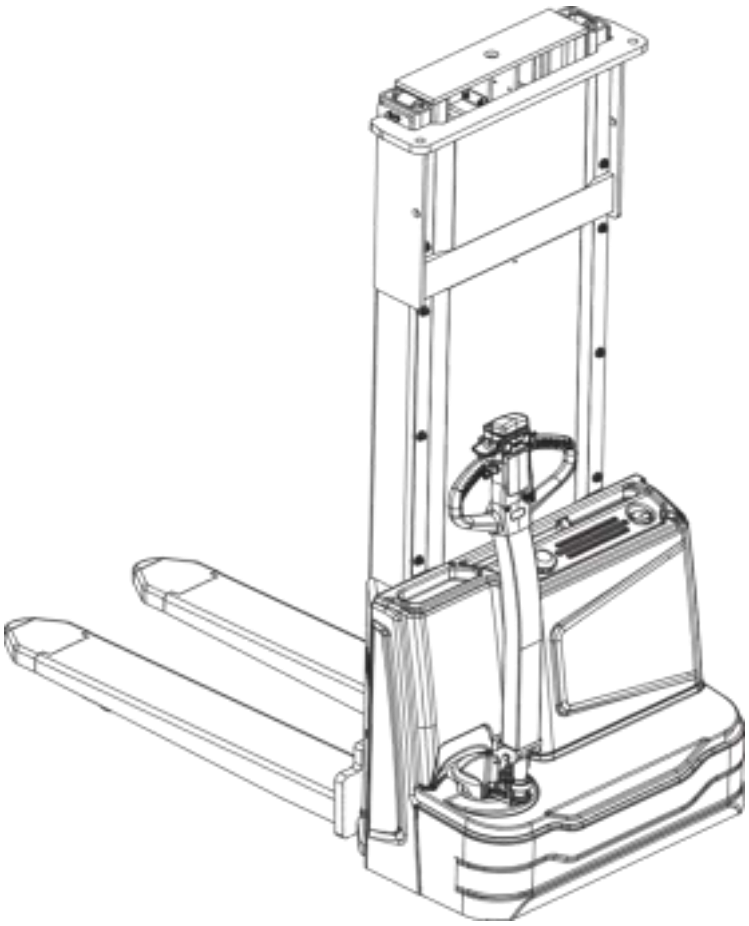


PSM 1.2

Electric Pallet Stacker

Operation Manual

52588283
(en-GB)
V5 03/26

Original Instructions

Foreword

This operation manual provides instructions to ensure the safe operation of the industrial truck. The instructions are clear and concise.

Our trucks are continuously being developed. Our company reserves the right to make changes to the design, equipment, and technical specifications of the system. This operation manual does not provide guarantees for specific features of the truck.

► Safety notices and text mark-ups

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

⚠ DANGER

Means that failure to comply can cause risk to life and/or major damage to property.

⚠ WARNING

Please strictly adhere to these safety instructions to avoid personal injury or major damage to equipment.

⚠ CATION

Please pay attention to the important safety instructions.

ⓘ NOTE

Pay attention to Instruction.

05th EDITION

▶ 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)

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

An unauthorized structural change or addition to the industrial truck can

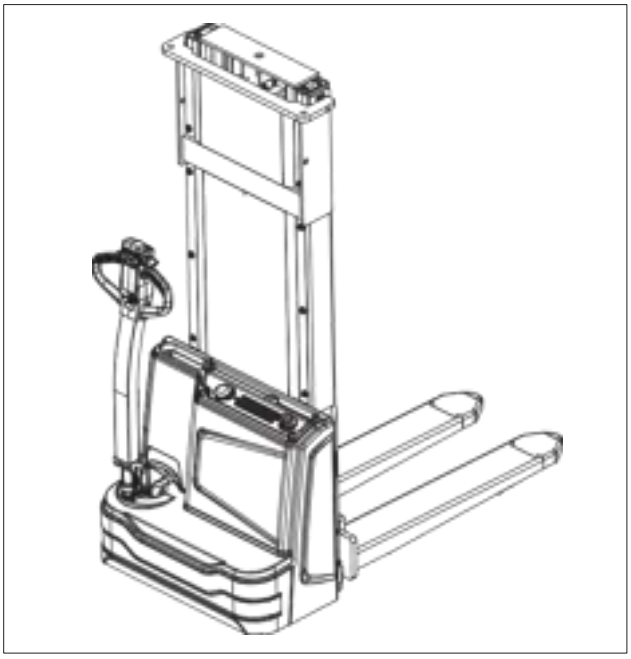
compromise safety, thus invalidating the declaration of conformity.

▶ Schematic views

View of functions and operations

This documentation explains the (usually sequential) chain of certain functions or operations. Schematic diagrams of a truck are used to illustrate these procedures.

These schematic diagrams are not representative of the structural state of the documented truck. The diagrams are used solely for the purpose of clarifying procedures.



Declaration of Conformity

CE

Manufacturer

Jungheinrich AG, 22039 Hamburg, Germany

Description
Industrial truck

Type	Option	Serial no	Year of manufacture
PSM 1.2			

On behalf of

Date

EU DECLARATION OF CONFORMITY

The undersigned hereby declare that the powered truck described in detail complies with the current versions of European Directives 2006/42/EG (Machinery Directive) and 2014/30/EU (Electromagnetic Compatibility - EMC). The manufacturer is authorised to compile the technical file.

UK CA

anton BY JUNGHEINRICH

Declaration of Conformity (○)

Product:	PSM 1.2 Serial number/type number
Manufacturer:	Jungheinrich Aktiengesellschaft 22039 Hamburg, Germany
UK representative:	Jungheinrich UK Ltd Sherbourne House Sherbourne Drive Tilbrook Milton Keynes MK7 8HX

Authorised to compile documentation:

The manufacturer is authorised to compile the technical documentation and its representative is authorised to make documentation available upon reasoned request for a period of at least 10 years from the date of first placement of the product on the UK market.

The manufacturer bears sole responsibility for issuance of this Declaration of Conformity.

The subject of the Declaration as outlined above satisfies the applicable UK legislation:

Supply of Machinery (Safety) Regulations 2008 No. 1597

and

Electromagnetic Compatibility Regulations 2016 No. 1091

Signed for and on behalf of:

Jungheinrich Aktiengesellschaft

Table of contents

NOTE

The appendix contains further manufacturer documentation (e.g. for the batteries, chargers and attachments).

1 General

1.1 Introduction

1.1.1 Introduction to/purpose of this instruction handbook

The truck described in this operator manual is designed for lifting and transporting material loads. It must be used, operated, and serviced as specified in the following instructions. Any other type of use is beyond the scope of application and can result in damage to personnel, the truck or property. Avoid overloading the truck with loads which are too heavy or placed on one side. The data plate attached to the truck, or the load diagram are binding for the maximum load capacity. All nameplates and safety signs on the truck should be cleaned regularly to maintain visibility.

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

1.1.2 Mounting of attachments

The mounting or installation of any attachments which will interfere with, or supplement, the functions of the truck is permitted only after written approval by the manufacturer has been obtained. If necessary, the approval of local authorities has to be obtained. Any approval obtained from local authorities does not, however, make the approval by the manufacturer unnecessary.

Check that loads are handled safely before commissioning a truck with attachments. It may be necessary to make adjustments, depending on the type of attachment, e.g. to pressure settings or adjusting stops and operating speeds.

1.1.3 Modification

Unauthorized modification to the truck can result in injury or death.

Do not remove, disable or modify any safeguards or other safety devices.

Exception: Only in the event that the truck manufacturer is no longer in business and there is no successor in the interest to the business, may the user arrange for a modification or alteration to a powered industrial truck, provided, however, that the user

- arranges for the modification or alteration to be designed, tested and implemented by an engineer(s) expert in industrial trucks and their safety.
- maintains a permanent record of the design, test(s) and implementation of the modification or alteration.
- approves and makes appropriate changes to the capacity plate(s), decals, tags and operation manual.
- affixes a permanent and readily visible label to the truck stating the manner in which the truck has been modified or altered, together with the date of the modification or alteration and the name and address of the organization that accomplished those tasks.

1.1.4 Pallet stacker handover

To avoid the inconvenience of making a claim after use, check the truck is in perfect condition and repair, and confirm your satisfaction with the vehicle on the manufacturer's product qualification certificate upon handover.

1.2 Definition of responsible persons

1.2.1 Drivers/Operator

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 authorized 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.

1.2.2 User

A user is a natural person or legal entity responsible for the truck. The user may operate the truck themselves or delegate the task of operating the truck to someone else (e.g., a driver/ operator). In specific circumstances, such as leasing, responsibility will be borne by the user according to the effective contract between the owner of the vehicle and the personnel operating the truck.

1.2.3 Specialist

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

- A completed vocational qualification that demonstrates their professional expertise. This proof should consist of a vocational qualification or a similar document.
- Professional experience indicates 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 is 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.

1.2.4 User rights, duties and rules of behavior

Everyone operating the truck has read and understood this manual and has been approved in the relevant truck operator training. Operate the truck in a safe manner to avoid endangering the lives and health of the driver and/or others. Adhere to all warnings and instructions in this manual. This manual is available for use by drivers/operators.

1.2.5 Driver rights, duties and rules of behavior

Complete training before using the truck. Also, ensure you have a local license to drive a truck. Always locate the technical specifications for the specific truck before use. Trucks may have optional features and enabled/disabled assist systems that you must understand before operation. Adhere to local safety regulations and instructions for safety equipment. Wear safety shoes when using the truck. Do not walk under raised forks yourself or allow others

to do so. Do not use any load support as a step. If the vehicle is damaged or has faults affecting safety or safe use, do not use the vehicle. All repairs must be carried out by properly trained personnel. Report all accidents resulting in personal injury or material damage to management. Check the functionality of the truck before each use.

1.2.6 Permissible operating conditions

- Average ambient temperature for continuous duty: ＋25°C
- Maximum ambient temperature, short term (up to 1h): ＋40°C
- Lowest ambient temperature for trucks intended for use in normal indoor conditions: ＋5°C
  Lowest ambient temperature for trucks intended for use in normal outdoor conditions: － 20°C
- Secure parking at 0°C~40°C
- Best operating temperature range: 15°C~ 35°C
- Charging temperature range: 5°C~40°C No charging below 0°C
- The truck's maximum operation altitude is up to 2000m.
- Use in specified rated load.
- Don’t use the truck in rainwater.
- The equipment is suitable for use in specified areas such as factories, tourist attractions, and
- recreational places.
- It is intended for use on flat, stable ground with sufficient load-bearing capacity.
- It is prohibited to pass the bulge or cavity as the small wheel diameter may cause truck tipping over.
- It is designed for use on roads with good visibility and where an equipment usage license is required.
- Trucks can only be operated in adequately illuminated working areas to avoid injuries. In case of insufficient light, an additional lighting equipment is needed to ensure that the driver can see properly.
- If you must travel on an incline, the gradients should be below A% at full load, or below B% without a load. (For the value of A and B, refer to the Gradability in technical data)

NOTE

Lithium battery charging temperature range: 5~40°C, 0°C below the low-temperature environment under the conditions of large-scale charging will cause damage to the battery. Discharge temperature range: -20°C~55°C, low temperature (-20°C~0°C) discharge capacity

than at room temperature may be reduced compared to normal, it is normal. battery can be 40°C~55°C Ambient temperature, but the battery ambient temperature is too high, especially in the long-term high temperature battery environment, will accelerate the aging of the battery material, shorten the battery life, it is not recommended for long-term use at this temperature.

Ambient temperature exceeding the above range of charge and discharge temperature may adversely affect the battery performance or damage, may greatly shorten the battery life, it should be avoided at the above temperature.

NOTE

Conditions of operation road surface: the truck should run on solid, flat, level and paved road surfaces (including both running and lifting).

WARNING

Operator must wear helmet, safety shoes and work (protective) clothes, whenever you operate and maintain the truck, handle the consumables etc.

⚠CAUTION

When working environment is not enough light, please add extra lighting of the working area.

ⓘNOTE

Special equipment and authorization are required if the truck is to be constantly used in conditions of extreme temperature or air humidity fluctuations. We recommend with special measures for the truck or buy the truck for cold store. If in doubt, contact the manufacturer's customer service department.

1.2.7 Wind loads

- Wind forces can affect the stability of a truck when lifting, lowering and transporting loads with large surface areas.
- Light loads must be specially secured when they are subjected to wind forces. This will prevent the load from sliding or falling.
- Stop the truck in both cases.

1.2.8 Intended use

The lift truck is designed for transporting and stacking the loads stated in the nameplate. In particular we refer to:

- the safety rules of your trade association.
- In accordance with the special provisions for driving on public roads specified by national specifications.
- Other local regulations.

The rules for the intended and approved use of industrial trucks must be followed under all circumstances by the responsible persons, especially by the operator and service personnel.

The user, not the manufacturer, is responsible for any danger arising from applications not authorized by the manufacturer.

If you want to use the truck for applications not mentioned in this manual, please first contact your authorized dealer.

No changes, particularly no modifications and additions, may be made to the truck without the approval of the manufacturer.

1.2.9 Impermissible use

Avoid the use of the truck by non-working personnel.

Don’t ride on the truck.

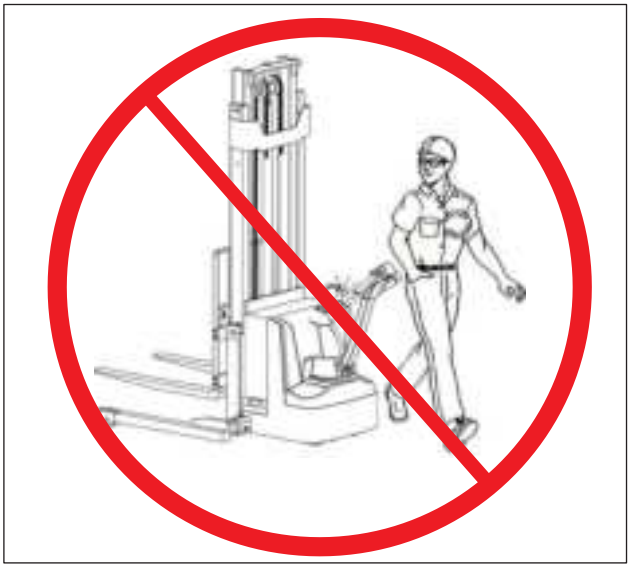
Don’t carry or lift people with the truck.

Don’t use the truck on slippery road surfaces.

(such as road surfaces with oil stain or residual snow or those frozen ones)

Don’t carry goods on steep slope to prevent goods from sliding off.

Don’t leave the truck before it is parked as regulated.



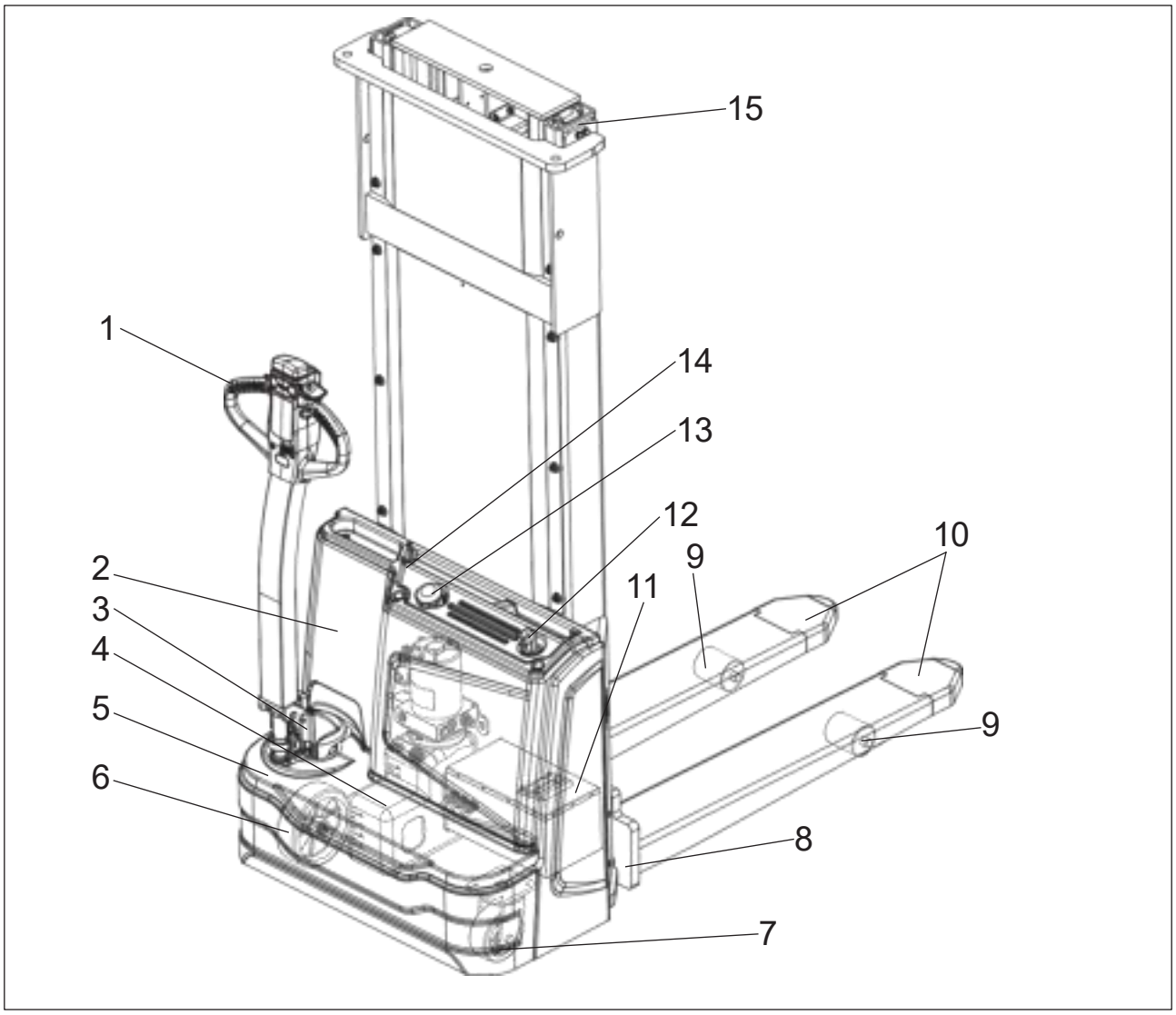
Don’t use the truck when any non-working personnel is in the dangerous area.
Don’t be distracted when using the truck.

Don’t place any part of your body in any moving part of the truck to avoid being clamped.

2 Truck description

2.1 Truck overview

2.1.1 Truck components



1	Tiller	9	Load wheels
2	Front cover	10	Fork
3	Rotation cover	11	Battery
4	Hydraulic unit	12	Charger plug
5	Bottom cover	13	Emergency stop switch
6	Driving wheel	14	Upper cover
7	Caster	15	Mast
8	Fork carriage		

2.1.2 Function Description

► **Design**

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

Beautiful and compact outline, concise and fluent line.

Chassis welded by high-performance steel plate guarantees enough load capacity.

► **Tiller**

The tiller is used for smooth steering and control of drive speed, lifting and lowering, braking and the horn without changing the position of the hand. The long tiller shaft allows effortless steering and a safe distance to the truck. A gas spring returns the tiller always into a vertical position that activates the brake automatically.

► **Driving**

The electronic control unit ensures comfortable use. Precise control of driving speed.

Jolt-free starting and smooth acceleration to maximum speed. Simply release or turn the drive direction switch to brake.

► **Hydraulics**

Gear pump driven by fully enclosed air-cooled motor.

Safety valve and lowering brake protect the hydraulic system.

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

► **Brake system**

The truck will be stopped by a regenerative service brake and hold by an automatic electromagnetic parking brake in it’s parking position.

► **Electrical system**

The truck features an electronic traction controller and a 24 V lithium-ion battery for efficient operation.

► **Lifting system**

The mast provides good visibility for the operator and supports easy installation and maintenance, and optional lift heights are available.

2.1.3 Standard Version Specifications

Technical specification details in accordance with VDI 2198. Technical modifications and additions reserved.

► **Performance data for standard trucks**

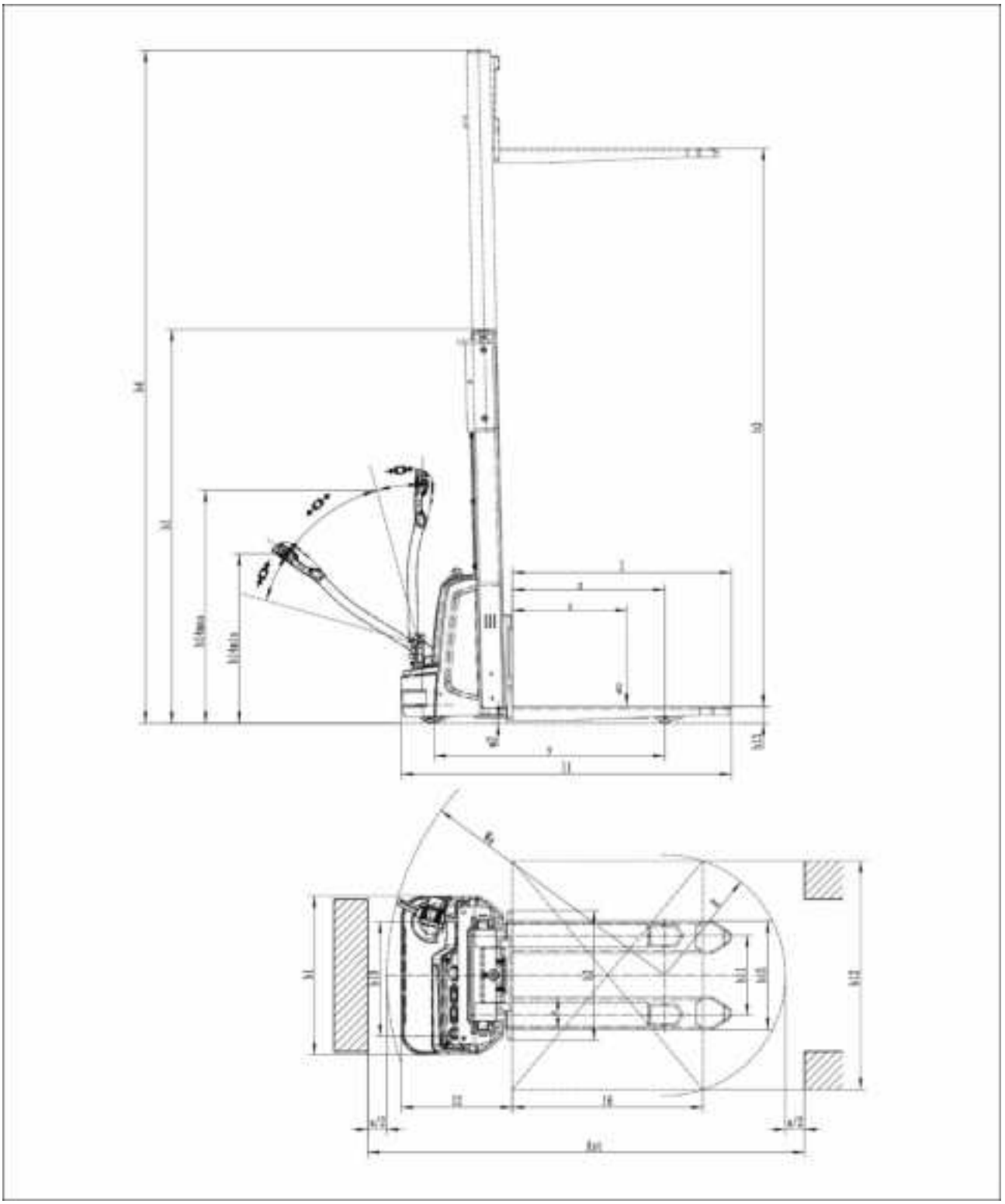
Distinguishing mark				
1.1	Manufacturer			ANTON
1.2	Model designation			PSM 1.2
1.3	Drive unit			Electric
1.4	Operator type			Pedestrian
1.5	rated capacity	Q	kg	1200
1.6	Load center distance	c	mm	600
1.8	Load distance	x	mm	802
1.9	Wheelbase	y	mm	1210
Weight				
2.1	Service weight (including battery)		kg	520
2.2	Axle loading, laden driving side/loading side		kg	580/1140
2.3	Axle loading, unladen driving side/loading side		kg	380/140
Types, Chassis				
3.1	Tire type driving wheels/loading wheels			Polyurethane
3.2	Tire size, driving wheels (diameter x width)		mm	Ø190×55
3.3	Tire size, loading wheels (diameter x width)		mm	Ø74×88
3.4	Tire size, caster wheels (diameter x width)		mm	Ø128×50
3.5	Wheels, number driving, caster/loading (x=drive wheels)		mm	1x，1/2
3.6.1	Track width, front, driving side	b10	mm	597
3.7.1	Track width, rear, loading side	b11	mm	415
Dimensions				
4.2	Height, mast lowered	h1	mm	2067
4.3	Free lift	h2	mm	-
4.4	Lift height	h3	mm	2930
4.5	Height, mast extended	h4	mm	3532
4.9	Height drawbar in driving position min./max.	h14	mm	750/1200
4.10	Height of wheel arms	h8	mm	-

4.15	Lowered height	h13	mm	92
4.19	Overall length	l1	mm	1733
4.20	Length to face of forks	l2	mm	583
4.21	Overall width	b1/ b2	mm	832
4.22	Fork dimensions	s/ e/ l	mm	75/170/1150
4.24	Fork carriage width	b3	mm	680
4.25	Fork spread	b5	mm	570
4.26	Distance between wheel arms/loading surfaces	b4	mm	-
4.31	Ground clearance, laden, below mast	m1	mm	-
4.32	Ground clearance, center of wheelbase	m2	mm	28
4.34.1	Aisle width for pallets 1000 × 1200 crossways	Ast	mm	2295
4.34.2	Aisle width for pallets 800 × 1200 lengthways	Ast	mm	2225
4.35	Turning radius	Wa	mm	1460
Performance data				
5.1	Travel speed, laden/ unladen		km/h	4.0/4.5
5.2	Lifting speed, laden/ unladen		m/ s	0.11/0.15
5.3	Lowering speed, laden/ unladen		m/ s	0.105/0.105
5.8	Max. gradeability, laden/unladen		%	3/10
5.10	Service brake type			Electromagnetic
Electric-engine				
6.1	Drive motor rating S2 60 min		kW	0.75
6.2	Lift motor rating at S3 15%		kW	2.2
6.4	Battery voltage/nominal capacity K5		V/ Ah	24/40
6.5	Battery weight		kg	11
6.6	Energy consumption according to DIN EN 16796		kWh/ h	0.765
6.7	Turnover output according to VDI 2198		t/h	30
6.8	Turnover efficiency according to VDI 2198		t/ kWh	42.8

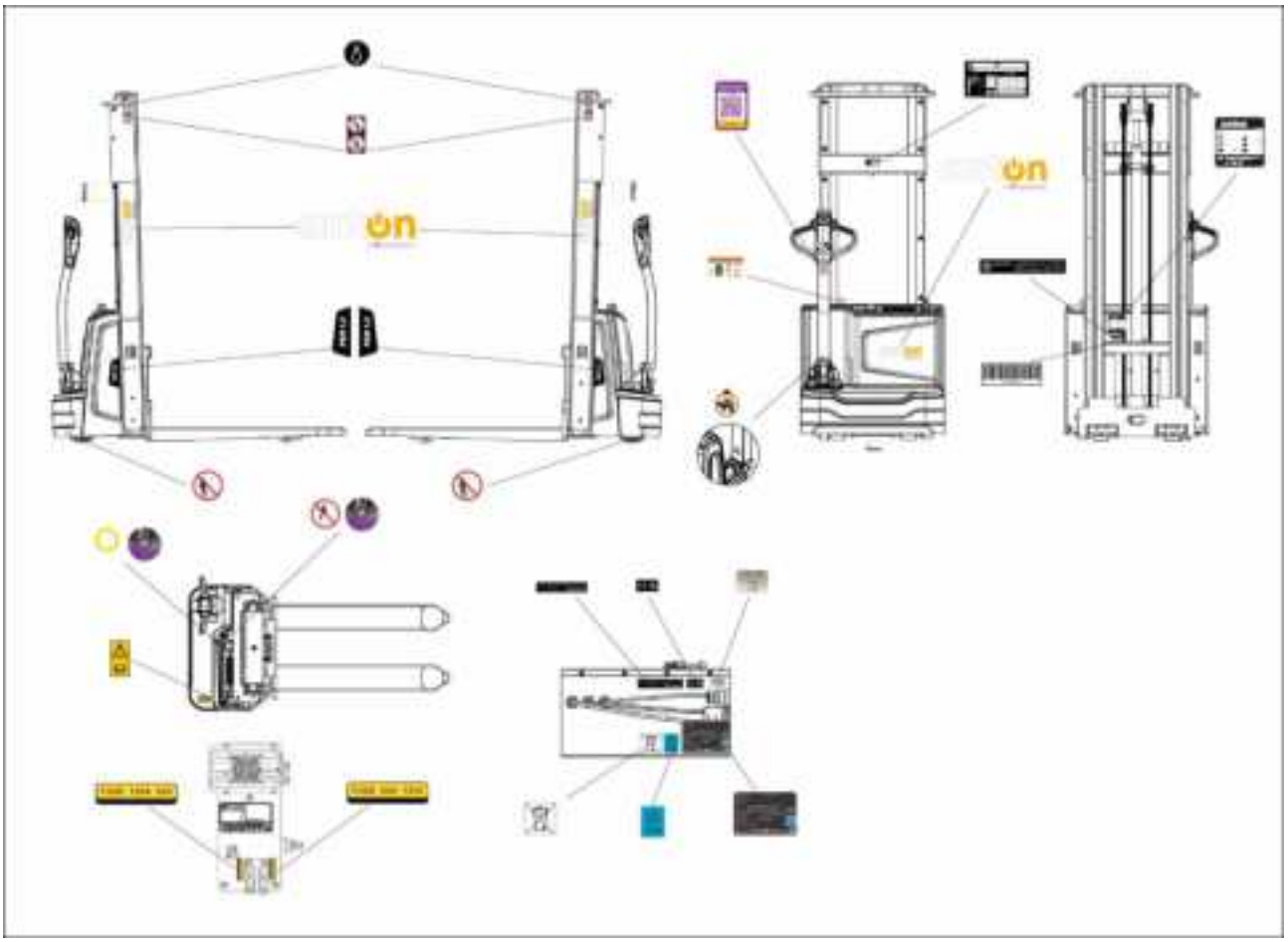
Addition data				
8.1	Type of drive control			DC
10.5	Steering type			Mechanical
10.7	Sound pressure level at the driver’s ear		dB (A)	74
15.1	Charger output current		A	15
15.15	Rated load at maximum lift height			-

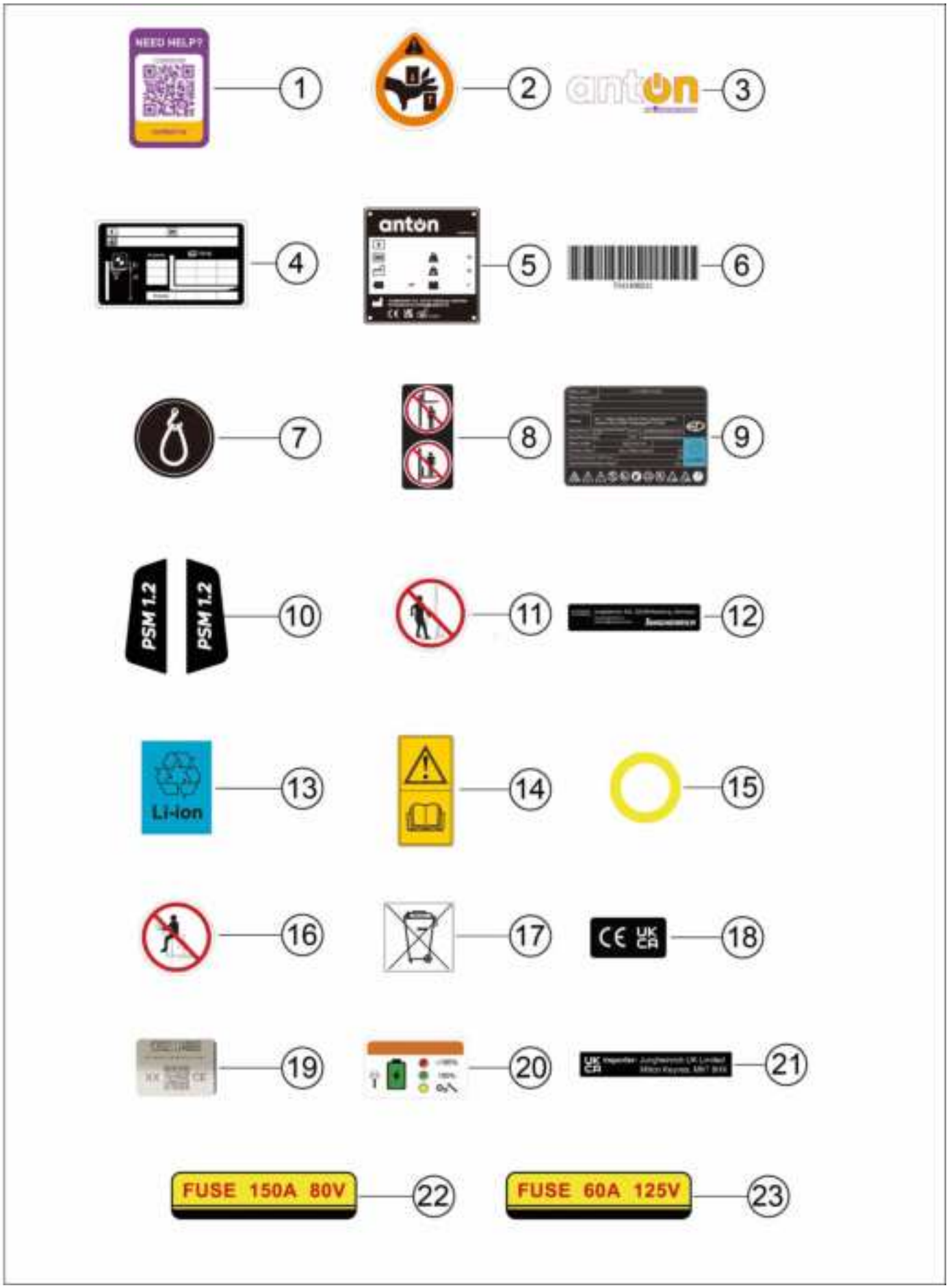
a=200mm

2.1.4 Dimensions



2.1.5 Identification points



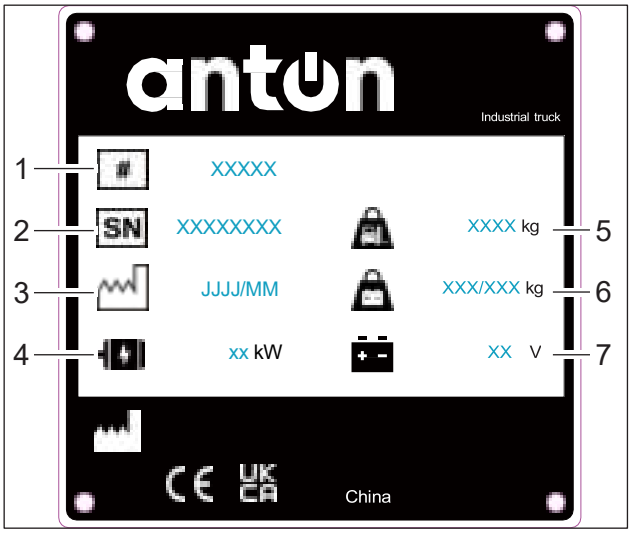

NEED HELP?
1
2
anton
3
4
anton
5
6
7
8
9
PSM 1.2
PSM 1.2
10
11
12
Li-ion
13
14
15
16
17
CE UK CA
18
19
20
21
FUSE 150A 80V
22
FUSE 60A 125V
23

Item	Description
1	QR code label
2	Anti-pinch hand label
3	Anton logo label
4	The load capability plate
5	Truck nameplate
6	Barcode label
7	Sling point label
8	Mast safety label
9	Battery nameplate
10	Product label
11	Anti-pinch foot label
12	Anton battery label
13	Li-ion battery recycling label
14	Read the “Instruction handbook” before operation
15	Emergency stop switch label
16	Prohibition label: “No passengers”
17	Battery sorting and recycling label
18	CE UKCA label
19	Battery serial number QR code label
20	Charging Indicator label
21	UKCA importer label
22	Fuse label 150A 80V
23	Fuse label 60A 125V

2.1.6 Truck data plate

For queries regarding the truck or ordering spare parts please quote the truck serial number.

Item	Description
1	PRODUCT NAME
2	SERIAL NO.
3	MANUFACTURE DATE
4	RATED DRIVE POWER
5	UNLADEN MASS
6	MIN/MAX BATTERY WEIGHT
7	BATTERY VOLTAGE

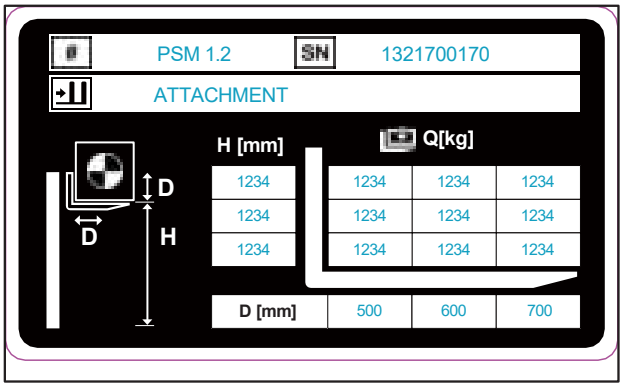


2.1.7 The load capability plate

The capacity plate gives the capacity Q (in kg) of the truck in kg for a vertical mast.

The maximum capacity is shown as a table with a given load centre of gravity D (in mm) and the required lift height H (in mm).

The capacity plate of the truck indicates the truck's capacity with the forks as originally supplied.

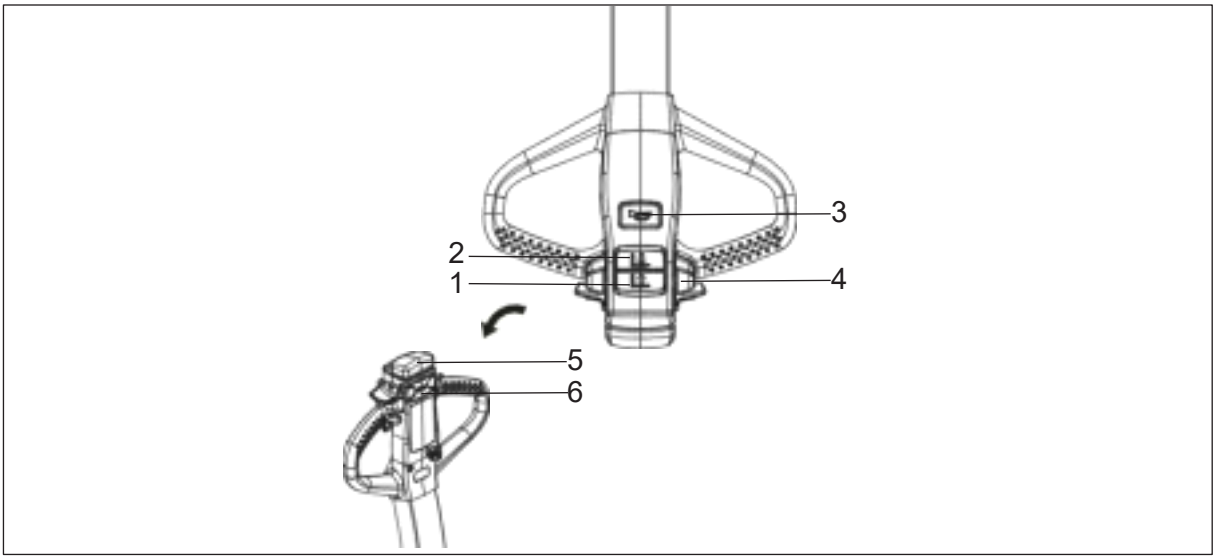


NOTE

"Required lift height H" corresponds to the "4.4 lift height h3" in the standard version specifications (See Page 9 Section "2.1.3 Standard Version Specifications").

2.2 Display and Controls

2.2.1 Tiller

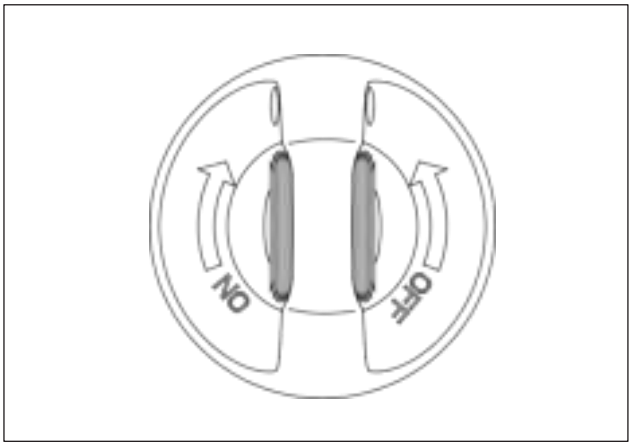


1	Lifting button	Lift loading parts.
2	Lowering button	Lower loading parts.
3	Horn button	Send out sound warning signals.
4	Drive switch	Controls travel direction and speed.
5	Emergency reverse switch	When driving in the drive direction, pressing this switch will cause the truck to move in the load direction, providing driver safety protection
6	Creep speed switch	Keep the tiller in the vertical state, press and hold the creep speed switch and drive switch, the truck will move at a low speed.

2.2.2 Key switch

Connect and interrupt control current.

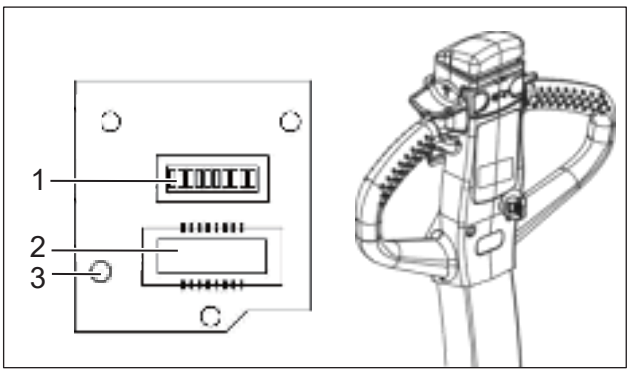
- When the key rotates to position “OFF”, the control current of the truck will be interrupted.
- When the key rotates to position “ON”, the control current of the truck will be connected.



NOTE

Pulling out the key switch of a truck before leaving can prevent the truck from starting accidentally.

2.2.3 Battery charge indicator



► **LED (1) show battery the remaining charge.**

When the truck has been released via the key switch, the battery charge status is displayed.

The color of the LED (1) represent the following conditions:

Signal light	Remaining charge capacity
Green	61-100%
Orange	31-60%
Red	21-30%
Flashing Red	11-20%
Flashing between the first and second bar of battery.	1-10%

► **LED (2) show the total operation time of the truck. Operating hours display (2)**

display range between 0.0 and 99,999.0 hours. Travel and lifting are logged.

► **LED (3) is a fault indicating light.**

DISPLAY	**DESCRIPTION**
Always off	Normal
Flashing	Truck failure

2.3 Related Safety Instruction and Standard (For CE)

2.3.1 Electrical requirements

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

2.3.2 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 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.

► **Continuous sound level: < 74 dB(A)**

according to EN 12053 as stipulated in ISO 4871.

The continuous sound level is a value averaged according to standard regulations, taking the sound pressure level into account when driving, lifting and idling. The sound pressure level is measured at the ear.

► **Electromagnetic compatibility (EMC)**

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 trouble free 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.

3 Safety

3.1 Safety Instructions

- Only trained and authorized operator shall be permitted to operate the truck.
- Operator must wear helmet, working shoes and uniform.
- Do wash the inner of the truck, do not place the truck outdoors and exposed to the rain.
- Fire extinguisher shall be equipped at the work site. Driver and manger should be familiar with the fire extinguisher position and application method.
- Whenever you find the truck abnormal, stop the truck, put on the DANGEROUS or FAULT sign to the truck, remove the key, and report to the managing person. Do not use the truck until the fault is fixed.
- The controller is equipped with energy accumulator, do not touch between B+ and B- to avoid electric injury. If you need check or clean the controller, connect load (like contactor coil or horn or bulb or resistance) between controller B+ and B- to discharge the controller capacity (Only personnel with specific professional training or necessary qualifications may perform this task).
- Only trained and authorized operator shall be permitted to operate the truck.
- Do not use truck under the weather of sand, snow, thunder, storm, typhoon, etc. Avoid using the truck when the wind speed is larger than 5m/s.
- The truck is not designed for street use due to its small wheels and is only for operation in specified areas.
- When handling bulky loads, which restrict your vision, please operate the machine in reverse or have a guide.
- Do not drive the truck when the forks in high position.
- Goods are not allowed to deviate the fork center, when goods is deviating the fork center, turn or pass uneven road, you are easily to fall. Meanwhile, possibility of turnover will increase.
- Wipe off the oil, grease or water on the tiller.

3.2 Safety regulations for the operation of truck

Driver Authorization

The truck may only be used by trained personnel who have demonstrated that they can drive, handle loads, and are authorized to operate the truck.

Unauthorized Use of Truck

The driver is responsible for the truck during the time it is in use and should prevent unauthorized persons from driving or operating the truck. Do not carry passengers or lift personnel.

Damage and Faults

The supervisor must be immediately informed of any damage or faults to the truck. If the truck is not safe for operation (e.g., wheel or brake problems) it must not be used until it has been repaired.

Repairs

The driver must not perform any repairs or alterations to the truck. Repairs must only be done by an authorized, trained technician. The driver must never disable or adjust safety mechanisms or switches.

Hazardous Area

A hazardous area is defined as the area in which a person is at risk due to truck movement lifting operations, the load handler (e.g., forks or attachments) or the load itself. This also includes areas which can be reached by falling loads or lowering operating equipment.

- Unauthorized persons must be kept away from the hazardous area.
- When there is danger to personnel, a warning (horn) must be sounded with sufficient notice.
- If unauthorized personnel are still within the hazardous area the truck shall be brought to a halt immediately.
- This unit is intended to be driven in clean, dry, flat surfaces in non-freezer or refrigerated environments.

Safety devices and warning signs

The safety devices, warning signs and warning instructions in the present operating instructions must be strictly observed.

Travel routes and work areas

Only use lanes and routes specifically designated for truck traffic. Unauthorized parties must stay away from work areas. Loads must only be stored in places specially designated for this purpose.

Nature of loads to be carried

The operator must make sure that the load is in a satisfactory condition. Only carry loads that are positioned safely and securely. Use suitable precautions to prevent parts of the load from tipping.

Before operation

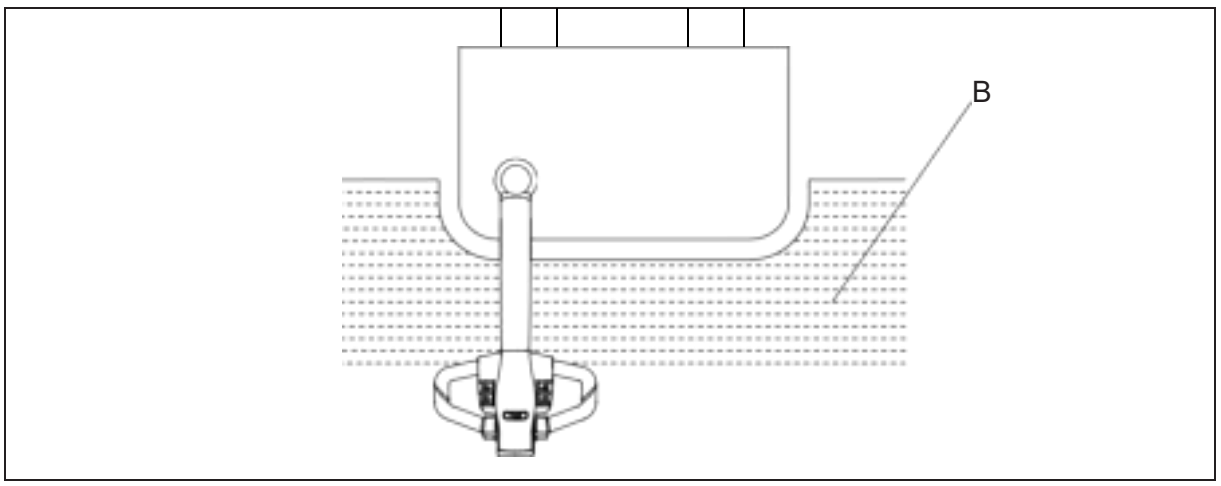
Before using the truck, inspect the work area. It should be neat, well lit, adequately ventilated, and free from hazardous material. Aisles and roadways should be unobstructed and well marked. Operators must know the classification for the truck and use the truck only in permissible areas.

Never operate the truck with greasy hands. This will make the controls slippery and result in loss of truck control.

Operating position

The truck may be operated in either direction while walking. When operating in reverse(forks leading direction, always keep both hands on the Tiller. When operating in forks-trailing direction keep one hand on the controls and, if possible, walk ahead and to the side of the truck.

During operation, always grasp the handle at the travel control. Keep fingers within the protected area of the handle at all times. The operator position for operating the truck within the operating area B.



⚠WARNING

Injury to hands can occur if the handle is grasped incorrectly. Keep hands and fingers within the protected area of the handle.

If any part of your body is outside the operating area B, there is a risk of crushing. Ensure that your entire body is within the area when operating the truck.

Travel

The truck is designed for operation on smooth, dry surfaces such as warehouse and factory floors, loading docks or paved areas. Under all travel conditions operate the truck at a speed that will permit it to be brought to a stop in a safe manner. Avoid running over loose objects on the roadway surface.

⚠WARNING

- *Loss of control!*
- *Do not travel at excessive speeds. keep your truck under control at all times.*
- *Always watch for pedestrians.*
- *Unstable loads are hazardous. Ensure all loads are secure and evenly positioned across both forks. Never lift a load with only one fork. Never carry anything on any part of the truck except the forks unless a specific area has been provided by the manufacturer. Never overtake another truck at an intersection, blind spot or other dangerous location. Use the horn at intersections and any location where visibility is limited.*
- *Inclines, Ramps, Docks, Elevators If you must travel on an incline, do so with caution. Do not operate truck on a wet incline.*
- *Keep the forks upgrade to maintain control when travelling up or down an incline with a loaded truck.Keep the forks downgrade when travelling up or down an incline with an empty truck.*

Stability

Stability is guaranteed if your truck is used properly in accordance with its intended purpose. Common reasons for a loss of truck stability include:

- Emergency stops or sharp turns
- Driving with a raised load or a load handling device
- Turning the vehicle around on or driving across a slope
- Driving up or down a slope with the load pointing downhill
- Driving with a wide load
- Carrying a swinging load
- Driving near the edge of a ramp or up steps
- Tilting the mast forward while carrying a raised load
- Driving on uneven surfaces
- Overloading the truck
- Carrying bulky loads in strong winds
- When carrying liquid, its centre of mass inside the container may shift due to inertial force (such as when pulling away, braking or turning)

⚠ DANGER

- *Tip-over will occur if you turn while travelling on a ramp or travel at an angle other than straight up or straight down a ramp.*
- *Never turn on an incline or ramp either loaded or unloaded. Travel straight up or straight down.*

Be aware that when descending an incline your stopping distance will be greater than when on a level surface. Reduce your speed, and ensure that there is adequate clear space at the bottom of the ramp to stop and turn.

To avoid hazards associated with a dock, you should personally check that the trailer brakes have been applied, wheel chocks are in place, and that any trailer-to-dock locking systems are being utilized. The impact of moving in and out of a trailer may cause the trailer to creep or move. Confirm that the driver will not move the trailer until you are done.

Do not drive the truck onto an elevator without specific authorization. Verify that the elevator's rated capacity exceeds the combined weight of the truck and the load. Approach the elevator slowly and make sure the elevator car is level with the floor before entering. Enter the elevator straight on with the load end leading. Ensure that no part of the truck or load contacts any part of the elevator other than the floor. Once inside the elevator, set the travel direction switch to neutral, switch off the truck, and secure it against unintended movement (e.g., apply the parking brake). All other personnel must leave the elevator before the truck enters or exits.

Be especially cautious when driving the truck on ramps or bridge plates. Be sure to maintain a safe distance from each edge. Before driving the truck over a ramp or bridge plate, verify that its position is secured to prevent movement. Never exceed the rated capacity of a ramp or bridge plate.

Battery safety

Remain aware of the following information.

Wear personal protective equipment (e.g., protective gloves and safety goggles) when handling a lithium-ion battery, especially if the battery is damaged or leaking. If electrolyte comes into contact with skin or eyes, immediately flush the affected area with plenty of water. If electrolyte contacts the eyes, seek medical attention immediately. Clean up any leaked electrolyte immediately using suitable absorbent materials and dispose of them in accordance with applicable regulations.

Remove any metal rings, bracelets, bands, or other jewelry before working with or near batteries or electrical components.

Never expose batteries to open flame or sparks.

Shorting of battery terminals can cause burns, electrical shock, or explosion. Do not allow metal parts to contact the top surface of the battery. Make sure all terminal caps are in place and in good condition.

Batteries may only be charged, serviced, or changed by properly trained personnel. Always follow battery manual provided by the manufacturers of the battery, charger.

4 Operation

4.1 Checks and tasks before daily use

- Damage to the truck or the attachment (variant), non-functional switches or safety systems and modification of predefined set values can lead to unpredictable and dangerous situations.
- The following checks and tasks enable causes of this type to be identified in good time. It is important to run through all the checks and tasks listed in the following table from top to bottom before daily use of the truck.
- If damage or other defects are identified on the truck or the attachment (variant), the truck must not be used until it has been properly repaired.
- Do not use the truck if there is any damage or defect.
- Contact your authorised service centre.

Operator's Daily Checklist

Date _____ Operator _____
Truck No. _____ No. _____
Department _____
Runtime _____
Meter Reading _____

Daily Check Items	O.K.(√)	Remark
Check for fluid leakage.		
Visually inspect the chassis, mast, chain, fork for damage, cracks or deformation.		
Check decal condition.(See Page 13 Section "2.1.5 Identification points")		
Check wheels for damage and smooth movement.		
Check the function of the emergency brake by pull out the Supply plug.(See Page 30 Section "Emergency stop switch")		
Check the chassis frame and apply grease as required. Check the position reset function of the operating handle.		
Check the lifting and lowering functions by operating the buttons. (See Page 35 Section "4.3.2 Goods picking")		
Check display equipment, alarm system and safety devices.(See Page 17 Section "2.2 Display and Controls")		
Check the control handle mechanical operating braking function. (See Page 30 Section "4.2.9 Braking")		
Check forward and reverse running functions by drive switch. (See Page 28 Section "4.2.6 Running")		

Operator's Daily Checklis

Date_____ Operator _____
Truck No. _____ No. _____
Department _____
Runtime_____
Meter Reading _____

Daily Check Items	O.K.(√)	Remark
Check emergency reverse function of the emergency reverse switch.(See Page 30 Section "4.2.9 Braking")		
Check the brake system.(See Page 30 Section "4.2.9 Braking")		
Test the parking brake function.(See Page 30 Section "4.2.9 Braking")		
Check the steering system.(See Page 29 Section "4.2.7 Steering")		
Check the vertical creep of the truck.(if equipped)		
Visually inspect the bolts and nuts.		
Visually inspect if there are any broken hoses or broken electric wires.		
Perform a visual inspection of the battery connector and connector pins for damage, deformation, or other signs of deterioration.		
Visually inspect the cover are secure and check for damage.		
Do not restrict the field of vision. Ensure the visible area specified by the manufacturer is observed.		
Attachment parts must be properly secured and function according to their operating instructions.(if equipped)		
Check that there are no foreign objects that could hinder the operation of the wheels and rollers.		
Visually inspect the battery and recharge the battery.(See Page 40 Section "4.5 Battery and charger")		

NOTE

- *Do not use the truck if there is any damage or defect.*
- *Contact your authorised service centre.*

4.2 Using the truck

4.2.1 Commissioning

The truck must only be operated on battery current!

To prepare the truck for operation after delivery or transportation, the following operations must be performed:

- Check the equipment for completeness.
- If necessary, install the battery. Make sure that the battery cable is not damaged.
- Fully charge the battery.
- Check for fluid leakage.
- Check the brake function.
- Check the lifting and lowering function.
- Check the driving function.
- Check the steering function.

The truck can now be started, see Page 27 Section "4.2.5 Truck starting".

NOTE

If the truck is delivered in multiple parts, setup and commissioning must only be performed by trained, authorized personnel.

Wheel flattening

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

Once the truck has covered a certain distance, the flattening will disappear.

4.2.2 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.

NOTE

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

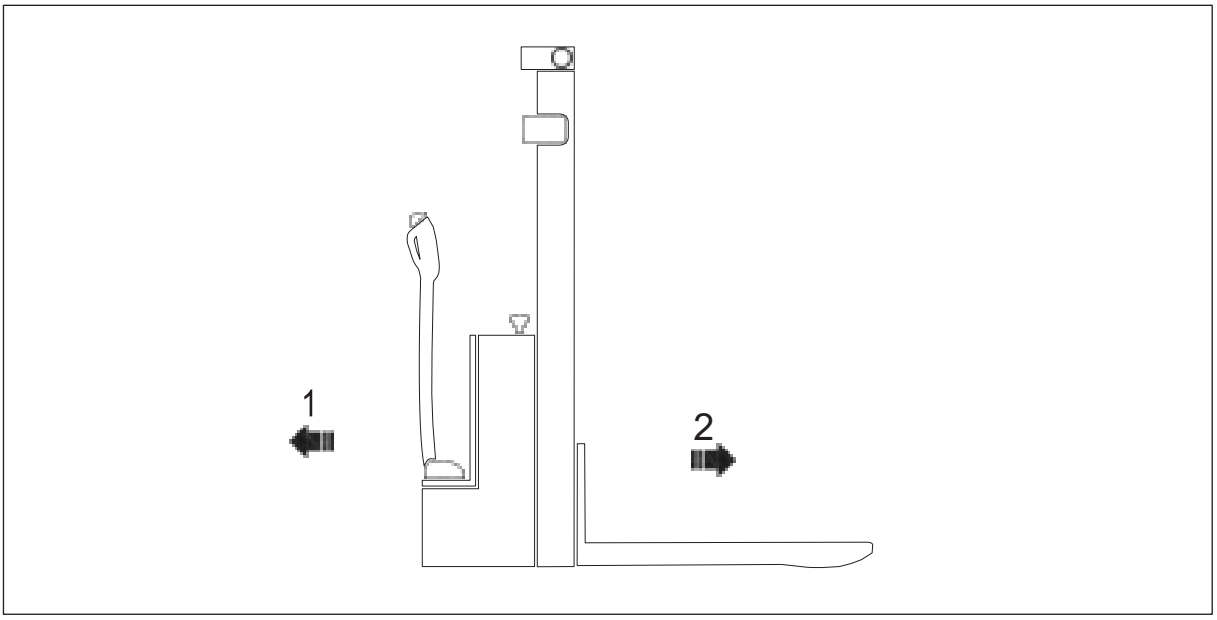
4.2.3 During running-in

We recommended operating the machine under light load conditions for the first stage of operation to get the most from it. Especially the requirements given below should be observed while the machine is in a stage of 100 hours of operation.

- Must prevent the new battery from over discharging when early used. Please charge when remain power is less than 20%.
- Perform specified preventive maintenance services carefully and completely.
- Avoid sudden stop, starts or turns.
- Oil changes and lubrication are recommended to do earlier than specified.
- Carry only 70-80% of the rated load.

4.2.4 Defining directions

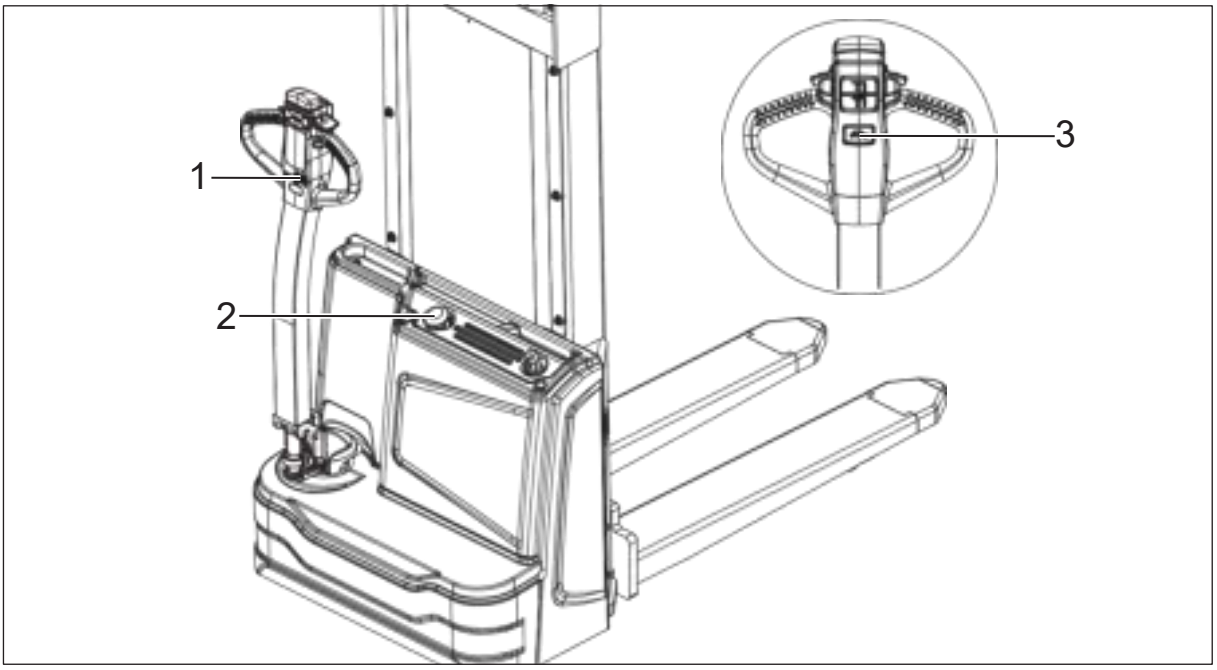
The drive directions of the truck are forward (1) and reverse (2).



4.2.5 Truck starting

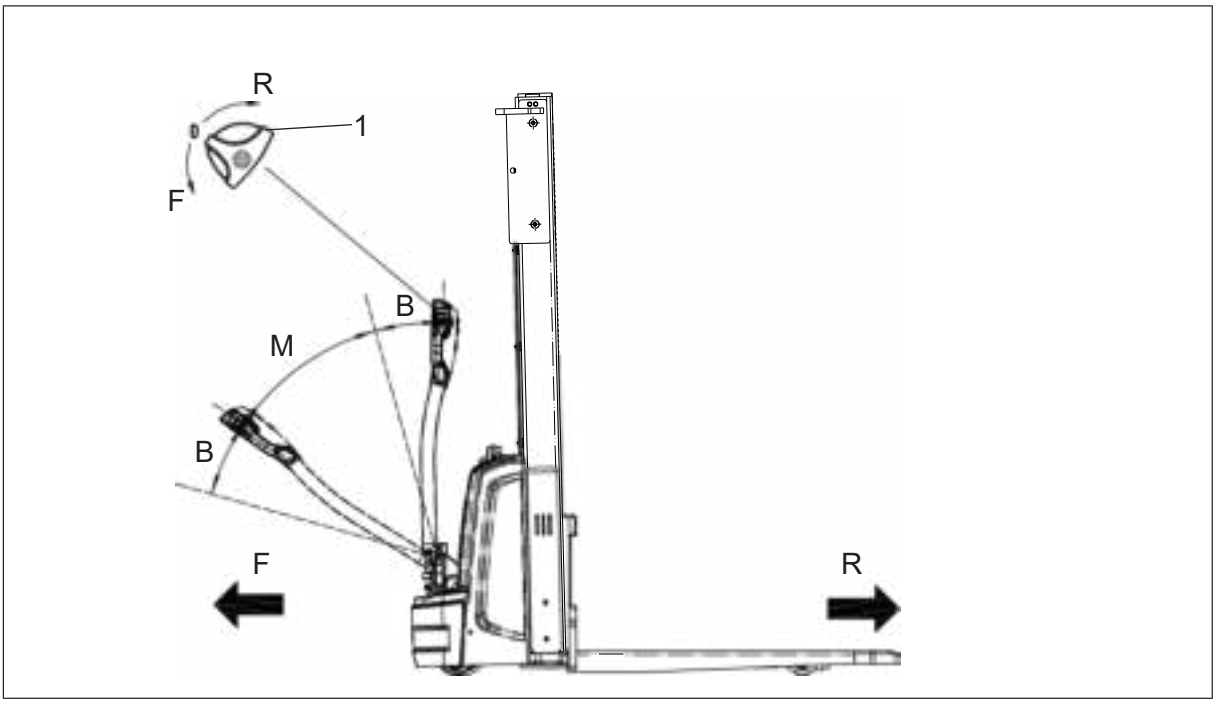
Carry out check before operation and make sure each function and state is normal (See Page 26 Section "4.2.1 Commissioning").

- Release the emergency stop switch (2).
- Open the key switch (1) to start the truck.
- Press the horn button (3) before driving to alert people nearby.



4.2.6 Running

► **Running area**



Set the tiller to the running area (M) ,Set the drive switch (1) to the required direction. Control the travel speed with the drive switch (1) (The lager the turning angle, the faster corresponding speed)

NOTE

When using the truck on a ramp or a uneven road, please lift the mast to prevent its bottom from colliding with the road surface.

NOTE

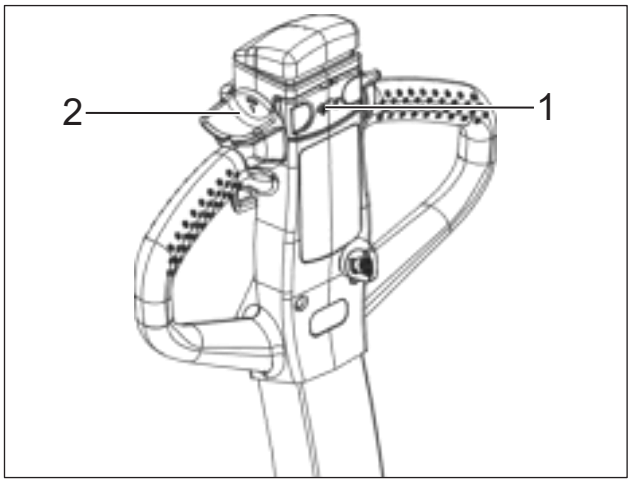
- *F is forwards.*
- *R is reverse.*
- *B is brake.*
- *M is running area.*

Creep speed function

Keep the tiller in the vertical state, and press and hold the creep speed switch

(1) and drive switch (2) at the same time, then the truck will move at a low speed.

Releasing any switch to exit creep speed mode.

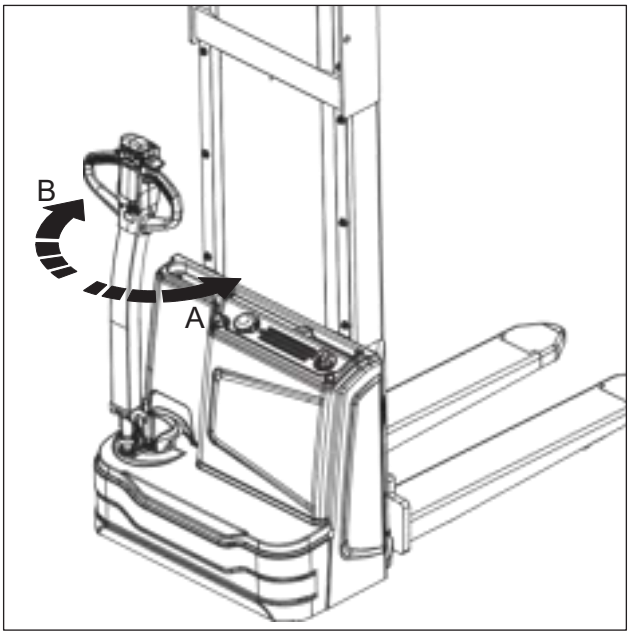


NOTE

Activating the interlock switch will exit creep speed mode.

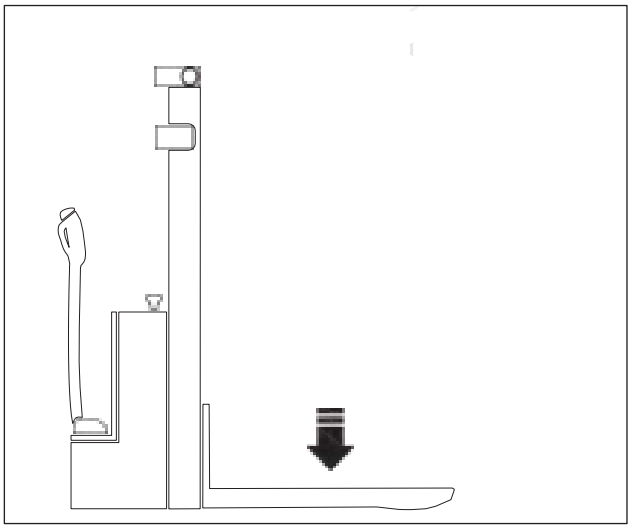
4.2.7 Steering

Turn the tiller left (A) or right (B) according to the desired direction.



4.2.8 Parking the truck securely

- Drive the truck to safe area or appointed area.
- Lower the mast to the bottom.
- Turn off the key switch.
- Press the emergency stop switch.



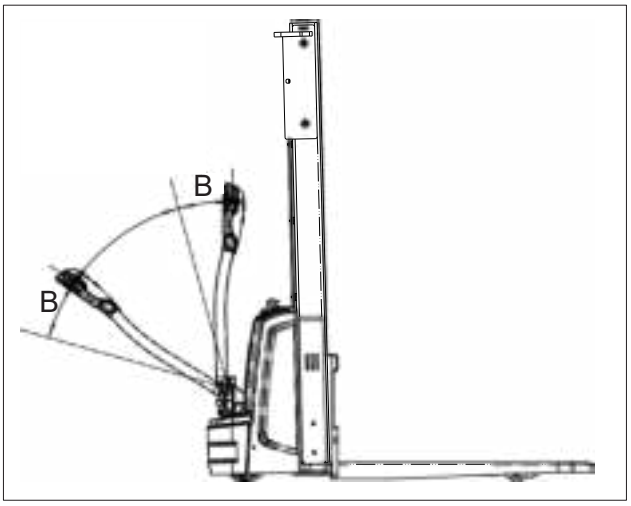
⚠CAUTION

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

⚠WARNING

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

4.2.9 Braking



► **Mechanical operating brake**

The truck is braked when the operating handle is released.

The mechanical brake engages when the tiller is positioned in braking area B.

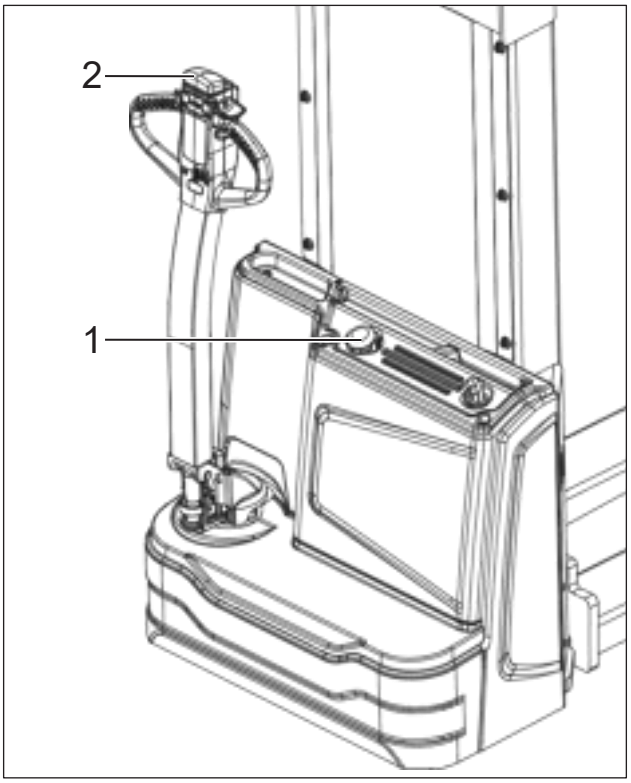
⚠CAUTION

If the Tiller moves slowly into the brake position, identify the cause and rectify the fault. If necessary, replace the gas spring!

⚠WARNING

The tiller tube contains a gas strut under high preload. Incorrect removal can cause sudden movement and result in crushing or impact injuries.

- *Wear protective gloves and safety goggles when removing or installing the gas strut.*
- *Do not disassemble or repair the gas strut. Replace a defective gas strut.*



► **Emergency stop switch**

Press the emergency stop switch (1), and then all the electrically propelled functions will be interrupted.

► **Regenerative braking**

Release the drive switch. The drive switch will automatically return to the initial position and the vehicle will begin to enter the regenerative braking state.

When it decelerates to <1 km/h, the electromagnetic brake will bring the motor to a stop.

⚠CAUTION

Open 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.

► **Reverse braking**

Braking can be accomplished by changing the direction of travel.

Press the drive switch in the opposite direction until the truck comes to a stop, then release the drive switch.

► **Emergency reverse switch**

To protect the driver from any risk of being trapped between an obstacle and the machine, the end of the tiller is fitted with a emergency reverse switch (2).

Once the safety reverser is triggered, the equipment will stop immediately, then slowly move back in the direction of the fork.

4.2.10 Using the truck on a slope

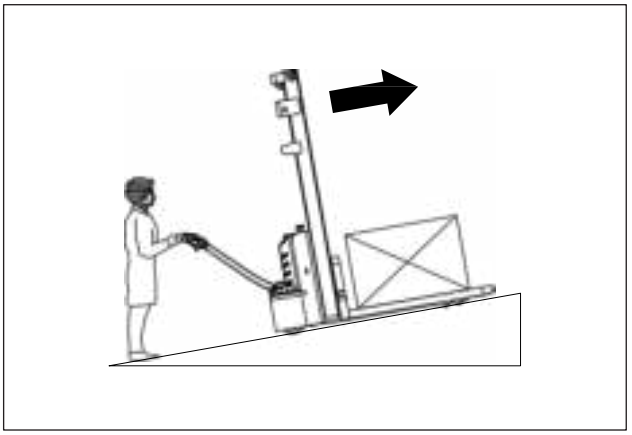
NOTE

Incorrect use of the truck on slopes places 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 data sheet.
- Make sure that the ground is dry with a nonslip surface and that the route is clear.
- Ascending slopes

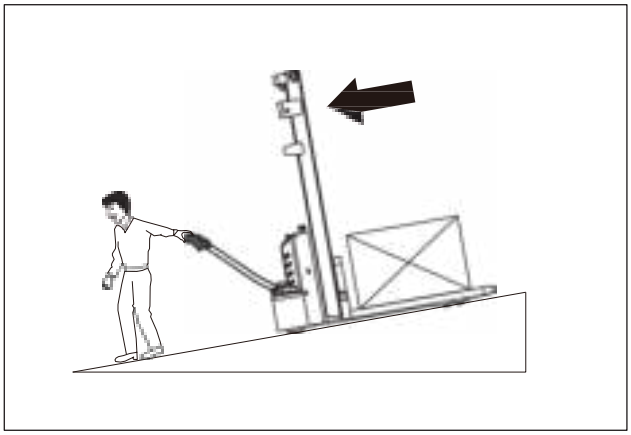
Travel up slopes must always be reverse, with the load uphill. Without a load, we recommend that you ascend slopes forwards.



▶ Descending slopes

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

Without a load, it is recommended that slopes are descended forwards. In all cases, travel at a very low speed and brake very gradually.



⚠DANGER

- *In all cases, you must travel at a very low speed and brake very gradually.*
- *Risk to life and/or risk of major equipment damage.*
- *Never park the truck on a slope. Never make a U-turn or take shortcuts on a slope. The driver must drive very slowly on slopes.*

▶ Starting on a slope

If you have to stop and then start on a 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.

4.3 Handling loads

4.3.1 Loading

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 nameplate. 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.

⚠ CAUTION

Safety footwear must be worn.

⚠ CAUTION

- *Do not touch nearby loads or loads positioned at the side or in front of the load being handled.*
- *Arrange the loads with a small space between them to prevent them coming into contact with one another.*

▶ Picking up a load from the ground

Approach goods carefully when driving the vehicle.

Lower the forks so that they can easily be inserted into the pallet. Insert the forks below the pallet.

If the goods are shorter than the forks, move the goods a few centimeters from the end of the forks so as not to scratch the goods in front.

Lift the goods a few centimeters.

▶ Picking up a load at height

Carefully drive the machine to the required location.

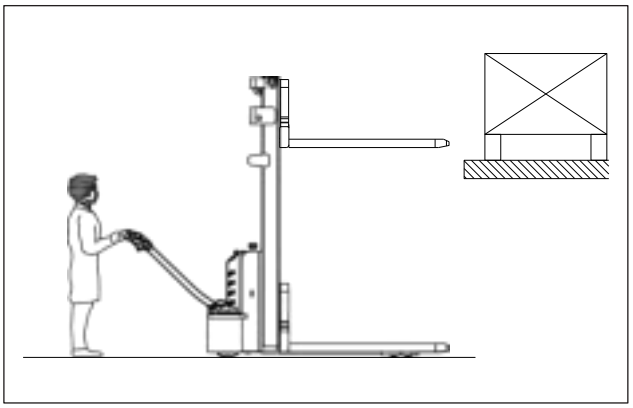
Raise the forks to the height of the pallet.

Carefully move the forks backward under the pallet.

Lift the forks until the pallet moves away from the racking.

Reverse the truck to free the pallet.

Lower the goods again until they are a few centimeters away from the ground.



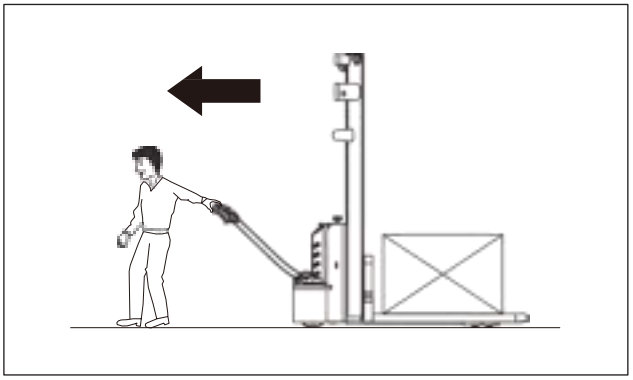
⚠ CAUTION

If the equipment has an initial lift control, separate the goods from the racking. To maintain maximum stability, never use the initial lift control, to avoid overloading the equipment.

▶ Transport loads

⚠ DANGER

Personnel must not stand under or near the mast when the load is in the raised



⚠ DANGER

Never transport a load with the forks in the raised position as the equipment may become unstable.

- *Always drive forwards for optimum visibility.*
- *When carrying a load on a slope, always climb and descend with the load up-hill.*
- *Never travel diagonally across the slope or make a U-turn.*
- *Reverse gear must only be used for depositing a load. Since visibility in this direction is restricted, you should only travel at very low speed.*
- *Never drive with an unstable load.*
- *If visibility is poor, let someone guide you.*
- *Be careful of low passageways, low door-ways, scaffolding, pipes etc.*
- *To facilitate movement over obstacles, increase the ground clearance.*
- *Check that the width of the load is compatible with the width of the aisle.*

ⓘ NOTE

When the fork is raised to approximately 800 mm, the mast half-speed switch is triggered, reducing the travel speed.

▶ Setting a load down on the ground

Carefully move the load into the deposit area.

Lower the load until the fork arms are free. Move the forks straight back.

Lift the forks a few centimeters again.

⚠ CAUTION

Be careful not to touch nearby loads or those behind the equipment.

⚠ CAUTION

Do not touch nearby loads or loads positioned behind the equipment.

⚠ CAUTION

Before you remove the load, ensure that there are no people in the vicinity.

▶ Stacking a load

Carefully drive the machine to the required location.

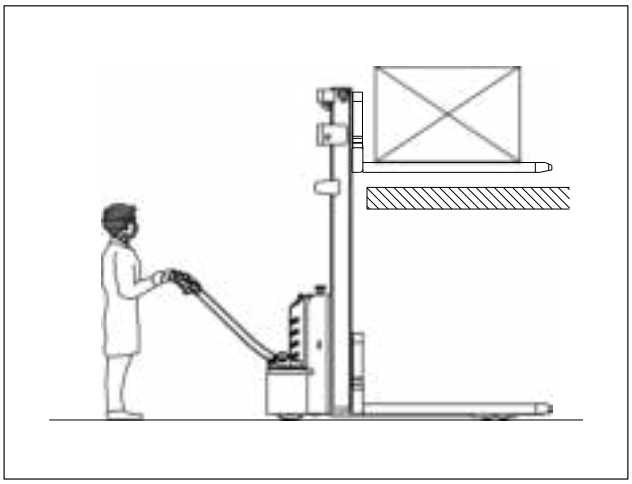
Raise the forks clearly above the level where the load is to be placed.

Drive the truck backward into the racking.

Lower the load until the fork arms are free.

Move the forks straight back.

Lower the forks again until they are a few centimeters away from the ground.



⚠ DANGER

Personnel must not stand under or near the truck when the load is in the raised position.

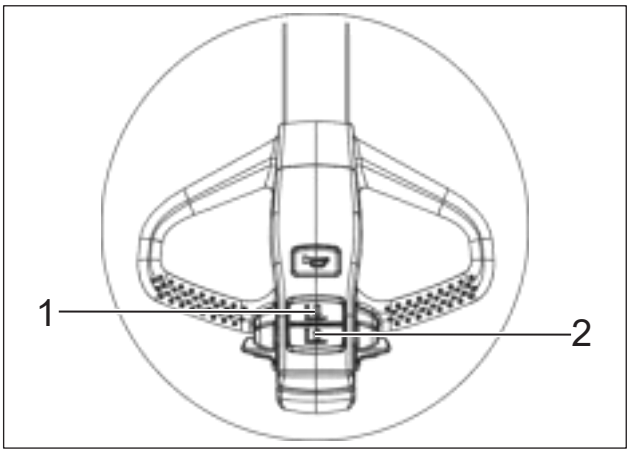
4.3.2 Goods picking

► **Lifting**

Keep pressing the lifting button (2) until reaching the required lifting height.

► **Lowering**

Lower the truck to the bottom through pressing the lowering button (1).



⚠ WARNING

Goods failing to be arranged and fixed may result in accidents.

ⓘ NOTE

To avoid shortening the service life of the oil cylinder, try not to lift the stacker mast to the highest state for every lifting operation.

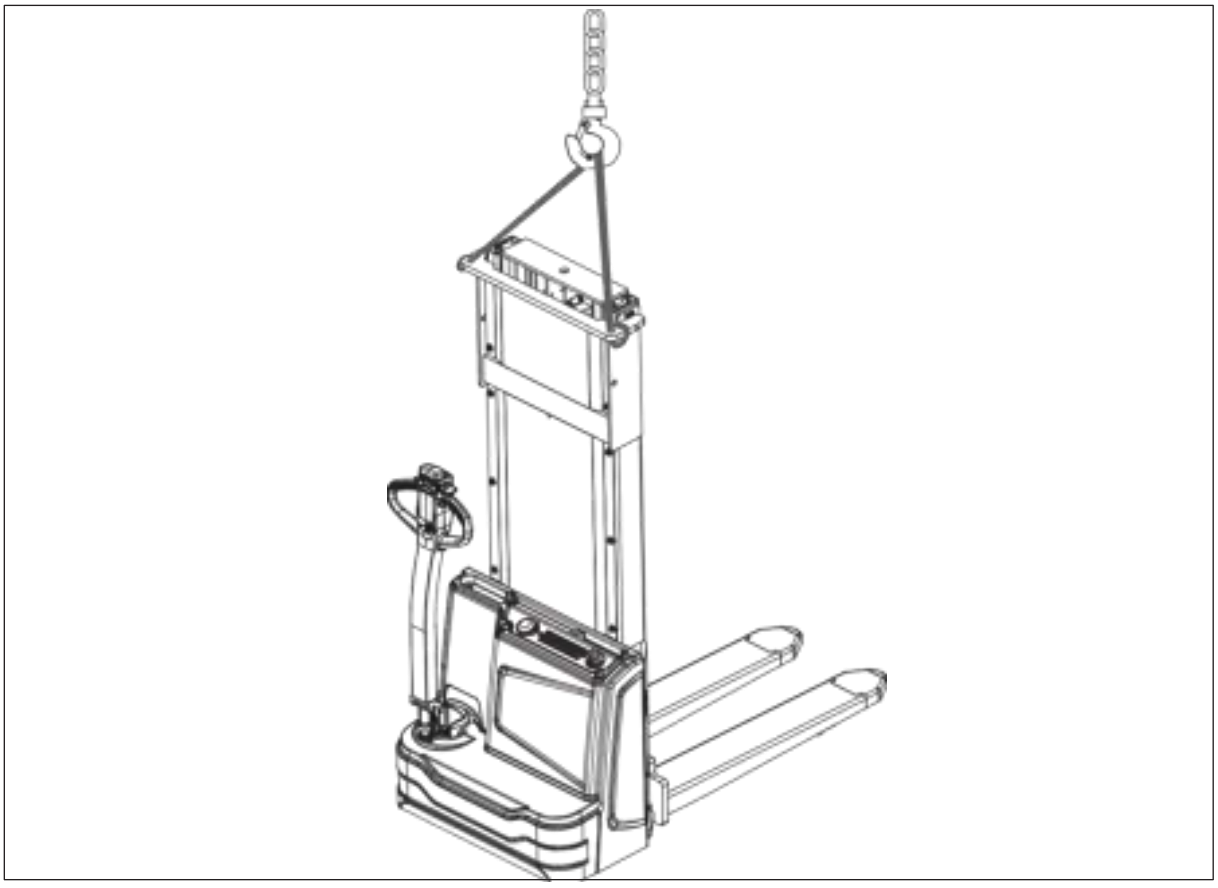
2.1 Transport

► **Location for lifting and/or slinging points**

⚠ DANGER

- *Suspended load!*
- *The use of unsuitable lifting gear can cause the truck to crash when being lifted by crane.*
- *Prevent the truck from striking other objects when it is being raised and avoid any involuntary movements.*
- *If necessary, secure the truck with guide ropes.*

- The truck should only be handled by people who are trained in using lifting slings and tools.
- Wear safety shoes when lifting the truck by crane.
- Do not stand under a swaying truck.
- Do not walk into or stand in a hazardous area.
- Always use lifting gear with sufficient capacity (for truck weight see truck data plate).
- Always attach the crane slings to the prescribed strap points and prevent them from slipping.
- Use the lifting gear only in the prescribed load direction.
- Crane slings should be fastened in such.
- Park the truck securely (See Page 29 Section "4.2.8 Parking the truck securely").
- Disconnect the power supply, remove the battery if necessary.
- Secure the lifting slings at the fastening points.
- Load the truck and park it securely at its destination.



2.1.1 Securing the truck for transport

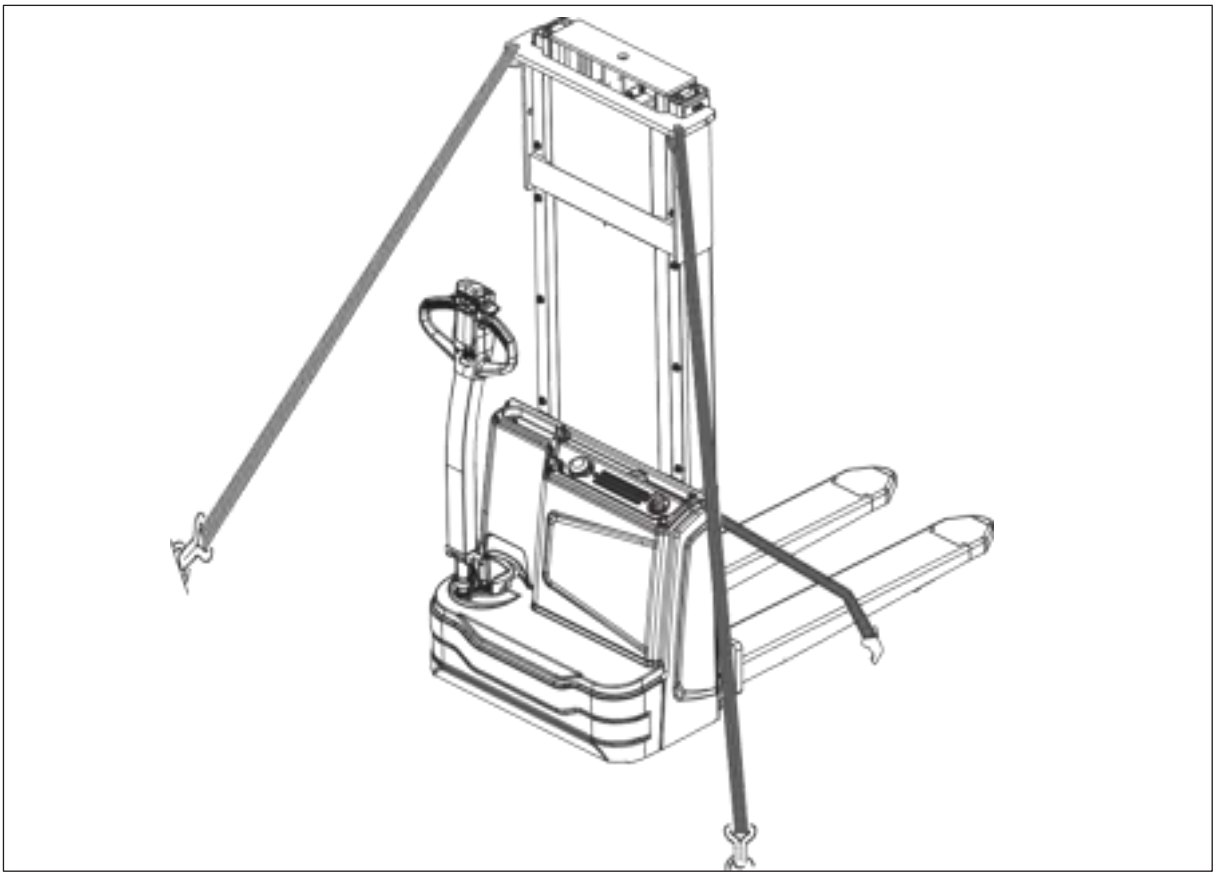
Correctly fix the truck to avoid move when using truck or trailer.

Procedure:

- Park the truck securely. (See Page 29 Section "4.2.8 Parking the truck securely")
- Sling the tensioning belt around the truck and attach it to the fastening rings of the transporting vehicle.
- Use wedges to prevent the truck from moving.
- Tighten the tensioning belt with the tensioner.

⚠ WARNING

- *The truck or trailer must have fastening rings.*
- *Only use tension belt or fastening belt of good nominal strength.*

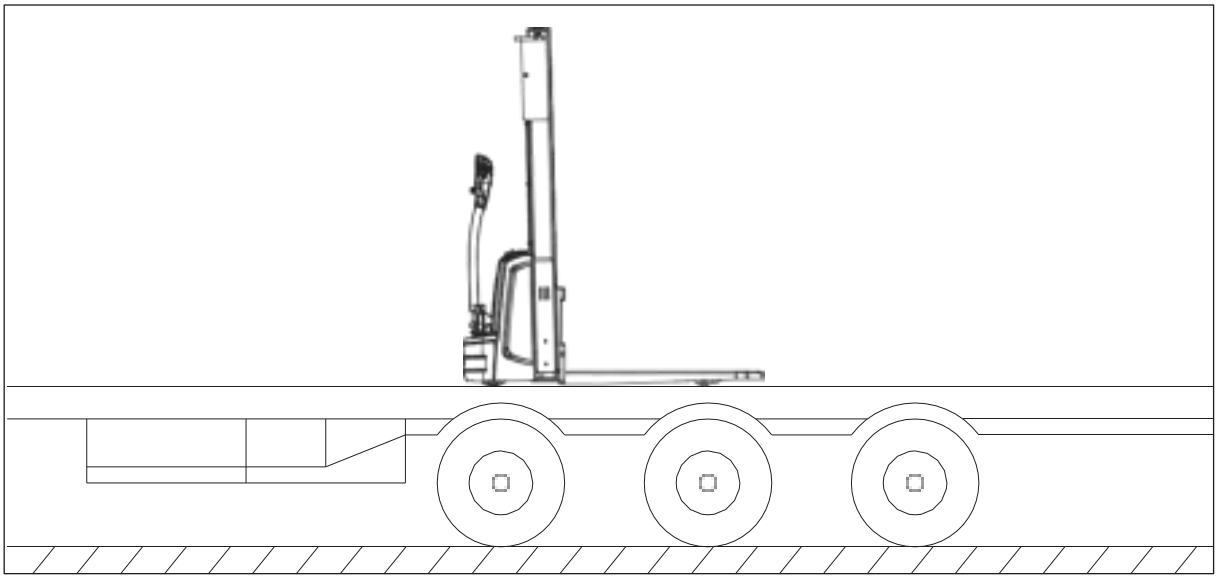


2.1.2 Transport

The truck is designed for short-distance lifting, lowering and transporting load units, not suitable for long-distance travel. If needed, the truck must be transported by using lifting device or platform to place on truck or trailer.

NOTE

- *The truck must be suitably protected from the effects of the weather during transport and storage.*
- *To load or unload the truck, use an inclined plane or a mobile ramp.*



► **How to remove a broken truck**

It's not allowed to tow the truck on the ground directly when the truck is broken down or damaged since the brake of the truck is closed under normal circumstances. Appropriate vehicles should be used to remove the broken trucks.

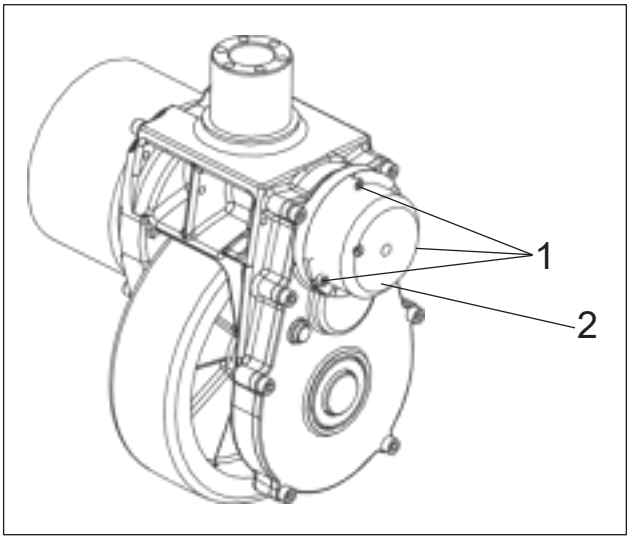
⚠ WARNING

Do not tow the broken trucks on the ground directly, or else the braking system would be damaged.

2.1.3 Operating the truck without its own drive system

If the truck has to be moved after a failure has rendered it immobile, proceed as follows:

- Set the emergency stop switch “OFF”.
- Set the key switch “OFF” and remove the key.
- Prevent the truck from rolling away.
- Remove the drive assembly (See Page 56 Section "5.5.7 Drive Wheels - Removal and Installation").
- Unscrew the three screws (1) and remove the electronic brake (2).
- Reinstall the drive assembly and the truck can be moved (no braking action).
- After setting down the truck at the destination, install the electronic brake in the reverse order of operation.
- Braking action is restored.



⚠ WARNING

This operating mode is not permitted when negotiating with inclines and gradients.

2.2 Battery and charger

2.2.1 Information for battery and charger

Battery types & dimensions are as follows:

Tuck type	Voltage/ rated capacity	Battery type	Charger	Charging time
PSM 1.2	24V/40Ah	Lithium-ion battery	15A	3h

2.2.2 Safety regulations for charging the battery

- Avoid the existence of any metal object in the surface of the lithium-ion battery.
- Do not pierce the battery case with nails or other sharp objects.
- Do not short-circuit the battery with wires or other metal objects.
- The plug connection parts should be inspected in terms of obvious damages before charging.
- Fire-fighting equipment must be kept in the charging place.
- Before charging, check if there is damage on cable connection and plug connection pieces.
- Do not use irregular charging sockets.
- Charging in non-charging area is prohibited.
- No inflammable substances or spark-generating materials being present or stored within a distance of 2 meters of the truck parked for battery charging.
- No smoking or open fire around when charging.
- When charging, do not wrongly connect the battery polarity, otherwise it may damage the battery.
- Please charge the lithium-ion battery at an ambient temperature of 0°C to 40°C. Do not charge the lithium battery below 0°C.
- The safety provisions related to the lithium-ion battery and the manufacturer of charging station must be strictly abode by.
- An RCD switch (residual current device, circuit breaker) of type B or B+ must be used where necessary.

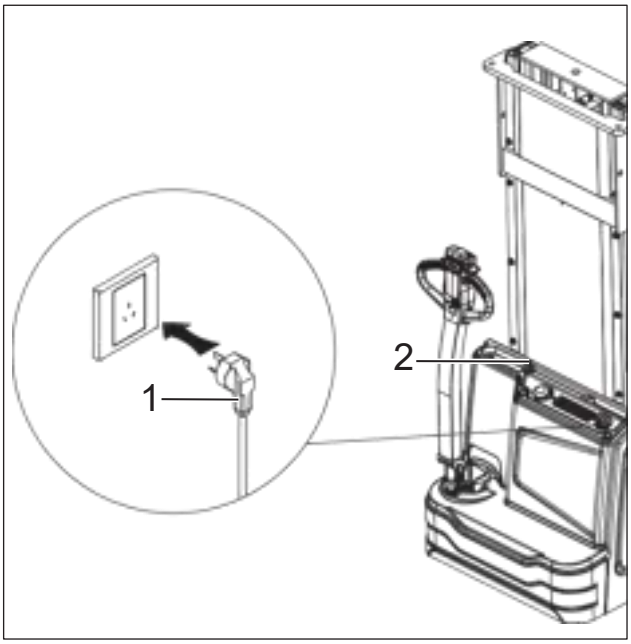
NOTE

The workplace regulations must be observed (emergency exits, escape routes, traffic routes, ...) must be kept clear.

Lithium-ion battery systems offer the advantage that they can be recharged temporarily, allowing industrial trucks to be charged at any time. As a result, shorter charging times can usually be achieved and charging with higher currents is also possible.

4.3.3 Charging the battery with a built-in charger

- Park the truck securely (See Page 29 Section "4.2.8 Parking the truck securely").
- Pull the charger cord (1) from the truck and examine it for damage.
- If undamaged, plug the charger into a wall outlet.
- If the built-in charger is connected to the outlet, the truck should not be moved.



⚠WARNING

Charging voltage range is 100~265V, single phase, 50HZ, please do not exceed the voltage range. Charger maximum input power 500W.

Please strictly implement the above data to prevent equipment damage and accidental risks such as fire.

Recharge the battery by observing the instructions provided by the battery supplier and by the battery charger supplier.

⚠WARNING

Do not use switchable power socket for charging.

NOTE

During charging, the travel and lift functions are automatically locked to ensure operational safety.

▶ **Charging indicator (2)**

NO.	LED status	Phenomenon	Cause	Description
1	Red light is on		Trouble free	Charging
2	Green light is on		Trouble free	End of charging
3	Yellow light is on		Storage battery fails.	/
4	Yellow light flashes		Charger failure	/

▶ Integrated charger

The integrated charger must not be opened.

In case of malfunctions, the customer service or the manufacturer's customer service must be notified.

The charger may only be used for the batteries supplied by the manufacturer. Swapping with other industrial trucks is not permitted.

The battery must not be connected to two chargers at the same time.

The mains connection may vary depending on the size of the integrated charger. Observe the correct voltage and amperage when using.

⚠DANGER

- *Damaged and unsuitable cables can lead to electric shock and, due to overheating, to fire.*
- *Only use mains cables with a maximum cable length of 3m.*
- *Unroll the cable reel completely when in use.*
- *Only use original mains cables from the manufacturer.*
- *Insulation protection classes and resistance to acids and alkalis must correspond to the manufacturer's mains cable.*

ⓘNOTE

Depending on the vehicle model and battery type, the battery is permanently connected to the vehicle and the battery plug does not need to be disconnected.

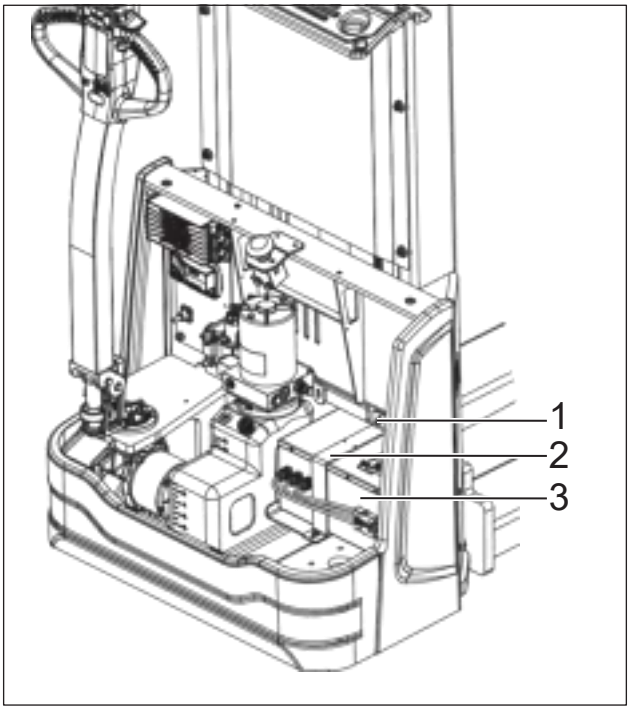
2.2.3 Battery removal and installation

Park the truck securely as described in Page 29 Section "4.2.8 Parking the truck securely" and turn off the power before removal and installation of the battery.

Battery removal and installation steps:

- Remove the cover (See Page 52 Section "5.5.2 Removing the cover").
- Loosen two screws (1) and pull out of the bracket (2).
- Disconnect the battery cable, grip the battery handle and remove the battery (3).

Installation is in the reverse order of operations.



⚠WARNING

The battery box is very heavy, be careful to avoid damage. Tools are available for removal.

⚠WARNING

To prevent short circuits, batteries with exposed terminals or connectors must be covered with a rubber mat.

2.3 Cleaning

Clean the truck

Washing instructions:

- Always park the Truck as specified.
- Disconnect the battery connector.

⚠CAUTION

Disconnect the battery connector when washing the truck.

Washing the exterior of the truck

⚠WARNING

Do not use inflammable fluids for cleaning. Observe the above safety precautions for pre- venting sparks through shorts (disconnecting the battery connector). When the truck is being cleaned, carefully cover all vulnerable components, particularly electric components. Observe the manufacturer's instructions for handling the cleaners.

- Clean the truck exterior with water and cleaning agents soluble in water (sponge, rags).
- Clean especially the oil filler openings and the surrounding area.
- Grease the required assemblies (mast, controls and joints).
- Cleaning the electrical system

⚠WARNING

Do not aim the steam cleaning device directly on electric motors and other electric components, brakes and bearings.

ⓘNOTE

Only use dry cleaning agents as cleaning agents. Do not remove any covers, etc.

- Clean electrical components with a nonmetallic brush and blow dry with a weak jet of air.

After washing the truck

- Dry the truck thoroughly (eg. with compressed air).
- Take the truck back into operation according to recommissioning.
- If moisture has penetrated the motors despite the precautionary measures, dry them first with compressed air. If not, there is the risk of short circuits! The truck must only then be turned on and taken into operation to prevent any damage due to corrosion.

5 Maintenance

5.1 Operational safety and environmental protection

The servicing and inspection operations contained in this chapter must be performed in accordance with the intervals indicated in the service checklists.

Only use original spare parts that have been certified by our quality assurance.

Used parts, oils and fuels must be disposed of in accordance with the applicable environmental protection regulations. Upon completion of inspection and servicing, carry out the activities listed in the “Restoring the truck after Decommissioning” section.

5.2 Maintenance Safety Regulations

Lifting and jacking up

When a fork truck is to be lifted, the lifting gear must only be secured to the points specially provided for this purpose. When the truck is to be jacked up, suitable measures must be taken to prevent the truck from slipping or tipping over (use of wedges, wooden blocks).

Work underneath the raised load lifting device must only be carried out when the fork is immobilised and supported by a chain of adequate strength.

Service plan

Maintenance work must be carried out according to the hour meter. Please consult the truck's maintenance plan.

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).

Work on the electric system

Work on the electric system of the truck must only be performed by personnel specially trained for such operations. Before commencing any work on the electric system, all measures required to prevent electric shocks have to be taken. Take off the metal accessories from the hand before checking the truck electrical system.

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.

Working on the hydraulic equipment

The hydraulic system must be depressurised prior to all work on the system.

Safety devices

After maintenance and repair work, all safety devices must be reinstalled and tested for operational reliability.

Maintenance operations that do not require special training

Simple maintenance operations such as checking the hydraulic fluid level can be carried out by persons with no special training. A specific qualification is not necessary.

Complicated maintenance operations such as replacing the battery, replacing the wheels and so on should be carried out by the authorised service centre.

Refer to the maintenance section of this manual for further information.

Servicing and maintenance personnel

Only qualified personnel authorized by the owner are permitted to perform maintenance or repair work. All items listed in the Scheduled Maintenance Charts must be performed by qualified technicians only. They must have knowledge and experience sufficient to assess the condition of a truck and the effectiveness of the protective equipment according to established principles for testing trucks. Any evaluation of safety must be unaffected by operational and economic conditions and must be conducted solely from a safety standpoint.

Daily inspection procedures and simple maintenance checks, e.g. checking the hydraulic oil level or checking the fluid level in the battery, may be performed by operators. This does not require training as described above.

Battery maintenance staff

Batteries must only be recharged, maintained and changed by specially trained personnel.

Personnel must follow the manufacturer's instructions of the battery, the battery charger and the truck.

It is essential to follow the battery maintenance instructions and the battery charger operating instructions.

Ordering spare parts and consumables

Only original spare parts have been certified by our quality assurance department. To ensure safe and reliable operation of the truck, use only the manufacturer's spare parts. Used parts, oils and fuels must be disposed of in accordance with the relevant environmental protection regulations. For oil changes, contact the manufacturer’s specialist department.

5.3 Servicing and inspection

Thorough and expert servicing is one of the most important requirements for the safe operation of the truck. Failure to perform regular servicing can lead to truck failure and poses a potential hazard to personnel and equipment.

The service intervals stated are based on single shift operation under normal operating conditions. They must be decreased accordingly if the truck is to be used in conditions of extreme dust, temperature fluctuations or multiple shifts.

The following maintenance checklist states the tasks and intervals after which they should be carried out. Maintenance intervals are defined as:

W	Every 50 service hours, at least once per week, performed by operator or service technician
A	Every 250 operating hours, at least once a month and a half, performed by operator or service technician
B	Every 500 operating hours, at least once per quarter, performed by operator or service technician
C	Every 1000 operating hours, at least once half year, performed by operator or service technician
D	Every 2000 operating hours, at least once per year, performed by operator or service technician

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

5.3.1 Operator

Simple maintenance operations can be carried out by persons with no special training. A specific qualification is not necessary.

► **Maintenance Checklist**

		Maintenance interval ●				
		W	A	B	C	D
Before starting maintenance work	Parking the truck securely and cut off the power supply. Using wooden blocks to prevent wheel from moving.					
	Clean the fork lift truck if necessary.					
	Check the time and date settings on the display unit. adjust if necessary.					
	Check for error codes on diagnostic software and delete.					
Functions and Control	Check the functions of the operation switches and display.	●				
	Check the braking functions.	●				
	Check the emergency stop switch functions.	●				
	Check the emergency reverse switch functions.	●				
	Check tiller steering functions.	●				
	Inspect where there is any damage in the cables and whether the terminals are reliable.		●			
Power Supply & Drive System	Inspect the battery charging port.				●	
	Check drive wheel and gearbox for abnormal noise				●	
	Check for wear or aging of insulation materials on cables, connectors, and battery terminals				●	
Chassis System	Check load wheels for jamming or abnormal noise				●	
	Visually inspect the chassis, cover, fork for damage, cracks or deformation.	●				
Hydraulic System	Check hydraulic cylinders and hydraulic oil tank for leaks			●		
	Inspect hydraulic pipelines for damage			●		
Other	Check if the label, nameplate, and load capacity plate are clear and complete.			●		

5.3.2 Specialist (Service technician)

► **Maintenance Checklist**

		Maintenance interval ●				
		W	A	B	C	D
Before starting maintenance work	Parking the truck securely and cut off the power supply. Using wooden blocks to prevent wheel from moving.					
	Clean the fork lift truck if necessary.					
	Check the time and date settings on the display unit. adjust if necessary.					
	Check for error codes on diagnostic software and delete.					
Functions and Control	Inspect the air gap of the electromagnetic brake, and if the air gap is larger than 0.4 mm, please replace the friction plates.				●	
	Inspect where there is any damage in the cables and whether the terminals are reliable, replace if necessary		●			
	Inspect and tighten controller and contactor	●				
Power Supply & Drive System	Inspect gearbox fastening condition				●	
	Clean drive motor, steering motor, and pump motor				●	
	Inspect the battery cables for damage and replace if necessary				●	
	Check for wear or aging of insulation materials on cables, connectors, and battery terminals				●	
	Check battery temperature				●	
	Retighten wheel fasteners		●			
	Tighten motor mounting bolts					●
	Check motor connector connection					●

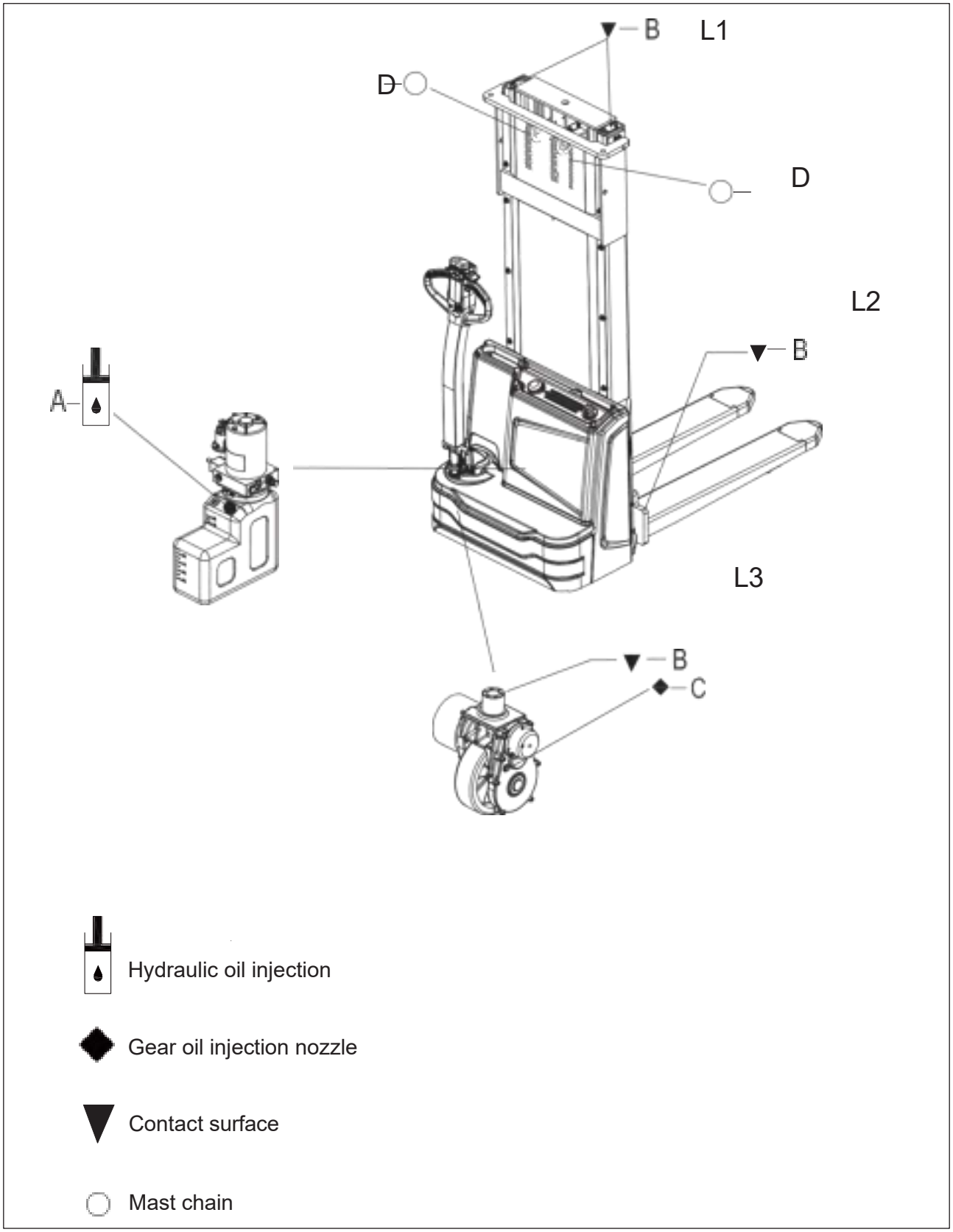
		Maintenance interval ●				
		W	A	B	C	D
Power Supply & Drive System	Check gearbox for gear oil leakage and replace/ replenish gear oil or grease			●		
	Check the safety condition of the wheels and replace them if necessary				●	
	Lubricate wheel bearings				●	
Chassis System	Check and lubricate the pin shaft and articulation points			●		
	Lubricate the caster (if necessary)			●		
	Check for looseness of each joint.				●	
Lifting System	Lubricate mast channels, rollers, and fork carriage		●			
	Inspect fork arm carriage and fork arms for visible cracks or damage	●				
	Check mast for damage or excessive movement	●				
	Check the wear of the lifting chain and chain guide, and replace if necessary			●		
	Check the truck mast channel steel rollers for abnormal noises, adjust or replace if needed			●		
	Adjust the tension of the lifting chains and lubricate them using chain spray			●		
Hydraulic System	Inspect hydraulic pipelines for damage			●		
	Check for hydraulic oil level, replenish hydraulic oil.			●		
	Check whether the truck's load capacity reaches the rated capacity. Adjustments can be made through the relief valve on the hydraulic unit (for specifics, consult the after-sales service department)				●	
	clean or replace hydraulic oil.					●
Other	Inspect the installation of truck fasteners			●		

NOTE

If the 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.

5.4 Lubrication Points

5.4.1 Lubricant chart



Lubricants				
Code	**Type**	**Specification**	**Amount**	**Position**
A	Anti-wear hydraulic oil	L-HM32	See Table 1	(See Table 1)
B	Multi-purpose grease	Polylub GA352P	Appropriate amount	Contact surface (See Table 2)
	General-purpose lithium-based grease	3#		
C	Grease (MoS_2)	-	80 grams	Gearbox
D	Chain spray or Engine oil	/	Appropriate amount	Chains

Table 1 Application Amount of Hydraulic Oil

Mast	Lifting Height (mm)	Quantity (L)
Duplex	2430	3.3
	2930	3.8
	3530	4.4

Table 2 Contact Surface Lubrication

Code	Position
L1	Mast Steel channel and rollers
L2	Fork carriage
L3	Drive wheel gear

⚠ WARNING

Entering or working at height can result in a fall and cause serious injury or death.

- *Use fall protection equipment if required by site rules (e.g., personal fall arrest system).*
- *Perform work at height with a second person present.*
- *Before starting work, ensure the ladder or access platform is correctly positioned and secured.*
- *Do not use shelves, racks, or other structures as access equipment.*

5.5 Maintenance Instructions

5.5.1 Prepare the truck for maintenance and repairs

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

Park the truck securely (See Page 29 Section "4.2.8 Parking the truck securely"). Remove the key to prevent the truck from accidentally starting.

When working under a raised lift truck, secure it to prevent it from tipping or sliding away.

5.5.2 Removing the cover

► **Removing the upper cover and front cover**

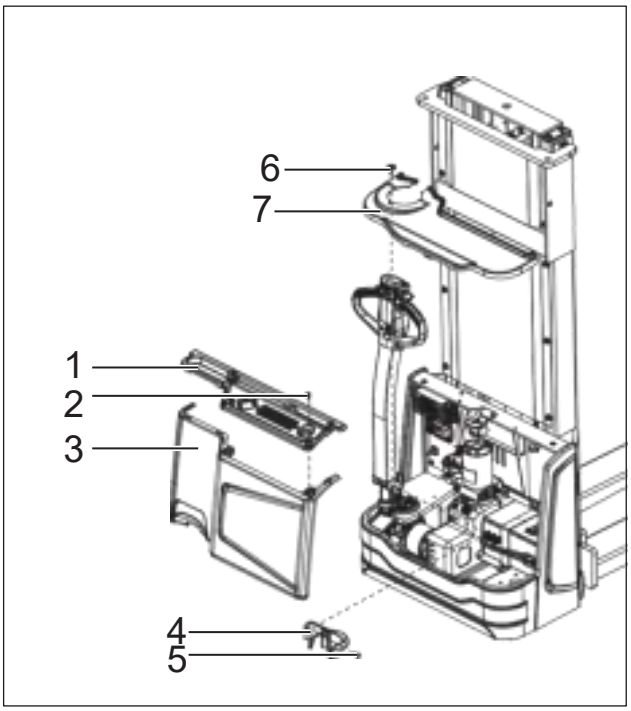
Undo four screws (2) on the upper cover (1) with a wrench.

► **Removing the rotation cover**

Undo two screws (5) on the rotation cover (4) with a wrench.

► **Removing the bottom cover**

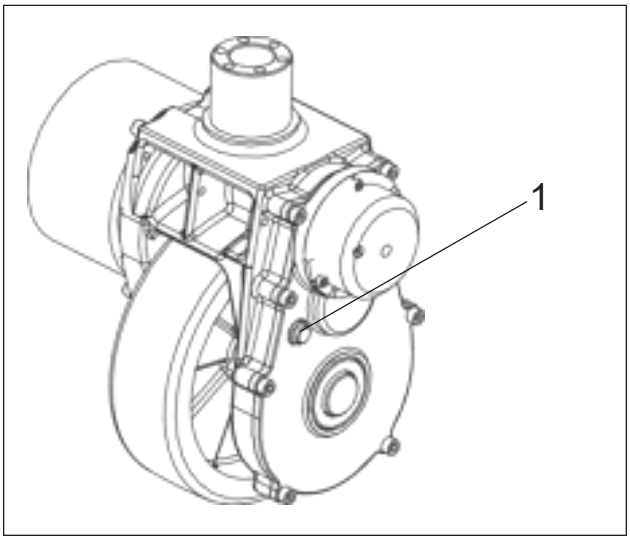
Undo a screw (6) on the bottom cover (7) with a wrench.



5.5.3 Checking the gear oil level and replace gear oil

- Prepare the truck for maintenance and repairs (See Page 52 Section "5.5.1 Prepare the truck for maintenance and repairs").
- Remove the cover (See Page 52 Section "5.5.2 Removing the cover").
- Add grease of the correct grade (See Page 50 Section "5.4 Lubrication Points").
- Add transmission oil every 500 operating hours or at least annually.

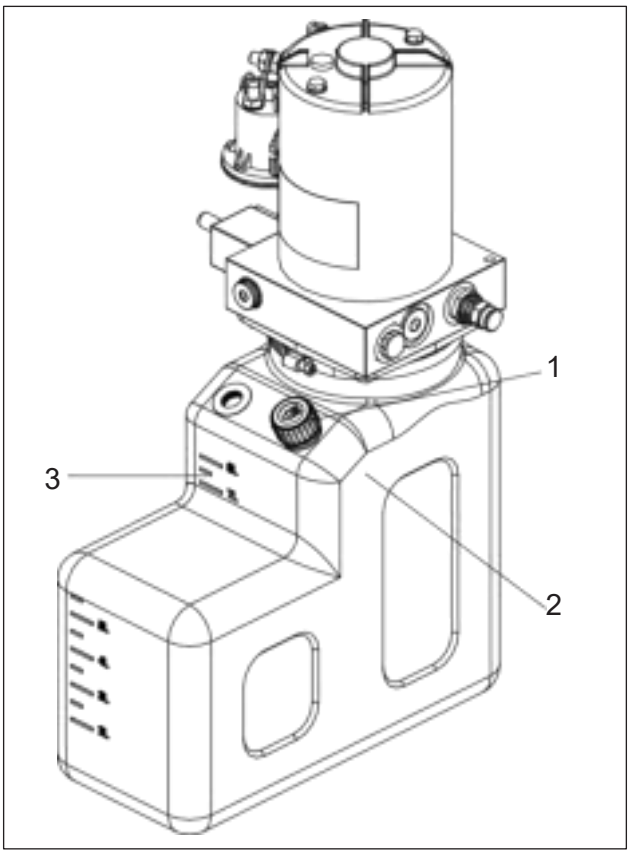
Install following the above steps in reverse order.



⚠WARNING

Don't not add gear oil that contains impurities.

5.5.4 Checking and replace hydraulic oil



- It is necessary to add hydraulic oil when you heard cavitation sound (similar to a ‘popping’ or ‘gurgling’ noise) from pipe during lifting.
- Prepare the truck for maintenance and repairs (See Page 52 Section "5.5.1 Prepare the truck for maintenance and repairs").
- Remove the cover (See Page 52 Section "5.5.2 Removing the cover").
- The hydraulic reservoir (2) has markings (3). The hydraulic oil level should be above the marking when the load handler is fully lowered.
- Add hydraulic oil if necessary. Turn the lid (1) counterclockwise from the hydraulic reservoir (2).
- Add hydraulic oil of the correct grade until the oil level lies above the markings.
- After topping up, lift the forks. The oil level is fully topped up when you can't hear cavitation sound. Continue to add oil if you still hear cavitation sound.
- Turn the lid (1) clockwise on the hydraulic reservoir (2).

Install following the above steps in reverse order.

⚠WARNING

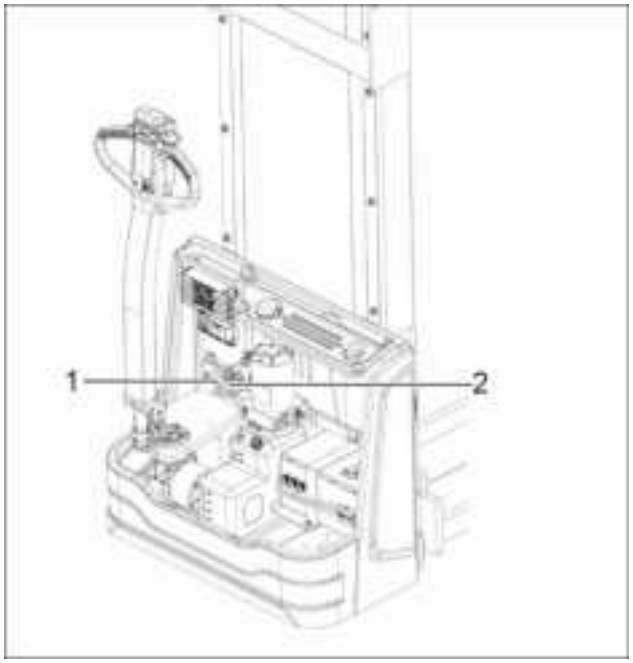
Re-tighten oil, add plug (1) and clean the residual oil on the reduction box surface.

⚠CAUTION

Do not add hydraulic oil that contains impurities.

5.5.5 Checking electrical fuses

- Prepare the truck for maintenance and repairs (See Page 52 Section "5.5.1 Prepare the truck for maintenance and repairs").
- Remove the cover (See Page 52 Section "5.5.2 Removing the cover").
- Check that all fuses are in working order.
- If necessary, replace them with fuses that match the parameters specified in the table below.



No.	Checking fuses for the following functions or components	Value
1	Pump contactor / Pump motor fuse	150A
2	Traction controller fuse	60A
3	Main harness fuse	5A

During normal operating conditions, inspect and lubricate the lift chains every 450 to 500 hours. If operating in corrosive or extreme working conditions, inspect more frequently.

When inspecting, check for: rust and corrosion, cracked plates, raised or turned pins, tight joints, excessive wear, and worn pins and holes.

Lift chain lubrication is a crucial step of your Planned Maintenance program. The correct and timely lubrication of the lift chains will maximize their service life.

Lift Chain Wear and Replacement Criteria:

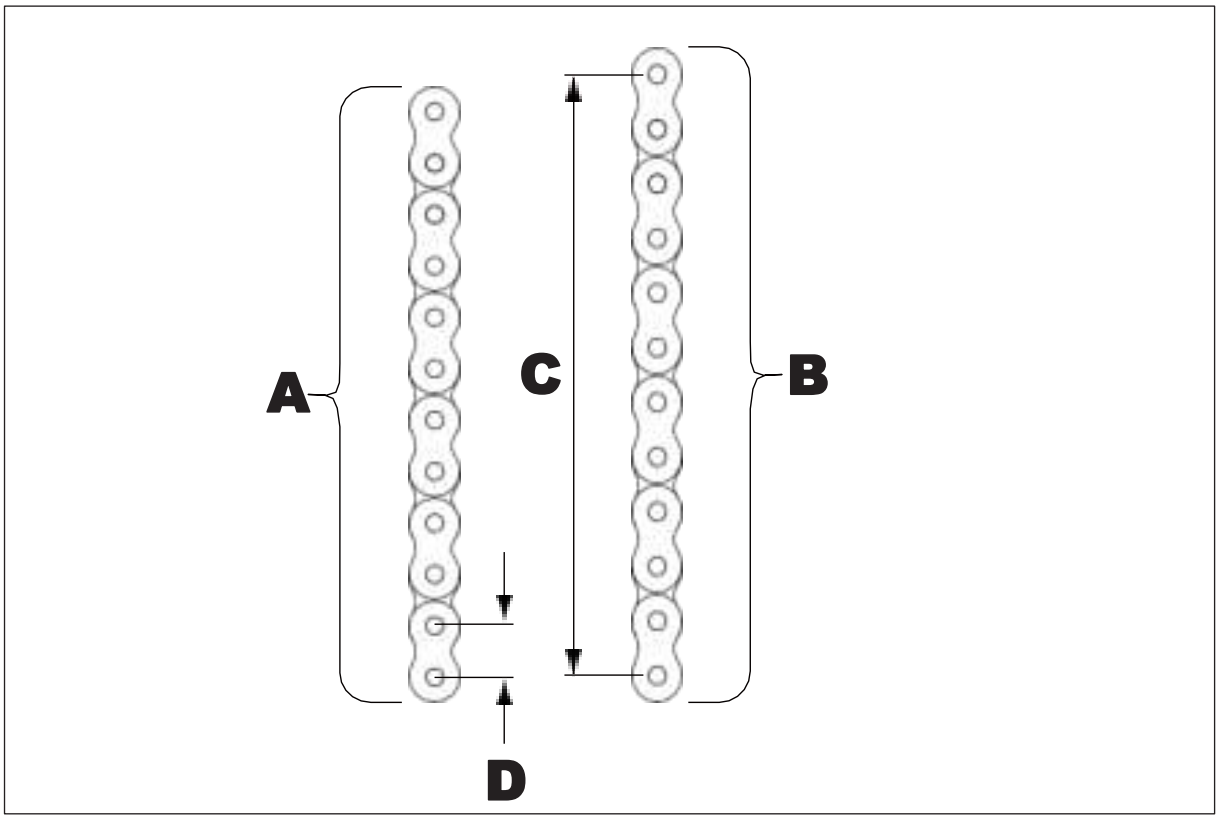
The lift chain will gradually stretch over time during normal operation. When a section of chain has stretched 3% or more, it is considered excessively worn and must be replaced. When checking for chain stretch, always measure a segment of chain that moves over a sheave.

► **New Chain Length (A): distance from the first pin counted to the last pin counted in a span** while the chains are lifting a small load.

► **Worn Chain Length (B): distance from the first pin counted to the last pin counted in a span** while the chains are lifting a small load.

► **Span (C): number of pins in the segment of chain to be measured.**

► **Pitch (D): distance from the center of one pin to the center of the next pin.**



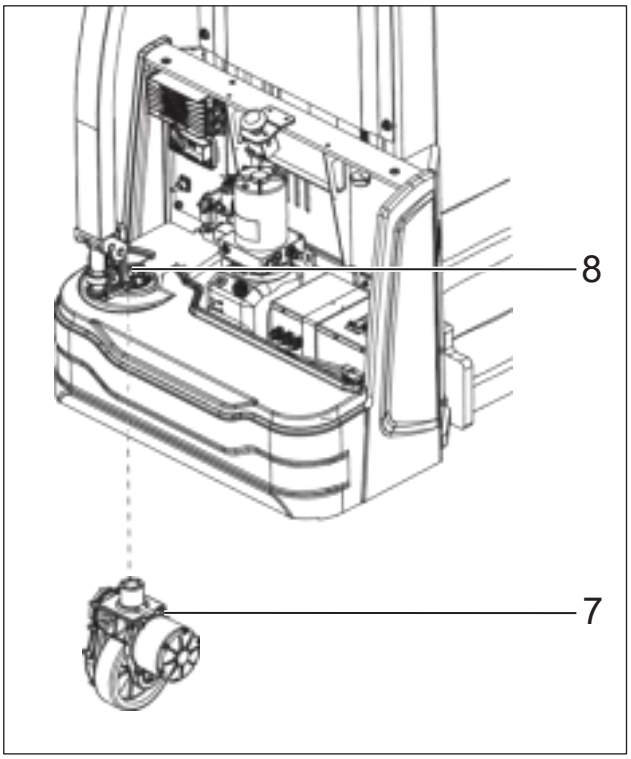
⚠WARNING

Do not attempt to repair a worn or broken lift chain.

5.5.6 Drive Wheels - Removal and Installation

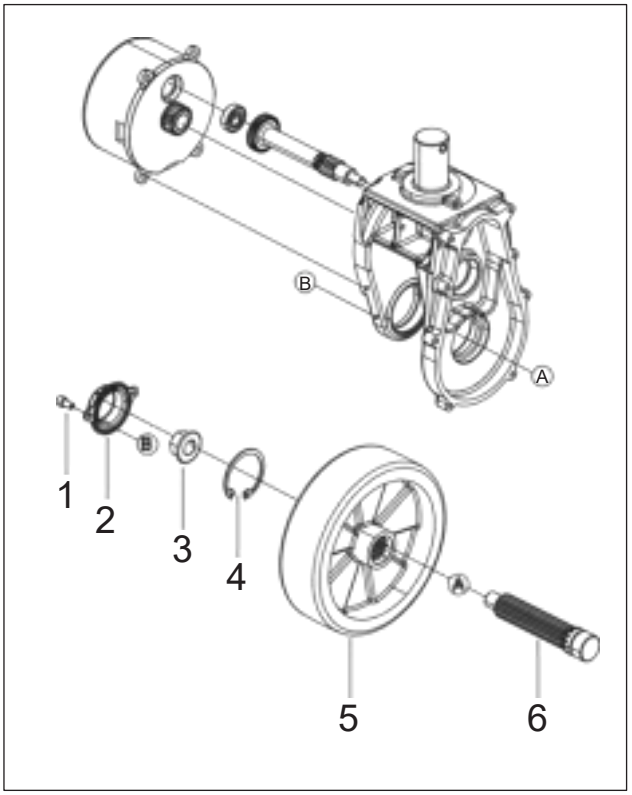
- Removal
- Prepare the truck for maintenance and repairs (See Page 52 Section "5.5.1 Prepare the truck for maintenance and repairs").
- Remove the cover (See Page 52 Section "5.5.2 Removing the cover").
- Lift the vehicle carefully with a hoisting device through the lifting holes.
- Undo six screws (8) and disconnect the harness, then remove the drive assembly (7).
- Unscrew the two screws (1) and remove the stuffy cover (2).
- Unscrew the nut (3), remove the circlip (4) and knock out the output shaft (6).
- Remove the drive wheel (5).
- Installation

Install according to the reverse order of removal.



⚠CAUTION

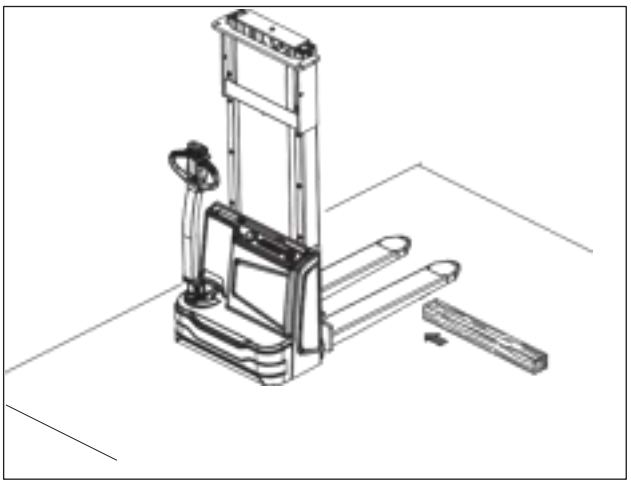
Tire wear can affect the stability of the truck, adjust the caster with minor wear on a regular basis, or replace the caster with heavy wear. Quality of tires directly affects the stability and driving performance of the device. If you need to replace the factory-fitted tires, please use original spare parts provided by the equipment manufacturer to reach the original design performance of the truck.

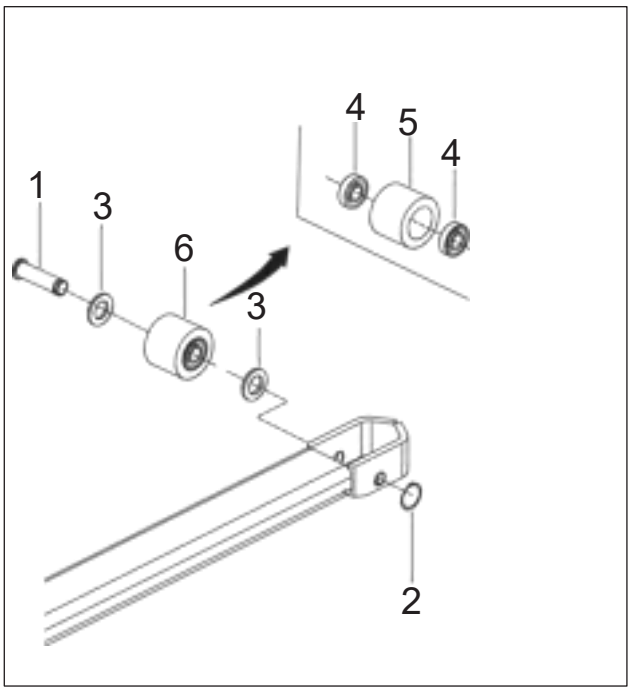


► Faults and Causes

1	Fault	Drive wheel slipping or jumping
	Cause	Wear
2	Fault	Drive wheel cracking or degumming
	Cause	Improper use
3	Fault	Vehicle sways while running
	Cause	Drive wheel lock nut loosening

5.5.7 Load wheels - removing and installing





- Removal
- Parking the truck securely (Page 29 Section "4.2.8 Parking the truck securely").
- Lift the vehicle carefully with a hoisting device through the lifting holes.
- Place a wooden wedge under the chassis near the load wheel, to raise the load wheel off the floor.
- Remove the snap ring (2) in the fork leg with a wrench.
- Remove the wheel pin shaft (1) from side, and remove washers (3), load wheel assembly (6).
- Remove the bearing (4) of load wheel assembly (6) with hammer and jacking equipment.
- Installation and Commissioning Install according to the reverse order of removal.

Drive the truck to check whether the load wheel is functioning properly. If there are any blockages or noises, please reinstall it.

⚠CAUTION

When replacing wheels, be sure that the truck won't tilt.

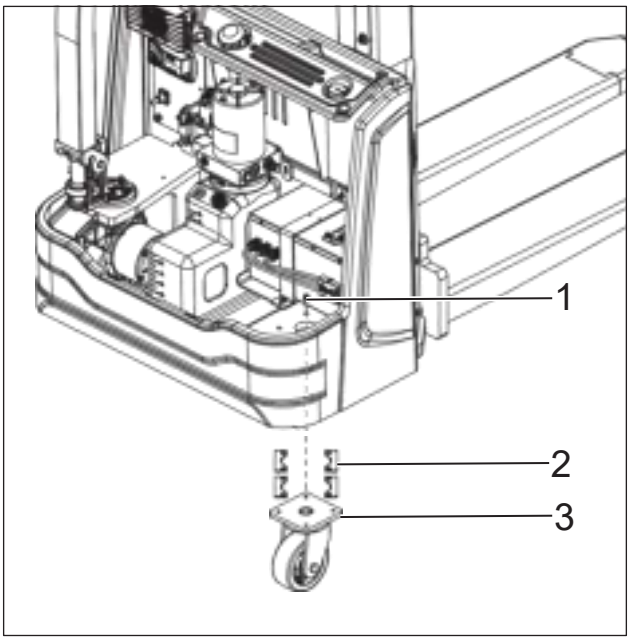
⚠CAUTION

When installing, please apply appropriate amount of grease on the axle first.

5.5.8 Caster - Removal and Installation

- Removal
- Prepare the truck for maintenance and repairs (See Page 52 Section "5.5.1 Prepare the truck for maintenance and repairs").
- Remove the cover (Page 52 Section "5.5.2 Removing the cover").
- Lift the vehicle carefully with a hoisting device through the lifting holes.
- Unscrew four screws (1), then remove the caster (3) and dust shim (2).
- Installation

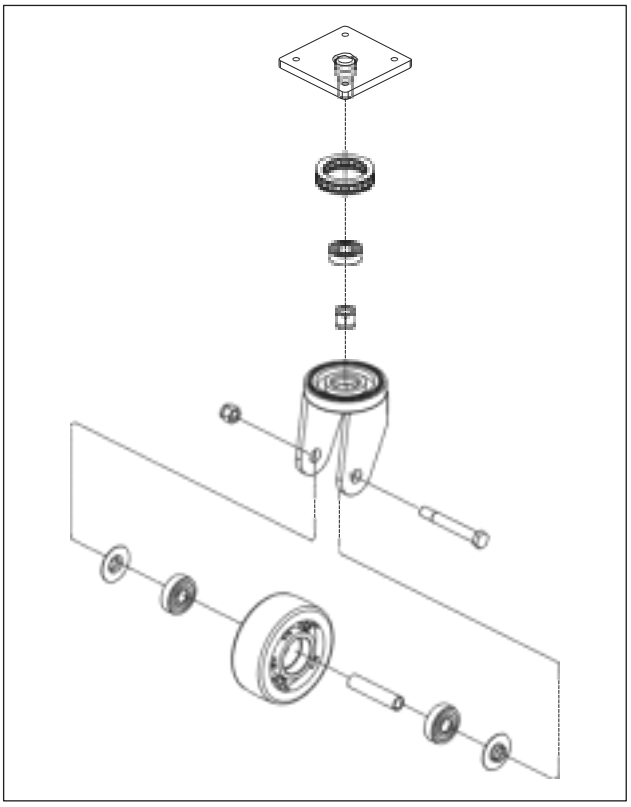
Install according to the reverse order of removal.



⚠WARNING

Make sure the lifting equipment is solid and secure, and the load capacity should be greater than the total weight of the vehicle. Lifting height of not more than 300mm, to prevent the hazards to the maintenance personnel working under the vehicle for caster removal and installation.

- Adjustment
- Park the truck with replacement completed on level ground to see if the casters and drive wheel can both be in contact with the ground.
- When the truck is running, check if the caster is functioning properly.
- After long time of use, the drive wheel will wear and tear to certain level, at this time, adjust the height of caster (3) through increasing or decreasing the number of adjustment shims (2) to make the two casters and drive wheel to be in close contact with the ground.
- Upon maintenance or replacement for parts of the caster, please refer to figure as right.



5.5.9 Decommissioning the trucks

The truck must be parked in a frost-free, clean, dry location and 0-40°C condition. Parking the truck in an environment below 0°C for a long time is forbidden. All necessary measures must be taken before, during and after decommissioning as described hereafter.

When the truck is out of service it must be jacked up so that all the wheels are clear of the ground.

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

5.5.10 Prior to decommissioning

Clean the truck thoroughly.

Check the hydraulic oil level and top up if required.

Apply a thin layer of lubricating oil or grease to all nonpainted mechanical components. Lubricate the truck in accordance with the lubrication schedule.

Charge the battery.

NOTE

Do not cover the Truck with plastic sheeting, as this can cause water vapor to accumulate.

⚠WARNING

Charge the battery every 1 to 2 months to avoid depletion of the battery through self- discharger.

5.5.11 Restoring the truck after Decommissioning

Thoroughly clean the truck.

Clean the battery. Grease the pole screws using pole grease and reconnect the battery. Recharge the battery.

Check if the hydraulic oil contains condensed water and change if necessary. Follow the daily checklist.

5.1.1 Final decommissioning, disposal

Final, proper decommissioning or disposal of the truck must be performed in accordance with the regulations of the country of application. In particular, regulations governing the

disposal of batteries, fuels, hydraulic oil, plastic and electronic and electrical systems must be observed.

The truck must only be disassembled by trained personnel in accordance with the procedures

as specified by the manufacturer.

► **Disposal of consumables**

Collect materials generated during maintenance, repair, and cleaning and dispose of them in accordance with national regulations. Perform disposal work only in designated areas and minimize environmental impact.

- Absorb any spilled fluids (e.g., hydraulic oil, brake fluid, gear oil) immediately using a suitable absorbent.
- Dispose of used oils and contaminated absorbents in accordance with national regulations.
- If battery electrolyte leaks, contain and absorb it immediately using suitable materials and dispose of the contaminated materials in accordance with national regulations.

► **Disposing of components and batteries**

The truck is made up of different materials.

If components or batteries must be replaced and scrapped, 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.

ⓘNOTE

We recommend working with a waste management company when disposing of components and batteries.

6 Troubleshooting

If the fault cannot be rectified after carrying out the remedial procedure, notify the manfacture's service department, as any further troubleshooting can only be performed by specially trained and qualified service personnel.

Fault	Probable Cause	Action
Truck does not start.	• Battery connector not plugged in • Key switch in “0” position • Battery charge too low • Faulty fuse • Truck in charge mode	• Check the battery connector and connect if necessary • Set key switch to “I” • Check battery charge, charge battery if necessary • Check fuses • Interrupt charging
Load cannot be lifted	• Charging capacity too low • Truck not operational • Hydraulic oil level too low	• Charging the battery • Carry out all measures listed under “Truck does not start” • Check the hydraulic oil level

7 Lithium battery

7.1 Lithium Battery Use and Maintenance

Information on the conformity of lithium-ion batteries

The manufacturer of the lithium-ion battery and manufacturer group provider declares that: the lithium-ion battery conforms with the provisions of the following

EU directive 2014/30/EU in accordance with EN12895.

This declaration of conformity with EU directives applies only to battery use that conforms to the recommendations described in the operating instructions.

7.1.1 Special lithium-ion safety rules

⚠DANGER

There is a risk of fire.

Use water-based extinguishers, CO2, dry chemical fire extinguishers.

⚠DANGER

- *Electrical danger.*
- *Do not open the battery. Electrical risk.*
- *Only technicians from the customer service center are permitted to open the battery.*

► **It is necessary to respect the following guidelines**

Read the documents provided with the battery carefully.

Only persons who have been trained to work with lithium-ion technology may work on the batteries (e.g., customer service center technicians).

Do not place lithium-ion batteries on or near flames or hot heat sources (> 65°C). This may cause the batteries to overheat or burst into flames. This type of use also impairs the performance of the batteries and reduces their service life.

Improper use may cause overheating or serious injury. Respect the following safety rules:

- Never short-circuit the battery terminals.
- Do not reverse the battery polarity.
- Do not open the battery.
- Do not submit the battery to excessive mechanical constraints.

7.1.2 Intended use

- Discharge temperature range: -20°C ~55°C, humidity ＜ 80%.
- Charging application temperature 5°C ~40°C.
- The battery's maximum operation altitude is up to 2000m.
- Do not disconnect the battery for emergency stopping, use instead the emergency switch.
- The truck shall not be used in a potentially explosive atmosphere or in an especially dusty environment.

NOTE

Lithium battery charging temperature range: 5°C ~40°C, 0°C below the low-temperature environment under the conditions of large-scale charging will cause damage to the battery.

Discharge temperature range: -20°C ~55°C, low temperature (-20°C ~0°C) discharge capacity than at room temperature may be reduced compared to normal, it is normal. battery can be 40°C ~55°C Ambient temperature, but the battery ambient temperature is too high, especially in the long-term high temperature battery environment, will accelerate the aging of the battery material, shorten the battery life, it is not recommended for long-term use at this temperature.

Ambient temperature exceeding the above range of charge and discharge temperature may adversely affect the battery performance or damage, may greatly shorten the battery life, it should be avoided at the above temperature.

7.1.3 Reasonably foreseeable misuse

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

7.1.4 Accessories

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

7.1.5 BMS (Battery Management System)

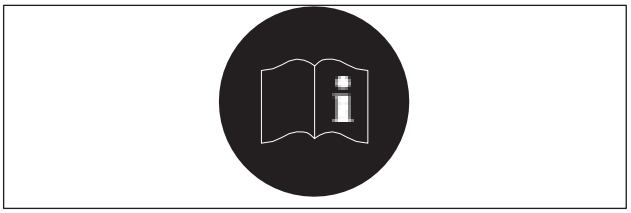
- The manufacturer battery management system (BMS) for a lithium-ion battery is crucial for the safety and performance of the system. Here are the most important features and functions:
- Current, voltage and temperature monitoring: the BMS continuously monitors the charging current, battery voltage and temperature of the cells, as well as the individual modules, during the charging and operating cycle.
- Differentiation for cells and modules: The BMS can differentiate between the individual cells and modules and monitor and control individual parameters for each cell or module to ensure even utilization and optimum performance.
- Safety shutdown: If safety limits are exceeded, such as critical temperatures, currents or voltages, the BMS safely shuts down the system to prevent damage to the battery and ensure safety.
- Output of error codes with corresponding action: The BMS recognizes errors and outputs corresponding error codes. Depending on the severity of the fault, the BMS can take measures such as issuing warning messages or switching off the system.
- Permanent communication with the vehicle's CAN bus: The BMS communicates continuously with the vehicle's Controller Area Network (CAN) bus to exchange important data and ensure that the BMS and other vehicle systems work in a coordinated manner.
- Integrated telemetry system (optional): In certain manufacturer vehicle types, a lithium-ion battery is equipped with an integrated telemetry system. This system records and transmits important battery operating data, such as cell voltages, temperatures and currents. This telemetry data can be accessed online and enables real-time monitoring and analysis of battery performance.

7.1.6 Battery Usage Guidelines and Manufacturer Compliance

Batteries must be used strictly in accordance with the manufacturer's instructions. Any modification to lithium batteries or their safety devices is strictly prohibited unless prior written approval has been obtained from our company. Only original replacement parts guarantee compliance with the manufacturer's quality management standards. Our company is not liable for vehicle malfunctions or accidents caused by the use of non-original spare parts. For further details, please refer to the lithium battery warranty agreement and the relevant terms and conditions.

7.2 Warning Indications

Follow the operating instructions and keep them in a visible position near the battery charger. If any faults are found on the lithium-ion battery, immediately take it out of service and contact the manufacturer’s customer service department.

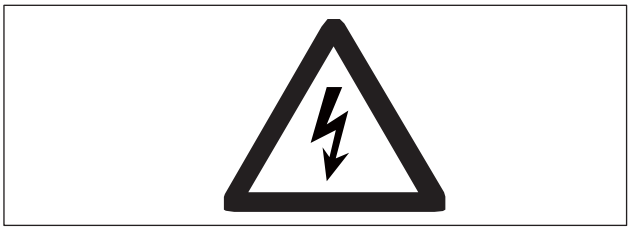


Always wear protective clothing (e.g. safety goggles and safety gloves) when working on cells and batteries!

- No smoke and fire!
- Avoid the existence of open fire, fiery metal wire or sparks around the lithium-ion battery, otherwise explosion or fire disaster may occur!
- Avoid fire and explosion hazards and short circuits due to overheating!
- Keep the battery away from all fire sources, heat sources and flammable or explosive materials!

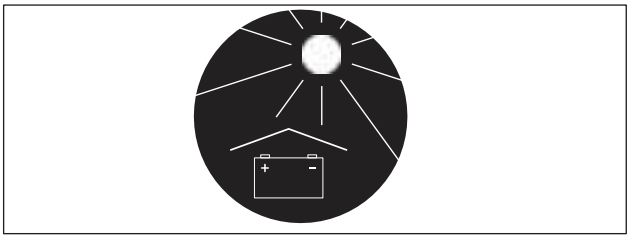
Do not step on the battery to avoid violent shaking or vibration!

- Avoid hot plugging!
- Dangerous voltage!
- Notice: the metal part of the battery cell is electrified, so don't place any external object or tool on the battery cell!



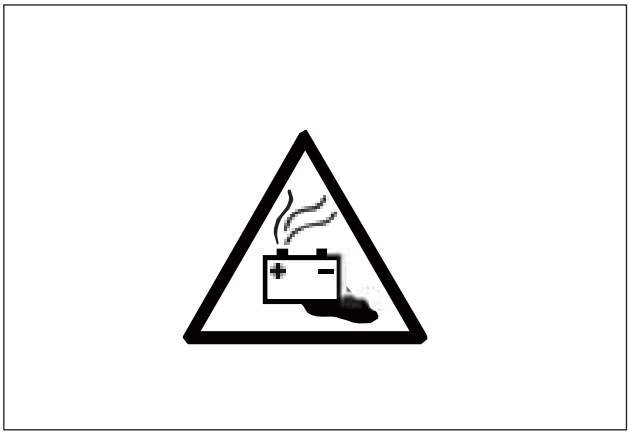
Do not place the battery on top of conductive objects!

- Don't knock over the battery!
- Using lifting and delivery devices as specified. Prevent the 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!
- Always wash your hands after completing the work. Use only insulated tools.
- Protect the battery from solar radiation or other forms of heat radiation.
- Do not expose the battery to any sources of heat.

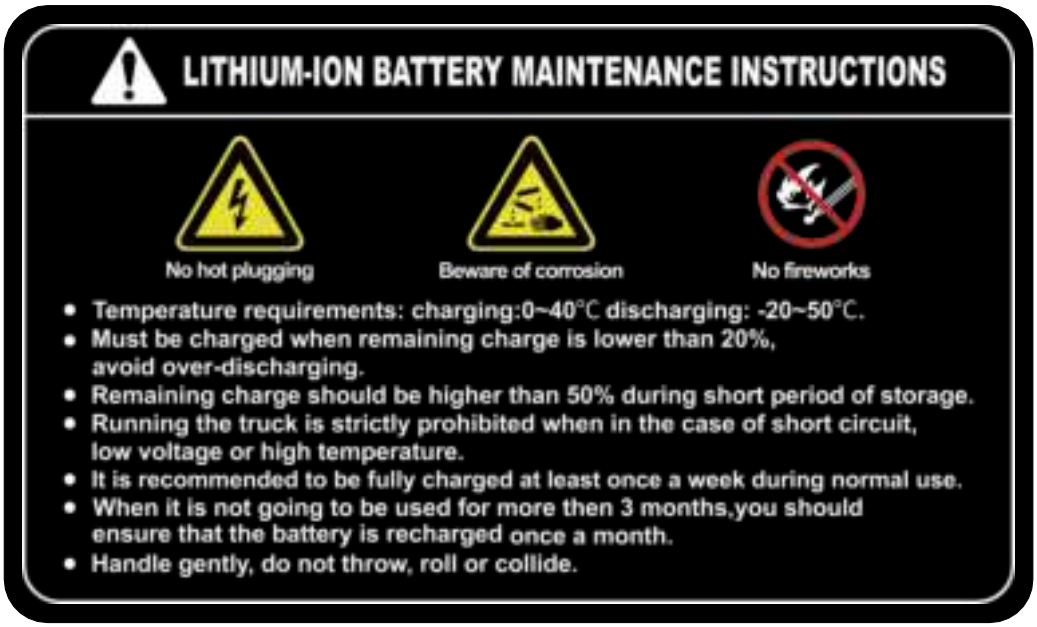


Electrolyte fluid can be discharged if the battery is physically damaged. Electrolyte fluid is harmful and must not come into contact with the skin or eyes.

- Do not physically alter the battery, strike, crush, compress, notch, dent or modify it in any way.
- Do not open the battery, damage, penetrate, bend, heat or allow it to become hot, do not throw it on the fire, short or immerse it in or wash it with water.
- Do not drop it or allow anything to fall on it, do not store it or operate it in a microwave oven, kiln or pressure vessel etc.



► **Labelling for Lithium-ion battery maintenance instructions**



Item	Description
1	The use of the battery is strictly prohibited when leakage between the communication terminal at the bottom of the battery and the charging/discharging pins, or when leakage is present in the gaps around the pins.
2	The use of the battery is strictly prohibited if there are visible impact marks, cracks, or traces of damage on the battery.
3	The use of the battery is strictly prohibited if it emits pungent odors, exhibits housing swelling at the mid-joint, or shows abnormal swelling/bulging of internal cells
4	The use of the battery is strictly prohibited if the connector pins burnt, deformation, ablation

7.3 Potential hazards

- No hazards are anticipated if the equipment is used correctly.
- Do not use the equipment for anything other than its intended purpose.
- The following hazards can arise in the event of improper use:

7.3.1 Physical damage

This can occur if a battery falls or is deformed through pressure (e.g. truck forks penetrate the battery housing).

Mechanical damage includes cracks, breakage, splinters or holes in the battery housing. This type of damage may be caused by a short circuit inside the battery,

which may result in harmful materials leaking, fire or battery explosion.

7.3.2 Short circuits

These may be caused by connecting the two battery terminals (e.g. battery immersed in water).

7.3.3 Temperature effects

High temperatures caused for example by sunlight or being store in warm locations (e.g. near ovens) can result in harmful materials leaking, fire.

In order to avoid fire and leakage of harmful materials, a safe place for storing batteries must satisfy the following criteria:

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

7.3.4 Examples of where to store a non-functional battery

- Roofed outdoor position.
- Ventilated container.
- Covered box with pressure and smoke discharge option.
- Fire hazard

⚠WARNING

Physical damage, thermal effects or incorrect storage in the event of a defect can result in fire.

Since the extinguishing of burning lithium-ion battery systems with suitable extinguishing agents, the responsible fire brigade should be informed in advance or the company fire. Fire protection assistants should be trained accordingly.

ⓘNOTE

A suitable method is cooling down cooling with water. Accordingly the parking area and charging stations should be equipped with extinguishing facilities.

⚠ DANGER

There is a risk of fire.

Use water-based extinguishers,CO2, dry chemical fire extinguishers.

7.3.5 Material discharge

► **Battery electrolyte fluid can be hazardous**

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

If it does, rinse the affected parts with plenty of water and seek medical assistance immediately.

In the event of skin irritation or if any substances are breathed in, seek medical assistance immediately.

In the event of inhalation bring the affected person into the fresh air and keep them still.

► **Precautionary measures for personnel**

- Keep personnel away and facing the wind.
- Block off the affected area.
- Ensure there is adequate ventilation.
- Wear personal protective equipment.
- In the presence of vapors/dust/aerosols, use self-contained breathing apparatus.

► **Precautionary measures for the environment**

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

► **Cleaning measures**

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

7.4 Touch voltage hazard

⚠ WARNING

Touch voltage hazard!

Hazardous touch voltages may occur in the event of a technical or mechanical defect on the battery. Touch voltages also occur on seemingly discharged batteries.

Touching the battery terminals or live attachments (battery cable, battery connector etc.) can result in dangerous current flows through the body. There is a risk of serious, irreversible or fatal injuries.

- *Tag out the faulty battery and take out of service.*
- *Do not touch faulty batteries.*
- *Do not place any objects or tools on the lithium-ion battery to avoid short-circuiting the battery.*
- *Do not short-circuit the lithium-ion battery.*
- *Notify the customer service department.*

7.5 Nameplate

► **Nameplate**

Item	Description
1	Battery name
2	Battery designation
3	Battery model
4	Serial number
5	Manufacturer
6	Address
7	Manufacturing date
8	Battery weight
9	Nominal voltage
10	Nominal energy in Watt hours
11	Recommended charge voltage
12	Warning Indications
13	Recycle sign

NOTE

The label position is subject to the actual lithium-ion battery.

7.6 Information on the conformity of lithium-ion batteries

- Regulation (EU) 2023/1542 in Articles 6, 10 and 13.
- Directive 2011/65/EU including amendment (EU)2015/863 in the latest valid version.
- EMC Directive 2014/30/EU in the latest valid version in the harmonised standards EN 12895:2015+A1:2019, EN IEC 61000-6-2:2019 and EN IEC 61000-6-4:2019.
- The harmonised standard EN 62619 in the latest valid version and to the harmonised standard EN 1175:2020 Annex C.2 as energy sources for industrial trucks.
- If a radio system is installed, we declare that it complies with the RED Directive 2014/53/ EU.
- 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 "**7.10 Hazard of faulty or discarded battery and recycle**".
Signs of liquid leakage at the bottom of the battery	
Case broken	
Swollen battery	
Connector pins burnt,deformation,ablation	Contact your authorised dealer to replace the contacts or Connector pins should be performed by a certified technician

► **Instructions on faulty batteries inspection**

⚠DANGER

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

7.7 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 middle connection of the body for swelling of the housing or internal cells abnormal expansion, bulge
- Check for cracks or damage.
- Check the battery for signs of impact and damage.

7.8 Hazard of faulty or discarded battery and recycle

Please monitor the battery status when in use and in storage. If you find any broken batteries, electrolyte leakage, abnormal expansion or pungent odors due to shipping damage or abnormal vibration, please stop use immediately and keep at least a 5 meter perimeter around the effected batteries. Please dispose of the damaged batteries properly and contact a recycling company to recycle the batteries (See chapter 10 Instructions for disposal). For batteries that are under manufacturer warranty policy, manufacturer will access the warranty claim according to your submission of the battery nameplate photo.

During the period waiting for disposal or recycle, please stock damaged and old batteries carefully by following instructions:

- Damaged and discarded battery temporary storage needs to be placed in an iron or plastic container with water that can cover whole battery at least 5 days (The battery may emit smoke when immersed in water. This is the process of consuming energy by the leaking battery, which is a normal reaction).
- Keep the container and batteries outdoors and 5 meters away from other things, especially flammable items.
- Use protective gloves when putting batteries in or out of water.
- Do not stack damaged or old batteries.
- For big battery with inner and outer boxes structure, Keep the batteries outdoors at least 5 day and contact a recycling company to recycle the batteries. Place the faulty batteries outdoors in an open and shaded area, this area must be well-ventilated and be equipped with fire equipment.

7.9 Charging

When charging, make sure the battery charger is turned OFF before connecting the battery charging cables. Lithium-ion batteries allow for fast charging, if the battery does not charge completely in a normal period or if the battery management system (BMS) indicates a fault, then remove the battery from service. Manufacturer recommends to opportunity charge lithium-ion batteries.

This is when the battery is recharged for short intervals during a shift period. It reduces or eliminates the need for long charging periods, changing batteries during a shift, and extending shift periods.

The positioning of chargers offers new possibilities compared to lead-acid batteries. For instance, placing them in parking spaces near break rooms facilitates opportunity charging during natural breaks. Furthermore, there is no hydrogen outgassing during the charging and discharging process, which contrasts with lead-acid batteries. During the charging and discharging process, no technical measures are needed for ventilation or air circulation due to the absence of hydrogen outgassing with lithium-ion batteries. However, fire protection regulations remain consistent with those for lead-acid battery chargers, requiring a minimum distance of 2.5 meters from combustible materials.

NOTE

The workplace regulations must be observed (emergency exits, escape routes, traffic routes, ... must be kept clear).

⚠CAUTION

- *No metal objects should be placed on the battery.*
- *Be careful of short-circuiting the battery!*
- *No modification of the lithium-ion battery connector.*
- *Do not use irregular charging sockets.*
- *The necessary extinguisher (yellow sand and powder fire extinguisher) should be equipped around the charger so that emergency extinguishing can be carried out under extreme conditions.*
- *Do not modify or disassemble the charging port and charging equipment, which may result in charging failure and fire.*
- *After the charging is finished, do not disconnect the charging device when it is wet or standing in the water, as this may cause electric shock and cause personal injury.*
- *To avoid damage to charger cord plug and receptacle, do not pull on charger cord plug. Do not twist, rock or bend plug sideways. Do not use if plug or receptacle is damaged. Loose or feels hot otherwise fire, property damage or personal injury may result.*
- *Connect only properly grounded AC outlet. Do not touch any uninsulated parts of the output plug or uninsulated battery terminals. Never try to change a frozen battery. There's the danger of explosion!*

Maintenance and repair must only be carried out by a qualified specialist who is familiar with the dangers involved and aware of relevance regulations.

7.10 Storage

Try to ensure that the battery or battery pack's power is ≥50% before long-term storage as the battery has the function of self-discharge, be sure to charge the battery once every 2 months to ensure the battery power is ≥50%.

The battery should be stored in a temperature environment of 0°C ~40°C.

The battery in a dry, ventilated and cool environment, avoid direct sunlight, high temperature, high humidity, corrosive gas, severe vibration, etc.

DO NOT stack, stacking of the batteries is not allowed.

Disconnect the batteries from other electrical items before storage, it is prohibited to have any form of discharge behavior during storing.

If the battery is found to be bulged, cracked, or has a low voltage value after long-term storage, the battery may be damaged. please contact the relevant technical department of the company for technical support.

After not using the battery for a long time, do not charge or discharge the battery if the smell of leakage is found near the battery.

⚠WARNING

- *Do not store used batteries for a long time.*
- *No load bearing, squeezing and contact stacking when storing batteries.*
- *Do not place batteries near cargo warehouses or near flammable and explosive dangerous goods.*

7.11 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 authorized personnel to ship 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 packed with Equipment or Lithium batteries contained in Equipment

- *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. The applicable IATA, ADR and IMDG regulations must be observed during transport.

For UN3480	Lithium-ion Batteries	 Fig0000-00080OM
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

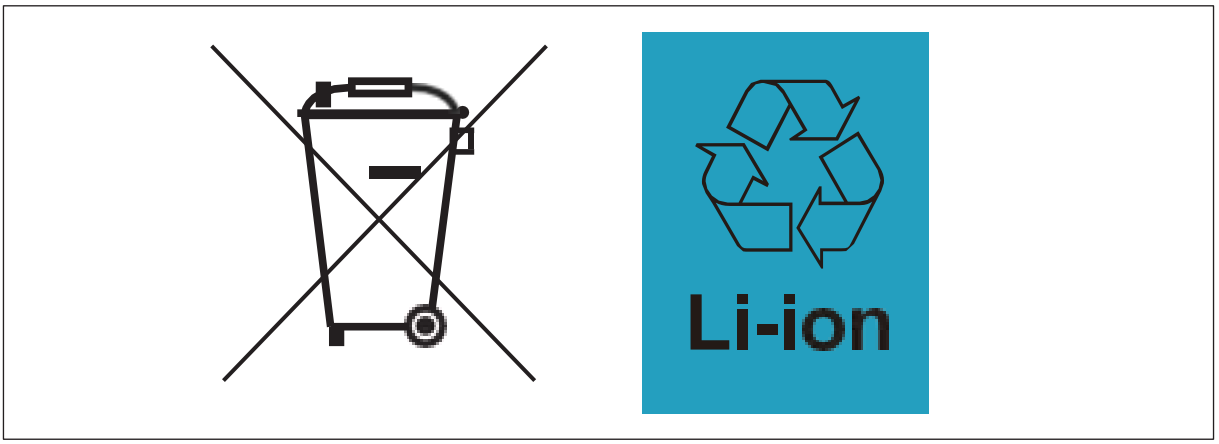
Recharge the lithium-ion battery before transporting it taking account of the transport mode (sea, road,air). Excessive discharge on arrival could damage the performance of the battery.

7.11.1 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.

7.12 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.



► **The requirements of recycling**

- Only authorized manufacturer dealers who have attended the after sales training, are authorized to do repairs on manufacturer batteries.
- All Li-ion battery should be placed in safe place according to the manufacturer Li-ion battery Manual.
- The transport of Li-ion battery must meet local regulation, manufacturer will supply UN38.3 and MSDS files according with UN and ADR regulation.
- The package of Li-ion battery before delivery must meet the UN 3480 or local carrier regulation.

Used cells and batteries are recyclable economic goods. In accordance with the mark showing a crossed rubbish bin, these batteries may not be disposed of as domestic waste.

Return and / or recycling must be ensured as required by the Batteries Act (Act regarding the commissioning, return and environmentally responsible disposal of batteries and accumulators). For battery disposal please contact the manufacturer's customer service department.

7.13 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 your 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 deformation and distortion of the casing before and during installation, stop using the battery immediately and store it separately.

If abnormalities such as looseness, 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, check the reason for analysis and give it a fix.

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 after-sales service department to replace the battery or obtain other solutions.

If the temperature of the battery exceeds 65°C before and during installation, stop using the battery immediately and leave it separately, if the temperature continues to rise, it needs to be buried with sand.

If there is fire or smoke happens to the battery, move it to the open air immediately, evacuate people in time and contact a recycling company to recycle the batteries.

7.14 Service

7.14.1 Cleaning

The manufacturer recommends to only use compressed air at less than 207 kPa (30 psi) or a slightly damp towel to clean the battery. The battery, or its charging station, may be equipped with fans, heat sinks, or other cooling devices that require periodic cleaning. Always know and follow the battery manufacturer's recommendations for cleaning and service.

7.14.2 Optimize Battery Life

Always use and follow the battery management system (BMS). The BMS is the electronic system that monitors battery data and use that data to its operating environment to influence the battery's safety, performance, and service life. It also functions as a safety cut-off device in case of overcharging, overcurrent, or overheating. Lithium-ion battery life is greatly reduced if used outside a temperature range of 0ºC to 40ºC (32ºF to 104ºF) or in an environment

with greater than 85% humidity. Manufacturer recommends to opportunity charge lithium-ion batteries.

This is when the battery is recharged for short intervals during a shift period. It reduces or eliminates the need for long charging periods, changing batteries during a shift, and extending shift periods.

► **Maintenance table**

No.	Maintenance content	Method of operation	Note	Frequency
1	Check if battery capacity is too low	Check instrumentation SOC display	Make sure the battery is not stored without charge for a long time. If the battery system needs to be put on hold for a long time, it is best to keep the battery in half power state and charge the battery every 3 months to ensure that the battery system is in half power state.	Everyday
2	The battery pack charge and discharge current	Check instrumentation display	make sure battery pack charge and discharge current meet with operation manual	Everyday
3	Connector pins at the bottom of the battery(if necessary)	Perform a visual inspection	If any ablation or deformation occurs in daily inspection, the battery connector pins should be replaced in time.	Everyday
4	Check whether the appearance is deformed, whether the surface is oxidized, paint removing, the mounting position is offset, and the cabinet is damaged.	Perform a visual inspection	check the reason for analysis and give it a fix	Everyday
5	Check the entire battery as well as the surface beneath it for signs of fluid leakage.	Perform a visual inspection	check the reason for analysis and give it a fix	Everyday
6	Clean the lithium battery and charger with a dry cloth or compressed air.	Perform a visual inspection, Wear insulated gloves and shake it gently	Make sure it tight	weekly

No.	Maintenance content	Method of operation	Note	Frequency
7	Whether the external wiring harness has worn, imprint, creases and exposed line core	Perform a visual inspection	Make the wiring harness fixed well	weekly
8	Check that the surface of lithium-ion battery looks clean	No dust, no water, no corrosion, oxidation, rust, etc.	Clean surface if you found dust, corrosion, oxidation, rust by using dustless cloth or air compressor, water battery is strictly prohibited to use	weekly
9	Check that the outside screws of the battery are fastened	Torque wrench correction requires no loosening	Reinforce screws	weekly
10	Check for water or foreign matter in the plug and socket and check for rust or charring (if necessary)	Perform a visual inspection	check the reason for analysis and give it a fix	Monthly
11	Check the cable for damage and loose joints (if necessary)	Perform a visual inspection	check the reason for analysis and give it a fix	Monthly
12	Check the battery case for abnormalities such as cracks, deformation, and bulging.	Perform a visual inspection	check the reason for analysis and give it a fix	Monthly

NOTE

The manufacturer instrumentation is used for serviced.