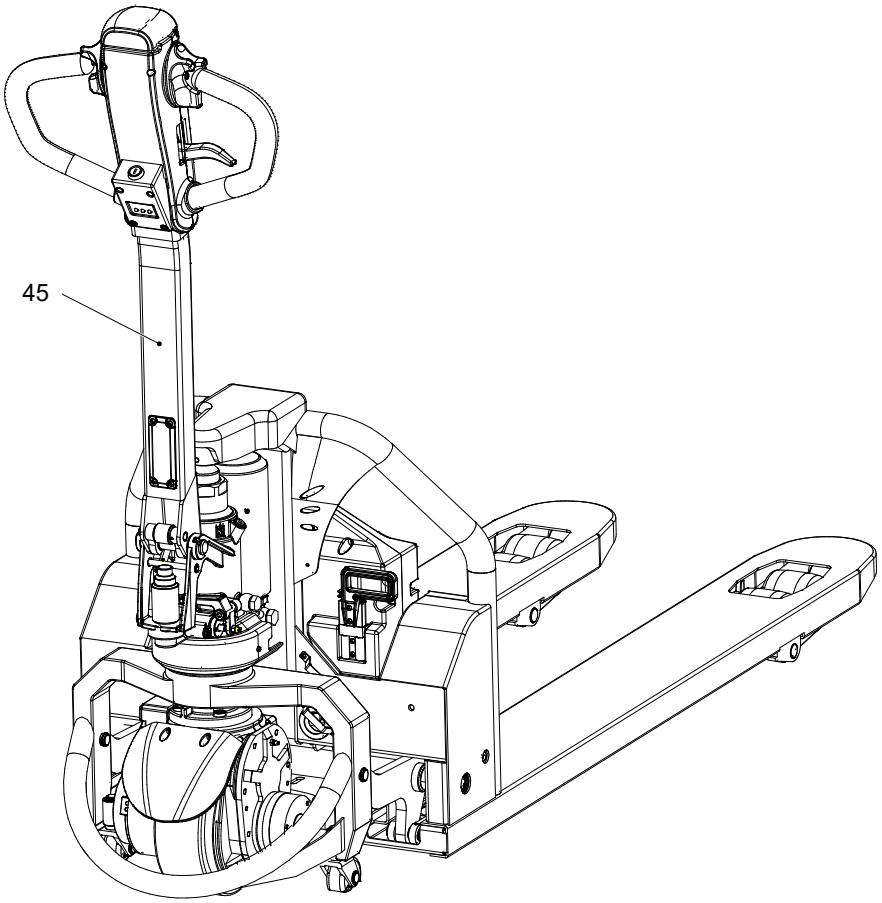
Procedure

- Set the tiller (45) to the travel zone (F).
- Control the travel direction with the travel switch (8):
  - Slowly turn the travel switch in the load direction (3):
    Travel in load direction.
  - Slowly turn the travel switch in the drive direction (2):
    Travel in drive direction.
- Control the travel speed with the travel switch (8):
  - The further the travel switch is turned, the higher the speed.
  - Control the travel speed by turning the travel switch.

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

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

4.5 Steering



Procedure

- Move the tiller (45) to the left or right.

The truck is steered in the required direction.

4.6 Lifting, transporting and depositing loads

⚠ WARNING!

Unsecured and incorrectly positioned loads can cause accidents

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

- ▶ Instruct other people to move away from the hazardous area of the truck. Stop using the truck if people do not vacate the hazardous area.
- ▶ Only carry loads that have been correctly secured and positioned. Use suitable precautions to prevent parts of the load from tipping or falling down.
- ▶ Damaged loads must not be transported.
- ▶ Never exceed the maximum loads specified on the load chart.
- ▶ 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.

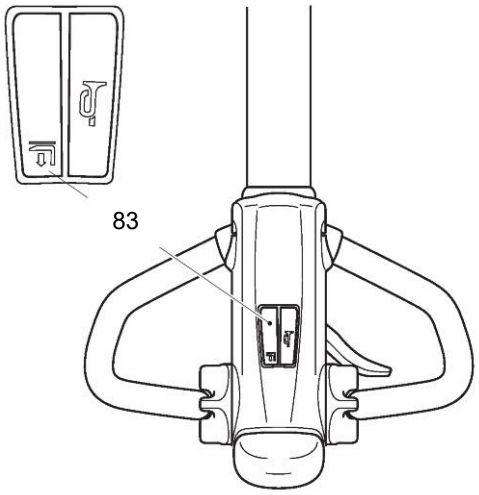
NOTICE

Adapt a slower speed when stacking and retrieving.

4.6.1 Raising a load

Requirements

– Load unit correctly palletized.
– Load unit weight matches the truck's capacity.
– Forks evenly loaded for heavy loads.



Procedure

- Drive the truck carefully up to the pallet.
- Slowly insert the forks into the pallet until the fork shank touches the pallet.

➔ The load unit must not extend by more than 50 mm beyond the fork tips.

- Press the "Lift" button (83) until you reach the desired lift height.

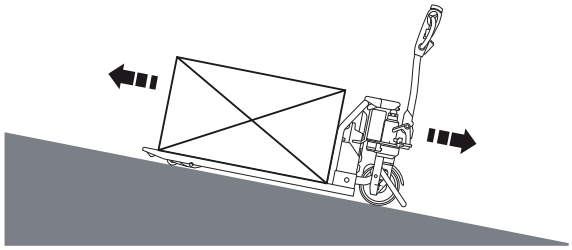
The load unit is raised.

⚠ CAUTION!

Release the button as soon as the load handler reaches its end stop.

4.6.2 Transporting a load

Transporting load units



Requirements

– Load unit correctly lifted.
– Good ground conditions.

Procedure

- Accelerate and decelerate gradually.
- 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 abruptly in hazardous situations.
- Watch out for other traffic at crossings and passageways.
- Always travel with a lookout at blind spots.
- On slopes and inclines always carry the load facing uphill, never approach at an angle or turn.

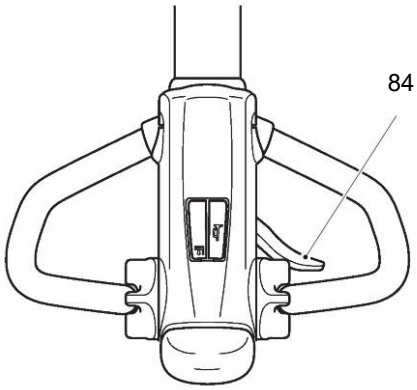
4.6.3 Depositing a load

⚠ CAUTION!

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

Requirements

– Storage location suitable for storing the load.



Procedure

- Drive carefully up to the storage location.
- Pull the lower handle (84) to lower the load.

➔ To avoid damaging the load and the load handler, avoid lowering the load abruptly.

- Lower the load handler so that it is clear of the load.
- Carefully drive the load handler away from the load.

The load unit has been set down.

5 Troubleshooting

This chapter enables the user to locate and rectify basic faults or the results of incorrect operation on his own. When trying to locate a fault, proceed in the order shown in the table.

If the industrial truck cannot be restored to operational status after carrying out the following remedial operations, contact the manufacturer's service department.
Additional troubleshooting must only be performed by the manufacturer's specialist service engineers. 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
- Error description
- Current location of truck.

5.1 Truck does not start

Possible Cause	Remedy
Battery connector plug (Emergency Disconnect) unplugged	Plug in the battery connector plug, see page 65.
Key switch set to O	Set the key switch to "I", see page 65.
Battery charge too low	Check battery charge and Charge the battery as required, see page 54.
Faulty fuse	Check fuses, see page 99.

5.2 Load cannot be lifted

Possible Cause	Remedy
Truck not operational	Carry out all measures listed under "Truck does not start", see page 78.
Hydraulic oil level too low	Check the hydraulic oil level, see page 98.
Battery discharge is displayed	Charge the battery, see page 54.
Faulty fuse	Check fuse, see page 99.
Excessive load	Note maximum capacity, see data plate, see page 25.

5.3 Battery is not charging

Possible Cause	Remedy
The battery charger does not work when green LED is on.	
– Output plug is disconnected or it is with reverse polarity.	– Ensure correct connection of all connectors.
– The battery is defective.	– Replace battery.
The power LED is OFF. The power supply is not available or has failed.	
– The AC plug is disconnected.	– Ensure correct connection of the AC plug.
– The battery charger is defective.	– Send back for repair.
– The status LED turns off. Overvoltage or short circuit in charger.	– Send back for repair.
– The red LED flashes. Overvoltage or overcurrent in charger.	– Send back for repair.

5.4 Faults and Error Messages

The error messages are defined by flashing codes:

● = long flash

○ = short flash

No	Code	Fault description	Analysis
1	●	Feedback overspeed	Controller failure, contact manufacturer.
2	●●	Kernel Running Error	Controller failure, contact manufacturer.
3	●●●	Long-term overload of controller and motor	Check whether the controller matches the motor and whether the controller is too small.
4		Retain	
5	●●●●●	The position command after the electronic gear ratio exceeds the maximum speed of the motor.	Controller failure, contact manufacturer.
6	●●●●●	In speed mode, the speed command exceeds the maximum speed of the motor.	Controller failure, contact manufacturer.
7	●●●●●●	In the torque mode, the torque command exceeds the maximum torque of the motor.	Controller failure, contact manufacturer.
8	●●●●●●	The speed sensoris lost.	Failure to detect speed feedback. Solutions: – Check the connection between the speed sensor and the controller. – Check whether the signal of the speed sensor is normal. – Check the detection circuit of the controller.
9	●●●●●●	The direction of the speed sensor is wrong.	The direction of AB phase of speed sensor is different from that of motor UVW. Solution（choose 1 from 3 methods below）: – Modify parameter 3.0 to change over the encoder. – Exchange any two phases of the UVW phases of the controller. – Exchange A and B phase connection positions.

No	Code	Fault description	Analysis
10		Retain	
11	● ○	2-minute maximum current protection for motor	The motor current keeps exceeding 2-minute maximum current for more than 2 minutes. – The motor is blocked; check whether the brake is turned on or not, and check whether the foreign body is stuck in the driving mechanism. – The parameters of the controller are not set properly.Refer to the motor parameter adjustmemt for details.
12	● ○	Controller Overcurrent	Mischoose of the controller type; or Controller failure, contact manufacturer.
13	● ○○○	Bus Charging Fault	Bus Charging Fault Solutions: – Check whether the motor U, V, W three-phase short circuit. – Check if battery voltage supply is too low. – Check whether the drive coil is short circuit (DO loop and battery B-).
14	● ○○○○	Connection failure of main contactor	Check whether the main contactor is connected properly.
15	● ○○○○○	Electromagnetic brake connection fault	Check whether the Electromagnetic brake is connected properly.
16	● ○○○○○ ○	Battery voltage is seriously low.	Check battery power; or the battery voltage of the controller is set improperly.
17	● ○○○○○ ○○	Battery voltage is too high.	Check battery power; or the battery voltage of the controller is set improperly.
18	● ○○○○○ ○○○	Severe Overheating of Power Plate	Controller protection, suspension of use.
19		Retain	

No	Code	Fault description	Analysis
20	○○	Abnormal input of accelerator/brake pedal	Abnormal input of accelerator/ brake pedal Solutions： – Check pedal and controller connection. – Check whether the pedal is damaged. – Check the parameters of the controller about the pedal, especially the type of pedal. (P91, P101).
21	○○ ●	Main contactor contact welding	Check whether the main contactor is damaged and replace the main contactor.
22	○○ ●●	5V output failure	Short circuit of motor encoder；or short circuit of other 5V external equipment； or controller failure, contact manufacturer.
23	○○ ●●●	MACID Test failed	ID of the controller CAN network is set wrongly. Reset ID.
24	○○ ●●●●	Driving failure of main contactor	Check whether the main contactor is damaged and replace the main contactor.
25	○○ ●●●●●	CAN nodes loss	The controller is configured in parameter P1, and interlock check is used in parameter P2. But in actual operation, no corresponding module has been found.Check the connection between each module and the working status of the module.
26	○○ ●●●●● ●	Abnormal temperature measurement circuit in controller	Controller failure, contact manufacturer.
29	○○ ●●●●● ●●●●	Abnormal temperature measurement circuit in controller	Controller failure, contact manufacturer.
31	○○○ ●	Battery voltage is slightly too low.	Battery power is insufficient, charge ASAP.
32	○○○ ●●	Mild Overheating of Power Plate	Load reduction.
33	○○○ ●●●	Low Temperature of Power Plate	The ambient temperature is too low.
34	○○○ ●●●●	Mild overheating of motor	Load reduction.

No	Code	Fault description	Analysis
35	○○○ ●●●●●	12V Output failure	Short circuit of handheld terminalpower supply；or controller failure, contact manufacturer.
36	○○○ ●●●● ●	Drive3 Connection failure	Check Drive3 connection.
37		Retain	
38	○○○ ●●●● ●●●	EEPROM Errors in reading and writing parameters	Controller failure, contact manufacturer.
39	○○○ ●●●● ●●●●	Parameter overrun error	Controller failure, contact manufacturer.
40	○○○○	Operational timing error	After reset, the key signals are not in place (throttle switch, direction switch, lift/drop, safety switch). When key signals return, alarm eliminates automatically.
41	○○○○ ●	20 % Residual Electricity Alarm	Charge.
42	○○○○ ●●	15% Residual Electricity Alarm	Charge.
43	○○○○ ●●●	Motor testing in progress	Motor matching
44	○○○○ ●●●●	Motor resistance value exceeds the standard	Controller failure, contact manufacturer.
45	○○○○ ●●●●●	Abnormal installation position of U-phase Hall	Replace motor, contact manufacturer.
46	○○○○ ●●●● ●	Abnormal installation position of V-phase Hall	Replace motor, contact service.
47	○○○○ ●●●● ●●●	Abnormal installation position of W-phase Hall	Replace motor, contact service.
48	○○○○ ●●●● ●●●●	Motor speed is not in the range of 3300-3800	Controller failure, contact service.

6 Operating the truck without its own drive system

⚠ 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.

Recovering the truck

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

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

F Industrial Truck Maintenance

1 Spare Parts

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

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

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

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

The serial number can be found on the data plate, see page 25.

2 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 truck manufacturer is no longer operating in the field and there is no successor to the business; operating companies must however:

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

NOTICE

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

➔ On completion of inspection and service work, carry out the operations listed in the “Recommissioning the truck after cleaning or maintenance work” section (see page 100).

3 Maintenance Safety Regulations

Maintenance and repair personnel

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

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

Customer Services

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

Operating company

The maintenance personal of the operating company has the technical expertise and experience to perform the activities in the maintenance check list for the operating company. The maintenance and repair work to be performed by the operating company are also written down, see page 85.

3.1 Working on the electrical system

⚠ WARNING!

Electrical current can cause accidents

Make sure the electrical system is voltage-free before starting work on it. The capacitors in the controller must be completely discharged. The capacitors are completely discharged after approximately 10 minutes. Before starting maintenance on the electrical system:

- ▶ Only suitably trained electricians may operate on the truck's electrical system.
- ▶ Before working on the electrical system, take all precautionary measures to avoid electric shocks.
- ▶ Park the truck securely (see page 66).
- ▶ Disconnect the battery.
- ▶ Remove any rings, metal wrist bands etc.

3.2 Consumables and used parts

⚠ CAUTION!

Consumables and used parts are an environmental hazard

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

▶ Note the safety regulations when handling these materials.

3.3 Wheels

⚠ WARNING!

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

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

Uneven wear reduces truck stability and increases the stopping distance.

▶ After replacing wheels, make sure the truck is not skewed.

▶ Always replace wheels in pairs, i.e. left and right at the same time.

When replacing wheels fitted at the factory, only use the manufacturer’s original spare parts. Otherwise the truck's rated performance cannot be ensured, see page 85.

3.4 Hydraulic system

⚠ WARNING!

Leaky hydraulic systems can result in accidents

Hydraulic oil can escape from leaky and faulty hydraulic systems.

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

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

▶ Remove any spilled hydraulic immediately with an appropriate bonding agent.

▶ The bonding agent / consumable mixture must be disposed of in accordance with regulations.

⚠ WARNING!

Faulty hydraulic hoses can result in injury and infection

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

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

NOTICE

Testing and replacing hydraulic hoses

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

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

3.5 Energy saving components

⚠ CAUTION!

Risk of accidents due to energy saving components

The tiller contains components that store mechanical energy. Improper opening may result in an accident.

- ▶ Do not dismantle the tiller.
- ▶ The tiller may only be dismantled by authorised service personal.

4 Lubricants and Lubrication Schedule

4.1 Handling consumables safely

Handling consumables

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

⚠ WARNING!

Improper handling is hazardous to health, life and the environment

Consumables can be flammable.

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

⚠ CAUTION!

Spilled consumables can cause slipping and endanger the environment

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

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

⚠ WARNING!

Improper handling of oils can be hazardous

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

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

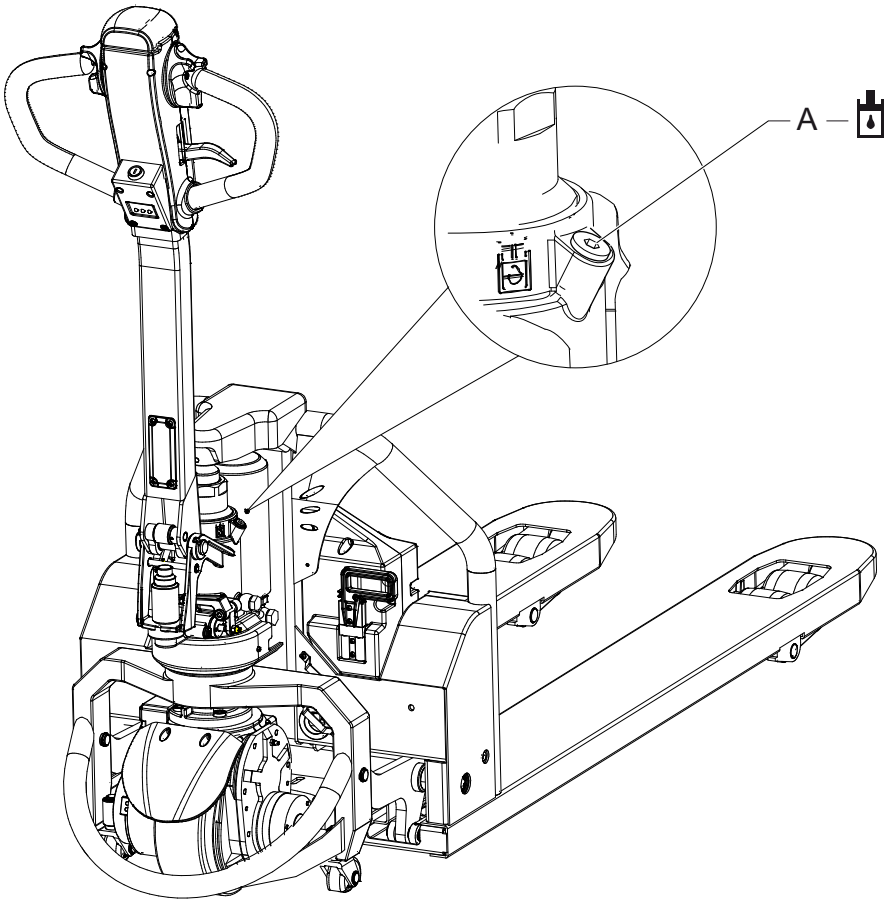
⚠ CAUTION!

Consumables and used parts are an environmental hazard

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

- ▶ Note the safety regulations when handling these materials.

4.2 Lubrication Schedule



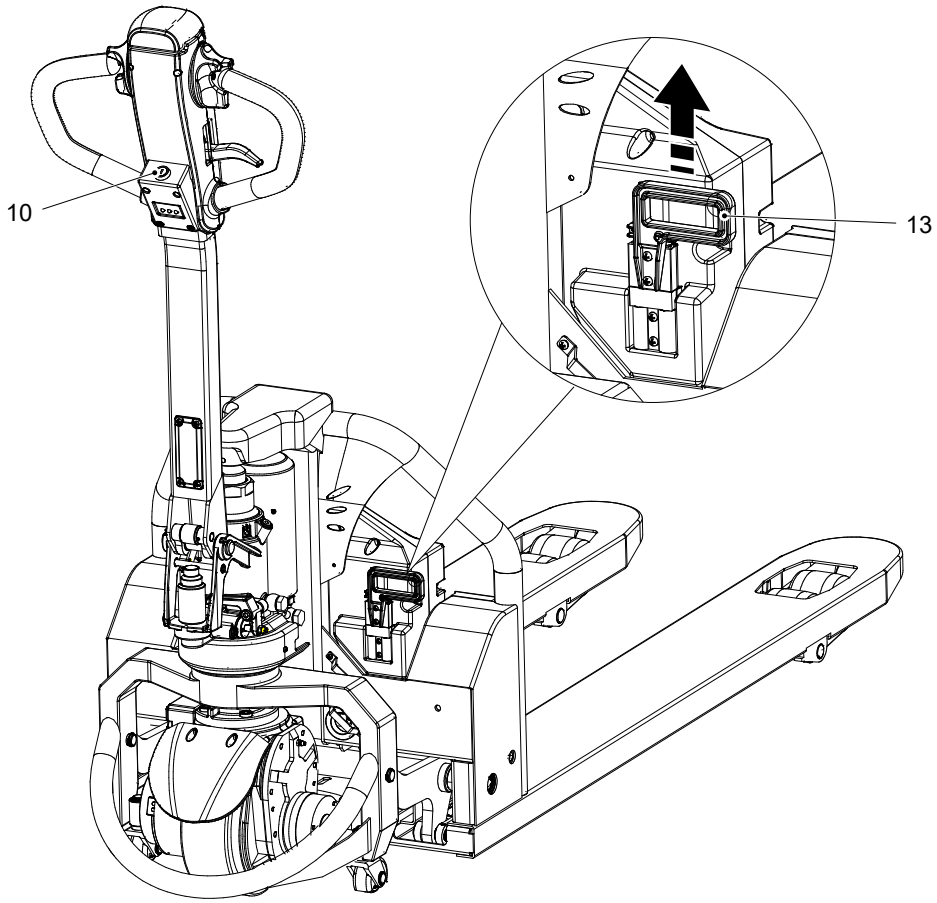
	Oil filler neck

4.3 Consumables

Code	Order no.	Package quantity	Description	Used for
A	51132826	250 ml	Hydraulic oil	Hydraulic System

5 Maintenance and repairs

5.1 Preparing the truck for maintenance and repairs



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

Procedure

- Fully lower the load handler.
- Park the truck securely, see page 66.
- Turn off the key switch (10) and remove the key.
- Unplug the battery connector plug (emergency disconnect) (13) to prevent the industrial truck from being switched on accidentally.
- When working under a raised lift truck, secure it to prevent it from lowering, tipping or sliding away.

5.2 Lifting and jacking up the truck safely

⚠ WARNING!

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

▶ When working under a raised load handler or a raised truck, secure them to prevent the truck from lowering, tipping or sliding away.

▶ When raising the truck, follow the instructions, see page 27. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with wedges).

⚠ WARNING!

Lifting and jacking up the truck safely

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

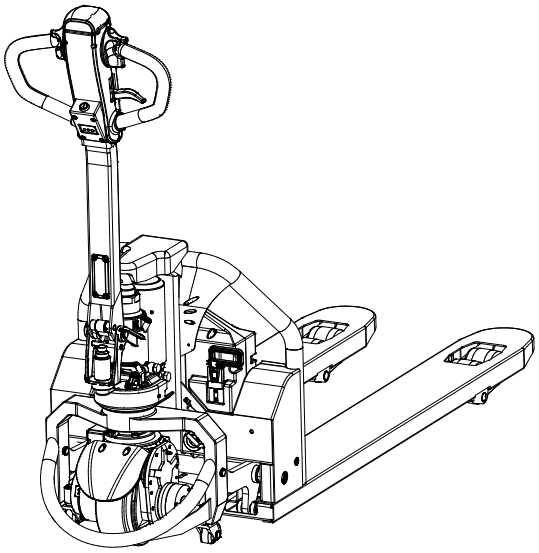
In order to raise and jack up the truck safely, proceed as follows:

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

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

▶ In order to raise the truck, the lifting accessories must only be secured to the points specially provided for this purpose, see page 27.

Raising and jacking up the truck securely



Requirements

– Prepare the truck for maintenance and repairs (see page 93).

Tools and Material Required

– Jack
– Hard wooden blocks

Procedure

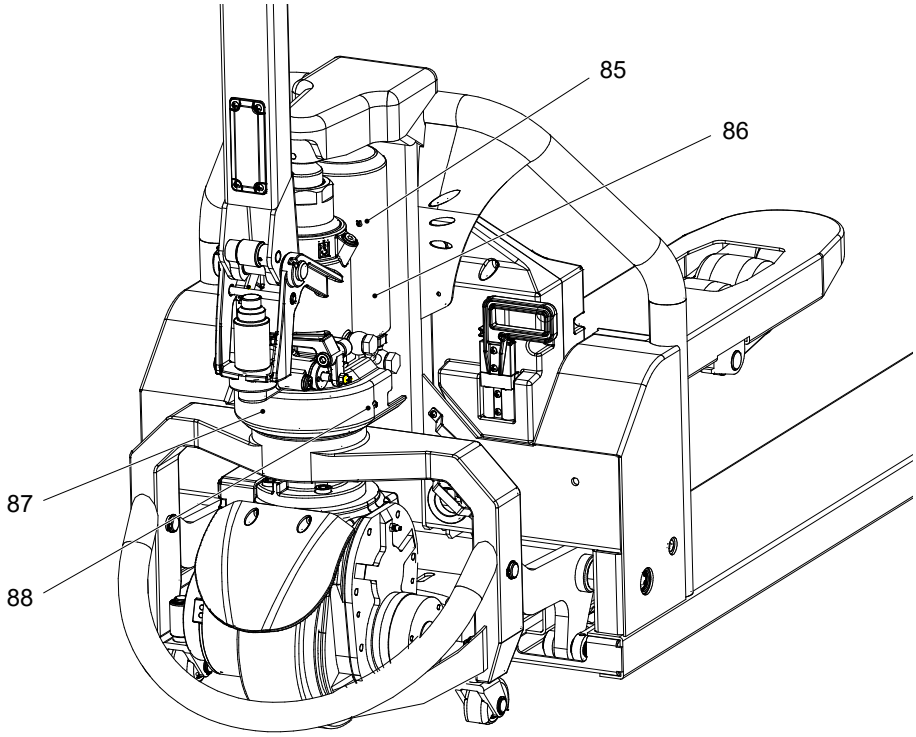
• Place the jack against the contact point.

➔ For jacking the truck, make sure to use the structural parts of the truck as contact point for the jack (e.g. truck chassis).

• Raise the truck.
• Support the truck with hard wooden blocks.
• Remove the jack.

The truck is now securely raised and jacked up.

5.3 Cover Disassembly



Requirements

– Truck prepared for maintenance and repairs, see page 93.

Tools and Material Required

– Phillips screwdriver

Procedure

- Remove the two screws (86) holding the protective screen (85).
- Rotate the tiller for 90 degrees.
- Lift the protective screen cautiously.
  - Pay attention to the cables.
  - Do not take down the cables.
  - Return the tiller in neutral position.
- Remove the two screws (88) holding the cover (87).
- Lift the cover (87) cautiously.
  - Pay attention to the cables.
  - Do not take down the cables.

Protective screen and cover are now removed.

Installation is the reverse order.

⚠ CAUTION!

Short circuits can cause fires

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

▶Before assembling the covers make sure that the battery cables cannot be damaged.

5.4 Cleaning

5.4.1 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).

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

Cleaning the truck

Requirements

– Truck prepared for maintenance and repair work (see page 93).

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:
  - Oil filler ports and their surroundings
- Dry the truck after cleaning, e.g. with compressed air or a dry cloth.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" (see page 100).

The truck is now clean.

5.4.2 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

– Truck prepared for maintenance and repair work (see page 93).

Tools and Material Required

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

Procedure

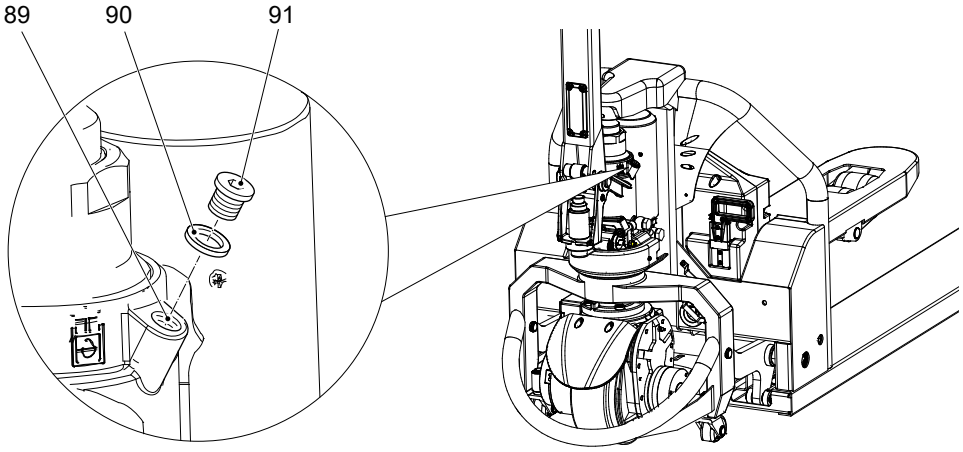
- Expose the electrical system, see page 95.
- Clean the electrical system assemblies with weak suction or compressed air (use a compressor with a water trap) and not a conductive, anti-static brush.
- Cover the electrical system, see page 95.
- Carry out all the tasks in the section "Recommissioning the truck after cleaning or maintenance work" (see page 100).

The electrical system assemblies are now clean.

5.5 Replacing wheels

Wheels must only be replaced by authorised service personnel.

5.6 Checking the hydraulic oil level



Requirements

– Prepare the industrial truck for maintenance and repairs, see page 93

Tools and Material Required

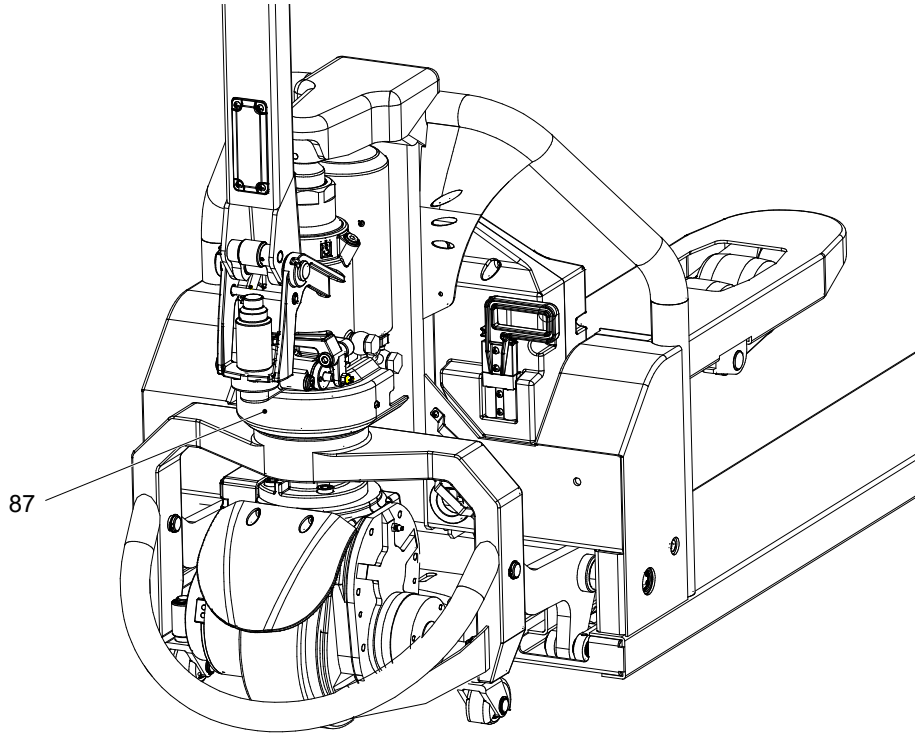
– Hydraulic oil, max. 250 ml
– Torque wrench, allen key (width 5 mm)
– Cleaning wipes
– Funnel

Procedure

- Remove the screw (91) from the oil filler port (89).
- Check the oil level. The oil should be seen in the oil filler port (89).
- Cover the area around the oil filler port (89) with a cleaning wipe.
- Add hydraulic oil, if needed.
- Start up the truck, see page 100.
- Lift the forks to the maximum height for 2 to 3 times without load.
- Clean the area around the oil filler port (89).
- Check the washer (90) for damages, replace if needed.
- Fasten the screw (91).
- Carry out the tasks for returning the truck to service, see page 64

The oil level is correct now.

5.7 Checking electrical fuses



Check fuses

Requirements

– Truck prepared for maintenance and repairs, see page 93.
– Disassemble the cover (87), see page 95.

Procedure

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

The fuses are now checked.

To protect	Rating
Electronic system control fuse	10 A

6 Restoring the truck to service after maintenance and repairs

Procedure

- Thoroughly clean the truck, see page 96.
- Charge the battery, see page 54.
- Insert the battery into the industrial truck.
- Plug in the battery connector plug.

➔ The manufacturer‘s customer service department is specially trained to carry out these operations.

- Start up the truck, see page 64.

7 Decommissioning the Industrial Truck

➔ If the truck is to be out of service for more than a month, e.g. for commercial reasons, 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.

⚠ WARNING!

Lifting and jacking up the truck safely

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

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

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

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

▶ In order to raise the truck, the lifting gear must only be secured to the points specially provided for this purpose, see page 27.

▶ When jacking up the truck, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks).

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.

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

7.1 Before Taking the Truck out of Service

Procedure

- Thoroughly clean the truck, see page 96.
- Prevent the truck from rolling away accidentally.
- Apply a thin layer of oil or grease to any non-painted mechanical components.
- Charge the battery, see page 54.
- Disconnect the battery, clean it and protect the battery connector plug and socket from environmental influences.

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

7.2 During decommissioning

NOTICE

Full discharge can damage the battery

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

▶Before a long period of inactivity, the battery must be fully charged.

▶Charge the battery at least every 12 weeks, see page 54.

7.3 Restoring the truck to service after decommissioning

Procedure

- Thoroughly clean the truck, see page 96.
- Charge the battery, see page 54.
- Insert the battery into the industrial truck.
- Plug in the battery connector plug.

➔ The manufacturer‘s customer service department is specially trained to carry out these operations.

- Start up the truck, see page 64.

8 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.

9 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.

10 Human vibration measurement

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

G Maintenance, Inspection and Changing of Maintenance Parts Requiring Replacement

⚠ WARNING!

Lack of maintenance can result in accidents

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

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

NOTICE

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

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

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

1 Maintenance Contents PTE 1.3

Issued on: 2020-02-14 12:00

1.1 Owner

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

1.1.1 Maintenance contents

1.1.1.1 Standard equipment

Brakes
Test the function of the brakes

Hydraulic operations
Correct the hydraulic oil level.

Steering
Test the tiller return function.

1.1.2 Inspection contents

1.1.2.1 Standard equipment

The following points must be checked:

Electrical system
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
The function of the emergency disconnect and for damage

Power supply
Battery and battery components for damage
The function and secure seating of the battery connector and for damage

Travel
The function of the collision safety switch and for damage
Wheels for wear and damage

Chassis/structure
The secure seating of the chassis and screw connections and for damage
Labels are legible, complete and plausible
Doors or covers for damage

Hydraulic operations
The function of the hydraulic system
The forks or load handler for wear and damage

Battery charger
The mains plug and mains cable for damage

1.2 Customer Service

1.2.1 Maintenance contents

In accordance with the PTE 1.3 service interval, to be performed every 1000 service hours, but at least once a year.

1.2.1.1 Standard equipment

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

Electrical system
Adjust the microswitches.
Test the contactors and/or relays.
Carry out a chassis insulation-resistance test.

Power supply
Measure the battery voltage.

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

Hydraulic operations
Adjust the lift mechanism.
Correct the hydraulic oil level.
Test and adjust the pressure relief valve.

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

Steering
Test the tiller return function.

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

1.2.2 Inspection contents

The following points must be checked:

1.2.2.1 Standard equipment

Electrical system
Cables and engine are secure and for damage
Warning and safety devices are in accordance with the operating instructions
Function of display and controls
Microswitches for function and damage
The function of the emergency disconnect and for damage
Contactors and/or relays for wear and damage
The electric wiring for damage (insulation damage, connections) and the fuse ratings

Power supply
Battery and battery cables for damage, contamination and secure mounting
The function of the battery latch and battery attachment and for damage
The function and secure seating of the battery connector and for damage

Travel
Drivetrain bearings for wear and damage
Transmission for noise and leaks
Wheel bearings and attachment for wear and damage
Wheels for wear, damage and secure mounting

Chassis/structure
The secure seating of the chassis and screw connections and for damage
Labels are legible, complete and plausible
Doors or covers for damage

Hydraulic operations
The function of the "hydraulic system" controls and for legibility, completeness and plausibility
The function of the lift mechanism and for wear and damage
The secure seating of the cylinders and piston rods and for leaks and damage
The function of the hydraulic system
The forks or load handler for wear and damage
Tie/plunger rods are uniformly adjusted and for wear and damage

Battery charger
The mains plug and mains cable for damage

1.2.3 Maintenance parts

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

1.2.3.1 Standard equipment

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