Li-Ion Battery 24V - 110Ah

04.14 -

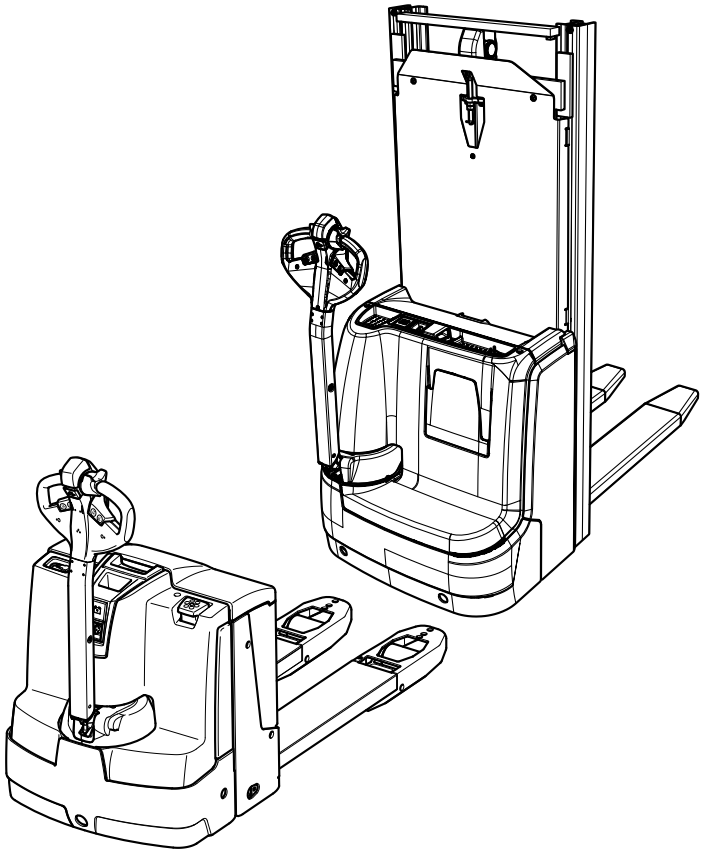
Operating instructions

GB

51416445

08.14

EJC 112
EJE 116
EJE 220
EJE C20



JUNGHEINRICH
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Declaration of Conformity

CE

Jungheinrich AG, Am Stadtrand 35, D-22047 Hamburg
Manufacturer or agent acting in the European Union

Type	Option	Serial no.	Year of manufacture

Additional information

On behalf of

Date

(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 provided clearly and concisely. The chapters are arranged by letter and the pages are numbered continuously.

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

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

Safety notices and text mark-ups

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

⚠ DANGER!

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

⚠ WARNING!

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

⚠ CAUTION!

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

NOTE

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

➔ Used before notices and explanations.

- ● Indicates standard equipment
- ○ Indicates optional equipment

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Contents

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

The battery is not authorised for use in cold stores.

See operating instructions of unmodified truck.

3 Approved application conditions

See operating instructions of unmodified truck.

Note permissible battery temperature range, see "Battery nominal data" on page 59. The permissible range of the battery application temperature does not increase the permissible range of the truck's application temperature.

⚠ 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.

NOTE

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

5 Adding attachments and/or optional equipment

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

B Truck Description

1 Application

The conversion to 110 Ah lithium ion battery operation enables frequently operated trucks to be run economically and energy-efficiently.

Conversion to 110 Ah lithium ion battery operation can be performed both in the factory as well as subsequently on selected pedestrian trucks in the current range of models:

- EJC 112 (short version, S battery tray)
- EJE 116 (S battery tray)
- EJE 116 (M battery tray)
- EJE 220 (M battery tray)
- EJE C20 (S battery tray)

→ Rider trucks and trucks with lateral battery removal cannot be converted for operation with the 110 Ah lithium ion battery.

2 Assemblies and Functional Description

Additional components and modifications are required to operate the truck with the 110 Ah lithium ion battery:

– Modified electrical system
– Key switch
– Special display unit
– Battery management system, as a component of the lithium ion battery:
  Automatic battery cutout after 60 minutes without energy consumption by performing travel, steering or hydraulic operations.
– Battery discharge monitor of battery management system:
  Battery cutout below residual capacity minimum level.
  As an emergency feature, brief reactivation of lifting or travel speed is possible without limitation.

Other features, controls and displays, previously offered as standard or as options, are not available as a result:

– Charge status monitor / battery discharge indicator
– CanDis display instrument
– CanCode keypad
  with the code lock, automatic cutout after a set time, parameter setting and travel program selection features
– ISM access module
– Traction controller battery discharge monitor:
  Lift cutout below minimum residual capacity
  Travel speed restriction below minimum residual capacity
– Lateral battery removal

→ If the truck is used temporarily with a suitable standard battery, the traction controller battery discharge monitor is restored to operation.

→ The 110 Ah lithium ion battery can only be charged with a specially equipped stationary or on-board charger.

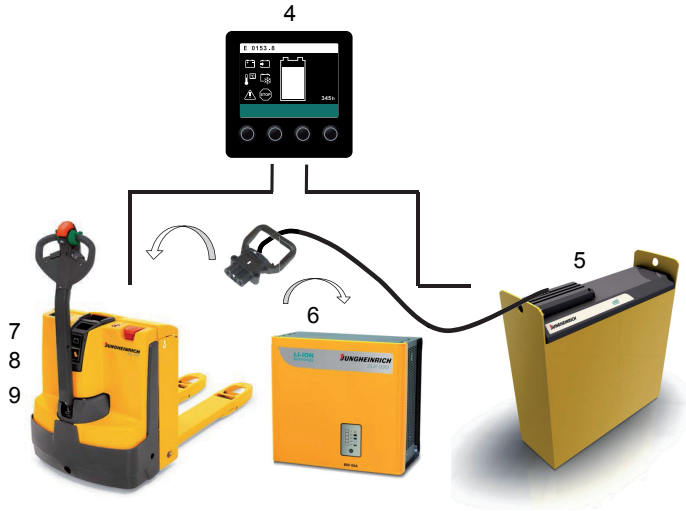
NOTE

Incorrect attachment can result in damage to the lithium ion battery

Unsuitable connectors of non-converted trucks, chargers or battery extension cables used with the lithium ion battery can damage the battery connector.

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

2.1 Assembly Overview



Item		Component
4	●	Display unit, connected to truck and battery
5	●	Lithium ion battery with battery management system
6	○	SLH090i stationary charger (with safety circuit)
7	○	On-board charger (with safety circuit)
8	●	Key switch
9	●	Modified electrical system
● = Standard equipment		○ = Optional equipment

2.2 Functional Description

Conversion to operation with the 110 Ah lithium ion battery changes some of the functions and properties of the truck.

Lithium ion battery management system

Charging and discharging of the lithium ion battery is enabled and monitored. Display messages, warning buzzers and if necessary cutouts are activated when critical values are reached.

Controls and displays

The display unit shows the key information for the operator such as service hours, battery capacity and event messages.

➔ If the truck is used temporarily with a suitable standard battery, the display unit does not show any battery capacity.

On-board charger (○)

The on-board charger is designed solely for charging suitable lithium ion batteries with a battery management system.

➔ A standard battery used temporarily in the truck will not be charged by the on-board charger.

2.2.1 Hourmeter

➔ Prepare the truck for operation, see "Preparing the Truck for Operation" on page 45.

Service hours are counted while the truck is operational and one of the following controls is applied:
- Tiller in travel zone "F"
- Slow travel button
- Lift button
- Lower button

3 Technical Specifications

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

3.1 EN norms

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.

3.2 Electrical Requirements

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

C Transport and Commissioning

1 Lifting by crane

⚠ WARNING!

All persons involved in loading by crane must be trained

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

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

⚠ WARNING!

Incorrect lifting by crane can result in accidents

Improper use or use of unsuitable lifting gear and can cause the truck to fall when being lifted by crane.

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

- ▶ The truck should only be loaded by personnel trained in the use of lifting slings and tools.
- ▶ Wear personal protective equipment (e. g. safety shoes, safety helmet, hi-vis jacket, protective gloves, etc.) when loading by crane.
- ▶ Do not stand under suspended loads.
- ▶ Do not enter or stand in a hazardous area.
- ▶ Always use lifting gear with sufficient capacity (for truck weight see truck rating plate).
- ▶ Always attach the crane lifting gear to the prescribed strap points and prevent them from slipping.
- ▶ Use the lifting slings only in the prescribed loading direction.
- ▶ Crane slings should be fastened in such a way that they do not come into contact with any attachments when lifting.

EJC 112

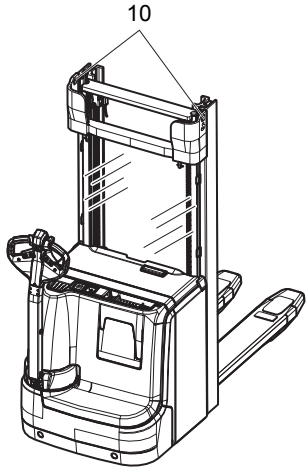
Lifting the truck by crane

Requirements
– Park the truck securely, see page 48.

Tools and Material Required
– Lifting gear
– Crane lifting gear

Procedure
• Secure the crane lifting gear to the strap points (10).

The truck can now be lifted by crane.



EJE 116 / EJE 220

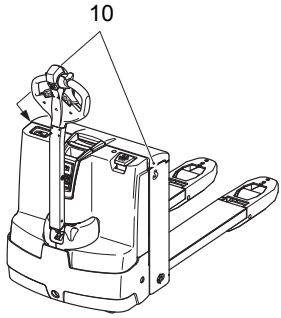
Lifting the truck by crane

Requirements
– Park the truck securely, see page 48.

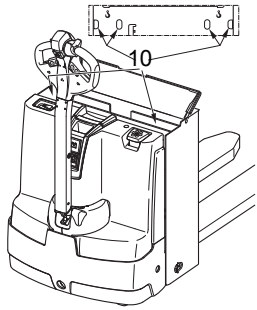
Tools and Material Required
– Lifting gear
– Crane lifting gear

Procedure
• Open the battery cover and remove the battery if necessary.
• Secure the lifting slings to the strap points (10).

The truck can now be lifted by crane.



Lifting the truck by crane



Requirements

– Park the truck securely, see page 48.

Tools and Material Required

– Lifting gear
– Crane lifting gear

Procedure

- Open the battery cover and remove the battery if necessary.
- Secure the lifting slings to the strap points (10).

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 "Parking the truck securely" on page 48.

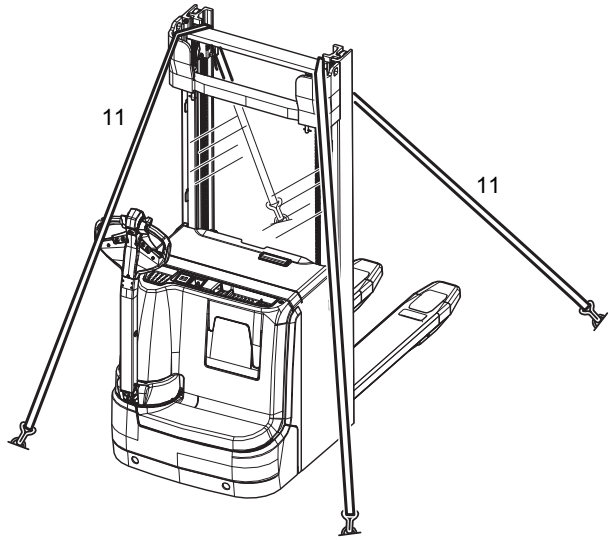
Tools and Material Required

– Lashing straps

Procedure

- Attach the lashing straps (11) to the industrial truck and the transport vehicle and tension sufficiently.

The truck can now be transported.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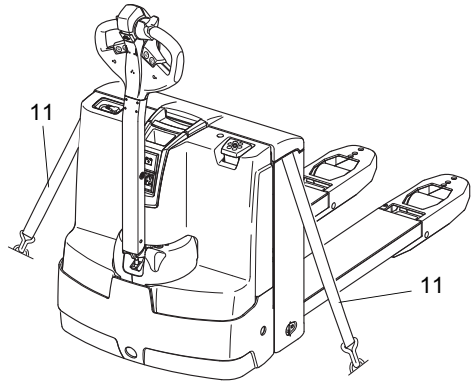
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3 Using the Truck for the First Time

⚠ WARNING!

The use of unsuitable energy sources can be hazardous

Rectified AC current will damage the assemblies (controllers, sensors, motors etc.) of the electronic system.

Unsuitable cable connections (too long, insufficient wire cross-section) to the battery (tow cables) can overheat, setting the truck and battery on fire.

▶ The truck must only be operated with battery current.

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

The converted truck is designed for operation with a suitable Jungheinrich lithium ion battery.

Procedure

- Check the equipment is complete.
- If necessary, install the battery, see "Battery removal and installation" on page 34.
- Charge the battery, see "Charging the battery" on page 28.

The truck can now be started, see "Preparing the Truck for Operation" on page 45.

Wheel flattening

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

D Battery - Servicing, Recharging, Replacement

1 Safety regulations for handling lithium-ion batteries

Maintenance personnel

Batteries may only be service, 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.

Battery disposal

Batteries may only be disposed of in accordance with national environmental protection regulations or disposal laws. The manufacturer's disposal instructions must be observed.

⚠ WARNING!

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

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

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

Park the truck securely before carrying out any work on the batteries (see "Parking the truck securely" on page 48).

2 Battery types

The converted truck is designed for operation with a suitable Jungheinrich lithium ion battery. The following table shows which combinations are included as standard:

Battery type	Capacity (Ah)	Weight (kg)	Dimensions (mm)
24 volt battery S battery tray	110	139	660X145X590
24 volt battery M battery tray	110	210	624X207X627

The battery weight can be taken from the battery data plate.

The 110 Ah lithium ion battery can only be charged with a specially equipped stationary or on-board charger.

NOTE

Incorrect attachment can result in damage to the lithium ion battery

Unsuitable connectors of non-converted trucks, chargers or battery extension cables used with the lithium ion battery can damage the battery connector.

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

The converted truck can be used temporarily with a suitable standard battery, see page 53. Refer to the operating instructions of the unmodified truck for the various battery types.

NOTE

Substituting the battery without a capacity display or battery management system may result in full discharge

If the truck is operated temporarily with a suitable standard battery the discharge status is not shown in the display unit. The battery does not automatically cut out after 60 minutes without energy consumption by performing travel, steering or hydraulic operations.

▶ Always use a charged standard battery as a substitute.

▶ Use substitute batteries for a temporary period only and restrict their use to essential operations only.

▶ Avoid full discharge of the substitute standard battery.

3 Exposing the battery

⚠ WARNING!

An unsecured truck can cause accidents

Parking the truck on an incline or with a raised load handler is dangerous and is strictly prohibited.

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

▶ Fully lower the load handler.

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

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

⚠ CAUTION!

A closing battery panel can pose a trapping hazard

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

▶ Open the battery cover as far as the stop.

Requirements

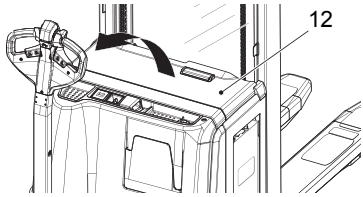
– Park the truck on a level surface.

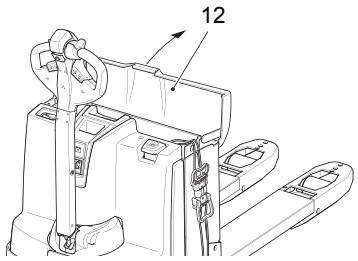
– Park the truck securely, see "Parking the truck securely" on page 48.

Procedure

- Open the battery panel (12).
- Where necessary remove the insulating mat from the battery.

The battery is now exposed.





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 Jungheinrich charger designed 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.

NOTE

Discharge can damage the battery

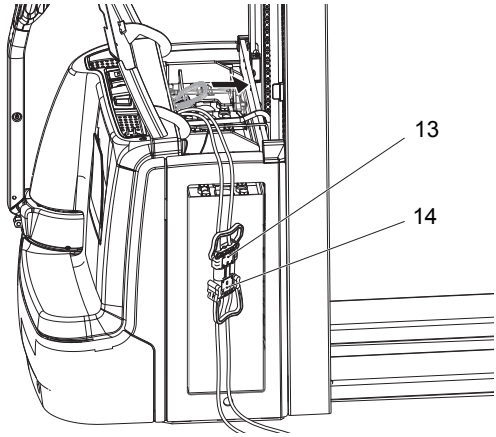
If the battery is not used for a long period of time, it can become damaged through discharge.

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

▶ To ensure a long battery life, we recommend checking and charging the battery every 4 weeks when it is not being used.

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

4.1 Charging the Battery with the SLH090i Stationary Charger



The stationary charger can only charge suitable lithium ion batteries with a battery management system, not standard batteries.

Charging the battery

Requirements

– Park the truck securely, see "Parking the truck securely" on page 48.
– Expose the battery, see "Exposing the battery" on page 27.

Procedure

- Disconnect the battery connector (13) from the truck plug.
- Connect the battery connector (13) to the charging cable (14) of the stationary charger.
- Start charging in accordance with the charger operating instructions.

The battery is now charged.

➔ The battery is permanently monitored during charging by the battery management system.

➔ Depending on the temperature, with the stationary charger and a fully discharged battery the charge time is approx. 70 minutes.

Partial charging

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

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

Completing battery charging, restoring the truck to operation

NOTE

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

Requirements

– The battery is fully charged.

Procedure

- Complete charging in accordance with the charger operating instructions.
- Disconnect the battery connector (13) from the charging cable (14) of the stationary charger.
- Attach the battery connector (13) to the industrial truck.

The truck is now ready for operation.

Trickle charge

A daily or continuous trickle charge beyond full charge is not required for the lithium ion battery, due to its design.

➔ When the battery is fully charged, charging is only released by the battery management system when the charge level has dropped below 80%.

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

⚠ DANGER!

Risk of electric shock and fire

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

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

NOTE

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

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

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

The on-board charger can only charge suitable lithium ion batteries with a battery management system, not standard batteries.

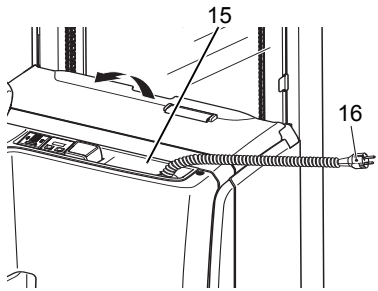
Starting to charge with the on-board charger

– **ELH mains connection**

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

The mains cable and mains connector (16) of the charger are contained in the front panel or the battery compartment (15).

Charging the battery



Requirements

– Park the truck securely, see "Parking the truck securely" on page 48.
– Expose the battery, see "Exposing the battery" on page 27.

Procedure

- Remove any insulating mats from the battery.
- The battery connector must remain plugged.
- Attach the mains connector (16) to a mains socket.
- Pull the Emergency Disconnect switch up.
  The flashing battery symbol or display unit shows the charge status or a malfunction.

The battery is now charged.

➔ When the mains connector (16) is attached to the mains, all the truck's electrical functions are disconnected (electric immobilizer). The truck cannot be operated.

➔ The battery is permanently monitored during charging by the battery management system.

➔ Depending on the temperature, with the on-board charger and a fully discharged battery the charge time is approx. 4 hours.

Partial charging

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

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

Completing battery charging, restoring the truck to operation

NOTE

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

Requirements

– The battery is fully charged.

Procedure

- Remove the mains connector (16) from the mains socket and store it along with the cable in the storage compartment (15).
- If applicable, place the existing insulating mats back over the battery.
- Close the battery panel securely.

The truck is now ready for operation.

⚠ **CAUTION!**

Damaged mains cables can be hazardous

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

Trickle charge

A daily or continuous trickle charge beyond full charge is not required for the lithium ion battery, due to its design.

➔ When the battery is fully charged, charging is only released by the battery management system when the charge level has dropped below 80%.

5 Battery removal and installation

⚠ WARNING!

An unsecured truck can cause accidents

Parking the truck on an incline or with a raised load handler is dangerous and is strictly prohibited.

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

⚠ WARNING!

Accident risk during battery removal and installation

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

- ▶ Note the "Safety regulations for handling lithium ion batteries" section in this chapter.
- ▶ Wear safety shoes when removing and installing the battery.
- ▶ Use only batteries with insulated cells and terminal connectors. If necessary cover them with a rubber mat.
- ▶ Park the truck on a horizontal surface.
- ▶ Make sure the crane lifting gear has sufficient capacity to replace the battery.
- ▶ Use only approved battery replacement devices (battery roller stand, replacement trolley etc.).
- ▶ Make sure the battery is located securely in the truck's battery compartment.

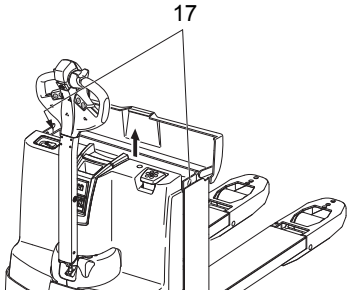
⚠ CAUTION!

Trapping hazard

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

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

5.1 Changing the battery from the top



Removing the battery

Requirements

– Park the truck securely, see "Parking the truck securely" on page 48.
– Expose the battery, see "Exposing the battery" on page 27.

Tools and Material Required

– Crane lifting gear

Procedure

- Disconnect the battery connector from the truck connector.

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

- EJE C20: Disassemble the battery panel.

➔ Remove the battery cable from the battery panel if necessary.

- Attach the crane lifting gear to the eyes (17).

➔ The hooks must be fitted in such a way that they do not fall onto the battery cells when the crane lifting gear is slackened. The lifting gear must exert a vertical pull so that the battery container is not compressed.

- Lift the battery slowly out of the battery compartment using crane lifting gear.

The battery has now been removed.

Battery installation

Requirements

– Park the truck securely, see "Parking the truck securely" on page 48.

Procedure

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

➔ Hook on the crane lifting gear so that when the battery has been inserted the lifting gear can be unhooked without damaging the battery cover.

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

- Attach the battery connector to the truck connector.

⚠ CAUTION!

Trapping hazard

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

▶ Do not reach between the battery cover and chassis. Hold the battery cover only by the designated recess.

▶ Close the battery panel carefully and slowly.

- Close the battery cover.

The battery is now installed.

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

E Operation

1 Safety Regulations for the Operation of the Forklift Truck

Driver authorisation

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

Operator's rights, responsibilities and rules of conduct

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

Unauthorised use of truck

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

Damage and faults

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

Repairs

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

Hazardous area

⚠ WARNING!

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

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

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

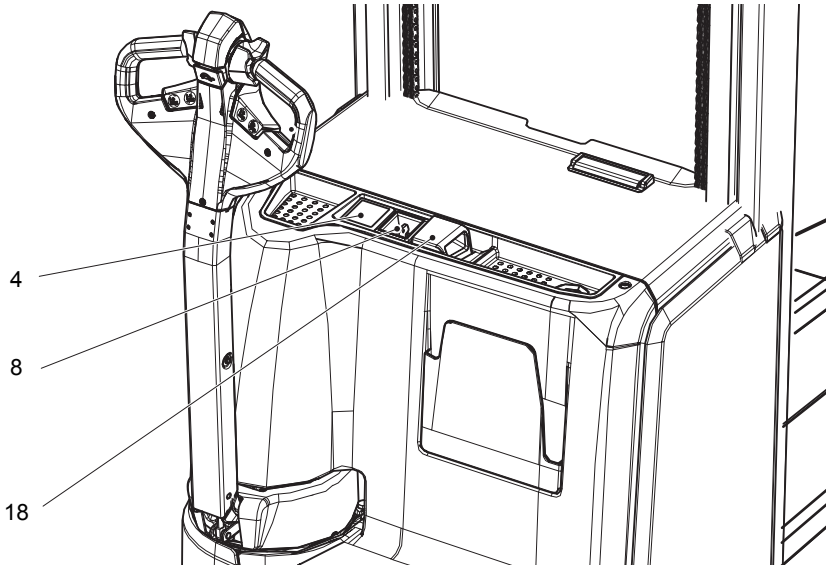
⚠ WARNING!

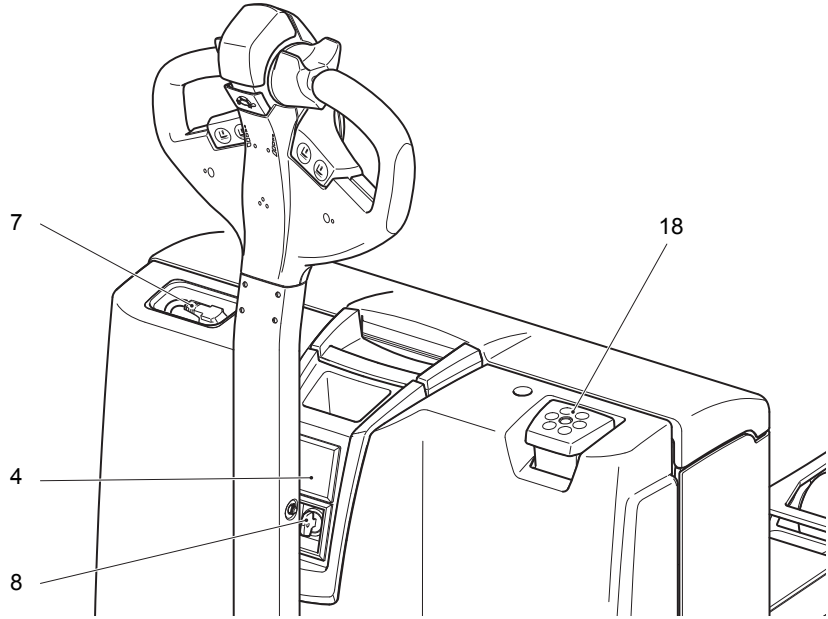
Removing or disabling safety devices can cause accidents

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

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

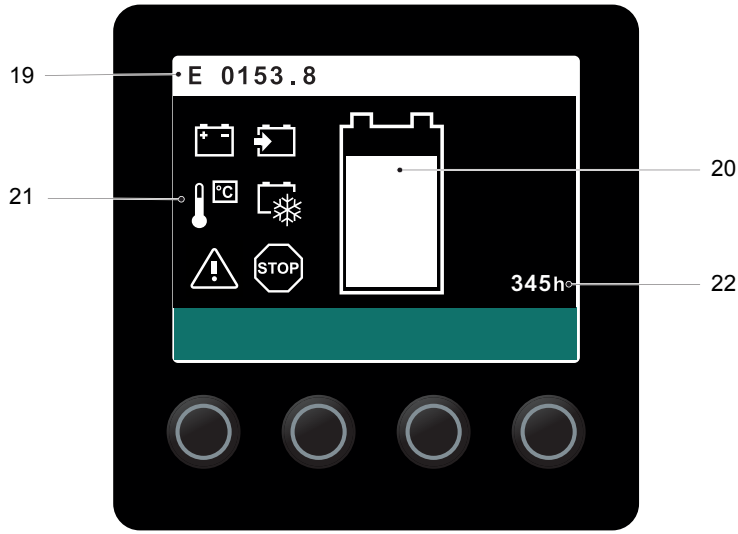
2 Displays and Controls





Item	Control /Display		Function
4	Display unit	●	Displays for: – Lithium ion battery charge status – Lithium ion battery discharge status – Service hours – Event messages
7	On-board charger (with safety switch)	○	Charges the lithium ion battery by inserting the mains connector into a mains socket.
8	Key switch	●	– Activates the truck by applying the control voltage – Removing the key prevents the truck from being switched on by unauthorized personnel.
18	Emergency Disconnect switch	●	Disconnects the battery supply – All electric functions are cut out and the industrial truck decelerates.
● = Standard equipment		○ = Optional equipment	

2.1 Display (2 Inch)



Item	Control or display	Function
19	Information field	Displays event messages
20	Battery capacity display[1]	Lithium ion battery discharge status
21	Icon field	Displays the icons, see "Symbols in the display" on page 42.
22	Service hours	see "Hourmeter" on page 16

1. Display element is animated when energy is recovered during regenerative braking.

2.1.1 Symbols in the display

Any number of pictograms can be displayed in the pictogram field (21). Which pictograms are shown in the pictogram field depends on the operating and truck status.

Symbol	Meaning	Colour	Function
	Stop notice	Red	Functional cutout following truck malfunctions[1]
	Warning	Red	Flashing: – Lithium ion battery malfunction – Battery management system malfunction
	Charging process	Green	Battery charge display (on-board charger only): – Flashing: Charging in progress – Steady light: Charging completed
	Battery indicator, low residual capacity	Yellow	Charge status display – Steady light: Residual capacity < 15% [2] – Flashing: Residual capacity < 10% [3]
		Red	Charge status display – Steady light: Battery is discharged.[3]
	Overtemperature	Red	Flashing: – Lithium ion battery overtemperature detected
	Low temperature	Red	Flashing: – Lithium ion battery low temperature detected

1. The lithium ion battery cuts out immediately.
2. The lithium ion battery needs to be charged soon.
3. The lithium ion battery needs to be charged immediately.

2.1.2 Service hour display

The service hour display range is between 0.0 and 99,999.0 hours. The display (52) has background lighting.

2.1.3 Event Messages

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

→ Remedies, see "Troubleshooting" on page 51.

2.1.4 Power up test

Once the truck has become operational the following displays appear:

– Brief flashing of status messages and system information
– Service hours
– Lithium ion battery charge status

2.2 Battery Management System Automatic Cutout

If no energy consumption from travel, steering or hydraulic operations is detected within a period of 60 minutes, the battery management system automatically cuts out the lithium ion battery.

When the truck has been switched off and on with the key switch the lithium ion battery is available again to energise the truck.

→ The presetting cannot be changed.

2.3 Battery Management System Discharge Monitor

⚠ CAUTION!

Applying maximum braking can result in accidents

Switching off the discharge monitor will cause the truck to decelerate to a halt at maximum force. This may cause the load to slide off the load handler. There is a higher risk of accidents and injury.

▶ Do not travel at maximum speed when the battery charge is low.

➔ The standard setting for the battery discharge monitor cannot be altered.

A buzzer is activated in the battery when the charge reaches a critical level.

The truck is switched off by the battery management system when the residual capacity falls below the required level. When the truck has been switched off and on with the key switch, all truck functions are briefly available again as emergency functions - through release of residual capacity - until the battery management system activates a full shutdown.

NOTE

Discharge can damage the battery

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

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

▶ To ensure a long battery life, we recommend checking and charging the battery every 4 weeks when it is not being used.

➔ Charge the battery see "Charging the battery" on page 28.

➔ If the truck is used temporarily with a suitable standard battery, the traction controller battery discharge monitor is restored to operation.

3 Preparing the Truck for Operation

3.1 Checks and Operations to Be Performed Before Starting Daily Work

⚠ WARNING!

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

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

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

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

Inspection before daily operation

Procedure

- Check the whole of the outside of the truck for signs of damage and leaks. Damaged hoses must be replaced immediately.
- Check the battery attachment and wire connections for damage and make sure they are secure.
- Check the battery connectors are secure.
- Check the load handler for visible signs of damage such as cracks, bent or severe wear.
- Check the drive wheel and load wheels for damage.
- Check that the markings and labels are present, clean and legible.
- Check the protection screen / grille and their attachments are secure and undamaged.
- Make sure the drive panels and covers are secure and check for damage.
- With the load handler lowered, check the mast chains are tensioned and secured correctly.
- Check tiller return function.
- Check the controls automatically return to the neutral position after use.
- Safety cutoff height switch (mast), check cable connections and magnet attachment.

3.2 Preparing the truck for operation

Switching on the truck

Requirements

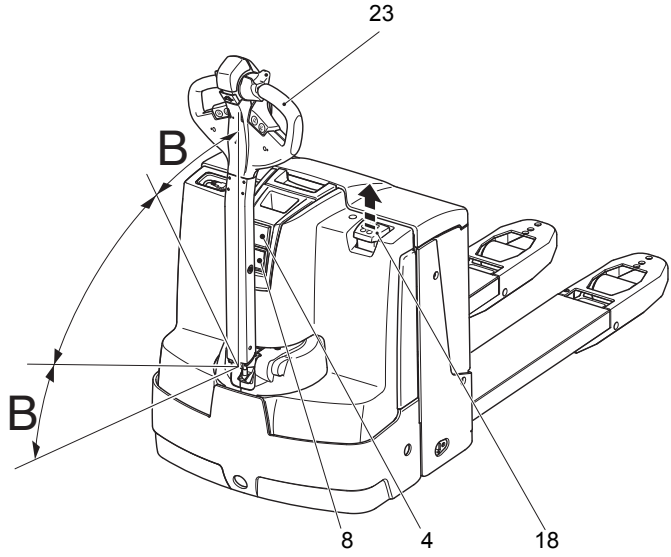
– For checks and operations to be performed before starting daily operation, see "Checks and Operations to Be Performed Before Starting Daily Work" on page 45.

Procedure

- Pull the Emergency Disconnect switch (18) to unlock it.
- Switch on the truck, to do this
  - Insert the key in the key switch (8) and turn it as far to the right as it will go.
    The tiller (23) must be in the upper braking zone "B". If event message "E-0914" is shown in the display unit, set the tiller to the upper braking zone "B".

Truck is operational.

The display unit (4) indicates the current battery charge status and the service hours, see "Display (2 Inch)" on page 41.



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

⚠ WARNING!

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

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

▶ Report any defects immediately to your supervisor.

▶ Mark defective truck and take out of service.

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

Procedure

- Test warning indicators and safety devices:
  - Test the Emergency Disconnect function by pressing the Emergency Disconnect switch. The main circuit is disconnected and no truck operations can be performed. Now pull the Emergency Disconnect switch to unlock it.
  - Test the horn by pressing the "warning signal" button.
  - Check the effectiveness of the brakes.
  - Test the steering.
  - Test the hydraulic system.
  - Test the travel functions.
  - Test the "collision safety switch" by depressing it whilst driving in the drive direction.
- Test the controls and displays and check for damage, see "Displays and Controls" on page 39.
  - Check tiller return function.
  - Check the controls automatically return to the neutral position after use.

3.4 Parking the truck securely

⚠ WARNING!

An unsecured truck can cause accidents

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

▶ 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.
- Fully lower the load handler:
  - Press the "lower" button.
- Using the tiller (23) turn the drive wheel to "forward travel".
- Switch off the truck, to do this:
  - Turn the key in the key switch (8) anti-clockwise as far as it will go. Remove the key from the key switch (8).
- Press the Emergency Disconnect switch (18).

The truck is parked.

4 Industrial Truck Operation

4.1 Usability as a Function of the Battery Temperature

The battery is not authorised for use in cold stores.

Lithium ion battery temperature	Usability
-10°C - 0°C[1]	Travel and lifting operations
0°C - 5°C[1]	Travel and lifting operations, battery charging
5°C - 40°C	Travel and lifting operations, battery charging
40°C - 55°C	Charging the battery

1. observe permissible temperature range for truck application, see operating instructions of the unmodified truck

➔ If the truck remains for a longer period in low temperatures the battery will cool and the available battery capacity will be reduced.

➔ In the event of overtemperature the battery management system shuts down the battery.

4.2 Emergency Disconnect

⚠ CAUTION!

Applying maximum braking can result in accidents

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

▶ Do not use the Emergency Disconnect switch as a service brake.

▶ Use the Emergency Disconnect switch during travel only in emergencies.

⚠ CAUTION!

Faulty or non-accessible Emergency Disconnect switches can cause accidents

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

▶ The operation of the Emergency Disconnect switch must not be affected by any objects placed in its way.

▶ Report any defects on the Emergency Disconnect switch immediately to your supervisor.

▶ Mark defective truck and take out of service.

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

Press the Emergency Disconnect switch

Procedure

- Press the Emergency Disconnect (18).

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

➔ Press the Emergency Disconnect switch on in emergencies.

Releasing the Emergency Disconnect switch

Procedure

- Pull the Emergency Disconnect switch (18) to unlock it.

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

5 Troubleshooting

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

➔ If, after carrying out the following remedial action, the truck cannot be restored to operation or if a fault in the electronics system is displayed with a corresponding error code, contact the manufacturer's service department.
Troubleshooting must only be performed by the manufacturer's customer service department. The manufacturer has a service department specially trained for these tasks.
In order for customer services to react quickly and specifically to the fault, the following information is essential:
- Truck serial number
- Event message from the display unit (if applicable)
- Error description
- Current location of truck.

5.1 Truck does not start

Possible Cause	Remedy
Battery management system switched off (battery discharge monitor)	Turn the key switch off and on again for a short period of operation (emergency function), see page 44 Charge the battery, see page 28
Battery charge too low	Charge the battery, see page 28

For other malfunctions refer to the operating instructions of the unmodified truck.

5.2 Load cannot be lifted

Possible Cause	Remedy
Battery management system switched off (battery discharge monitor)	Turn the key switch off and on again for a short period of operation (emergency function), see page 44 Charge the battery, see page 28
Battery charge too low	Charge the battery, see page 28

For other malfunctions refer to the operating instructions of the unmodified truck.

5.3 Lithium-ion battery fault

Battery and battery management system malfunctions are shown on the display unit, see "Symbols in the display" on page 42.

Possible Cause	Remedy
Overtemperature (battery temperature too high)	Park the truck securely, switch it off and leave the battery to cool.
Low temperature (battery temperature too low)	Only use the battery within the permissible temperature range.
Battery or battery management system malfunction	Contact the manufacturer's customer service department.

5.3.1 Substitution with a standard battery

The converted truck can be used temporarily with a suitable standard battery. Refer to the operating instructions of the unmodified truck for the various battery types.

➔ A standard battery used temporarily in the truck will not be charged by the on-board charger.

NOTE

Substituting the battery without a capacity display or battery management system may result in full discharge

If the truck is operated temporarily with a suitable standard battery the discharge status is not shown in the display unit. The battery does not automatically cut out after 60 minutes without energy consumption by performing travel, steering or hydraulic operations.

- ▶ Always use a charged standard battery as a substitute.
- ▶ Use substitute batteries for a temporary period only and restrict their use to essential operations only.
- ▶ Avoid full discharge of the substitute standard battery.

➔ If the truck is used temporarily with a suitable standard battery, the traction controller battery discharge monitor is restored to operation.

F Industrial Truck Maintenance

1 Operational Safety and Environmental Protection

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

⚠ WARNING!

Risk of accidents and component damage

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

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

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

NOTE

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

➔ On completion of inspection and service work, carry out the operations listed in the “Recommissioning the truck after cleaning or maintenance work” section (see "Restoring the truck to service after maintenance and repairs" on page 57).

2 Maintenance Safety Regulations

Maintenance and repair personnel

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

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

Customer Services

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

Operating company

The maintenance personal of the operating company has the technical expertise and experience to perform the activities in the maintenance check list for the operating company. The maintenance and repair work to be performed by the operating company are also written down, see "Maintenance and repairs" on page 57.

2.1 Working on the electrical system

⚠ WARNING!

Electrical current can cause accidents

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

- ▶ Only suitably trained electricians may operate on the truck's electrical system.
- ▶ Before working on the electrical system, take all precautionary measures to avoid electric shocks.
- ▶ Park the truck securely (see "Parking the truck securely" on page 48).
- ▶ Remove the battery, see "Battery removal and installation" on page 34.
- ▶ Remove any rings, metal wristbands etc.

3 Maintenance and repairs

3.1 Preparing the truck for maintenance and repairs

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

Procedure

- Park the truck securely, see "Parking the truck securely" on page 48.
- Disconnect the battery to prevent the truck from being switched on accidentally.

⚠ WARNING!

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

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

▶ When raising the truck, follow the instructions, see "Transport and Commissioning" on page 19. When working on the parking brake, prevent the truck from accidentally rolling away (e.g. with wedges).

3.2 Front panel disassembly and assembly

See operating instructions of unmodified truck.

3.3 Drive panel disassembly and assembly

See operating instructions of unmodified truck.

3.4 Battery panel disassembly

See operating instructions of unmodified truck.

3.5 Restoring the truck to service after maintenance and repairs

See operating instructions of unmodified truck.

4 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.

5 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.

6 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 Jungheinrich lithium-ion battery

1 Jungheinrich lithium-ion battery

The 110 Ah Jungheinrich lithium-ion battery is a maintenance-free battery with rechargeable high-performance energy cells. The battery's daily runtime can be extended through intermediate charges.

1.1 Battery nominal data

1.	Product	110 Ah lithium ion battery
2.	Nominal voltage	25.6 V (3.2 V x 8 cells)
3.	Rated capacity	See data plate
4.	Charge current	100 A
5.	Application temperature during operation[1,2]	-10°C to 40°C (not cold store)
6.	Charging application temperature	0°C to 40°C
7.	Storage temperature (for 5% to 90% relative air humidity) [1]	-20°C to 40°C recommended: 20°C to 35°C (max. 1 year)
8.	Electro-chemical system	Lithium ion, LiFePO4 cathode

1. Higher and lower temperatures reduce the useful life, lower temperatures reduce the available capacity.
2. The permissible range of the battery's application temperature does not increase the permissible range of the truck's application temperature.

1.2 Accessories

Only the Jungheinrich charger should be used to charge the Jungheinrich lithium on battery.

⚠ CAUTION!

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

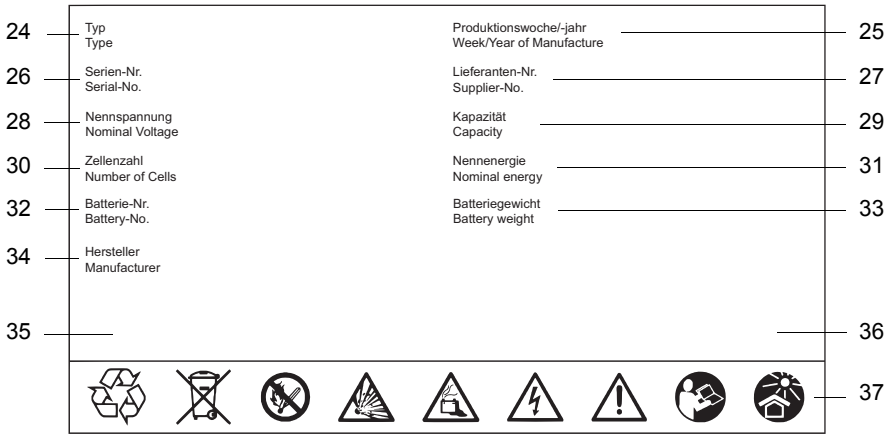
1.3 Battery Management System

The battery is continually monitored by the battery management system. The battery management system checks for example the cell temperature, the voltage and the charge status of the cells, as well as releasing charge and discharge processes.

A battery discharge monitor is incorporated in the battery management system, see page 44.

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

2 Battery data plate



24	Battery type
25	Production week / production year
26	Serial number
27	Supplier number
28	Rated voltage
29	Rated capacity
30	Number of cells
31	Rated energy in Watt hours
32	Battery number
33	Battery weight in kg
34	Manufacturer
35	CE mark
36	Manufacturer's logo
37	Safety instructions and warning information

2.1 Safety Instructions, Warning Indications and other Notes

 	Used batteries must be treated as hazardous waste. These batteries are marked with the recycling symbol and the sign showing a crossed-out rubbish bin, and should not be disposed of with ordinary household waste. Buy-back terms and type of recycling are to be agreed with the manufacturer as described in § 8 of the battery legislation.
	Do not smoke! No naked flames, glowing embers or sparks near the battery - fire and explosion hazard!
	Avoid fire and explosion hazards and short circuits due to overheating! Keep away from naked flames and strong heat sources.
	Always wear protective clothing (e.g. safety goggles and safety gloves) when working on cells and batteries. Always wash your hands after completing the work. Only use insulated tools. Do not mechanically machine the battery, strike, crush, compress, notch, dent or modify it in any way. Do not open the battery, damage, penetrate, bend, heat or allow it to become hot, do not throw it on the fire, short or immerse it in or wash it with water. Do not drop it or allow anything to fall on it, do not store it or operate it in a microwave oven, kiln or pressure vessel etc. Always use the Jungheinrich charger to charge the battery.
	Hazardous electric voltage! High performance lithium cells can generate very high short circuit currents, causing them to become hot. Attention! The metal parts of the battery cells are constantly under voltage, so do not place any foreign objects or tools on the battery. Observe the accident prevention regulations and DIN EN 50272-3 safety requirements.
	If the materials leak out, do not inhale the fumes. Wear safety gloves.
	Follow the user instructions and keep them in a visible position in the charging area. Work on the batteries should be performed only as instructed by specialist personnel.

	Protect the battery from solar radiation or other forms of heat radiation. Do not expose the battery to any sources of heat.

3 Potential hazards

No hazards are anticipated if the equipment is used correctly.

Do not use the equipment for anything other than its intended purpose.

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.

3.1 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.

3.1.1 Particular hazard from combustion products

⚠ WARNING!

Combustion products are caused by fires or explosions.
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.

- 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.

3.1.2 Additional fire fighting instructions

- Risk of metal fires.
- Fire residue, contaminated extinguishing agents or materials must be disposed of in accordance with the local official regulations.
  They must not be introduced to the open water or underground water.

Unsuitable extinguishing agents

- Water
- Foam
- Grease fire extinguishing agents

Requires suitable extinguishing agents

- Powder extinguishers

Suitable extinguishing agents

- Carbon dioxide extinguisher
- Metal fire extinguisher (PM 12i extinguisher)
- Metal fire extinguisher powder PL 9/78 DIN/EN 3SP-44/95
- Dry sand

3.1.3 Special fire fighting protective equipment

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

3.1.4 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.

3.2 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.

3.2.1 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.

3.2.2 Precautionary measures for the environment

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

3.2.3 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).

3.3 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 "Potential hazards" on page 64.

4 Battery lifetime and maintenance

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

NOTE

Discharge can damage the battery

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

- ▶ Before a long period of inactivity, the battery must be fully charged.
- ▶ To ensure a long battery life, we recommend checking and charging the battery every 4 weeks when it is not being used.

5 Operation

5.1 Discharging the battery

The specified rated capacity is 90% available.
No particular action needs to be taken.

5.2 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 Jungheinrich charger designed 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.

NOTE

Discharge can damage the battery

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

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

▶ To ensure a long battery life, we recommend checking and charging the battery every 4 weeks when it is not being used.

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

Charging the battery

Procedure

- Charge the battery, see Chapter D, "Charging the Battery".

6 Storage / safe handling / faults

6.1 Storing the battery

NOTE

Discharge can damage the battery

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

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

▶ To ensure a long battery life, we recommend checking and charging the battery every 4 weeks when it is not being used.

6.2 Instructions for safe handling

NOTE

New batteries are supplied and stored 50% charged.

– 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.

6.3 Faults

If any faults are found in the battery or the Jungheinrich charger, 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 Jungheinrich will
help identify faults.

⚠ WARNING!

Do not open the battery.

7 Disposal and shipping a lithium-ion battery

7.1 Instructions for disposal

NOTE

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

Used cells and batteries are recyclable economic goods. In accordance with the mark showing a crossed rubbish bin, these batteries may not be disposed of as domestic waste. Return and / or recycling must be ensured as required by the Batteries Act (Act regarding the commissioning, return and environmentally responsible disposal of batteries and accumulators). For battery disposal please contact the manufacturer's customer service department.

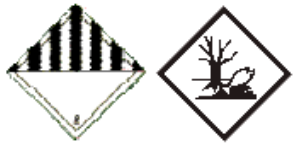
Used batteries must be treated as hazardous waste.
Batteries marked with the recycling symbol and the sign showing a crossed-out rubbish bin should not be disposed of with ordinary household waste.
Buy-back terms and type of recycling are to be agreed with the manufacturer.

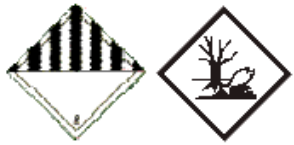
7.2 Shipping information

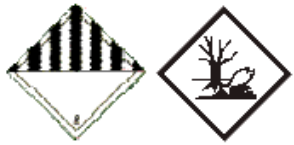
The Jungheinrich lithium ion battery is a hazardous material. The latest ADR (Accord européen relatif au transport international des marchandises Dangereuses par Route) regulations apply to the shipping of this battery.

7.2.1 Shipping functional batteries

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

ADR classification (road transport)	UN 3480 Lithium - Ion - batteries class 9 packaging group II
- Classification code	M4 Lithium - battery
- Hazard label	
- ADR limited quantity	LQ:0

IMDG classification (sea transport)	UN 3480 Lithium - Ion - batteries class 9 packaging group II
- EMS	F-A, S-I
- Hazard label	
- IMDG limited quantity	LQ: -

IATA classification (air transport)	UN 3480 Lithium - Ion - batteries class 9 packaging group II
- Hazard label	

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

NOTE

New batteries are transported 50% charged.

7.2.2 Shipping faulty batteries

To ship faulty Jungheinrich lithium-ion batteries, contact the manufacturer's customer service department who will arrange for a special hazardous material shipping. Lithium ion batteries are classed as hazardous goods and must therefore not be shipped independently.

8 Risk and safety phrases

Risk and safety phrases are codified hazard and safety instructions.
The R phrases describe the hazards from the battery cells and their contents.
The S phrases describe the safety measures to be applied.

8.1 Risk clauses (R phrases)

8.1.1 Battery cell

R 10	Flammable

8.1.2 Battery contents

R 21/22	Contents of the battery cells are hazardous to health on contact with the skin and if swallowed.
R 34	Contents of the battery cells cause chemical burns.
R 36/37/38	Contents of the battery cells irritate the eyes, respiratory tract and the skin.
R 41	Danger of serious eye damage.
R 45	Can cause cancer.
R 50/53	Highly toxic to aquatic organisms, can cause long-term damaging effects in water.

8.2 Safety phrases (S phrases)

S 23	Do not inhale gas / smoke / steam / aerosol (the manufacturer must apply appropriate markings, contents of the battery cells).
S 24/25	Avoid contact with the eyes and the skin (contents of the battery cells).
S 26	After contact immediately wash the eyes with copious water and consult the doctor (contents of the battery cells).
S 36/37/39	When working, wear appropriate protective clothing, safety gloves and safety glasses / eye protection (contents of the battery cells).
S 45	If an accident occurs or if you feel unwell, immediately call for a doctor (if possible show them this document, contents of the battery cells).
S 53	Avoid exposure – seek special instructions before using. – Only for professional users (contents of battery cells).
S 61	Do not release into the environment. Seek special instructions (contents of the battery cells).