Original instructions

# Electric pallet truck

## ECH 12C, ECH 15C


CE

2063 2065

first in intralogistics

5001 801 1532 EN - 10/2022 - 04

## Address of manufacturer and contact details

STILL GmbH
Berzeliusstraße 10
22113 Hamburg, Germany
Tel. +49 (0) 40 7339-0
Fax: +49 (0) 40 7339-1622
Email: info@still.de
Website: http://www.still.de

Made in China

## Rules for the operating company of industrial trucks

In addition to these operating instructions, a code of practice containing additional information for the operating companies of industrial trucks is also available.

This guide provides information for handling industrial trucks:

- Information on how to select suitable industrial trucks for a particular area of application
- Prerequisites for the safe operation of industrial trucks
- Information on the use of industrial trucks
- Information on transport, initial commissioning and storage of industrial trucks

### Internet address and QR code

The information can be accessed at any time by pasting the address **https://m.still.de/vdma** in a web browser or by scanning the QR code.

# 1 Foreword



# 2 Safety

# 1

# Foreword

# Your truck

## Technical description

This series of electric pallet trucks is used for handling pallets and has a maximum load capacity of up to 1200 and 1500 kg , depengding on the model.

The truck range includes the following models: ECH12C, ECH15C.

### Design

The latest ergonomic and practical design, adaptable to all operators and working conditions.

The polyurethane cowling provides superior stability and shock resistance.

The chassis is made of thick steel plate and is suitable for the harshest working conditions.

### Steering system

Extremely smooth steering makes the vehicle easier to manoeuvre in tight spaces.

A gas spring enables the tiller to quickly return to the vertical position after it is released.

### Tiller

The composite construction tiller head provides excellent impact resistance.

Ergonomic, suitable for left and right-handed operators. The push-buttons for the horn, lifting and lowering can be operated using one hand without changing grip.

The anti-crush button integrated into the tiller head protects the operator if the vehicle recoils.

### Driving

Precise, load-independent travel.

Jolt-free starting and smooth acceleration to maximum speed.

Simply release or turn the drive direction switch to brake.

Booster circuit prevents the truck rolling back when starting on a gradient.

### Brake system

The electromagnetic brake with dust protection function can be used as a safety brake and parking brake. Braking is controlled by the drive controller: the brake's electromagnet acts on the motor shaft and simultaneously cuts off the power. Automatic braking is activated when the tiller is in the horizontal or vertical position (end stop brake).

### Battery

24 V/20 Ah maintenance-free lithium battery.

The power indicator light displays battery power.

## General

The industrial truck described in these operating instructions conforms with the applicable standards and safety regulations.

The industrial truck is fitted with state-of-the-art technology. Following these operating instructions will allow the industrial truck to be handled safely. By complying with the specifications in these operating instructions, the functionality and the approved features of the industrial truck will be retained.

Get to know the technology, understand it and use it safely - these operating instructions provide the necessary information and help to avoid accidents and to keep the truck ready for operation beyond the warranty period.

Therefore:

– Before commissioning the industrial truck, read the operating instructions and follow the instructions.

– Always follow all the safety information contained in the operating instructions and on the industrial truck.

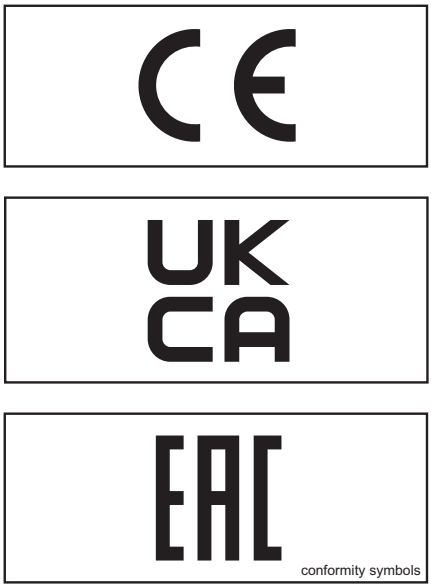
## Conformity marking

The manufacturer uses the conformity marking to document the conformity of the industrial truck with the relevant directives at the time of placing on the market:

- CE: in the European Union (EU)
- UKCA: in the United Kingdom (UK)
- EAC: in the Eurasian Economic Union

The conformity marking is applied to the nameplate. A declaration of conformity is issued for the EU and UK markets.

An unauthorised structural change or addition to the industrial truck can compromise safety, thus invalidating the declaration of conformity.



conformity symbols

## Declaration that reflects the content of the declaration of conformity

**Declaration**

STILL GmbH
Berzeliusstraße 10
22113 Hamburg Germany

We declare that the specified machine conforms to the most recent valid version of the directives specified below:

| | |
|---|---|
| Industrial truck type | **corresponding to these operating instructions** |
| Model | **corresponding to these operating instructions** |

– "Machinery Directive 2006/42/EC" [1)]
– "Supply of Machinery Safety Regulations 2008, 2008 No. 1597" [2)]

Personnel authorised to compile the technical documents:

See declaration of conformity

STILL GmbH

[1)] For the markets of the European Union, the EU candidate countries, the EFTA States and Switzerland.
[2)] For the United Kingdom market.

The declaration of conformity document is supplied with the industrial truck. The declaration shown explains the conformity with the provisions of the EC Machinery Directive and the Supply of Machinery Safety Regulation 2008, 2008 No. 1597.

An unauthorised structural change or addition to the industrial truck can compromise safety, thus invalidating the declaration of conformity.

The declaration of conformity must be carefully stored and made available to the responsible authorities if necessary. It must also be handed over to the new owner if the industrial truck is sold on.

# Using the truck

## Commissioning

Commissioning is the initial intended use of the truck.

The necessary steps for the commissioning vary depending on the model and equipment of the truck. These steps require preparatory work and adjustment work that cannot be performed by the operating company. See also the chapter entitled "Definition of responsible persons".

– To commission the truck, contact the authorised service centre.

## Intended use of the trucks

**⚠ CAUTION**

This machine was designed for the transport and storage on racks (pallet stackers only) of loads packed on pallets or in industrial containers designed for this purpose.

The dimensions and capacity of the pallet or container must be adapted to the load being transported and must ensure stability.

The table of characteristics and performance attached to this user manual gives you the information you need to check that the equipment is suitable for the work being carried out.

Any specific usage must be authorised by the site manager; an analysis of the potential risks associated with this usage will enable him to put in place any necessary additional safety measures.

## Improper use

The operating company or driver, and not the manufacturer, is liable for any hazards caused by improper use.

**NOTE**

*Please note the definition of the following responsible persons: "operating company" and "driver".*

Use for purposes other than those described in these operating instructions is prohibited.

**⚠ DANGER**

**There is a risk of fatal injury from falling off the truck while it is moving!**

– It is prohibited to carry passengers on the truck.

The truck may not be operated in areas where there is a risk of explosion, in areas that cause corrosion or in areas that are particularly dusty.

Stacking or unstacking on inclined surfaces or ramps is not permitted.

## Precautions

- Do not drive on steep slopes, to prevent the load from slipping off.
- The truck must be switched off when left unattended. Key (or key code) must be removed when the truck is unattended to prevent unauthorised use.
- When using this truck, pay attention to the surroundings and do not become distracted.
- Please pay attention to the moving parts of the truck to prevent your hands from being crushed.

## Description of use

- This truck is suitable for transporting goods over level surfaces.
- This truck is suitable for use within temperatures ranging from 5°C to 40°C and above. If the truck is used for long periods in environments below 5°C, in freezers, or where there are extreme changes in temperature and humidity, it must be fitted with additional special equipment with permission from the manufacturer.
- The truck can climb gentle gradients below 6% at full load, or below 16% without a load.
- Only use the truck at altitudes not exceeding 2000 metres.
- Use the truck properly to avoid being crushed by the drive wheel.
- Do not use the truck to carry passengers.
- Do not drive on slippery surfaces such as grease etc.

# Information about the documentation

## Documentation scope

- Operating instructions
- Operating instructions for attachment parts (special equipment)
- Spare parts list

These operating instructions describe all measures necessary for the safe operation and proper maintenance of the truck in all possible variants at the time of printing. Special designs to meet customer requirements are documented in separate operating instructions. If you have any questions, please contact your service centre.

Enter the production number and the year of production located on the nameplate in the field provided:

**Production no. .....**

**Year of production .....**

Please quote these numbers for all technical enquiries.

Operating instructions are provided with each truck. These instructions must be stored carefully and must be available to the driver and operator at all times.

If the operating instructions are lost, the operator must immediately request a replacement from the manufacturer.

The spare parts list can be reordered there as a spare part.

Personnel responsible for operating and maintaining the equipment must be familiar with these operating instructions.

The operating company (see the chapter “Definition of responsible persons”) must ensure that all operators have received, read and understood these instructions.

Thank you for reading and complying with these operating instructions. If you have any questions or suggestions for improvements, or if you have found any faults, please contact your service centre.

## Supplementary documentation

This industrial truck can be fitted with unplanned equipment (**UPA**) that deviates from the standard equipment and/or the variants.

The UPA may be, for example:

- Special sensors
- Special attachments
- Towing devices
- Customised attachments

In this case, the industrial truck has additional documentation. This may be in the form of an insert or separate operating instructions.

The original operating instructions for this industrial truck are valid for the operation of standard equipment and variants without restriction. The operational and safety information in the original operating instructions

continues to be valid in its entirety unless it is countermanded in this additional documentation.

The requirements for the qualification of personnel as well as the time for maintenance may vary. This is defined in the additional documentation.

– If you have any questions, please contact your authorised service centre.

## Issue date and topicality of the operating instructions

The issue date and the version of these operating instructions can be found on the title page.

STILL is constantly engaged in the further development of trucks. These operating instructions are subject to change, and any claims based on the information and/or illustrations contained in them cannot be asserted.

Please contact your authorised service centre for technical support relating to your truck.

## Copyright and trademark rights



## Explanation of information symbols used

**⚠ DANGER**

**Indicates procedures that must be strictly adhered to in order to prevent the risk of fatalities.**

**⚠ WARNING**

Indicates procedures that must be strictly adhered to in order to prevent the risk of injuries.

**⚠ CAUTION**

Indicates procedures that must be strictly adhered to in order to prevent material damage and/or destruction.

**NOTE**

*For technical requirements that require special attention.*

**ENVIRONMENT NOTE**

*To prevent environmental damage.*

## List of abbreviations

This list of abbreviations applies to all types of operating instructions. Not all of the abbreviations that are listed here will necessarily appear in these operating instructions.

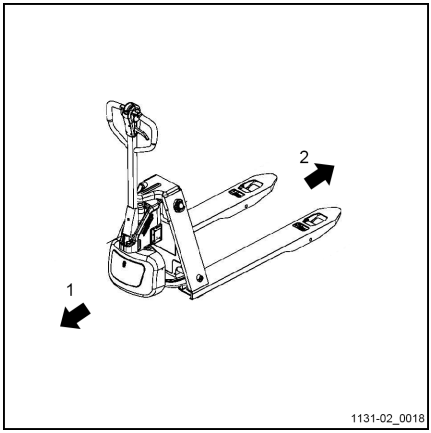
| Abbreviation | Meaning | Explanation |
|---|---|---|
| ArbSchG | Arbeitsschutzgesetz | German implementation of EU occupational health and safety directives |
| Betr-SichV | Betriebssicherheitsverordnung | German implementation of the EU working equipment directive |
| BG | Berufsgenossenschaft | German insurance company for the company and employees |
| BGG | Berufsgenossenschaftlicher Grundsatz | German principles and test specifications for occupational health and safety |
| BGR | Berufsgenossenschaftliche Regel | German rules and recommendations for occupational health and safety |
| DGUV | Berufsgenossenschaftliche Vorschrift | German accident prevention regulations |
| CE | Communauté Européenne | Confirms conformity with product-specific European directives (CE labelling) |
| CEE | Commission on the Rules for the Approval of the Electrical Equipment | International commission on the rules for the approval of electrical equipment |
| DC | Direct Current | Direct current |
| DFÜ | Datenfernübertragung | Remote data transfer |
| DIN | Deutsches Institut für Normung | German standardisation organisation |
| EG | European Community | |
| EN | European standard | |
| FEM | Fédération Européene de la Manutention | European Federation of Materials Handling and Storage Equipment |

| Abbreviation | Meaning | Explanation |
|---|---|---|
| $F_{max}$ | maximum Force | Maximum power |
| GAA | Gewerbeaufsichtsamt | German authority for monitoring/issuing regulations for worker protection, environmental protection, and consumer protection |
| GPRS | General Packet Radio Service | Transfer of data packets in wireless networks |
| ID no. | Identification number | |
| ISO | International Organization for Standardization | International standardisation organisation |
| $K_{pA}$ | Uncertainty of measurement of sound pressure levels | |
| LAN | Local Area Network | Local area network |
| LED | Light Emitting Diode | Light emitting diode |
| $L_p$ | Sound pressure level at the workplace | |
| $L_{pAZ}$ | Average continuous sound pressure level in the driver's compartment | |
| LSP | Load centre of gravity | Distance of the centre of gravity of the load from the front face of the fork backs |
| MAK | Maximum workplace concentration | Maximum permissible air concentrations of a substance at the workplace |
| Max. | Maximum | Highest value of an amount |
| Min. | Minimum | Lowest value of an amount |
| PIN | Personal Identification Number | Personal identification number |
| PPE | Personal protective equipment | |
| SE | Super-Elastic | Superelastic tyres (solid rubber tyres) |
| SIT | Snap-In Tyre | Tyres for simplified assembly, without loose rim parts |
| StVZO | Straßenverkehrs-Zulassungs-Ordnung | German regulations for approval of vehicles on public roads |
| TRGS | Technische Regel für Gefahrstoffe | Ordinance on hazardous materials applicable in the Federal Republic of Germany |
| UKCA | United Kingdom Conformity Assessed | Confirms conformity with the product-specific directives that apply in the United Kingdom (UKCA labelling) |
| VDE | Verband der Elektrotechnik Elektronik Informationstechnik e. V. | German technical/scientific association |
| VDI | Verein Deutscher Ingenieure | German technical/scientific association |

| Abbreviation | Meaning | Explanation |
|---|---|---|
| VDMA | Verband Deutscher Maschinen- und Anlagenbau e. V. | German Mechanical Engineering Industry Association |
| WLAN | Wireless LAN | Wireless local area network |

## Drive directions

The drive directions of the truck are forward (1) and reverse (2). ▷



# Environmental considerations

## Packaging

During delivery of the truck, certain parts are packaged to provide protection during transport. This packaging must be removed completely prior to initial start-up.

**ENVIRONMENT NOTE**

*The packaging material must be disposed of properly after delivery of the truck.*

## Disposal of components and batteries

The truck is composed of different materials. If components or batteries need to be replaced and disposed of, they must be:

- disposed of,
- treated or
- recycled in accordance with regional and national regulations.

**NOTE**

*The documentation provided by the battery manufacturer must be observed when disposing of batteries.*

**ENVIRONMENT NOTE**

*We recommend working with a waste management company for disposal purposes.*

# 2

# Safety

# Safety regulations

These operating instructions, which come with the truck, must be communicated to all those concerned and in particular to personnel responsible for maintenance and driving. The employer must make sure that the forklift operator has properly understood all the safety information.

Please observe the directives and safety regulations attached, in particular:

- Information concerning the use of materials handling trucks
- Regulations concerning traffic lanes and working areas
- Appropriate behaviour, rights and responsibilities of the driver
- Use in particular areas
- Information about the weight and dimensions of pallets or any other container
- Information concerning starting, driving and braking
- Information concerning maintenance and repair
- Regular checks and technical inspections
- Recycling of lubricants, oils and batteries
- Residual risks.

Care is recommended both for the user and the person in charge (employer) with regard to adhering to all safety rules concerning the use of material-handling trucks.

When instructing forklift operators, we recommend the following points are emphasized:

- The features of the truck
- The special accessories
- The specific features of the working environment.

Train the user in how to drive the truck, until it is under proper control.

Then, and only then, proceed to transferring pallets.

Forklift truck stability is guaranteed when the unit is used correctly.

# Definition of responsible persons

## Operating company

The operating company is the natural or legal person or group who operates the truck or on whose authority the truck is used.

The operating company must ensure that the truck is only used for its proper purpose and in compliance with the safety regulations set out in these operating instructions.

The operating company must ensure that all users read and understand the safety information.

The operating company is responsible for the scheduling and correct performance of regular safety checks.

We recommend that the national performance specifications are adhered to.

## Specialist

A qualified person is defined as a service engineer or a person who fulfils the following requirements:

- A completed vocational qualification that demonstrably proves their professional expertise. This proof should consist of a vocational qualification or a similar document.
- Professional experience indicating that the qualified person has gained practical experience of industrial trucks over a proven period during their career During this time, this person has become familiar with a wide range of symptoms that require checks to be carried out, such as based on the results of a hazard assessment or a daily inspection
- Recent professional involvement in the field of the industrial truck test in question and an appropriate further qualification are essential. The qualified person must have experience of carrying out the test in question or of carrying out similar tests. Moreover, this person must be aware of the latest technological developments regarding the industrial truck to be tested and the risk being assessed

## Drivers

This truck may only be driven by suitable persons who are at least 18 years of age, have been trained in driving, have demonstrated their skills in driving and handling loads to the operating company or an authorised representative, and have been specifically instructed to drive the truck. Specific knowledge of the truck to be operated is also required.

The training requirements under §3 of the Health and Safety at Work Act and §9 of the plant safety regulations are deemed to have been satisfied if the driver has been trained in accordance with BGG (General Employers' Liability Insurance Association Act) 925. Observe the national regulations for your country.

### Driver rights, duties and rules of behaviour

The driver must be trained in his rights and duties.

The driver must be granted the required rights.

The driver must wear protective equipment (protection suit, safety footwear, safety helmet, industrial goggles and gloves) that is appropriate for the conditions, the job and the load to be lifted. Solid footwear should be worn to ensure safe driving and braking.

The driver must be familiar with the operating instructions and have access to them at all times.

The driver must:

- have read and understood the operating manual
- have familiarised himself with safe operation of the truck
- be physically and mentally able to drive the truck safely

**⚠ DANGER**

**The use of drugs, alcohol or medications that affect reactions impair the ability to drive the truck!**

Individuals under the influence of the aforementioned substances are not permitted to perform work of any kind on or with the truck.

### Prohibition of use by unauthorised persons

The driver is responsible for the truck during working hours. He must not allow unauthorised persons to operate the truck.

When leaving the truck, the driver must secure it against unauthorised use, e.g. by pulling out the key.

# Basic principles for safe operation

## Insurance cover on company premises

The company premises are very often restricted public traffic areas.

**NOTE**

It is advisable to review the operational liability insurance so that insurance covers the truck with respect to third parties in the event of damage caused in restricted public traffic areas.

## Modifications and refitting

If your truck is to be used in specific conditions (e.g. refrigerated warehouse or flameproof protection), it must be specially equipped and approved for this purpose, if applicable.

If your truck is used for work that is not specified in the guidelines or in these instructions, and it must be modified or refitted for this purpose, it is important to remember that any structural modification could affect truck handling while driving as well as the stability of the truck, and could lead to accidents. You should therefore contact the manufacturer before carrying out any modification. Permission from the manufacturer is required for any modification that may affect the truck's stability.

Any constructional modification or transformation of your truck is forbidden without prior written permission from the manufacturer. Authorisation from the relevant authority may also be required.

**SPECIAL CASE: if the manufacturer of the truck is no longer in business and its activity is unlikely to be taken over by a successor**

In this specific case, you may plan a modification or alteration to your truck provided that:

- The modification or alteration is designed, tested and implemented by one or more engineers who are experts in the field of industrial trucks and their safety
- A record is kept of the design, the different tests and the implementation of the modification or alteration
- Appropriate changes are approved and made to the capacity plate, decals, labels and operating instructions
- a permanent and clearly visible label is attached to the truck indicating the nature of the modification or alteration as well as the date of the modification or alteration, and the name and address of the company that carried out the work.

## Warning regarding non-original parts

Original parts, attachments and accessories are specially designed for this truck. We draw your attention to the fact that parts, attachment parts and accessories supplied by other companies have not been tested or approved by STILL.

**⚠ CAUTION**

The installation or use of such products may have a negative impact on the design of the truck and thus impair active or passive driving safety.

We recommend that you obtain approval from the manufacturer and, if applicable, from the relevant regulatory authorities before installing such parts. The manufacturer accepts no liability for any damage caused by the use of non-original parts and non-original accessories.

## Damage, faults

Any damage or faults observed on the truck or the accessories must be reported immediately to the responsible personnel. The truck and accessories must never be used before they are correctly reconditioned as they cannot be guaranteed to be safe for operating or driving.

The safety mechanisms and switches must never be removed or disabled. The predefined setpoint values must not be modified.

Work on the electric installation (e.g. connecting a radio, additional lights or other accessories) is permitted only with the approval of the manufacturer.

## Medical devices

The operation of medical devices, for example pacemakers or hearing aids, can be impaired. Check with your doctor or manufacturer if the medical devices are sufficiently protected against electromagnetic interference.

## Battery connection cables

**⚠ CAUTION**

Using sockets with NON-ORIGINAL battery connection cables can be dangerous (see purchase references in the parts catalogue)

# Vibrations

## Vibrations to which the hands and arms are exposed

The following value is valid for all truck models:

| Specified characteristics for upper limb vibrations | |
|---|---|
| vibration characteristics | < 2.5 $m/s^2$ |

**NOTE**

*It is mandatory to specify the hand-arm vibrations, even where the values do not indicate any danger, as in this case.*

**⚠ CAUTION**

The value expressed above can be used to compare forklift trucks of the same category. It cannot be used to determine the operator's daily exposure to vibrations during real operation of the truck; these vibrations depend on the conditions of use (floor conditions, method of use etc.) and therefore daily exposure must be calculated using data from the place of use.

# Residual risk

## Residual dangers, residual risks

Despite careful working and compliance with standards and regulations, the occurrence of other risks when using the truck cannot be entirely excluded.

The truck and all other system components comply with current safety requirements. Nevertheless, even when the truck is used for its proper purpose and all instructions are followed, some residual risk cannot be excluded.

Even beyond the narrow danger areas of the truck itself, a residual risk cannot be excluded. Persons in this area around the truck must exercise a heightened degree of awareness, so that they can react immediately in the event of any malfunction, incident or breakdown etc.

**⚠ WARNING**

All persons that are in the vicinity of the truck must be instructed regarding these risks that arise through use of the truck.

In addition, we draw attention to the safety regulations in these operating instructions.

Risks can include:

- Escape of consumables due to leakages, rupture of lines and containers etc.
- Risk of accident when driving over difficult ground such as gradients, smooth or irregular surfaces, or with poor visibility etc.
- Falling, tripping etc. when moving on the truck, especially in wet weather, with leaking consumables or on icy surfaces
- Fire and explosion risks due to batteries and electrical voltages
- Human error resulting from failure to observe the safety regulations,
- Unrepaired damage or defective and worn components,
- Insufficient maintenance and testing
- Use of incorrect consumables
- Exceeding test intervals

The manufacturer is not held responsible for accidents involving the truck caused by the failure of the operating company to comply

with these regulations either intentionally or carelessly.

### Stability

The stability of the truck has been tested to the latest technological standards and is guaranteed provided that the truck is used properly and according to its intended purpose. These standards only take into account the dynamic and static tipping forces that can arise during specified use in accordance with the operating rules and intended purpose. However, the danger of exceeding the moment of tilt due to improper use or incorrect operation and losing stability can never be excluded.

The loss of stability can be avoided or minimised by the following actions:

- Always secure the load against slipping, e.g. by lashing.
- Always transport unstable loads in suitable containers.
- Always drive slowly when cornering.
- Drive with the load lowered.
- Even with sideshifts, align the load as centrally as possible with the truck and transport in this position.
- Avoid turning and diagonally driving across slopes or gradients.
- Never have the load facing downhill when travelling on slopes or gradients.
- Pick up only loads of the approved width.
- Always take great care when transporting suspended loads.
- Do not drive over ramp edges or steps.

## Special risks associated with using the truck and attachments

Approval from the manufacturer and attachment manufacturer must be obtained each time the truck is used in a manner that falls outside the scope of normal use, and in cases where the driver is not certain that he can

use the truck correctly and without the risk of accidents.

## Overview of hazards and countermeasures

**NOTE**

*This table is intended to help evaluate the hazards in your facility and applies to all drive types. It does not claim to be complete.*

– Observe the national regulations for the country in which the truck is being used.

| Hazard | Course of action | Check note<br>√ done<br>- Not applicable | Notes |
|---|---|---|---|
| Truck equipment does not comply with local regulations | Testing | O | If in doubt, consult the responsible factory inspectorate or employers' liability insurance association |
| Driver's lack of skills or qualifications | Driver training (sit-on and stand-on) | O | DGUV principle 308-001<br>VDI 3313 driver's licence |
| Usage by unauthorised persons | Access with key only for authorised persons | O | |
| Truck not safe for operation | Periodic inspection and rectification of defects | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| Risk of falling when using working platforms | Compliance with national regulations (different national laws) | O | German Ordinance on Industrial Safety and Health (BetrSichV) and employer's liability insurance associations |
| Impaired visibility due to load | Application planning | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| Contamination of breathable air | Assessment of diesel exhaust gases | O | Technical Regulations for Hazardous Substances (TRGS) 554 and the German Ordinance on Industrial Safety and Health (BetrSichV) |
| | Assessment of LPG exhaust gases | O | German threshold limit values list (MAK-Liste) and the German Ordinance on Industrial Safety and Health (BetrSichV) |

| Hazard | Course of action | Check note<br>√ done<br>- Not applicable | Notes |
|---|---|---|---|
| Impermissible usage (improper usage) | Provide operating instructions | O | German Ordinance on Industrial Safety and Health (BetrSichV) and German Health and labour protection law (ArbSchG) |
| | Written notice of instruction to driver | O | German Ordinance on Industrial Safety and Health (BetrSichV) and German Health and labour protection law (ArbSchG) |
| | German Ordinance on Industrial Safety and Health (BetrSichV), observe the operating instructions | O | |
| When fuelling | | | |
| a) Diesel | German Ordinance on Industrial Safety and Health (BetrSichV), observe the operating instructions | O | |
| b) LPG | DGUV regulation 79, observe the operating instructions | O | |
| When charging the drive battery | German Ordinance on Industrial Safety and Health (BetrSichV), observe the operating instructions | O | VDE 0510-47<br>(= DIN EN 62485-3): In particular<br>- Ensure adequate ventilation<br>- Insulation value within the permissible range |
| When using battery chargers | German Ordinance on Industrial Safety and Health (BetrSichV), DGUV rule 113-001 and observe the operating instructions | O | German Ordinance on Industrial Safety and Health (BetrSichV) and DGUV rule 113-001 |
| When parking LPG trucks | German Ordinance on Industrial Safety and Health (BetrSichV), | O | German Ordinance on Industrial Safety and Health (BetrSichV) and DGUV rule 113-001 |

| Hazard | Course of action | Check note<br>√ done<br>- Not applicable | Notes |
|---|---|---|---|
| | DGUV rule 113-001 and observe the operating instructions | | |
| When operating driverless transport systems | | | |
| Roadway quality inadequate | Clean/clear roadways | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| Loading equipment incorrect/slipped | Reposition load on pallet | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| Unpredictable driving behaviour | Employee training | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| Routes blocked | Mark routes<br>Keep roadways clear | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| Routes intersect | Announce right-of-way rule | O | German Ordinance on Industrial Safety and Health (BetrSichV) |
| No person detection when placing goods into stock and removing goods from stock | Employee training | O | German Ordinance on Industrial Safety and Health (BetrSichV) |

## Danger to employees

According to the German Ordinance on Industrial Safety and Health (BetrSichV) and labour protection law (ArbSchG), the operating company must determine and assess hazards during operation, and establish the labour protection measures required for employees (BetrSichVO). The operating company must therefore draw up appropriate operating instructions (§ 6 ArbSchG) and nominate a person who is responsible for these operating instructions. Drivers must be informed of the operating instructions that apply to them.

**NOTE**

*Please note the definition of the following responsible persons: "operating company" and "driver".*

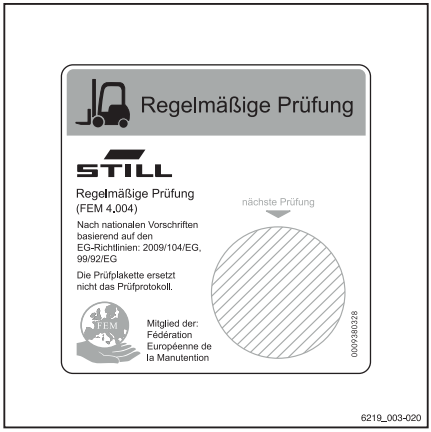
The design and equipment of the truck comply with the standards and directives required for CE conformity. The design and equipment also comply with the standards and directives necessary for the UKCA compliance that is required in the United Kingdom. The design and equipment are therefore not part of the required scope of the hazard assessment. The same applies to attachments with their own CE labelling and UKCA labelling. The operating company must, however, select the type and equipment of the trucks so as to comply with the local provisions for deployment.

The result of the hazard assessment must be documented (§ 6 ArbSchG). In the case of truck applications involving similar hazard situations, the results may be summarised. Refer to the chapter entitled "Overview of hazards and countermeasures", which provides advice on complying with this regulation. The overview specifies the primary hazards that, in the event of non-compliance, are the most frequent causes of accidents. If other major hazards are present as a result of the specific operating conditions, these hazards must also be taken into consideration.

The conditions of use for trucks are broadly similar in many plants, so the hazards can be summarised in one overview. Observe the information provided by the relevant employers' liability insurance association on this subject.

# Safety tests

## Carrying out regular inspections on the truck ▷




The operating company must ensure that the truck is checked by a specialist at least once a year or after particular incidents.

As part of this inspection, the technical condition of the truck must be completely tested with regard to accident safety. In addition, the truck must be thoroughly checked for damage that may have been caused by improper use. A test log must be created. The results of the inspection must be retained at least until a further two inspections have been carried out.

The inspection date is indicated by an adhesive label on the truck.

– Arrange for the authorised service centre to perform regular testing on the truck.
– Observe the guidelines for tests carried out on the truck in accordance with FEM 4.004.

The operating company is responsible for ensuring that any defects are remedied without delay.

– Notify your authorised service centre.

**NOTE**

*In addition, observe the national regulations for the country of use.*

## Insulation testing

The insulation of the truck must have sufficient insulation resistance. For this reason, insulation testing in accordance with DIN EN 1175 and DIN 43539, VDE 0117 and VDE 0510 must be conducted at least once yearly as part of the FEM testing.

The insulation testing results must be at least the test values given in the following two tables.

– For insulation testing, contact the authorised service centre.

The exact procedure for this insulation testing is described in the workshop manual for this truck.

**NOTE**

*The truck's electrical system and drive batteries must be checked separately.*

### Test values for the drive battery

| Component | Recommended test voltage | Measurements | | Nominal voltage $U_{Batt}$ | Test values |
|---|---|---|---|---|---|
| Battery | 50 VDC | Batt+<br>Batt- | Battery tray | 24 volts | > 1200 Ω |
| | 100 VDC | | | 48 volts | > 2400 Ω |
| | 100 VDC | | | 80 volts | > 4000 Ω |

### Test values for the entire truck

| Nominal voltage | Test voltage | Test values for new trucks | Minimum values over the duration of the service life |
|---|---|---|---|
| 24 volts | 50 VDC | Min. 50 kΩ | > 24 kΩ |
| 48 volts | 100 VDC | Min. 100 kΩ | > 48 kΩ |
| 80 volts | 100 VDC | Min. 200 kΩ | > 80 kΩ |

# Safety regulations for handling consumables

## Permissible consumables

**⚠ WARNING**

Consumables can be dangerous.

It is necessary to follow the safety regulations when handling these substances.

Refer to the maintenance data table for the permissible substances necessary for operation.

## Oils

**⚠ DANGER**

**Oils are flammable!**

- Follow the statutory regulations
- Do not allow oils to come into contact with hot motor parts.
- No smoking, fires or flames!

**⚠ DANGER**

**Oils are toxic!**

- Avoid contact and consumption
- In case of inhalation of steam or fumes, breathe fresh air immediately.
- After contact with the eyes, rinse thoroughly with water (for at least 10 minutes) and then consult an eye specialist.
- If swallowed, do not induce vomiting. Seek immediate medical attention.

**⚠ WARNING**

Prolonged intensive contact with the skin can result in loss of skin oils and cause irritation.

- Avoid contact and consumption.
- Wear protective gloves!
- After any contact, wash the skin with soap and water and then apply a skin care product.
- Immediately change soaked clothing and shoes.

**⚠ WARNING**

There is a risk of slipping on spilled oil, particularly when combined with water!

- Collect spilled oil immediately using an oil-binding agent and dispose of it in accordance with regulations.

**ENVIRONMENT NOTE**

Oils are water pollutants!

Always store oil in containers that comply with the applicable regulations.

Avoid spilling oils.

Collect spilt oil immediately using an oil binding agent and dispose of it in accordance with regulations.

Dispose of old oils according to the applicable regulations.

## Hydraulic fluid

**⚠ WARNING**

During operation of the forklift truck, hydraulic fluids are pressurised and are hazardous to your health.

- Do not spill these fluids!
- Follow the statutory regulations
- Do not allow the fluids to come into contact with hot motor parts.
- Do not allow to come into contact with the skin.
- Avoid inhaling the spray
- Penetration of pressurised fluids into the skin is particularly dangerous if these fluids escape at high pressure due to leaks in the hydraulic system. In case of such injury, seek medical advice immediately.
- To avoid injury, use appropriate personal protective equipment (e.g. protective gloves, industrial goggles, skin protection and skin care products).

**ENVIRONMENT NOTE**

Hydraulic fluid is a water-polluting substance!

Always store hydraulic fluid in containers complying with the regulations.

Avoid spilling.

Spilt hydraulic fluid should be removed with oil-binding agents at once and disposed of according to the regulations.

Dispose of old hydraulic fluid according to regulations.

## Disposal of consumables

**ENVIRONMENT NOTE**

*Materials that have to be disposed of following maintenance, repair and cleaning must be systematically collected and disposed of in accordance with regulations. Observe the national regulations for your country. Work may only be carried out in areas designated for this purpose. Take care to minimise, as far as possible, any impact on the environment.*

- Any spillage of fluids such as hydraulic oil, brake fluid or gear lubricant oil must be immediately soaked up with an oil-binding agent.
- The regulations for disposal of used oil are applicable.
- Any spillage of battery acid must be neutralised immediately.

# EMC – Electromagnetic compatibility

Electromagnetic compatibility (EMC) is a key quality feature of the truck.

EMC involves

- limiting the emission of electromagnetic interference to a level that ensures the troublefree operation of other equipment in the environment.
- ensuring sufficient resistance to external electromagnetic interference so as to guarantee proper operation at the planned usage location under the electromagnetic interference conditions to be expected there .

An EMC test thus firstly measures the electromagnetic interference emitted by the truck and secondly checks it for sufficient resistance to electromagnetic interference with reference to the planned usage location . A number of electrical measures are taken to ensure the electromagnetic compatibility of the truck .

**⚠ CAUTION**

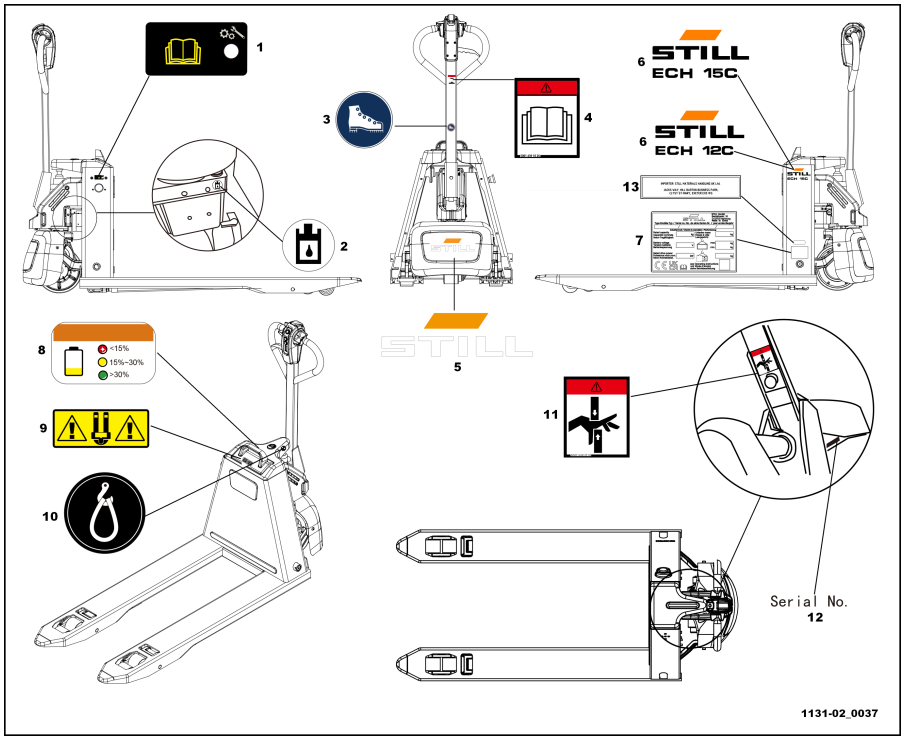
The EMC regulations for the truck must be observed.

When replacing truck components the protective EMC components must be installed and connected again.

# 3

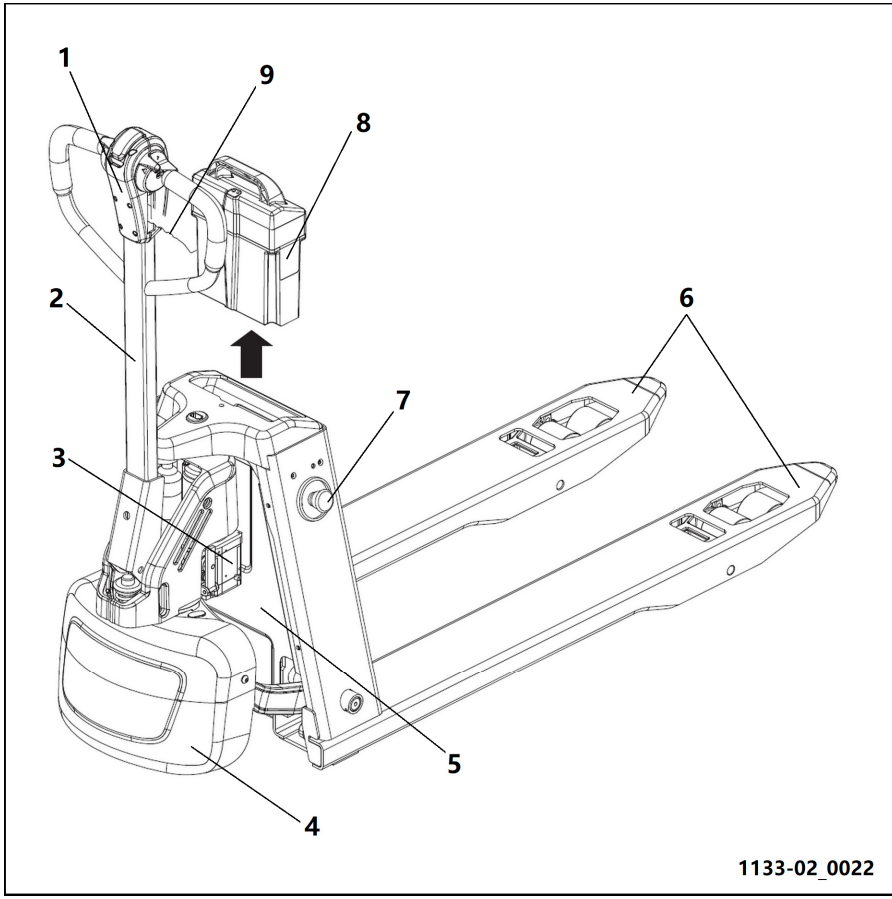
# Views

# Safety devices and warning labels



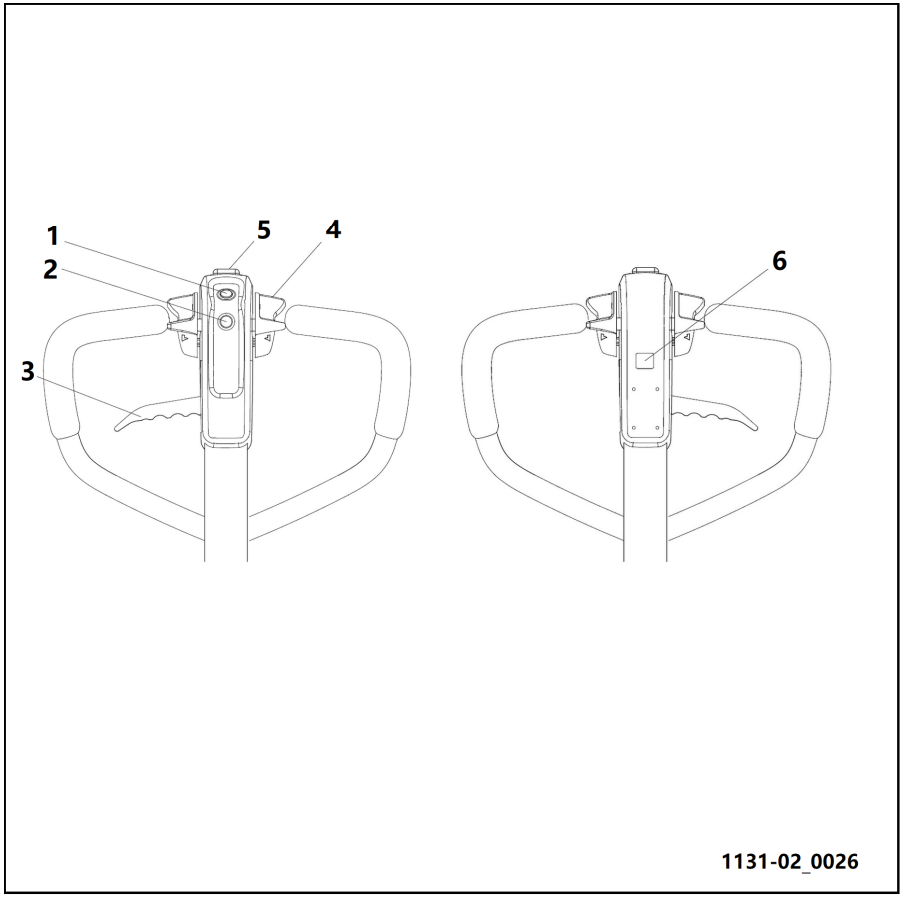

| | |
|---|---|
| 1 | "Instructions" label |
| 2 | "Filler port" label |
| 3 | "Foot protection" label |
| 4 | "Instructions" label |
| 5 | "STILL" label |
| 6 | "Pallet truck model" label |
| 7 | "Identification plate" label |
| 8 | "Battery indicator" label |
| 9 | "Battery wrong insertion" label |
| 10 | "Slinging" label |
| 11 | "Anti-pinch" label |
| 12 | Serial No. |
| 13 | "Importer" label (for UK) |

# Overview of main components_plug model




| | | | |
|---|---|---|---|
| 1 | Operating handle | 6 | Fork |
| 2 | Joystick | 7 | Emergency off switch |
| 3 | Hydraulic station | 8 | Lithium-ion battery |
| 4 | Drive wheel | 9 | Handle |
| 5 | Baffle | | |

# Control handle_plug model



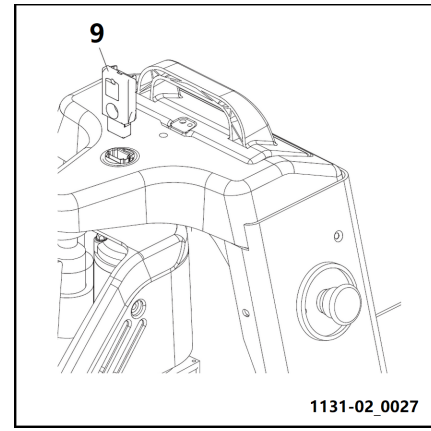

| | | | |
|---|---|---|---|
| 1 | Horn button | 4 | Drive switch |
| 2 | Lifting button | 5 | Emergency reverse button |
| 3 | Manual lowering button | 6 | Creep speed button |

## Key switch

Turns the control current on and off.

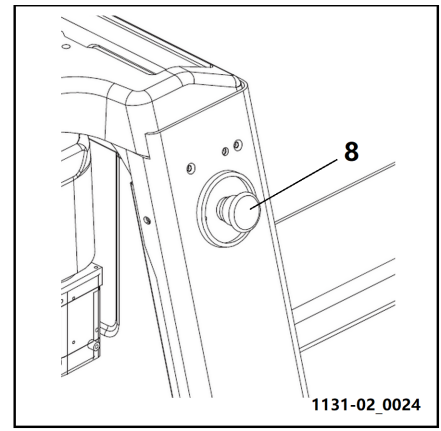
– Insert the key switch(9) to turn on the truck's power supply.

– Remove the key switch (9) to turn off the truck's power supply.



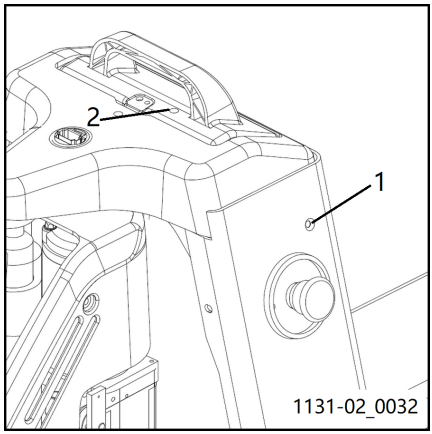

## Emergency off switch

The vehicle's electrical system circuits will be disconnected when you press this switch (8). All electrical functions will be stopped and the vehicle will be forced to perform an emergency stop.



# Indicator light

The charging indicator (1)displays the following different states:




| Charging indicator | | |
|---|---|---|
| Display | Description | Malfunction analysis |
| Red light remains lit | Charger is charging | Normal status |

Power display light (2)normal status display:

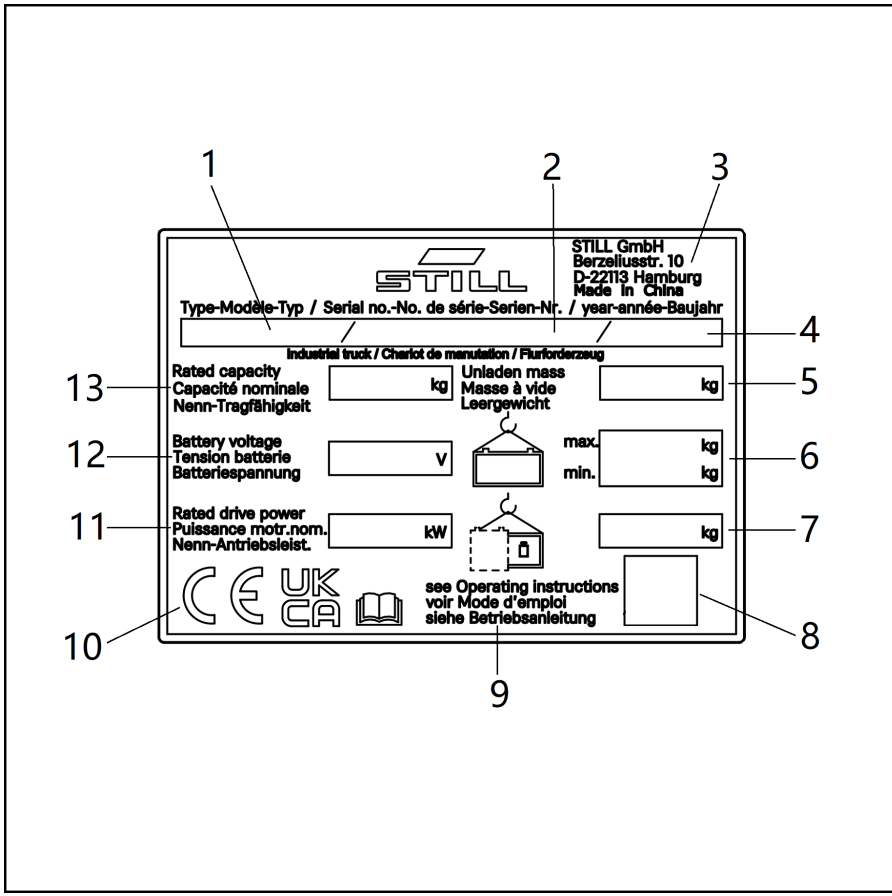
| Name | **LED** colour | Parameter value |
|---|---|---|
| Remaining charge on standard battery | Green | 60-100% |
| | Yellow | 30%-60% |
| | Constantly illuminated in red | 15-30% |
| | Flashing red | 0-15% |

If the control unit detects a battery malfunction, the power display light (2)will flash with an error code until the malfunction is eliminated.

**NOTE**

*Please see the chapter "Troubleshooting" , This chapter is intended to help users identify and eliminate simple faults or problems caused by operational errors.*

# Identification plate




| | | | |
|---|---|---|---|
| 1 | Type | 10 | Conformity marking:<br>**CE mark** for the markets of the EU, the EU candidate countries, the EFTA States and Switzerland<br>**UKCA mark** for the United Kingdom market<br>**EAC mark** for the Eurasian Economic Union market |
| 2 | Serial number | | |
| 3 | Manufacturer | | |
| 4 | Year of manufacture | | |
| 5 | Unladen mass in kg | | |
| 6 | permissible battery weight in kg (for electric trucks only) Max./Min. | | |
| 7 | Own mass (self weight) in kg without battery | 11 | Rated drive power in kW |
| 8 | Data matrix code | 12 | Battery voltage in V |
| 9 | Refer to technical data listed in this operating instructions for more detailed information | 13 | Rated capacity |

**NOTE**

- *It is possible for there to be multiple conformity markings on the nameplate.*
- *The EAC mark may also be located in the immediate vicinity of the nameplate.*

# 4

# Operation

# Operating instructions

This series of truck is suitable for transporting goods over a level surface. The pallet can be open or with horizontal slats and may protrude outwards.

Ambient temperature for usage:

– Suitable for temperatures between 5°C and 40°C.

– If the truck is in used for long periods in environments under 5°C, in freezers or in places with extreme changes in temperature and humidity, then additional special equipment must be installed with permission from the manufacturer.

**NOTE**

The floor surface must be dry, clean and level.

For braking and stability reasons, the maximum permissible gradient over short distances is limited to 16% unladen and 6% laden.

The pallet truck can only carry pallets up to a maximum weight of 1500 kg evenly distributed on the forks. For uses other than those specified above, contact an authorised dealer.

**⚠ CAUTION**

The pallets used must be in good condition.

**⚠ WARNING**

Risk of serious injury and/or major equipment damage.

Always drive in accordance with the floor conditions (uneven floor, etc.), especially in the case of hazardous work areas and hazardous loads.

**⚠ CAUTION**

Equipment wear or damage

To avoid scraping the bottom of the lifting system on the floor, keep the forks raised before starting.

**⚠ CAUTION**

Equipment wear or damage

The driver must turn off the ignition and remove the key before leaving the pallet truck.

**⚠ DANGER**

**Equipment wear or damage**

Safety shoes must be worn to provide effective protection.

**⚠ WARNING**

Risk of serious injury and/or major equipment damage.

Place both hands on the tiller and turn off the power supply before touching moving parts and any equipment.

**⚠ WARNING**

Risk of serious injury and/or major equipment damage.

To prevent visibility being affected or completely obstructed during operation of the stacker, do not install or affix anything on the mast protection screen.

**⚠ DANGER**

**Fatal crushing hazard!**

The fork carriage must be at its lowest position when carrying out any work on the protection screen (cleaning, replacement, etc.).

**⚠ CAUTION**

Equipment wear or damage

The driver is not permitted to sit on the dashboard/battery cover.

**⚠ WARNING**

Risk of serious injury and/or major equipment damage.

Before driving forwards or backwards, carefully check in the direction of travel to ensure that it is safe to proceed.

**⚠ CAUTION**

Equipment wear or damage

To ensure the safety of the driver, the pallet truck must not be used in the vicinity of forklift trucks.

**⚠ CAUTION**

Equipment wear or damage

To prevent feet from being crushed by the load or forks, keep a safe distance from other people when lowering the forks.

## Checks before first commissioning

**⚠ WARNING**

The truck can only be driven by battery power!

After the truck has arrived or been transported, you must perform the following checks before putting it into use:

– Check whether the equipment is intact and in good condition.

– Check whether the hydraulic system is in good condition.

– If the truck does not yet have a battery installed, you must install a battery, making sure not to damage the battery cables.

– Recharge the battery.

If the truck is parked for too long, the wheels may become slightly flattened where they touch the ground. The flat areas will automatically return to their former condition after the truck is driven for a short time.

## Break-in period precautions

During the initial stage of putting the truck into use, it should be operated with low loads. Within the first 100 hours in particular, the following requirements should also be met:

– Excessive discharge of a new battery during initial use must be prevented.It should generally be charged promptly when at 20%.

– The specified preventive maintenance must be done thoroughly.

– Avoid sudden braking, driving quickly or sharp turns.

– Change oil or lubricant promptly according to the instructions.

– Limit the load weight to 70-80% of the rated load.

**⚠ CAUTION**

When the truck is in the running-in stage (approx. 100 hours of operation), the equipment user should check the fastening of the wheel nuts and bolts and refasten them if necessary.

## Daily inspection

This chapter describes pre-shift checks before putting the truck into operation.

Daily inspection is effective to find the malfunction or fault on this truck. Check the truck on the following points before operation.

Remove load from truck and lower the forks.

**⚠ CAUTION**

Risk of injury.

Don't use the truck if any malfunction is found.

- Check for scratches, deformation or cracks.
- Check if there is any oil leakage from the cylinder.

- Check the vertical creep of the truck.
- Check the smooth movement of the wheels.
- Visually inspect the battery.
- Check that all operation buttons of the tiller operate correctly.
- Check display equipment, alarm system and safety devices.
- Check the chassis frame and apply grease as required. Check the position reset function of the operating handle.
- Check the function of the emergency brake by activating the emergency button.
- Check, the tiller arm-switch braking function
- Check the lifting and lowering functions by operating the buttons.
- Visually inspect the bolts and nuts.
- Visually inspect if there are any broken hoses or broken electric wires.

## Lithium-ion battery routine inspection

**⚠ CAUTION**

The following items should be checked every day.

| Daily inspection items / Additional servicing work to be performed every 1000 hours or every 6 months. | Troubleshooting |
|---|---|
| Liquid leakage and corrosion at the charging/discharging contacts at the bottom of the battery | Stop using the battery and handle in accordance with the chapter "Instructions on storing and handling faulty batteries". |
| Signs of liquid leakage at the bottom of the battery | |
| Case broken | |
| Swollen battery | |
| Contacts burnt | Contact your authorised dealer to replace the contacts. |

# Drive system

## Driving, steering and braking

**NOTE**

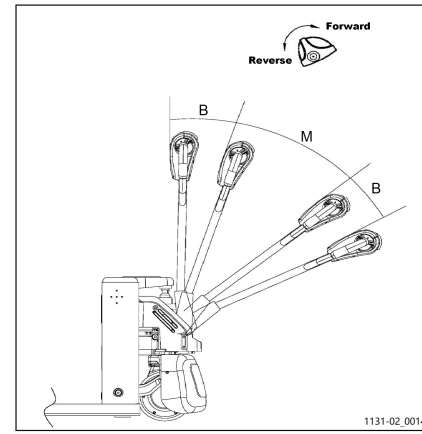
*Before driving the truck, make sure that all covers are closed.*

**⚠ CAUTION**

When using the vehicle on an incline or uneven surface, raise the forks to prevent the bottom of the forks scraping against the ground.

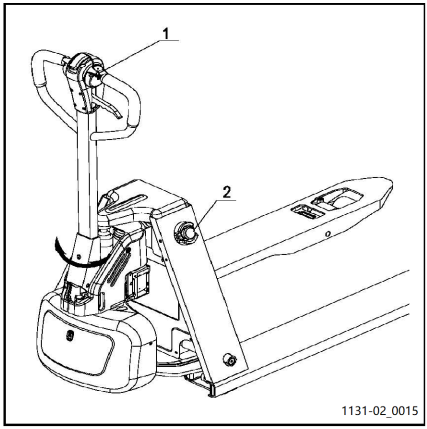
### Driving

Place the drive handle in the driving area (M) and place the drive switch in the desired direction of travel (forward or reverse). When there is a large angle of rotation, the speed will also be correspondingly large.



## Steering

– Turn the operating handle (1) left or right according to the desired direction. ▷




## Braking

### Emergency stop

– Press the emergency off switch (2). All electrical functions will be interrupted.

### Forced braking

Releasing the operating handle will force the brakes. The operating handle will automatically move to the upper braking position (B). Alternatively, the brake can be forced by pressing the operating handle down to the lower braking position (B).

**⚠ CAUTION**

If the operating handle moves into the braking position slowly, identify the cause and rectify the fault.

### Regenerative braking

Release the drive switch. The drive switch will automatically return to the initial position (speed is 0). The vehicle will enter the regenerative braking state and slow down. When it decelerates to less than 1 km/h, the brake will bring the motor to a stop.

**⚠ CAUTION**

Activate the drive switch. If the drive switch cannot quickly return to the initial position, or resets very slowly, identify the cause and rectify the fault. Replace the handrail elbow if necessary.

### Reverse brake

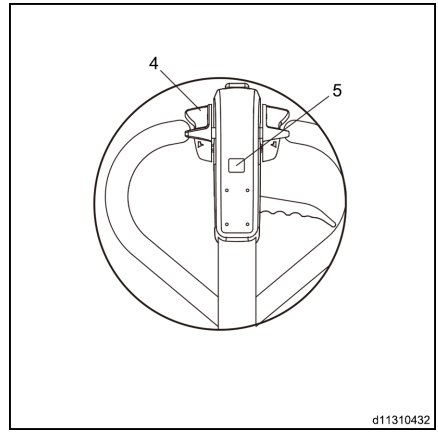
Turning the drive switch to the opposite direction while travelling brakes the truck by reverse current until it starts moving in the opposite direction.

**⚠ CAUTION**

In a dangerous situation, the driver can apply forced braking by placing the operating lever in the braking position, or by using reverse braking, depending on the actual situation.

## Creep speed switch

– Keeping the handle in the vertical position, simultaneously press the drive switch (4) and the creep speed switch (5); the truck will reduce its speed to 20% of the maximum speed.




## Using the truck on a slope

**NOTE**

*Incorrect use of the truck on slopes is not recommended. It places particular stress on the traction motor, brakes and battery.*

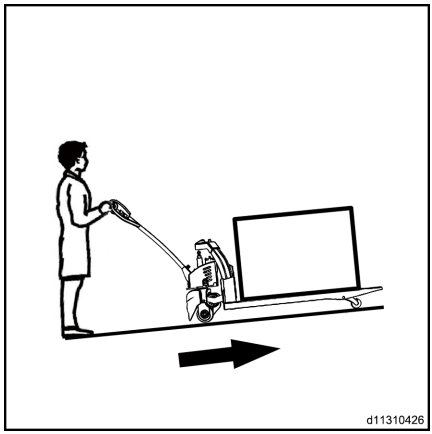
Be particularly careful near slopes:

- Never attempt a slope with a gradient greater than that specified in the truck's datasheet.
- Make sure that the ground is dry with a non-slip surface and that the route is clear.

## Ascending slopes

Always ascend slopes travelling in the reverse direction, with the load facing uphill.

Without a load, we recommend that you ascend slopes forwards.

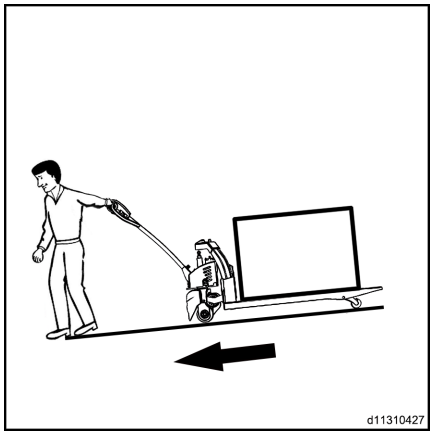



## Descending slopes

Travel down slopes must always be forwards, with the load uphill.

Without a load, it is recommended to descend slopes forwards.

In all cases, travel at a very low speed and brake very gradually.




**⚠ DANGER**

**Risk to life and/or risk of major equipment damage.**

Never park the truck on a ramp. Never make a U-turn or take shortcuts on a ramp. On a slope, the operator must drive very slowly.

**⚠ WARNING**

Risk of serious injury and/or serious damage to equipment

Since braking force is limited, a laden truck can climb a smooth gradient of 6% or less. An unladen truck can climb a smooth gradient of 16% or less.

## Starting on a slope

If you have to stop and then start on slope, proceed as follows:

– Stop on the slope by pressing the accelerator in the opposite direction until the machine comes to a standstill.

– Return the accelerator to the neutral position, then release the accelerator control button to apply the parking brake.
– To restart, press the accelerator button for the desired direction.
– The truck will move off.

# Load handling

## Picking up and storing goods

**NOTE**

*Loads that are not positioned and secured in accordance with the regulations pose an accident risk.*

- *Instruct all personnel to vacate the truck's hazard area. If any person is located in the hazard area, stop the truck immediately.*
- *Only transport loads that have been positioned and secured in accordance with regulations. Adopt appropriate protective measures if the load is at risk of tipping over or falling during transport.*
- *You must not transport goods using damaged transportation tools (such as trucks, pallets etc.).*
- *Never go under raised load-bearing components.*
- *Personnel are prohibited from entering load components.*
- *You must not use the truck to lift personnel.*
- *Try to move the forks until they are completely under the goods.*

**⚠ CAUTION**

Before picking up a load, the operator must ensure that it has been correctly stacked.

The weight of the load must not exceed the truck's rated load capacity.

Do not place long loads sideways across the forks.

### Lifting

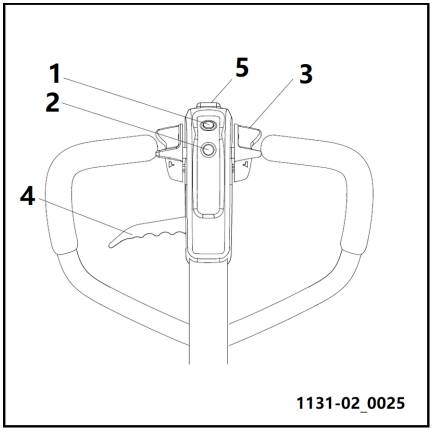
– Push the lifting button (2) until the desired lifting height is reached, then release the button.

**Lowering**

– Pull the lowering handle (4) upwards until the load-bearing component reaches the bottom, then release the button.

**⚠ CAUTION**

To avoid shortening the service life of the cylinder, try not to raise the forks to maximum height when lifting.



# Safety guidelines for handling loads

**⚠ WARNING**

Closely observe the following instructions before picking up loads.Never touch or stand on moving parts of the truck (e.g. lifting devices, equipment for picking up loads).

**⚠ WARNING**

Risk of crushing hands and feet when using the lift.

When using the lift, keep hands and feet away from moving parts.

**⚠ DANGER**

**It is not permitted to walk under the forks. It is not permitted to transport or lift people on the forks.**

If there are people under or on top of the forks, do not move the truck. Do not move the forks and do not drive the truck.

**⚠ DANGER**

**Risk of accident when forks are changed:**

If the forks are changed and a different type of forks to the original forks is fitted, the residual load capacity changes.

When forks are changed, a new residual capacity plate must be affixed.

If a truck is supplied without forks, the residual capacity plate for standard forks is affixed.(See chapter "Technical Datasheet")

**⚠ DANGER**

**Wear protective footwear. Always keep a suitable distance between your feet and the truck.**

Risk of crushing feet when manoeuvring the truck.

**⚠ CAUTION**

The transport of persons or passengers is strictly prohibited.

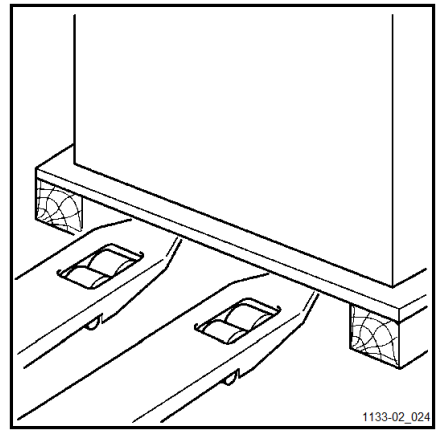
**⚠ CAUTION**

Be especially careful not to collide with adjacent loads.

The load must be properly positioned to prevent collisions in narrow aisle spaces.

# Loading

## Loading




**⚠ CAUTION**

Before lifting a load, ensure that its weight does not exceed the truck's maximum load capacity.

– Refer to the rated load capacity specified on the truck's identification plate.
– Ensure that the load is stable and uniform to prevent any partial spillage.
– Check that the width of the load is compatible with the width of the forks.

**⚠ DANGER**

**It is mandatory to wear safety footwear for pedestrian mode driving.**

**⚠ WARNING**

Transporting people is strictly prohibited.

**⚠ CAUTION**

Take care not to disturb any adjacent loads, or those which may be to the side or in front of the load being handled.

Loads should be laid out as follows:

– Line up loads with a small space between each one and its neighbour to avoid any fouling.

**⚠ CAUTION**

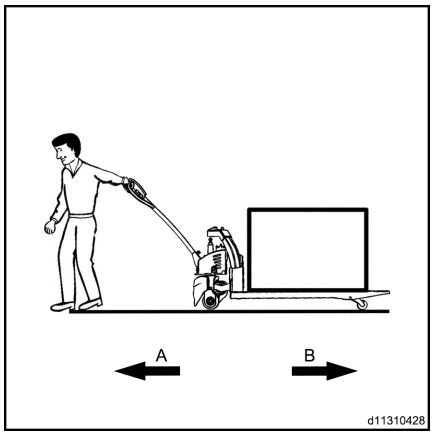
Only transport loads that have been positioned and secured in accordance with regulations.

Take appropriate protective measures if the load is at risk of tipping over or falling during transport.

– Approach the load carefully.
– Adjust the height of the forks until they can be easily inserted into the pallet.
– Insert the forks under the load.
– If the load is shorter than the forks, position the forks so that the front of the load overhangs them by a few centimetres, to avoid interference with the load immediately ahead.

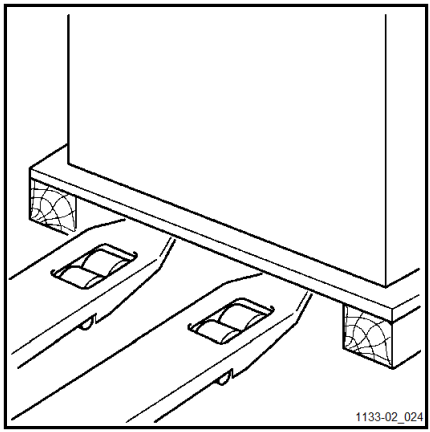
– Raise the load a few centimetres above its support.
– Back the truck away from the stack or any neighbouring loads, gently and in a straight line.

## Transporting loads




– Always carry loads in the forward direction of travel (A) in order to have the best visibility.
– When carrying a load on a slope, always ascend or descend with the load uphill.Never drive sideways across a slope or perform a U-turn.
– Reverse travel (B) is to be used solely for unloading.Since visibility is reduced when travelling in this direction, drive only at very slow speed.

## Unloading

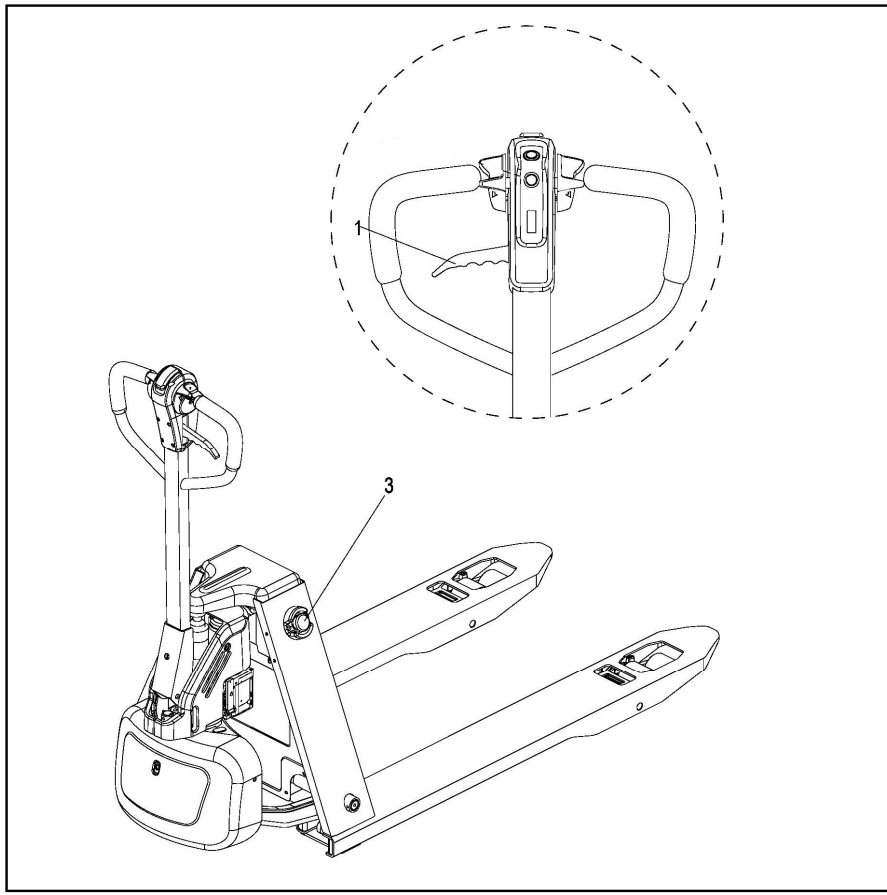



– Carefully drive the truck to the desired location.
– Carefully drive the truck to the unloading area.
– Lower the load until the fork arms are free from the pallet.
– Back the truck away in a straight line.
– Raise the forks to mid-height.

**⚠ CAUTION**

Take care not to disturb any adjacent loads, or those which may be to the side or in front of the load being handled.

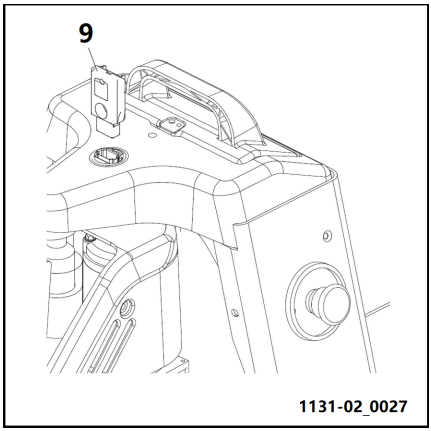
# Parking the vehicle safely




Whenever you leave the truck, it must be parked correctly, even if you only intend to leave it for a short time.

– Pull the lowering lever (1). Lower the load-bearing component.
– Fully lower the forks.
– Press the emergency off switch (3).

– Remove the key switch(9) to turn off the power. ▷




**⚠ WARNING**

You must always park the truck according to regulations.

Never park the truck on an incline. The load-bearing component must be completely lowered.

## Hoisting the Truck

This section explains the attachment of lifting equipment to the truck for the purpose of hoisting. Many methods of rigging to a crane or hoist are possible. Explanation of such methods as well as operation of lifting equipment is outside the scope of this manual. Both the attachment of lifting equipment to the truck and the hoisting operation itself must be performed by personnel experienced in rigging.

**⚠ DANGER**

**Danger to life!**

Personnel must not stand below or near the truck when the pallet truck is being lifted.

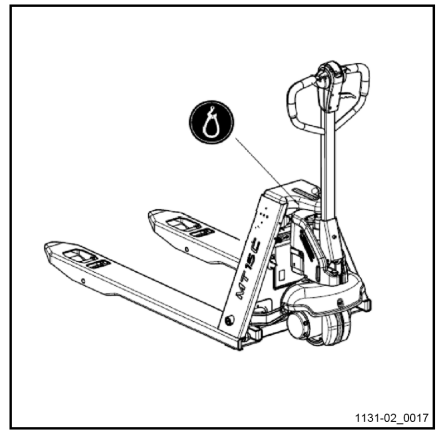
**⚠ WARNING**

Lifting equipment of insufficient capacity can fail and cause severe injury or death.

Ensure that all lifting slings, hardware, or other equipment has sufficient capacity to carry the weight of the truck. Refer to the truck data plate for truck weight. If a battery is installed, its weight must be added to the truck weight listed on the data plate.

– Switch the truck off and press the emergency stop button.

– Attach slings in the positions identified by the hook symbol. ▷

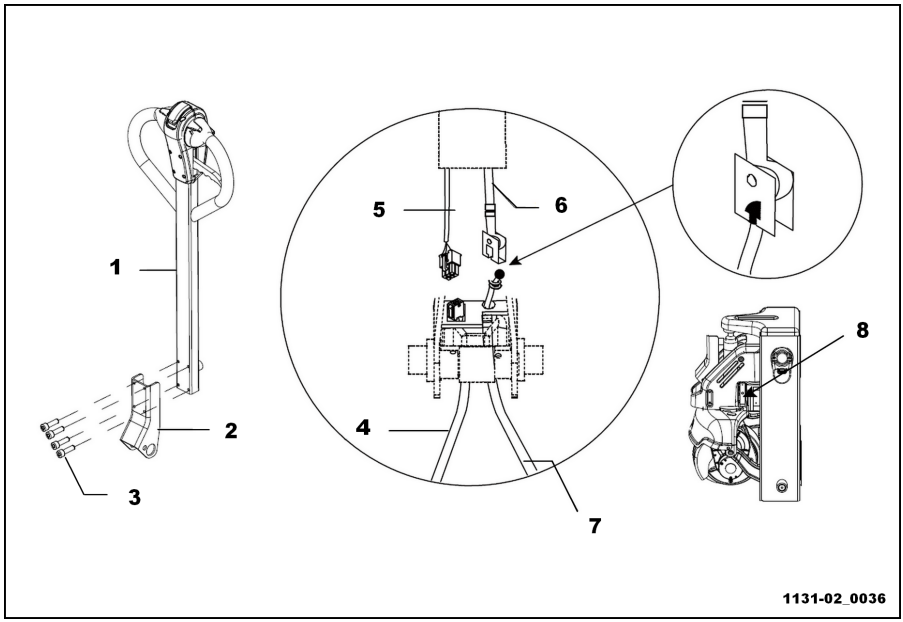



**⚠ CAUTION**

Risk of major equipment damage.

It is strictly forbidden to attach the lifting slings to the operating handle or to other points not intended for this purpose.

# Handle and handle lever installation




| | | | |
|---|---|---|---|
| 1 | Control handle | 5 | Bend wire |
| 2 | Bracket | 6 | Steel wire I |
| 3 | Screw | 7 | Steel wire II |
| 4 | Controller wire | 8 | Hand-operated value |

– Plug the connector of bend wire(5) into controller wire(4).

- First, touching hand-operated value(8).
- The steel wire II(7)rising up buckle end of the steel I(6)into the steel wire II(7)from manual.
- Release the steel wire II(7) and tighten the adjust screw(3).

# Battery Use and Maintenance

## Precautions for safely working on the battery

The truck must be parked correctly before carrying out work on the battery.

### Fire prevention measures

- Do not smoke or use open flames around the battery.
- Flammable substances and work equipment that may produce sparks must not be placed within 2 metres around the truck to be charged.
- The work location must have good ventilation.
- Fire-fighting equipment must be prepared.

### Preventing electric shock

Take note of the following two points for batteries with high voltage and power:

- Do not create a short-circuit.
- Keep tools away from the battery poles to prevent sparks or short circuits.

**NOTE**

*Metal or conductive objects must not be placed on top of the battery to prevent the battery from short circuiting.*

## Battery charging

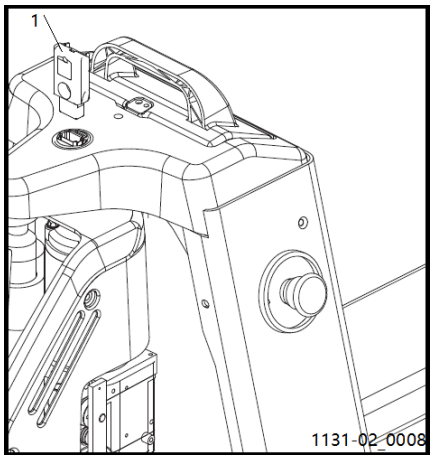
### Charging precautions

- The truck must be parked in a well-ventilated room.
- There must be no metal parts on the surface of the battery.
- Before starting charging, check all cable connections and plug connectors for obvious damage.

– Make sure that the charger is not connected to the circuit before connecting or disconnecting it.
– The safety regulations in the chapter "Battery charging" must be strictly observed.

### Charging procedure

– Ensure that charging requirements are complied with.
– Park the truck as specified.
– Remove the key switch (1) to turn off the power, and then take the plug-in lithium-ion battery out before charging. ▷




**⚠ CAUTION**

The charging voltage range is 100–240 V, 50–60 Hz. Do not exceed this voltage range.

**⚠ CAUTION**

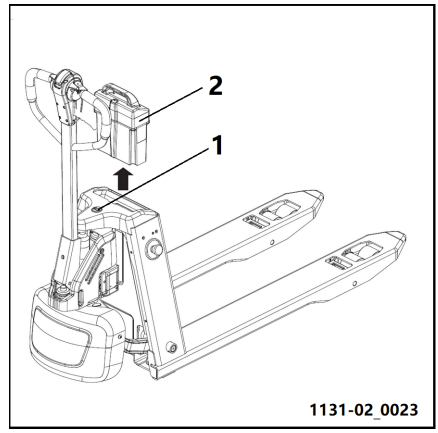
When charging and maintaining the battery, observe the manufacturer's maintenance instructions for the battery and battery charger.

## Disassembling and installing the battery

Before disassembling and installing the battery, you must raise the forks to the highest position and then turn off the truck's power supply.

Disassembly/installation steps:

– Remove the key switch (1) to turn off the power, and remove the lithium-ion battery (2).




**⚠ CAUTION**

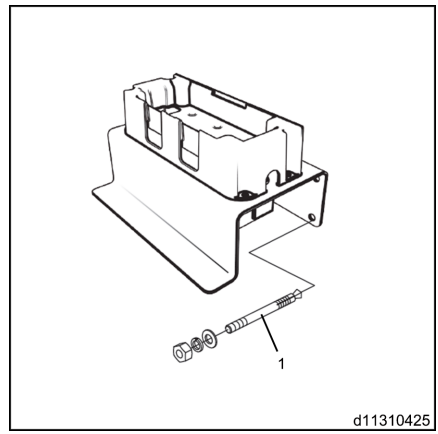
When removing the cables, put them aside carefully to avoid damaging them during the procedure.

Install the battery in reverse order, paying attention to the location where the battery is installed and whether the wiring is correct. Route the battery cable so that it is not trapped when the battery is inserted.

## Mounting the battery charger

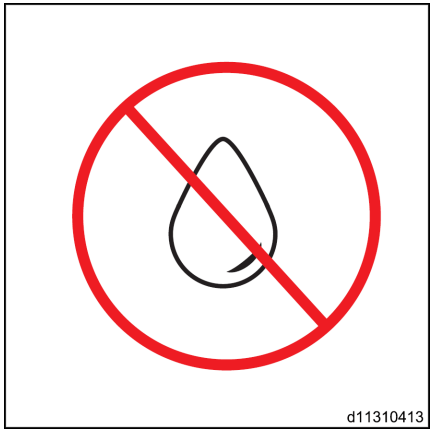
**NOTE**

*The charging stand can be secured to the wall using expansion screws (1).*



## Battery precautions

– Avoid the battery becoming corroded by water or corrosive liquid. ▷



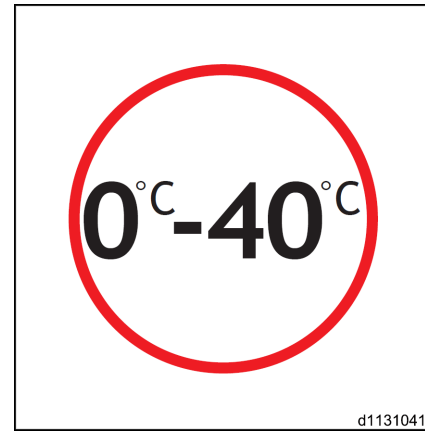

– Keep the battery away from all fire sources, heat sources and flammable or explosive materials. ▷

– Do not place the battery on top of conductive objects. ▷


**⚠ WARNING**

If this happens, the battery may leak, emit heat or smoke, which may lead to a serious fire or explosion.

– The charging environment temperature should be 0°C to 40°C. ▷

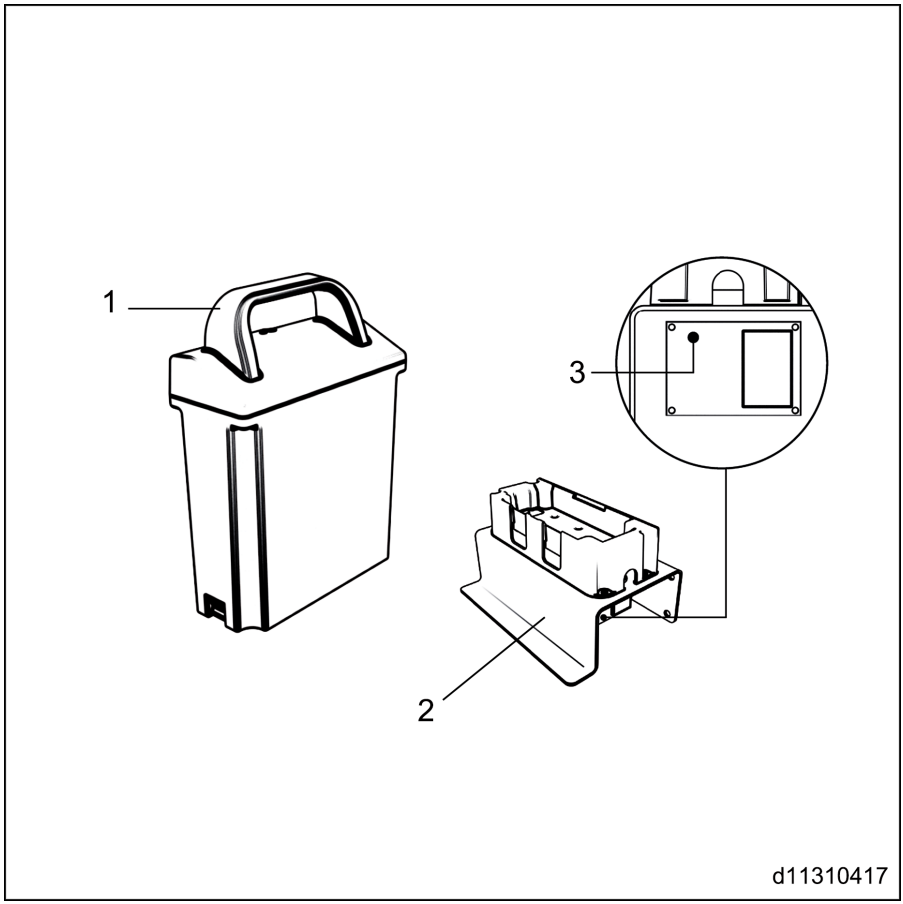



**⚠ WARNING**

If the battery fails, please contact an authorised dealer to have it repaired.

Do not disassemble the battery.

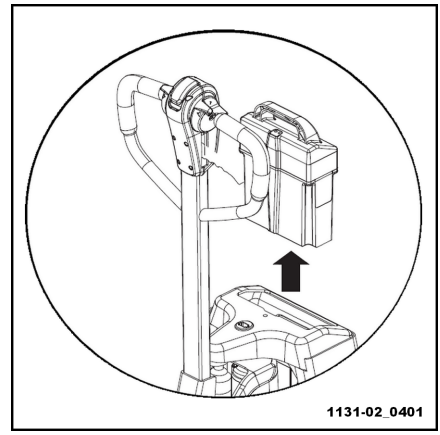
## Battery charger



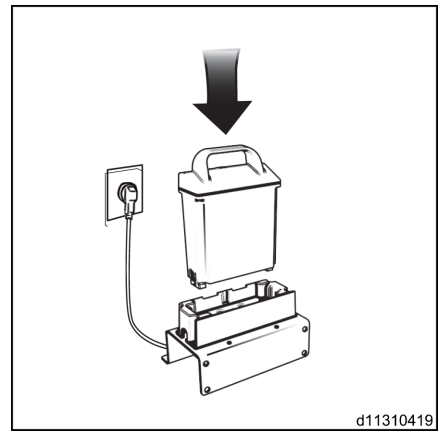

1 Battery
2 Charging stand
3 LED light

## Battery charger

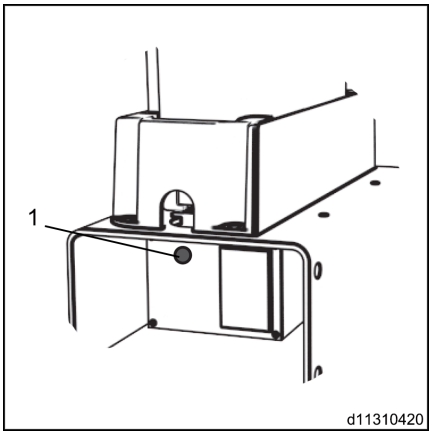
– Remove the battery. ▷




– Plug into charging stand and charge (110/220V 50/60HZ). ▷



– The LED light (1) comes on.




**NOTE**

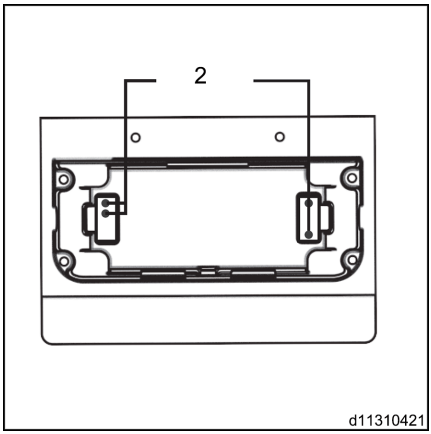
*LED light mode*

- *Charging:red LED light*
- *Fully charged:green LED light*
- *Charging fault:flashing yellow LED light*
- *Battery fault:steady yellow LED light*

**⚠ WARNING**

Before removing the battery, make sure the vehicle is completely powered off.

The figure on the right is a top view diagram of the charging contact pins (2).Correctly plug the battery into the charging stand.

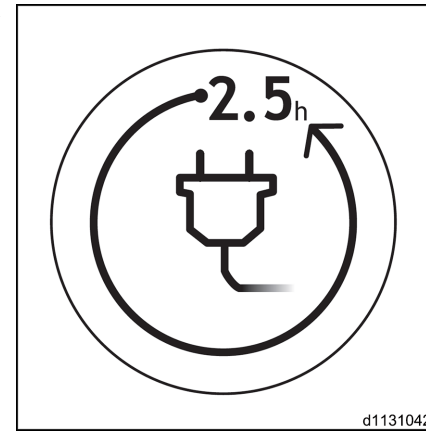



**NOTE**

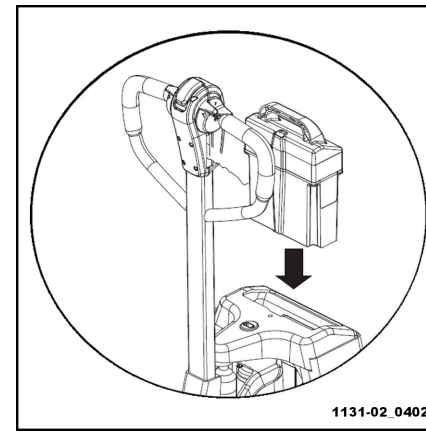
*If the battery is still not fully charged after five hours, contact an authorised dealer.*

### Charging complete

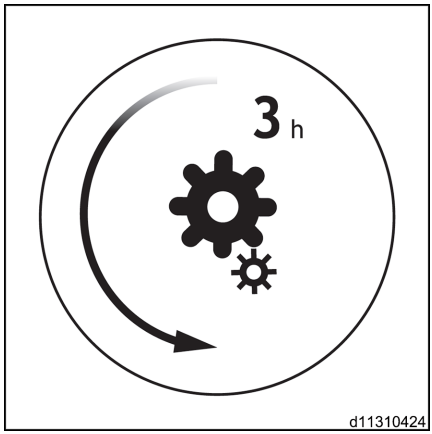
– The battery will take approximately 2.5 hours to fully charge at a voltage of 100–240 V AC. ▷




– Insert the battery into the vehicle's battery holder. ▷



– A fully charged battery can last for three hours of continuous use. ▷




**⚠ WARNING**

Before returning the battery to the vehicle, ensure that the vehicle is powered off.

**⚠ CAUTION**

Identify the positive and negative terminals according to the charging stand contact pins.

**NOTE**

*Due to the characteristics of lithium batteries, battery capacity is reduced in low-temperature environments.*

## Servicing the battery

### Never over-discharge the battery

– Never allow the battery charge to be depleted until the truck cannot move before recharging. This shortens the battery life.

– Once the low battery charge symbol appears, charge the battery immediately.

### Servicing the battery

The battery must be kept dry and clean. Terminals and cable lugs must be tightened, cleaned and a small amount of specialised grease applied. Batteries with non-insulated terminals must be covered with a non-slip insulating mat.

**NOTE**

- *To prevent static electricity from causing an explosion, never use a dry cloth or fabric to wipe the surface of the battery.*
- *Pull out the mains plug.*
- *Wipe it with a damp cloth.*
- *Wear protective eyewear, rubber shoes and rubber gloves.*

## Lithium-ion battery

### Battery introduction and instructions

### Battery introduction

| | | | |
|---|---|---|---|
| Rated voltage | 24 V | Battery material | LFP |
| Rated capacity | 20 Ah | Battery dimensions | 200 x 90 x 295 mm |
| Charger voltage | 24 V | Charger current | 10 A |
| Battery weight | 5 kg | | |

### Operating instructions

1. Because the product may have been in transit or storage, before the lithium-ion

battery is used for the first time it must be fully charged using the supplied charger (never use with other types of chargers or other modified devices);

2. The lithium-ion battery should be used at an ambient temperature of 0°C–40°C. Do not use or store the battery near a fire/heat source where the temperature is outside this permitted range;

**⚠ CAUTION**

Ambient usage temperature: 0°C to 40°C

3. The lithium-ion battery can be charged and reused at any time. When the battery power is low, charge it promptly to avoid over-discharge; the replaced battery should also be charged promptly to avoid internal damage to the battery caused by over-discharge of the battery after self-discharge;

4. Do not place metal objects (such as wrenches, knives) on the lithium-ion battery, or other objects that may cause short-circuiting of the battery, in order to avoid short circuit between the positive and negative terminals;

5. Do not bump or strike the lithium-ion battery during use. If the battery leaks or smells, stop using it immediately and keep it away from sources of fire;

6. If the battery life is significantly shortened, please contact the after-sales service to have it checked;

7. If the lithium-ion battery fails and cannot be used, remove it from the vehicle. Trained personnel can use our BMS special reading instrument to read the information and make a preliminary judgement. For problems that cannot be solved, please contact the after-sales service department for a solution;

8. Before installing and removing the battery, be sure to read the user manual. The weight of the battery body is evenly distributed. If there is an external weight, pay attention during installation and removal. When lifting, hook two slings to the eyelets, gently lift and keep the battery stable without tilting it; Make sure that the lifting gear is suitable in terms of size and load capacity. Observe the battery weight given on the battery nameplate).

9. The operator must carefully read the instructions before use and undergo relevant safety training in order to deal with any unexpected situations;

## Lithium battery Warning

Abide by the operation manual!

All the operations related to the storage battery must be implemented under the instruction of professionals!

Always wear protective clothing (e.g. safety goggles and safety gloves) when working on cells and batteries.

No smoke and fire!

Avoid the existence of open fire, fiery metal wire or sparks around the storage battery, otherwise explosion or fire disaster may occur!

Explosion or fire disaster is likely to occur; avoid short circuit!

Keep the battery away from all fire sources, heat sources and flammable or explosive materials.

Don’t knock over the storage battery!

Using lifting and delivery devices as specified. Prevent the storage battery cell, interface and connection cable from being damaged by the lifting hook!

If the materials leak out, do not inhale the fumes. Wear safety gloves.

Dangerous voltage! Avoid hot plugging!

Notice: the metal part of the storage battery cell is electrified, so don’t place any external object or tool on the battery cell!

Do not place the battery on top of conductive objects.

Don’t trample on the battery to prevent it from fierce shaking or shacking!

## Information on the conformity of lithium-ion batteries

The manufacturer of the lithium-ion battery declares that: the lithium-ion battery conforms with the provisions of the following EU directive 2014/30/EU in accordance with EN12895.

These batteries has been certified according to EN 62619:2017 for safe use and according to UN38.3 for safe transport.

## Lithium-ion battery Compliance Standards

- Please carefully read the documents included with the battery.
- Batteries may only be operated by personnel trained in lithium-ion technology (e.g. trained and authorised technicians appointed by the dealer).
- Make sure it does not fall or have anything fall onto it.
- Do not allow the battery to be exposed to moisture or water (>80%)
- Protect the battery from sun exposure.
- Do not conduct any physical processes or modifications to the battery.
- Only qualified and authorised personnel may carry out charging, maintenance and replacement of the battery.
- Do not place the lithium-ion battery above or near a flame or heat source (>65°C). Otherwise it may cause the battery to overheat or burst into flames. This will damage the battery's performance and lower its service life.
- It is strictly prohibited to remove the battery when it is in a charging state.
- Do not use or store batteries with low charge (using and storing batteries with low charge will cause premature capacity loss of the battery system).
- Non-competent persons are strictly prohibited from disassembling and accessing the battery system, accompanying chargers and other equipment; the battery system is a hazardous product, only specialists may carry out maintenance and replacement.
- Before starting the vehicle, connect to the power supply via the push button switch. After the vehicle has stopped, the battery system must be powered off and stopped via the push button switch. If it takes too long, the battery will over-discharge. In severe cases, it will affect the battery's performance.
- When using it for the first time, the battery should be fully charged.
- The battery should be charged promptly after each use (the initial charging state should keep the temperature of the battery system below 40°C to ensure smooth charging).
- Only for use on trucks manufactured by the supplier (provided that this battery type has been approved for use with the truck).

**⚠ DANGER**

**Do not open the battery unnecessarily. This can be an electrical risk. The battery can only be opened under the guidance of a trained and authorised technician appointed by the dealer.**

## Reasonably foreseeable misuse

- Never short circuit the battery terminals.
- Do not reverse the battery polarity.
- Do not overcharge.

**⚠ DANGER**

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

## Accessories

Do not use a charger that is not released by supplier for lithium-ion battery.

These batteries can only be used with the internal charger.

**⚠ WARNING**

Should such issues as failing to abide by the operation manual, failing to use the original parts for maintenance or damaging caused by users themselves occur, the quality guarantee will be invalid automatically!

## BMS (Battery Management System)

– The battery is permanently monitored by the BMS (Battery Management System).

– This provides the communication with the truck.

– The BMS continually monitors items such as the cell temperature, the voltage and the charge status of the cells.

## First aid measures after a Li-ion accident

### First-aid measures

**⚠ WARNING**

Risk of injury!

Escaping gases can lead to breathing difficulties.

– Course of action required if gases or liquids escape. Immediately ventilate the area or go out into the fresh air; in more serious cases, call a doctor immediately.

– Skin irritation can occur in the event of contact with the skin. Thoroughly wash the skin with soap and water.

– Eye irritation can occur in the event of contact with the eyes. Immediately rinse eyes thoroughly with water for 15 minutes, then consult a doctor.

## Charging

1. The battery can only be charged using the vehicle-specific charger. Other chargers may cause battery damage;

2. The normal charging temperature range of the battery is 5°C–40°C. Do not charge in an environment that exceeds the normal temperature range;

3. If charging is not completed within the specified time, stop charging the battery;

4. Professional personnel must be on hand to carry out and oversee charging operations, in order to ensure that the charging plug and socket work normally without overheating, the charging equipment works properly, the battery pack and its protection circuit work properly, and the entire power supply system shows no signs of short circuit, overcurrent, overtemperature and overcharging.

5. When charging and maintaining the battery, observe the manufacturer's maintenance instructions for the battery and battery charger.

**⚠ DANGER**

Never overcharge or over-discharge the lithium-ion battery.

**⚠ CAUTION**

1. The normal battery charging temperature range is 5°C–40°C.

2. The voltage difference between the maximum and minimum cell voltages during charging is less than 0.1 V.

3. The voltage of the lithium-ion battery matches the charger voltage.

4. The charger should periodically check the charging overvoltage protection device.

## Dangers of faulty or scrapped batteries

Please keep a close eye on the battery condition when using or storing batteries. If you notice any broken batteries, electrolyte leakage, abnormal swelling or pungent smells caused by transportation or vibration, please stop using the battery immediately and keep a distance of at least 5 metres from the relevant batteries. Please dispose of damaged batteries properly and contact the authorised service to recycle it.

For large batteries with an inner/outer casing structure, please put the battery in an outdoor environment for at least 5 days. Contact the authorised service to recycle it.

**⚠ WARNING**

1. Do not store batteries for long periods of time.

2. Batteries in storage must not bear any loads, be crushed or in contact with each other.

3. Do not put batteries in warehouses for goods or near inflammable or explosive items.

4. Do not pile up faulty or old batteries.

## Instructions on storing and handling faulty batteries

**⚠ DANGER**

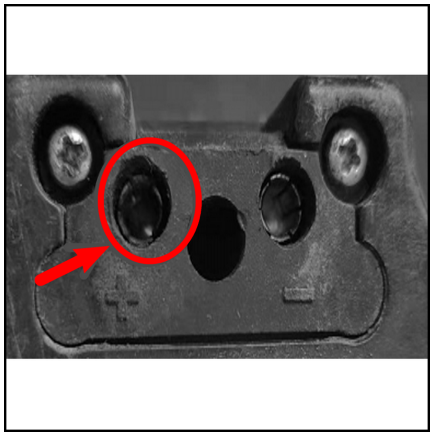
**Faulty batteries may cause short circuits and lead to fires. To eliminate potential safety hazards and avoid unnecessary economic losses and other consequences, please act in strict accordance with the guidelines.**

## Checking batteries for signs of malfunction

– Whether there is any leakage between the communication terminal and charging/discharging pins at the bottom of the battery, and in the gaps around the pins; ▷

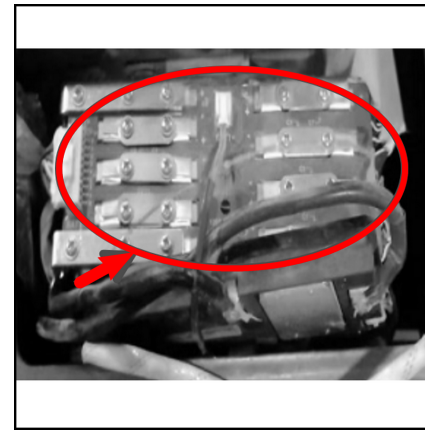
– Check whether there are pungent smells;

– Check the jack at the bottom for signs of blackening and burning; ▷



– Check the middle connection of the body for swelling of the housing or internal cells; ▷


– Check the battery for signs of impact and damage. ▷



## Storing faulty batteries

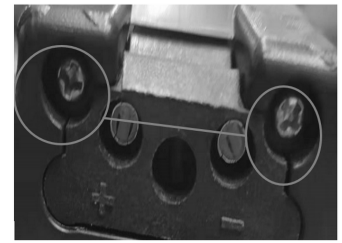
Place the faulty batteries outdoors in an open and shaded area, this area must be well-ventilated and be equipped with fire equipment. Flammable substances and work equipment that may produce sparks must not be placed within 2 metres around.

Batteries in storage must not bear any loads, be crushed or in contact with each other.

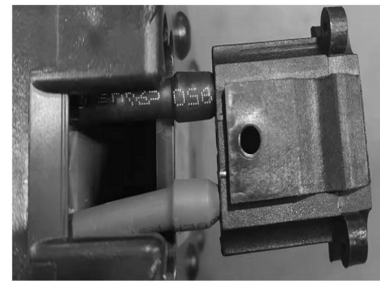
## Insertion and removal procedure for the positive and negative inserts of the battery power supply

If necessary, remove the positive and negative inserts of the battery supply to avoid short circuiting as follows:

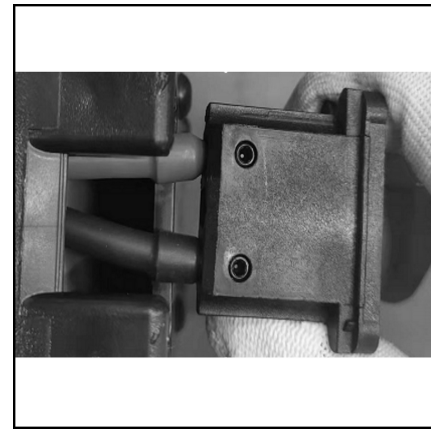
– Use a cross screwdriver to take out the two screws securing the insert at the bottom of the battery. ▷



– Pull out the bottom positive and negative insert. ▷



– Rotate the insert 180°, or fix the insert to the exterior using adhesive tape, to avoid the insert being put back into the battery.



**⚠ CAUTION**

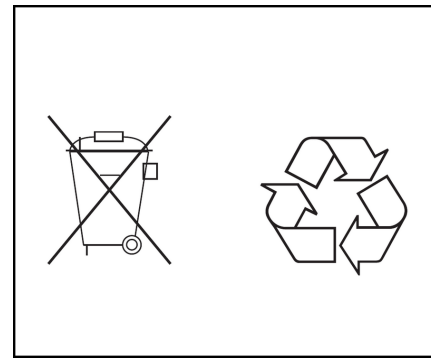
A specialist battery recycling facility must be contacted immediately to dispose of the malfunctioning batteries. If required, please contact your authorised dealer for advice.

For leaking batteries that have a warranty, when needed please take a picture of the plate of the leaking battery and the leakage area.

**⚠ WARNING**

Disassembly is prohibited without permission. When handling a malfunctioning battery, you must consult your authorised dealer for advice when needed.

## Instructions for disposal



– 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 Legislation.

– The method of battery recovery and reuse can be discussed with our company. We reserve the right to change the technology.

**NOTE**

*The requirements of recycling*

- *Only authorized dealers who have attended the after sales training, are authorized to do repairs on batteries.*
- *All Li-ion battery should be placed in safe place according to this manual.*
- *The transport of Li-ion battery must meet UN, ADR and local regulations.*
- *The package of Li-ion battery before delivery must meet the UN 3480 or local carrier regulation.*

## Storage

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

We recommend that batteries are stored at a height between 60 and 120 cm.

– Store the battery in a dry place at a temperature between 0 and 40° to preserve its service life. This area must not be hermetically sealed to allow air renewal.
– If the battery system needs to be placed on hold for a long time, it would better keep the battery in the semi-electric state and charge the battery every 2 months to ensure that the battery system is in the semi-electric state.
– The positive and negative terminals of the battery system are prohibited from contacting with metal objects during storage.

## Common Problems and Solutions

During the use and maintenance of the lithium-ion battery, the battery or battery system may have one or more of the following abnormal conditions, please organize the professional engineers and technicians to perform the necessary processing according to the instructions in this manual; if you have any questions about the status or solutions, please contact dealer or after-sales service department of the company to obtain professional technical support.

– If the battery is found to have abnormal mechanical characteristics such as swelling, cracked casing, melted casing, and distortion of the casing before and during installation, stop using the battery immediately, place it in open and well-ventilated space, and contact the after-sales service.
– If abnormalities such as looseness, cracks, cracks in the insulation layer, burn marks, etc. of the battery's pole pressing bolts, conductive strips, main circuit wires and connectors are found before and during the installation, stop using the battery immediately, contact the after-sales service.
– If the polarity of the positive and negative terminals of the battery is found not match the polarity identification before installation, please stop using the battery immediately and contact the aftersales service department to replace the battery or obtain other solutions.
– If there is fire or smoke happens to the battery, move it to the open air immediately, evacuate people in time, and pour a large amount of cold water onto the battery to cool it down and put out the fire.
– If the battery is found to emit smoke before and during installation, immediately stop using the battery and bury it with sand, and notify the after-sales service department of the company for record and obtain technical support.

## Maintenance

### Routine maintenance

– Professional personnel must be on hand to carry out and oversee charging operations, especially when the lithium-ion battery is almost fully charged, specifically to ensure good contact between the plug and socket, good contact of the lithium battery pack connection points and correct operation of the charging device during the charging process. If an abnormal situation occurs, the lithium-ion battery must be repaired before charging.
– Before charging and discharging, check the battery voltage, temperature, cell voltage difference and other parameters of the lithium-ion battery on the indicator unit and make sure that all the values are within the normal range.

– If the lithium-ion battery pack is covered in dust, metal filings or other debris, use compressed air or a dry cloth to clean it. Avoid cleaning with water or damp items.
– When charging and discharging, try to avoid splashing water or other conductive liquids on the lithium-ion battery. Avoid exposing it to heavy rain during use.
– Estimate the charging time and discharging time of the lithium-ion battery according to the actual state of use of the battery or battery pack. Observe whether there is any abnormality in the battery or battery pack at the end of charging and discharging, such as a large voltage difference between individual cells.

## Transportation

Before transporting any lithium-ion battery, check the current regulations on the transport of dangerous goods. Comply with these when preparing the packaging and transport. Train authorised staff to dispatch lithium-ion batteries.

**NOTE**

*It is recommended that the original packaging is kept for any subsequent dispatch. A lithium-ion battery is a special product.*

**Special precautions should be taken when:**

– Transporting a truck equipped with alithium-ion battery.
– Transporting only the lithium battery.

A class 9 danger label must be affixed to the packaging for transport.

It is different if the battery is transported on its own or in a truck. An example of a label appears in this supplement(see figure below). Refer to the latest current regulations before dispatch as the information might have changed since this supplement was written.

Special documents must be sent with the battery. Refer to the applicable standards or regulations.


| | |
|---|---|
| For UN3480 | Lithium Ion Batteries. |
| For UN3481 | Lithium Ion Batteries packed with Equipment or Lithium batteries built into Equipment. |

**⚠ WARNING**

Do not pack higher than 1.2 m above the floor of the container and secure properly.

**NOTE**

*"Overpack" is the name for the outer packaging of the dangerous goods.*

**NOTE**

*Recharge the lithium-ion battery before transporting it taking account of the transport mode ( boat, road). Excessive discharge on arrival could damage the performance of the battery.*

### 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.

## Forklift truck transport

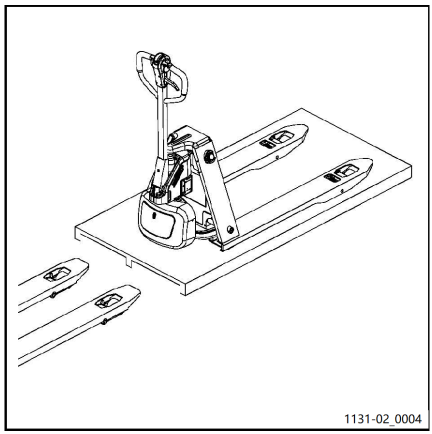
– Only use haulage equipment with sufficient load capacity. (For loading and unloading weights, see the truck model nameplate and vehicle parameters).

– The load weight is greater than the net weight of the truck (including battery weight). The load weight does not just include the net weight of the truck; it also includes the wooden pallet.

– The pallet (or wooden box) should be large and strong enough to withstand the weight of the truck.

• Follow the prescribed steps and park the vehicle correctly.

• Make sure the forks are aligned with the pallet, move slowly and stop after inserting the forks as far into the pallet as possible.




**NOTE**

- *Pay attention to the fork blades when lifting the truck onto the pallet, to prevent injuries caused by the fork blades trailing on the ground.*
- *Transport on a spacious and level surface to avoid damaging the truck.*
- *Be mindful of surface conditions when raising and lowering the pallet to avoid tipping the truck.*
- *The truck should be protected against rain.*

## Cleaning the Forklift

Cleaning depends on the type of use and the workplace. Should the truck come into contact with highly aggressive elements such as salt water, fertilizers, chemical products, cement, etc., it should be cleaned as carefully as possible after every work cycle. It is preferable to use cold compressed air and detergents. Use

water-dampened rags to clean the parts of the body.

**⚠ CAUTION**

Do not clean the truck with direct jets of water; DO NOT use solvents and petrols that could damage parts of the truck.

## Cleaning operations

**⚠ CAUTION**

High-pressure cleaners, excessive water pressure or water and steam that are too hot can damage components. If water penetrates the electrical system ,there is a risk of a short circuit occurring !

– Do not use high pressure cleaners for cleaning.
– Strictly adhere to the following steps.

Do not use combustible liquids to clean the truck.

You must take all safety precautions before you start cleaning and you must prevent sparks from being produced during work processes (such as from short circuits). If the truck is powered by a battery, you must disconnect it from the battery cable connections.

When cleaning electronics and electrical components, you must use low-strength suction gas or compressed air. You should also use a non-conductive, anti-static brush to clean dust off component surfaces.

If you clean the truck, you must first carefully seal all electronics and electrical components, otherwise these components may get wet and malfunction.

Do not use steam cleaning equipment.

Once you have finished cleaning, you must check the alarm, emergency off switch, and brake performance. You must also lubricate the truck according to its maintenance schematics.

# Decommissioning and storing

If the truck is to be decommissioned for more than 2 months, it must be parked in a frost-free and dry location.

When storing the truck, 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 storage period is longer than six months, the user must contact the company's service department to clarify other operational measures that need to be taken.

### Precautions prior to storage

- Clean the truck thoroughly.
- Check the brakes.
- Check the hydraulic oil level and top up if required.
- Apply a thin layer of lubricating oil or grease to all unpainted mechanical components.
- Lubricate according to the truck's maintenance schematic diagram.
- Recharge the battery periodically.
- Clean the battery and apply specialised grease to the electrode bolts.
- Spray all exposed contacts with a suitable contact spray.

**⚠ CAUTION**

Charge the battery every month.

If the truck is driven by the battery, then the battery must be charged every month to avoid depletion of the battery through self-discharge, otherwise sulphation will destroy the battery.

### Recommissioning after storage

- Clean the truck thoroughly.
- Lubricate according to the truck's maintenance schematic diagram.
- Clean the battery, apply specialised grease to the electrode studs, and install and fix the terminals on the battery.
- Recharge the battery.
- Check whether the hydraulic oil contains condensed water. Change the hydraulic oil if necessary.
- Check the alarm, emergency off switch and brake performance.
- Put the truck into service in accordance with the operational manual's instructions.

**NOTE**

*If there are difficulties with operating electrical system switches, you should apply contact spray to the exposed contact surfaces and remove the oxide layers on the surfaces of the operating component contacts by performing repeated switch operations. After putting the truck into service, the driver should immediately carry out repeated brake performance tests.*

# Equipment scrappage and disposal procedure

When the truck is eventually scrapped and disposed of, this must be carried out in accordance with the laws and regulations in force in the country of use. Special attention should also be paid to regulations regarding the disposal of used batteries, fuel, oil and

electronic and electrical equipment, as well as local environmental protection regulations.

# 5

# Maintenance

# General Maintenance Information

## Operational safety and environmental protection

- You must carry out the checks and maintenance operations outlined in this section at the intervals set out in the service plan.
- Modifying this truck, especially its safety devices, is prohibited. You must not change the work parameters of this truck.
- Only original equipment meets with company quality assurance requirements. To ensure the equipment's stability and operational performance, you must only use original equipment manufactured by our company. You must handle old components and replacement of fluids in accordance with current environmental protection regulations. Please contact our company's customer service department if you need to change the oil.
- Once you have completed checking and servicing, you must check the alarm system, emergency off switch and brake function. You must also lubricate in accordance with maintenance schematics. Once you have carried out these procedures, the truck can be put into service again.

## Repairs and maintenance safety regulations

### Repairs and maintenance personnel

Maintenance and repairs on the truck should only be carried out by qualified personnel who are authorised by our company.

### Lifting and jacking equipment

When lifting the truck, the lifting device can only be installed on the fixed positions as specified.

When jacking up the truck, appropriate tools such as chocks and wooden blocks must be used to secure the truck and prevent it from accidentally rolling or tipping over.

When working under a raised load-bearing component, sufficiently strong chains or safety devices must be used to secure the forks.

**⚠ WARNING**

The battery connector must be disconnected before the industrial truck is jacked up.

**⚠ WARNING**

Make sure that the industrial truck is only jacked up on level surfaces, and is secured against rolling and dropping.

### Working on the electrical system

Work on the electrical system must be carried out by professionally trained electricians.

Before commencing work, the operator must take all necessary measures to prevent electrical accidents.

If the truck is powered by a battery, the key switch must be removed to prevent the truck from being accidentally started.

### Parameter regulations

When repairing and replacing hydraulics, electronics and electrical components, you must pay special attention to comply with the truck's relevant parameter regulations.

### Truck tyres

The quality of the tyres directly affects the stability and driving performance of the truck. If you need to replace the tyres that were installed in the factory, you must use original equipment supplied by our company to meet the data indicators for the model list.

When replacing wheels or tyres, you must ensure that the truck will not tilt (for example, if you replace left and right wheels at the same time).

## Maintenance and checks

Perform maintenance thoroughly in accordance with regulations to ensure reliable stability of the truck's performance. This is the one of the most important conditions for increasing service life. Neglecting regular maintenance can cause the truck to malfunction and break down. It can also create latent dangers for staff and work safety.

The wear to components that need maintenance is largely determined by the actual work and usage conditions of the truck. Service intervals will be shorter if operational usage conditions exceed ordinary levels. For example, if there is lots of dust, if there are large temperature fluctuations or if the truck is used for shift work.

When the truck is in the running-in stage (approx. 100 hours of operation), the equipment user should check the fastening of the wheel nuts and bolts and refasten them if necessary.

## General

The following instructions contain all the information required for servicing your truck. Carry out the various maintenance work in compliance with the maintenance plan. This will ensure that your truck is reliable and in good working order and that the warranty remains valid.

Maintenance should only be carried out by authorised technicians, or by authorised dealers in accordance with a signed maintenance contract.

Modifying or installing additional equipment on the forklift truck is prohibited without the agreement of the manufacturer.

**NOTE**

*If the data plates or affixed labels are incomplete or damaged, they should be replaced with new ones. For locations and reference numbers, please see the spare parts catalogue.*

**⚠ CAUTION**

If the forklift truck is used in an extreme environment (such as excessive heat, excessive cold or areas with high dust concentrations), the time intervals given in the maintenance tables should be reduced accordingly.

**ENVIRONMENT NOTE**

*Please comply with regulations regarding the use, handling and disposal of fuel and lubricating oil.*

The forklift must undergo functional testing and a trial run after each inspection.

### Service plan

Maintenance work must be carried out according to the maintenance checklist.

The service plan is followed by advice to facilitate work.

Maintenance intervals must be reduced if the truck is used under harsh conditions (extreme heat or extreme cold, large quantities of dust).

### Grade and quantity of lubricants and other consumables

Only lubricants and other consumables specified in these operating instructions are authorised for use during maintenance work.

Lubricants and other consumables required for truck maintenance are listed in the maintenance specifications table.

Never mix different qualities of grease or oil. If it is absolutely necessary to change brands, make sure to flush thoroughly beforehand.

Before changing any filters or working on the hydraulic system, thoroughly clean the surface and the areas around the part.

All containers used to pour oil must be clean.

## Servicing and maintenance personnel training and qualification

Truck maintenance must only be carried out by qualified and authorised personnel.

The annual inspection for prevention of accidents at work must be carried out by a person qualified to do so. The person carrying out this inspection must provide their expertise and opinion without being influenced by economic factors or company internal issues. Safety is the only critical deciding factor.

The person responsible for carrying out the inspection must have sufficient knowledge and experience to be able to assess the condition of the truck and the efficiency of the protective installations in accordance with the technical regulations and principles established for checking industrial trucks.

# Inspection and Maintenance

## Service plan

### Service plan

| Note regarding servicing work |
|---|
| Specialist knowledge is required for servicing work. Special tools are also needed.<br>Contact your service dealer. |

| Daily inspection and servicing work. |
|---|
| |
| **Power supply** |
| Visually inspect the battery. box body is damaged, the box body is partially cracked or missing. |
| Check the liquid leakage corrosion at the charging and discharging terminals at the bottom of the Lithium-ion battery. |
| Check the traces of liquid leakage at the bottom of the Lithium-ion battery. |
| Check the Lithium-ion battery bulge, the bulging of the battery shows that the shape of the battery changes, which is different from the original size, and some or all of it expands to the surrounding. |
| Check the Lithium-ion battery terminal ablation, the terminal is blackened or there are traces of high temperature burning. |
| **Electrical system** |
| Check operation switch, display equipment and component functions. |
| Check alarm system and safety devices. |
| Check the inching switch setting function. |
| **Drive system** |
| Check the chassis frame and apply grease. Check the position reset function of the operating handle. |
| **Hydraulics** |
| Check the hydraulic functions. |
| Check hoses, pipes and interfaces for damage and ensure their tightness and sealing. |

| Additional servicing work to be performed every 500 hours or every half year. |
|---|
| |
| **Power supply** |
| Check that the battery cable connections are tight . |
| **Electrical system** |
| Check that cables are free from damage and that the terminals are firmly attached. |

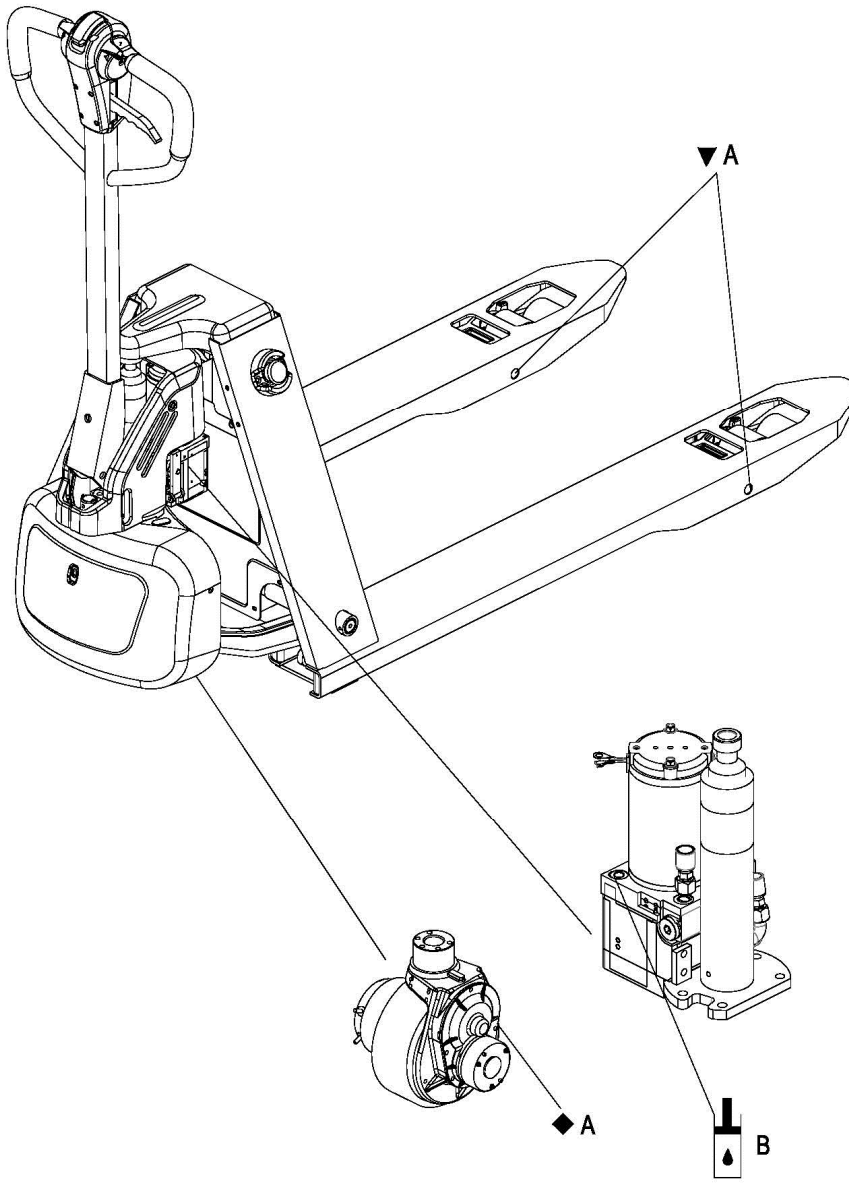
| Additional servicing work to be performed every 500 hours or every half year. |
|---|
| |
| Check the control unit. |
| Check the fastening of the cables and motor. |
| **Drive system** |
| Check the gearbox for abnormal sound and leakage. |
| Check the wheels for wear and damage. |
| Check the wheel bearings and their mounting. |
| **Hydraulics** |
| Check cylinder block and piston for damage and ensure that they are properly sealed and secured. |
| Check the oil level in the oil tank. |
| **Other** |
| Check the frame for damage. |

| Additional servicing work to be performed every 1000 hours or every 12 months, in addition to the 500-hour servicing work: |
|---|
| |
| **Drive system** |
| Adding gear oil. |

| Additional servicing work to be performed every 2000 hours or every 24 months, in addition to the 1000-hour servicing work: |
|---|
| |
| **Hydraulics** |
| Change the hydraulic oil. |

# Technical inspection and maintenance data

## Lubrication maintenance schematics



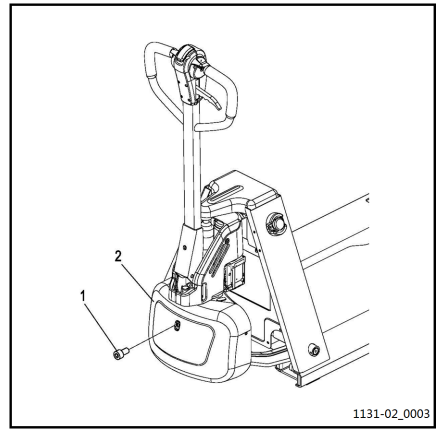
A Turning mechanism, gear oil injection port C
B Hydraulic oil filler port

## Table of recommended fuels and oils

| Designation | Model no. | Amount added | Position used |
|---|---|---|---|
| Antifriction hydraulic oil | L-HM46 | 0.21L | Hydraulics |
| Moly lithium grease no. 3 | Grease (contains MoS2) | 110 g | Gearbox |
| Moly lithium grease no. 3 | Grease (contains MoS2) | As appropriate | Turning mechanism |

# Essential maintenance

## Disassembling the cowling




– Loosen the 4 stud bolts that lock the cowling in place (1).

– Remove the cowling.

## Replacing the drive wheel

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

## Check the hydraulic oil level

If there are popping noises coming from the tubing when lifting, this indicates that the hydraulic oil is insufficient and should be promptly replenished.

– Park the truck as specified.

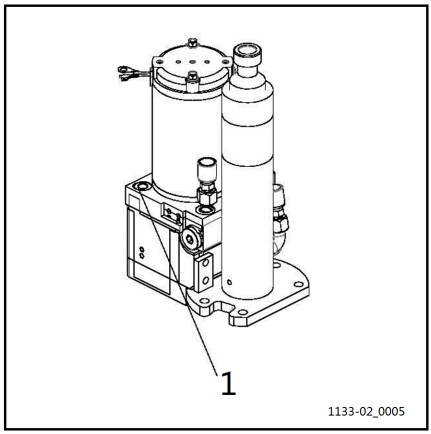
– Pull the key switch out to prevent the truck from being accidentally started.

**⚠ CAUTION**

If you need to work underneath a raised truck, take effective measures to prevent accidents such as the truck overturning or slipping.

– Remove the cover.

– When necessary, you must top up from the filler port (1) with the specified hydraulic oil. ▷
– After topping up, lift the forks. The oil level is fully topped up when you no longer hear popping noises; continue to add oil if you still hear popping noises.
– Refit by following the above steps in reverse order.




## Topping up the gear oil ▷

– Park the truck as specified.
– Pull the key switch out to prevent the truck from being accidentally started.

**⚠ CAUTION**

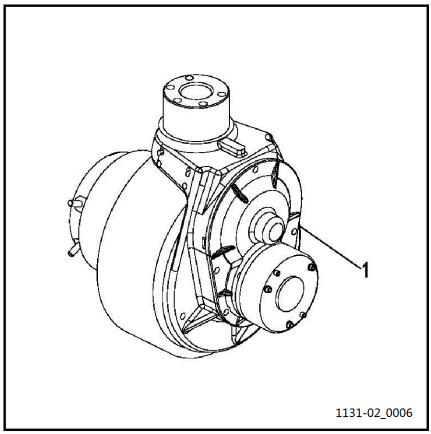
If you need to work underneath a raised truck, take effective measures to prevent accidents such as the truck overturning or slipping.

– Remove the cover.
– Pour correct gear oil into the grease fitting (1).

**⚠ CAUTION**

Do not add gear oil that contains impurities.

– Refit by following the above steps in reverse order.



# Troubleshooting

## Troubleshooting

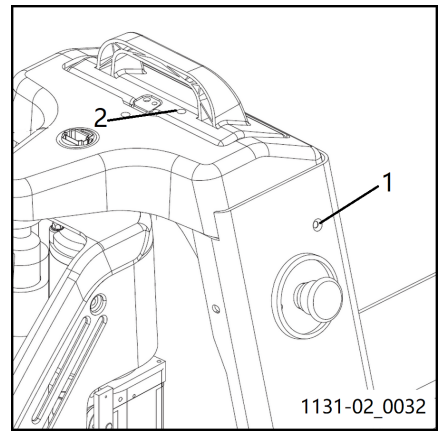
This chapter is intended to help users identify and eliminate simple faults or problems caused by operational errors. Carry out the checks in the table below in sequence to determine the specific cause of the failure.

| Malfunction | Possible reason | Solution |
|---|---|---|
| The truck cannot start | The truck's power supply is off.<br>The battery power is too low<br>A fuse is blown<br>The truck is in battery charge mode | Press the start button or insert the key switch.<br>Check the battery charge and charge the battery if needed<br>Check the safety device<br>Interrupt the charging process |
| Unable to lift goods | The hydraulic oil level is too low<br>The load is overweight | Check the hydraulic oil level<br>Pay attention to the rated load (refer to the model identification plate) |

If you are still unable to resolve the fault after performing all the steps listed in "Solutions", please contact the company's customer service department. Further fault identification and elimination operations must be performed by after-sales service personnel who have undergone special training.

## Battery malfunction information

– If the control unit detects a battery malfunction, the battery light (2) will flash with an error code until the error is eliminated. Specific error code displays are as follows: ▷




- 1. Monomer under-voltage: the green light flashes once (the cycle is for 1 second) then stops for 2 seconds, then flashes twice, then stops for 3 seconds and repeats.
- 2. Monomer over-voltage: the green light flashes once (the cycle is for 1 second) then stops for 2 seconds, then flashes 3 times, then stops for 3 seconds and repeats.
- 3. Short circuit protection: the green light flashes once (the cycle is for 1 second) then stops for 2 seconds, then flashes 4 times, then stops for 3 seconds and repeats.

- 4. Overcurrent protection: the green light flashes once (the cycle is for 1 second) then stops for 2 seconds, then flashes 5 times, then stops for 3 seconds and repeats.
- 5. Battery temperature is too high: the green light flashes twice (the cycle is for 1 second) then stops for 2 seconds, then flashes 3 times, then stops for 3 seconds and repeats.
- 6. Battery temperature is too low: the green light flashes twice (the cycle is for 1 second) then stops for 2 seconds, then flashes 4 times, then stops for 3 seconds and repeats.
- 7. Contactor-related malfunction: the green light flashes 3 times (the cycle is for 1 second) then stops for 2 seconds, then flashes 4 times, then stops for 3 seconds and repeats.
- 8. For other malfunctions, the yellow light will flash; the cycle is for 1 second.

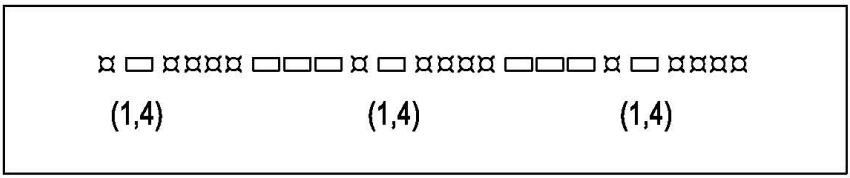
## Control unit error messages

### Handheld unit diagnostic

– Connect the handheld unit to the control unit terminal;

– Enter the Diagnostic menu and look for the error message.

### LED malfunction light diagnostic

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Under normal vehicle usage, the LED malfunction indicator light (3) will be continuously lit. When a malfunction occurs, the LED will flash and display an error code. The LED light will turn off once the malfunction has been eliminated.

The LED light will display a two digit code:

– For example, the digit code “1, 4”——60— CAPACITOR CHARGE, will be displayed as shown in the image.

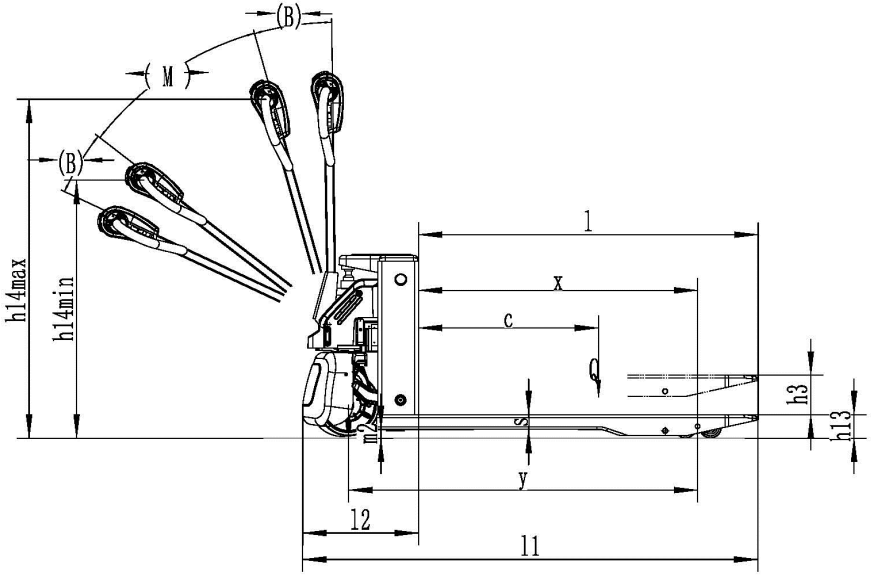
| Error message | LED flashes (1) time | LED flashes (2) times | Fault | Error diagnosis |
|---|---|---|---|---|
| THERMAL FAULT | 1 | 1 | Over/under temperature cut | (1) temperature is under 80°C or below -10°C;<br>(2) Vehicle is over-loaded;<br>(3) Operating in harsh environment;<br>(4) Electromagnetic brake is not releasing normally |
| THROTTLE FAULT | 1 | 2 | Potentiometer slippage or low voltage beyond range | (1) Accelerator input terminal open circuit or short circuit;<br>(2) Accelerator potentiometer failure;<br>(3) Incorrect accelerator type selected |
| SPEED POT FAULT | 1 | 1 | Speed limit potentiometer malfunction | (1) Speed limit potentiometer open circuit or short circuit;<br>(2) Speed limit potentiometer open circuit |
| UNDER-VOLTAGE FAULT | 1 | 4 | Cell voltage too low | (1) Cell voltage <17 V;<br>(2) Poor battery or control unit connection |
| OVERVOLTAGE FAULT | 1 | 5 | Cell voltage too high | (1) Cell voltage >31 V;<br>(2) Battery charger is still connected when the vehicle is running;<br>(3) Poor battery contact |
| MAIN OFF FAULT | 2 | 1 | Main contactor coil drive “closed” malfunction | (1) The main contactor coil was activated in error |
| (not used) | 2 | 2 | | |
| MAIN FAULT | 2 | 3 | Main contactor malfunction | (1) The main contactor is stuck or there is an open circuit;<br>(2) Main contactor coil drive error |
| MAIN ON FAULT | 2 | 4 | Main contactor coil drive “closed” malfunction | (1) The main contactor coil was deactivated in error |
| (not used) | 2 | 5 | | |
| WIRING FAULT | 3 | 1 | HPD malfunction time exceeds 10 seconds | (1) Incorrect operation of the accelerator;<br>(2) Accelerator terminal or the accelerator |

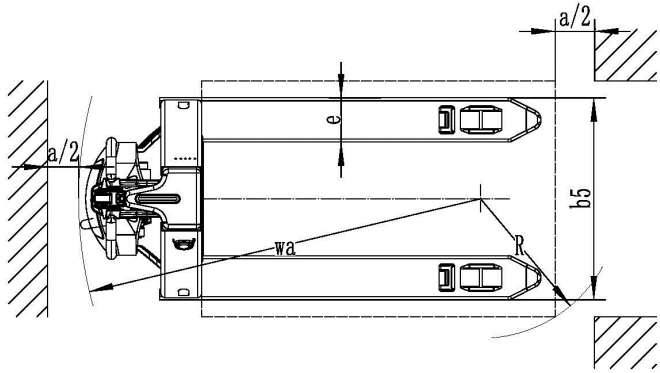
| | | | | |
|---|---|---|---|---|
| BRAKE ON FAULT | 3 | 2 | Brake activation malfunction | (1) Solenoid brake coil open circuit;<br>(2) Solenoid brake drive short circuit |
| PRE-CHARGE FAULT | 3 | 3 | Precharge fault | (1) Control unit failure;<br>(2) Low cell voltage |
| BRAKE OFF FAULT | 3 | 4 | Brake deactivation malfunction | (1) Solenoid brake coil short circuit<br>(2) Solenoid brake coil open circuit |
| HPD FAULT | 3 | 5 | HPD malfunction | (1) The accelerator or key switch have been made to, or prohibited from, inputting several operating sequence errors;<br>(2) Erroneously adjusting the accelerator |
| CURRENT SENSE FAULT | 4 | 1 | Current check malfunction | (1) Electric motor or electric motor wiring short circuit;<br>(2) Control unit failure |
| HARDWARE FAILSAFE | 4 | 2 | Electric motor voltage exceeds range | (1) Electric motor voltage cannot match accelerator input;<br>(2) Electric motor or electric motor wiring coil short circuit |
| EE CHECK-SUM FAULT | 4 | 3 | EEPROM Malfunction | (1)EEPROM malfunction or failure |
| (not used) | 4 | 4 | | |
| BATTERY DISCONNECT FAULT | 4 | 5 | Battery is not connected | (1) Battery is not connected;<br>(2) Poor battery terminal contact |

# 6

# Technical Data

# Technical datasheet



## Technical datasheet

| Description | | | | |
|---|---|---|---|---|
| 1.1 | Manufacturer | | STILL | STILL |
| 1.2 | Truck model | | ECH 12C | ECH 15C |
| 1.3 | Drive type: battery, diesel, petrol, LPG, mains power | | Battery | Battery |
| 1.4 | Operation | | Pedestrian | Pedestrian |
| 1.5 | Nominal loading capacity | Q (kg) | 1200 | 1500 |
| 1.6 | Load centre | c (mm) | 600 | 600 |
| 1.8 | Axle centre to fork face | x (mm) | 950 (880) | 950 (880) |
| 1.9 | Wheelbase | y [mm] | 1190(1120) | 1190(1120) |

| Weight | | | | |
|---|---|---|---|---|
| 2.1 | Service weight | kg | 115 | 115 |
| 2.2 | Axle load with load, front/rear | kg | 540/1070 | 540/1070 |
| 2.3 | Axle load without load, front/rear | kg | 100/15 | 100/15 |

| Wheels | | | | |
|---|---|---|---|---|
| 3.1 | Tyres: Pneumatic, polyurethane, rubber | | PU | PU |
| 3.2 | Tyre size, front | mm | Φ210x70 | Φ210x70 |
| 3.3 | Tyre size, rear | mm | Φ80x60(Φ74x88) | Φ80x60(Φ74x88) |
| 3.5 | Wheels, number front/rear (X=drive) | | 1x/4(1x/2) | 1x/4(1x/2) |

| Dimensions | | | | |
|---|---|---|---|---|
| 4.4 | Lift height | h3 (mm) | 115 | 115 |
| 4.9 | Height of tiller arm in driving position, min/max | h14 (mm) | 750/1190 | 750/1190 |
| 4.15 | Fork height, lowered | h13 (mm) | 80 | 80 |
| 4.19 | Overall length | l1 (mm) | 1550 | 1550 |
| 4.20 | Length to fork face | l2 (mm) | 400 | 400 |
| 4.21 | Overall width | b1/b2 (mm) | 560 (685) | 560 (685) |
| 4.22 | Dimensions of forks | s/e/l (mm) | 50x150x1150 | 50x150x1150 |
| 4.25 | Distance between fork arms | b5 (mm) | 560 (685) | 560 (685) |

| Dimensions | | | | |
|---|---|---|---|---|
| 4.32 | Ground clearance with load, center of wheelbase | m2 (mm) | 30 | 30 |
| 4.34 | Aisle width with 800 x 1200 mm pallet along forks | Ast (mm) | 2062 | 2062 |
| 4.35 | Turning radius | Wa (mm) | 1390 | 1390 |

| Performance data | | | | |
|---|---|---|---|---|
| 5.1 | Driving speed, full load/no load | km/h | 4.5/5 | 4.5/5 |
| 5.2 | Lifting speed, with/without load | m/s | 0.017/0.024 | 0.017/0.024 |
| 5.3 | Lowering speed, with/without load | m/s | 0.09/0.06 | 0.09/0.06 |
| 5.8 | Maximum climbing ability, with/without load | % | 6/16 | 6/16 |
| 5.10 | Brake type | | Electric | Electric |

| Driving | | | | |
|---|---|---|---|---|
| 6.1 | Traction motor rating S2 60 min | kW | 0.75 | 0.75 |
| 6.2 | Lifting motor rating at S3 15% | kW | 0.5 | 0.5 |
| 6.4 | Battery voltage, nominal capacity K5 | V/Ah | 24/20 | 24/20 |
| 6.5 | Battery weight | kg | 5 | 5 |
| 6.6 | Energy consumption acc. to VDI cycle | kW/h | n/a | n/a |

| Other | | | | |
|---|---|---|---|---|
| 8.1 | Drive control method | | DC | DC |
| 8.4 | Noise level | dB(A) | <74 | <74 |

## Eco-design requirements for electric motors and variable speed drives

All motors in this industrial truck are exempt from Regulation (EU) 2019/1781 because these motors do not meet the description given in Article 2 "Scope", Item (1) (a) and because of the provisions in Article 2 (2) (h) "Motors in cordless or battery-operated equipment" and Article 2 (2) (o) "Motors designed specifically for the traction of electric vehicles".

All variable speed drives in this industrial truck are exempt from Regulation (EU) 2019/1781

because these variable speed drives do not meet the description given in Article 2 "Scope", Item (1) (b).

## Eco-design requirements for electric motors and variable speed drives

STILL GmbH

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