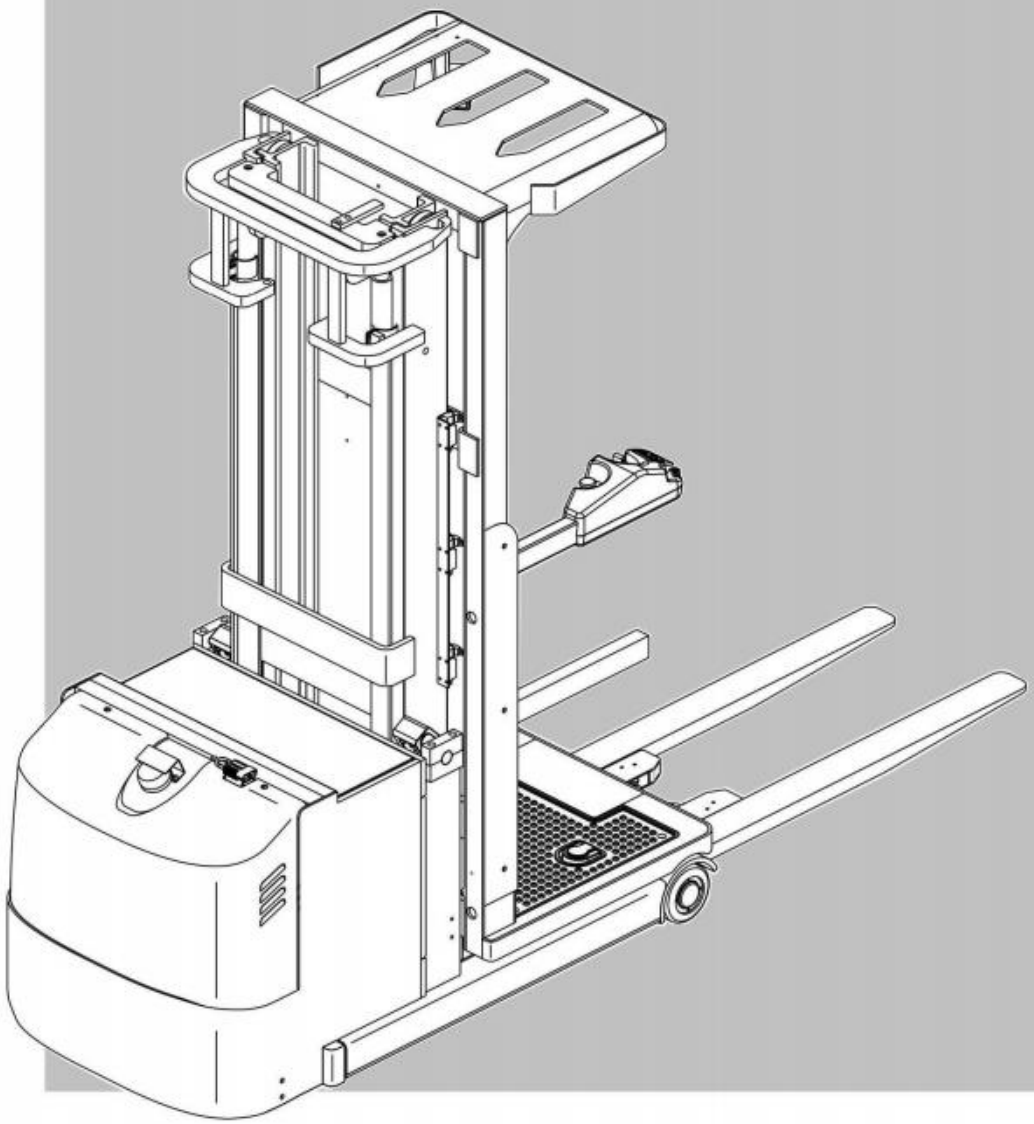
JX2-4

Order Picker

Operation Manual



CE CERTIFICATE

Part No.508000003150
V1 10/2016

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· Material handling equipment: Focus on electric forklift and warehouse equipment
·OEM parts: Global parts supply
·Imow industry,online: One stop industrial products supply

Guided by our customer-oriented concept, EP has developed service centers in more than 30 countries around the world, from which customers are able to receive timely local service. Moreover, 95% of warranty parts can be shipped out within 24 hours after been ordered. Through our online after-sales service system, customers can process their warranty claims, order spare parts and consult the operation manuals, maintenance materials and spare parts catalogs.

With business all over the world, EP has thousands of employees and hundreds of agents worldwide to provide our global customers with prompt local service.

Based on the concept of sharing economy , EP also offer rental service for various logistics equipment. Adhering to the idea "Making the leasing of logistic equipment more simple", EP is devoted to providing customized one-stop leasing solutions for our customers with our high quality, reasonable price and prompt rental service.

EP's mission&vision is " Let more people apply the electrical material handling equipment to relieve the intensity of labour" and "Let's grow together".

EP EQUIPMENT CO., LTD
Address: XIAQUAN, DIPU, ANJI, ZHEJIANG, CHINA
Tel: + 86-0571-28023920
Fax: + 86-0571-28035616
Website: www.ep-ep.com
Email: service@ep-ep.com

Foreword

Thanks for purchasing our order pickers.

The present original operating instructions are designed to provide sufficient instruction for the safe operation and maintenance of the truck. Please be sure to read this operator manual carefully if you are operator or are in charge of the truck,before you operate and service the truck. Only in this way can you protect yourself and make the truck play a role as much as possible.

Our trucks are subject to ongoing development, so maybe there are some differences between your product and the description in this manual. And the operator manual details will be different because of customer's special requirements.

If you have any questions ,please keep in touch with the sales department of Equipment or let the dealer know.

Notes:

1. This manual is used for operation and maintenance , the detail parameters, size and specifications in context is only for reference , the real parameters will depend on sale files.
2. Manual pictures for reference only, the real car shall prevail, and shall not affect the manual use.

Warning!

The truck can only be used indoors !

Internet address and QR code of Parts manual

By entering the address http://www.ep-care.com in a web browser or by scanning the QR code, Login after registration, Select "Parts purchase" function and input part number or model **name to find the truck.**

Note: After registration, please send email to info@ ep-care.com to activate your account

2016.12 1st EDITION

WARNING!

TO PREVENT SETIOUS RISK OF INJURY TO YOUORSELF AND OTHERS OBSERVE THE FOLLOWING SAFETY INSTRUCTIONS.

These trucks may become hazardous if adequate maintenance is neglected. Therefore, adequate maintenance facilities, trained personnel and procedures should be provided.

Maintenance and inspection shall be performed in conformance with the following practices:

1. A scheduled planned maintenance,lubrication and inspection system should be followed.

2. Only qualified and authorized personnel shall be permitted to maintain, repair, adjust, and inspect truck.

3. Before leaving the truck:
– Do not park the truck on an incline.
– Fully lower the operator position.
– Press the emergency brake switch .
– Set the key switch to the "OFF" position and remove the key.

4. Before starting to operate truck:
– Be in operating position
– Place directional control in neutral
– Before operating truck, check functions of lift systems, directional control,speed control,steering, warning devices and brakes.

5. Do not use open flame to check lever, or for leakage of electrolyte and fluids or oil. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.

6. Brakes,steering mechanisms, control mechanisms,guards and safety devices shall be inspected regularly and maintained in legible condition.

7. Capacity, operation and maintenance instruction plates or decals shall be maintained in legible condition.

8. All parts of lift mechanisms shall be inspected to maintain them in safe operating condition.

9. All hydraulic systems shall be regularly inspected and maintained in conformance with good practice. Cylinders, valves and other similar parts shall be checked to

assure that "drift" has not developed to the extent that it would create a hazard.

10. Truck shall be kept in a clean condition to minimize fire hazards facilitate detection of loose or detective parts.

11. Modifications and additions which affect capacity and safe truck operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation and maintenance plates or decals shall be changed accordingly.

Catalog

Correct use and Application

The “Guidelines for the Correct Use and Application of Industrial Trucks” (VDMA) are supplied with the truck. The guidelines is an important component of these operating instructions and must be observed. Your country's relevant laws and regulations is not affected.
The truck described in the present operator manual is an industrial truck designed for lifting and transporting load units.
It must be used, operated and serviced in accordance with the present instructions. Any other type of use is beyond the scope of application and can result in damage to personnel, the truck or property. In particular, 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. The truck must not be used in fire or explosion endangered areas, or areas threatened by corrosion or excessive dust.

Proprietor responsibilities

For the purposes of the present operator manual the “proprietor” is defined as any natural or legal person who either uses the truck himself, or on whose behalf it is used. In special cases (e.g. leasing or renting) the proprietor is considered the person who, in accordance with existing contractual agreements between the owner and user of the truck, is charged with operational duties.
The proprietor must ensure that the truck is used only for the purpose it is intended for and that danger to life and limb of the user and third parties are excluded.
Furthermore, accident prevention regulations, safety regulations and operating, servicing and repair guidelines must be followed. The proprietor must ensure that all truck users have read and understood this operator manual.
Failure to comply with the operator manual shall invalidate the warranty. The same applies if improper work is carried out on the truck by the customer or third parties without the permission of the manufacturer’s customer service department.

Adding accessories

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

1. Truck Description

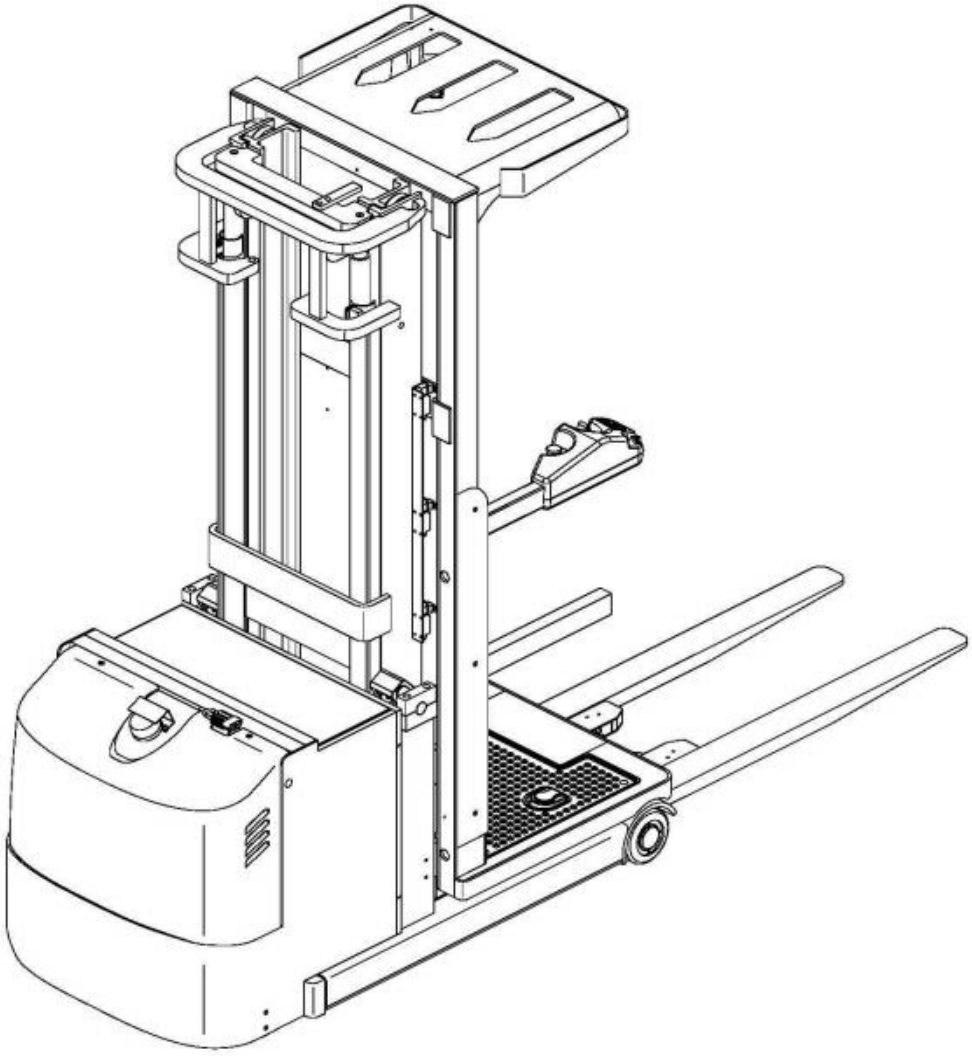
1.1Application

The truck is an electric order picker.The JX2-4 is designed to transport and pick goods on level surfaces.Loads can be stacked, unstacked and transported over long distances.

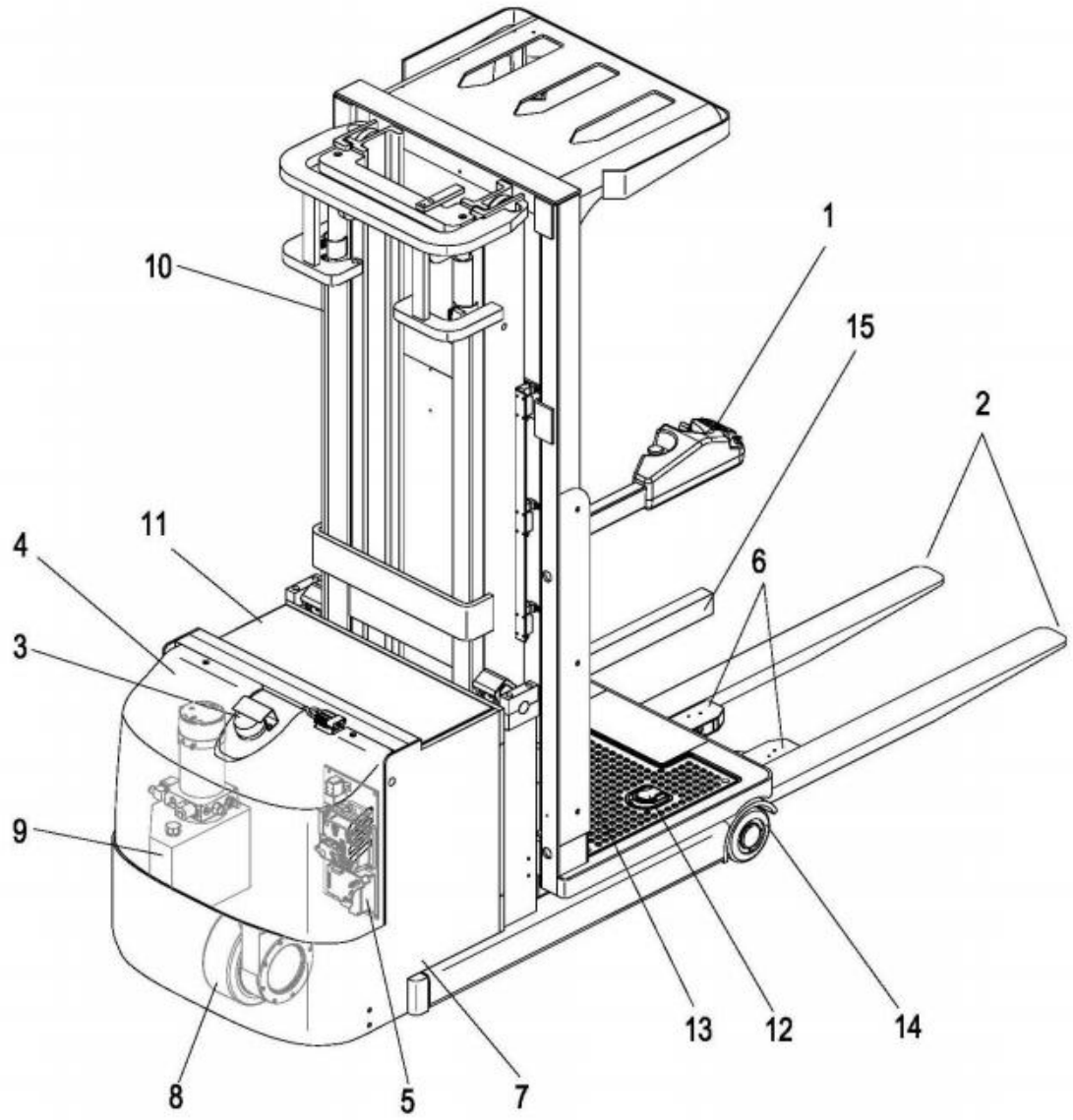
The capacity can be obtained from the data plate.

Warning!

The truck can only be used indoors !



1.2 Truck Assemblies



Item	Component	Item	Component
1	Control panel	9	Hydraulic pump
2	Fork	10	Mast
3	Warning lamp	11	Battery
4	Cover	12	Drive pedal
5	Controller	13	Height-adjustable operator position
6	Fixture	14	Load wheel
7	Frame	15	Gates
8	Drive wheel		

Safety mechanisms: An enclosed truck geometry with rounded edges ensures safe handling of the truck. Pressing the Emergency brake switch disconnects all electrical functions in hazardous situations.Gates on either side of the cab interrupt all truck operations as soon as they are opened.When you start up the truck the drive pedal must be applied.There is a safety belt on the truck, before you operate the forklift truck, please fasten the seat belt to protect yourself.

Drive: The entire drive unit is enclosed in the truck chassis.
The electronic traction controller ensures the smooth rotation of the drive motor and as a result smooth driving, powerful acceleration.

Brake system: The operator can brake gently and wear-free by pulling back the travel control button.The electromagnetic spring pressure brake acting on the drive motor serves as both parking and handbrake.

Steering system: Extremely smooth steering with three phase drive system.The steering wheel is integrated in the control panel. The position of the steered drive wheel is shown in the control panel display unit. The maximum steer angle is ±90°.

Controls and Displays：The functions are activated via ergonomic thumb movement to ensure fatigue-free operation without stressing the wrists; sensitive application of travel and hydraulic movements to spare and position the goods precisely.Driver's display unit for all important driver information such as steering wheel position,overall lift, truck status reports (e.g. faults), battery capacity and time etc..

Hydraulic system ： All hydraulic operations are controlled by a sturdy, maintenance-free AC motor with no wear parts and with a flanged low emission gear pump.Oil is distributed via electromagnetic switch valves.

Electrical system: Standard electronic drive, lift and steering control system.The electronic drive control enables plugging when changing direction.

For controls options see chapter three.

1.3 Standard Version Specifications

Technical specification details in accordance with VDI2198. Technical modifications and additions reserved.

1.3.1 Performance data for standard trucks

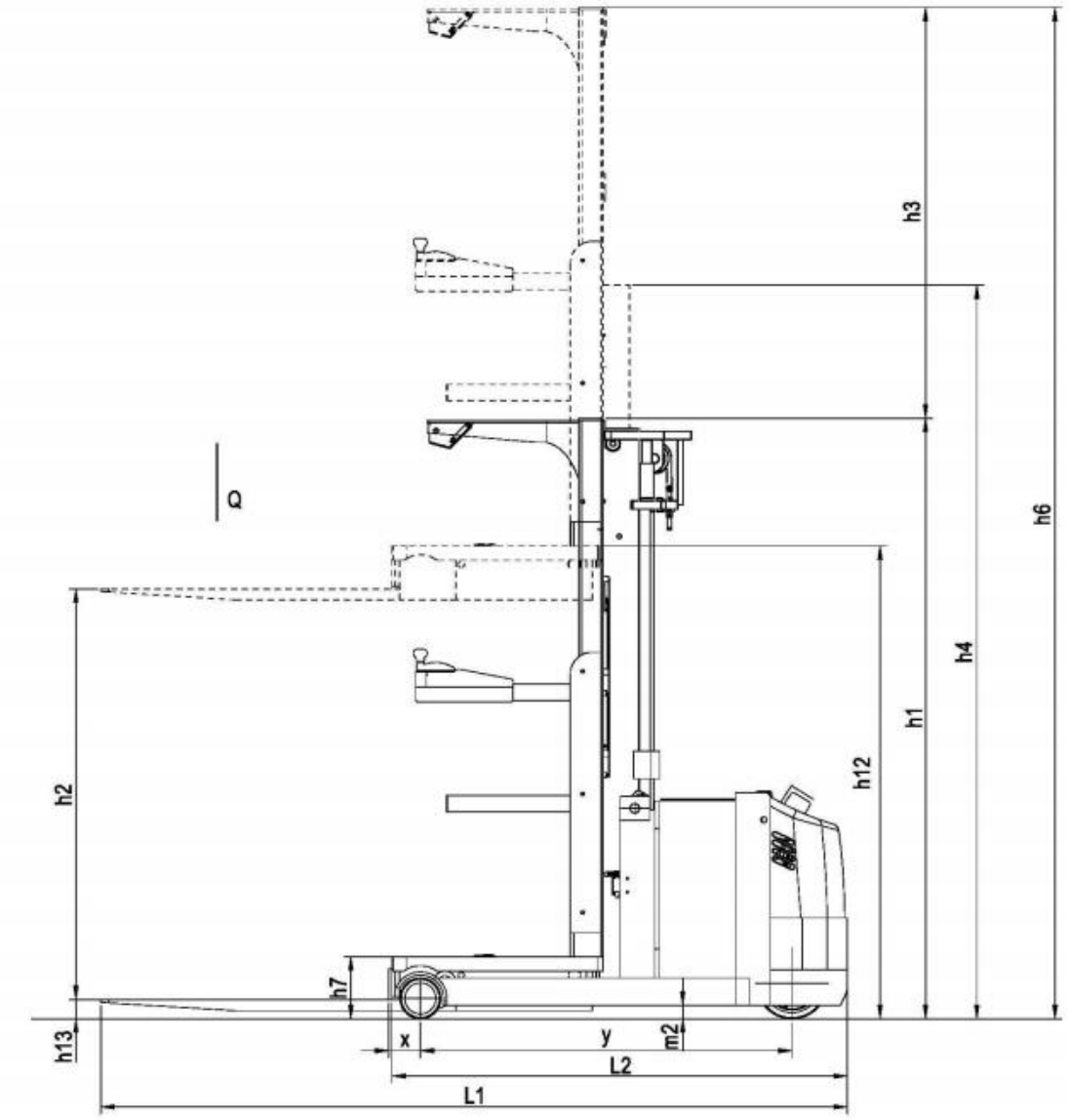
Item	Description	JX2-4(126in)	JX2-4(144in)	Unit
Q	Load capacity	1000		Kg
	Service brake type	electromagnetism		
	Travel speed	8.0		Km/h
	Lifting speed, laden/ unladen	0.13 / 0.16		m/ s
	Lowering speed, laden/ unladen	0.16 / 0.18		m/ s
	Service weight (with battery)	1900	1965	Kg
	The maximum allowed size	740*275*630		mm
	Axle loading, laden driving side/loading side	730/2170	760/2205	Kg
	Axle loading, unladen driving side/loading side	1170/730	1200/765	Kg
	Drive motor rating S2 60 min.	4.0		kw
	Lift motor rating at S3 15%	3.0		kw
	Battery voltage/ rated capacity	24/360		V/Ah

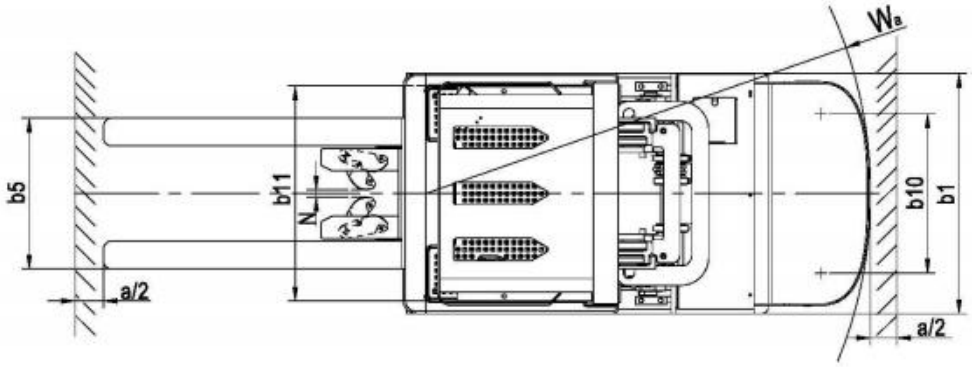
1.3.2 Dimensions

Item	Description	JX2-4(126in)	JX2-4(144in)	Unit
X	Load distance，centre of drive axle to fork	115		mm
y	Wheelbase	1365		mm
b_{10}	Track width, front,driving side	570		mm
b_{11}	Track width,rear,loading side	770		mm
h_1	Height, mast lowered	2270	2380	mm
h_3	Lift height	3140	3595	mm
h_4	Height, mast extended	3680	4190	mm
h_6	Height of overhead guard (cabin)	5410	5975	mm
h_7	Seat height/standing height)	220		mm
h_{12}	Stand height, elevated	3360	3815	mm
h_{13}	Lowered height	63		mm

l_1	Overall length	2750		mm
l_2	Length to face of forks	1680		mm
b_1/ b_2	Overall width	860		mm
s/ e/ l	Fork dimensions	1070*100*40		mm
b_5	Distance between fork-arms	540		mm
h2	Fork lift height	3200	3600	mm
N	width of pallet clamp	25-150		mm
m_2	Ground clearance, center of wheelbase	50		mm
Ast	Aisle width for pallets 1000 × 1200 crossways[1)]	3100		mm
Ast	Aisle width for pallets 800 × 1200 lengthways[1)]	3150		mm
Wa	Turning radius	1600		mm
	Tyre type, Driving wheels/Loading wheels	polyurethane		
	Tyre size, driving wheels （Diameter×Width）	Φ260×105		mm
	Tyre size, load wheels （Diameter×Width）	Φ165×120		mm
	Wheels, number driving/loading (x=drive wheels)	1x+2/2		

1) Including safety distance a = 200 mm


h3
h6
h4
h1
h12
h2
Q
h7
h13
x
y
m2
L2
L1


Wa
b5
b11
N
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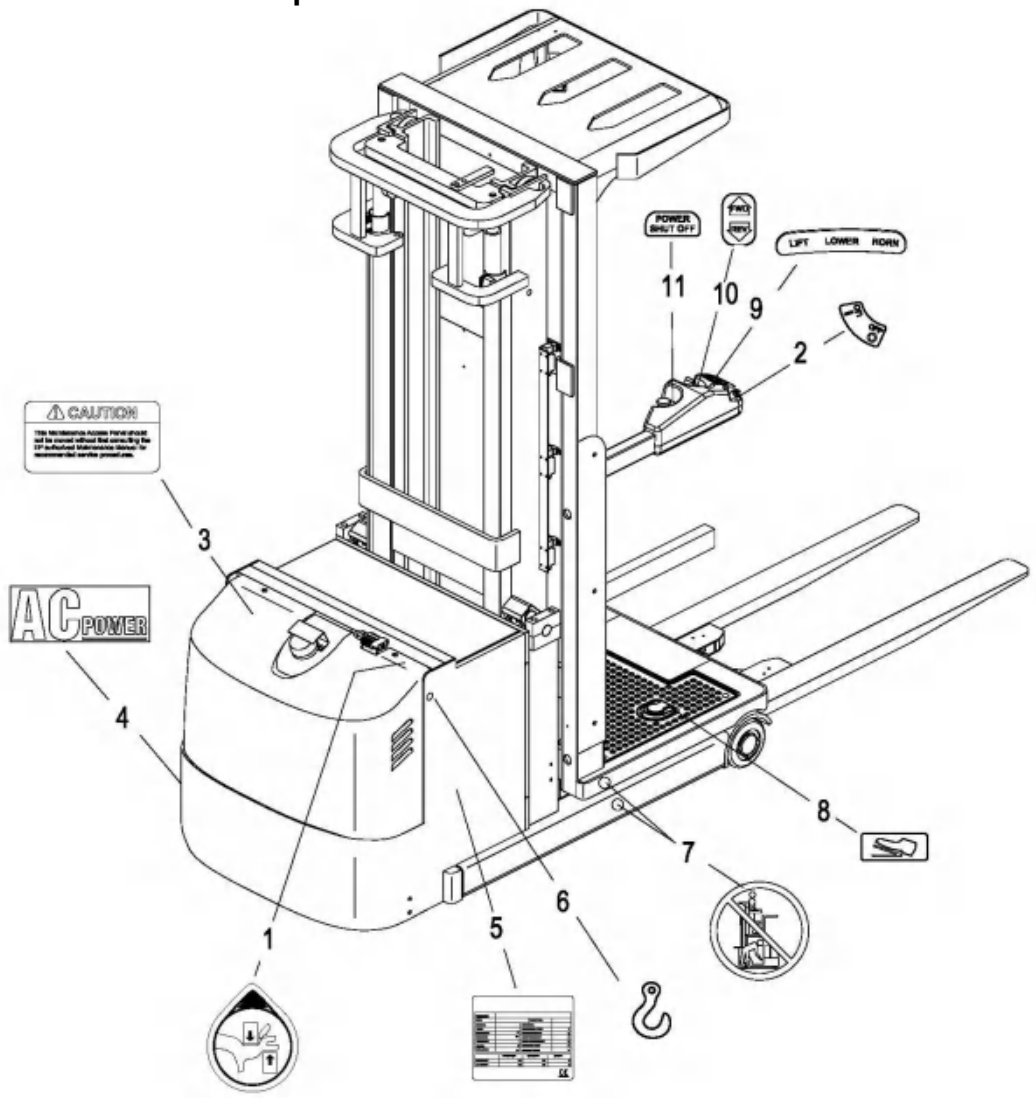
a/2

1.4 Identification points

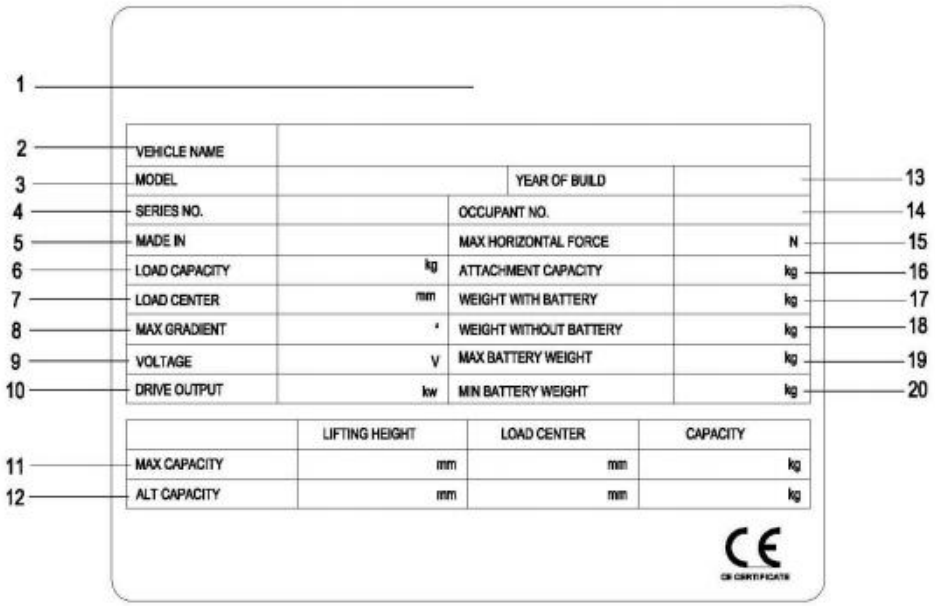


Item	Description
1	“Never put your hands in inner .“ warning
2	Key switch decal
3	Caution
4	AC Power
5	Data Plates
6	Lifting hole mark
7	"Safety" warning
8	Drive pedal
9	Horn/Lower/Lift
10	Travel FWD.&REV.
11	Power shut off

1.4.1Truck data plate

Item	Description	Item	Description
1	Manufacturer	11	Max capacity
2	Vehicle name	12	Alt capacity
3	Model	13	Year of build
4	Series No.	14	Occupant No.
5	Made in	15	Max horizontal force
6	Load capacity	16	Attachment capacity
7	Load center	17	Weight with battery
8	Max gradient	18	Weight without battery
9	Voltage	19	Max battery weight
10	Drive output	20	Min battery weight

For queries regarding the truck or ordering spare parts always quote the truck serial number (4).



2. Commissioning

2.1 Using the truck for the First Time

Only operate the truck with battery current.
Preparing the truck for operation after delivery or transport.
Procedure

- Check the equipment is complete.
- Check the hydraulic oil level.
- Install the battery if necessary (where required), (see "4.3 Battery removal and installation") do not damage battery cable.
- Charge the battery, (see "4.2 Charging the battery").

When the truck is parked the surface of the tyres will flatten. The flattening will disappear after a short period of operation.

2.2 During brake-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 charging when remain power 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.
- Limited load is 70～80% of the rated load.

3.Operation

3.1 Safety Regulations for the Operation of trucks

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

Driver's rights, obligations and responsibilities: The driver must be informed of his duties and responsibilities and be instructed in the operation of the truck and shall be familiar with the operator manual . The driver shall be afforded all due rights . Safety shoes must be worn with pedestrian operated trucks.

Unauthorized Use of truck: The driver is responsible for the truck during the time it is in use. He shall prevent unauthorized persons from driving or operating the truck. It is forbidden to carry passengers or lift personnel.

Damage and Faults: The supervisor must be immediately informed of any damage or faults to the truck. trucks not safe for operation (e.g. wheel or brake problems) must not be used until they have been rectified.

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

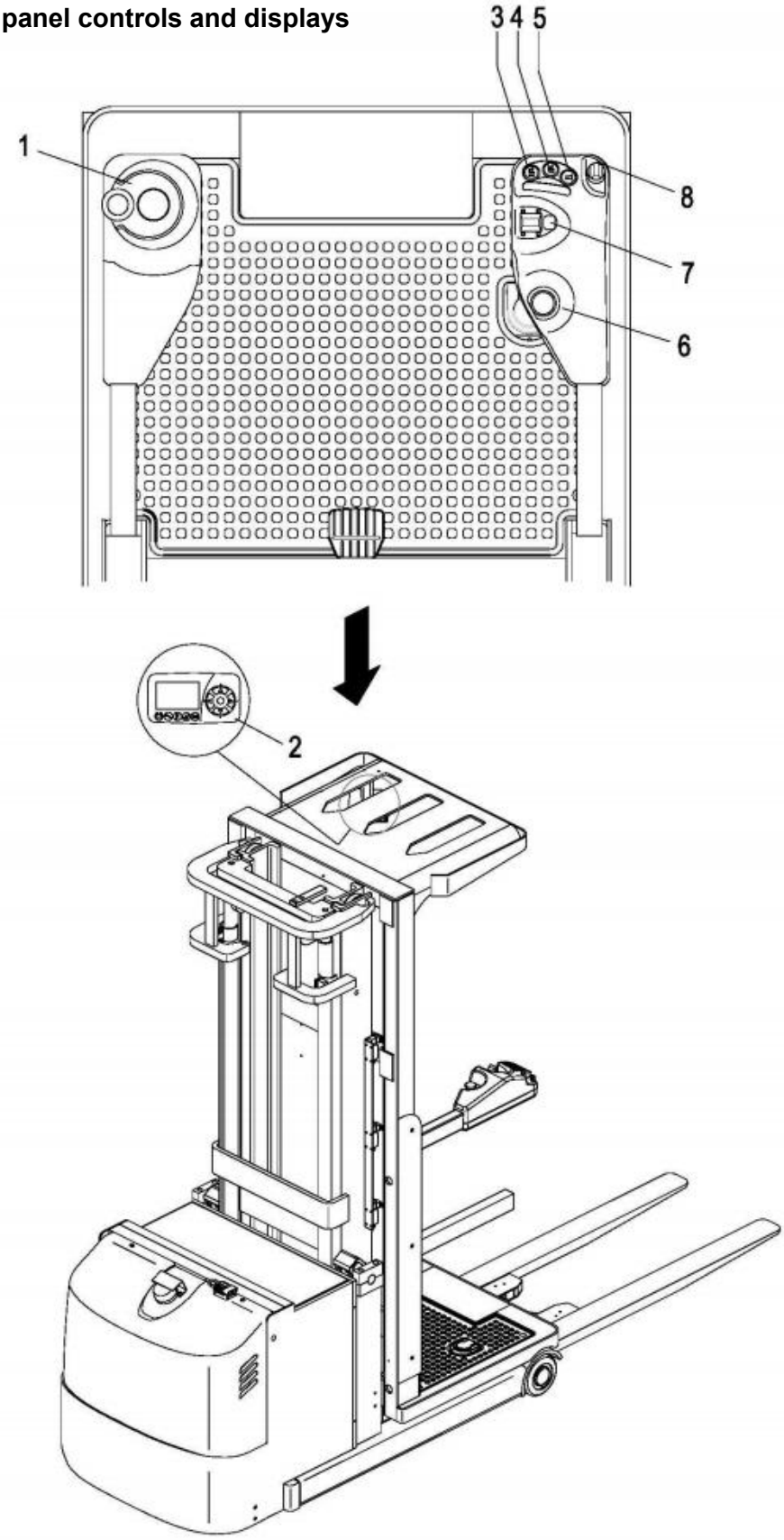
Hazardous area: A hazardous area is defined as the area in which a person is at risk due to truck movement, lifting operations, the load handler (e.g. forks or attachments) or the load itself. This also includes areas which can be reached by falling loads or lowering operating equipment.

- Unauthorized persons must be kept away from the hazardous area.
- Where there is anger to personnel, a warning must be sounded with sufficient notice.
- If unauthorized personnel are still within the hazardous area the truck shall be brought to a halt immediately.

Safety Devices and Warning Signs: Safety devices, warning signs and warning instructions shall be strictly observed.

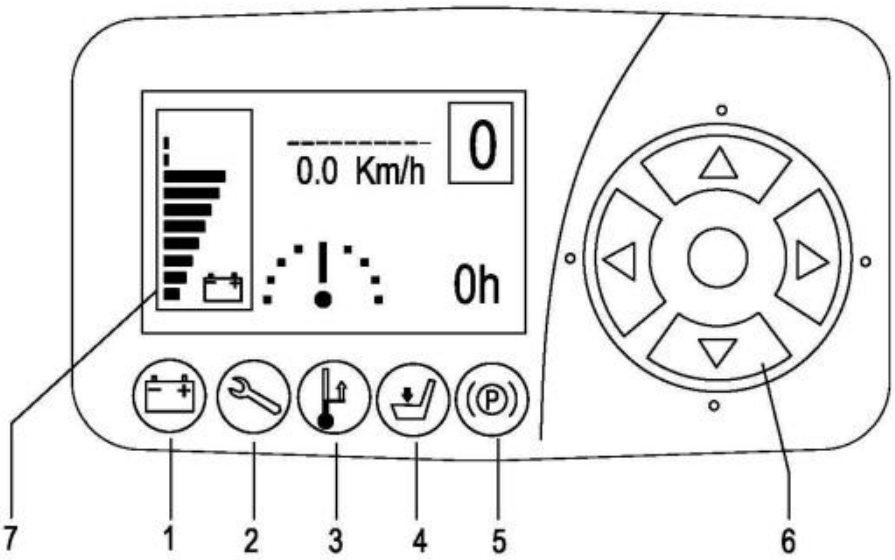
3.2 Controls and Displays

3.2.1 Control panel controls and displays



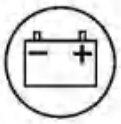
Item	Control / Display	Function
1	Steering wheel	Steers the truck in the required direction.
2	Display unit	Operating information and warning message display.
3	"Lifting" button	Lift the operator position.
4	"Lowering" button	Lower the operator position.
5	"Horn" button	Activates the horn.
6	Emergency brake switch	Disconnects the supply current, deactivates all electrical functions, causing the truck to brake automatically.
7	Travel switch	Select the required driving direction.
8	Key switch	Switches control current on and off. Removing the key prevents the truck from being switched on by unauthorized personnel.

3.2.2 Display unit controls and displays



1 Low battery alarm lamp

When the electricity is too low, the lamp will illuminate.Must prevent the battery from over discharging , please charging.



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2 Fault alarm lamp

When the order picker has fault, the lamp will illuminate.At this time, the Information display area of LCD screen will display the warning and fault indication .

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3 Temperature alarm lamp

When overuse makes the temperature of drive motor high, the lamp will illuminate.At the moment,in order to preventing the motor from being burned out,please don't use the order picker temporarily.And when the temperature drop,continue to use.

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4 Drive pedal alarm lamp

When you don't step on the drive pedal, the lamp will illuminate.

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5 Brake alarm lamp

Stop driving.The lamp will illuminate.

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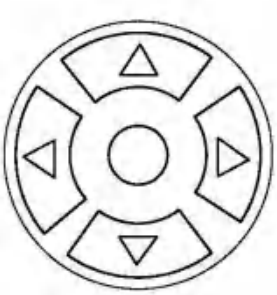
6 Function keys

Use the "left" button to adjust the speed mode;Use the "down" button to switch the driving mode. Use the "middle" to code.

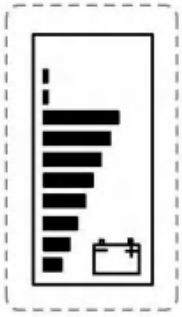


7 LCD screen

Power display area

It will display the rate of charge here.Each cell represents 10% charge,a total of 10 lattice.

For example, figure shows the order picker has 80% charge.



Information display area

Displays the warning and fault indication(**see 6.1 Error Message,Page 35**)

Speed display area

Displays possible travel speeds.Unit:Km/h .

Steering display area

Use the steering wheel to steer the truck outside narrow aisles.The position of the drive wheel is shown here,area:+/- 90° .

Driving mode display area

" 0h " ： Hour meter;

" " ： Crawl speed.

Speed mode display area

Four modes : Mode 1、Mode 2、Mode 3 and Mode 4 .

Switch the mode:Press the left button of Function keys(6) to switch the mode.

Low Voltage Protection

This vehicle has a low-voltage protection function.

When the battery voltage is less than, the vehicle will appear that the driving speed is slow and the platform can not be lifted.And now the battery needs to be charged.

3.3 Run the truck

Checks and operations to be performed before starting daily work

• Visually inspect the entire truck (in particular wheels and load handler) for obvious damage.

• Visually inspect the battery attachment and cable connections.

• Check the load handler for visible damage such as cracks, bent or severely worn load forks.

• Check wheels for wear and damage.

• Test the warning device.

• Make sure the load chains are evenly tensioned.

• Check whether the normal function of all safety devices.

Warning!

Before the order picker can be commissioned, operated or a load unit lifted, the driver must ensure that there is nobody within the hazardous area.

To prepare the truck for operation

• Close the safety gates.

• Insert the key in the key switch and turn it to the “ON” position .

• Pull up the emergency brake switch .

• Test horn.

• Check the operation of the brake.

3.4 Industrial Truck Operation

3.4.1 Safety regulations for truck operation

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

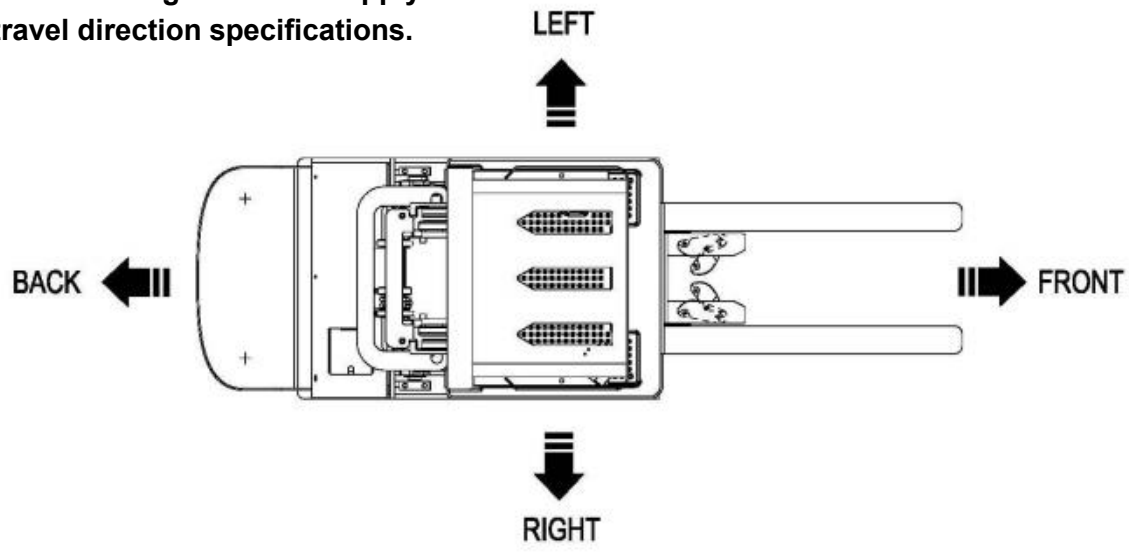
Driving conduct: The driver must adapt the travel speed to local conditions. The truck must be driven at slow speed when negotiating bends or narrow passageways, when passing through swing doors and at blind spots. The driver must always observe an adequate braking distance between the forklift truck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

Negotiating lifts and docks: Lifts and docks must only be used if they have sufficient capacity, are suitable for driving on and authorized for truck traffic by the owner. The driver must satisfy himself of the above before entering these areas. The truck must enter lifts with the load in front and must take up a position which does not allow it to come into contact with the walls of the lift shaft.
Persons riding in the lift with the forklift truck must only enter the lift after the truck has come to a rest and must leave the lift before the truck.

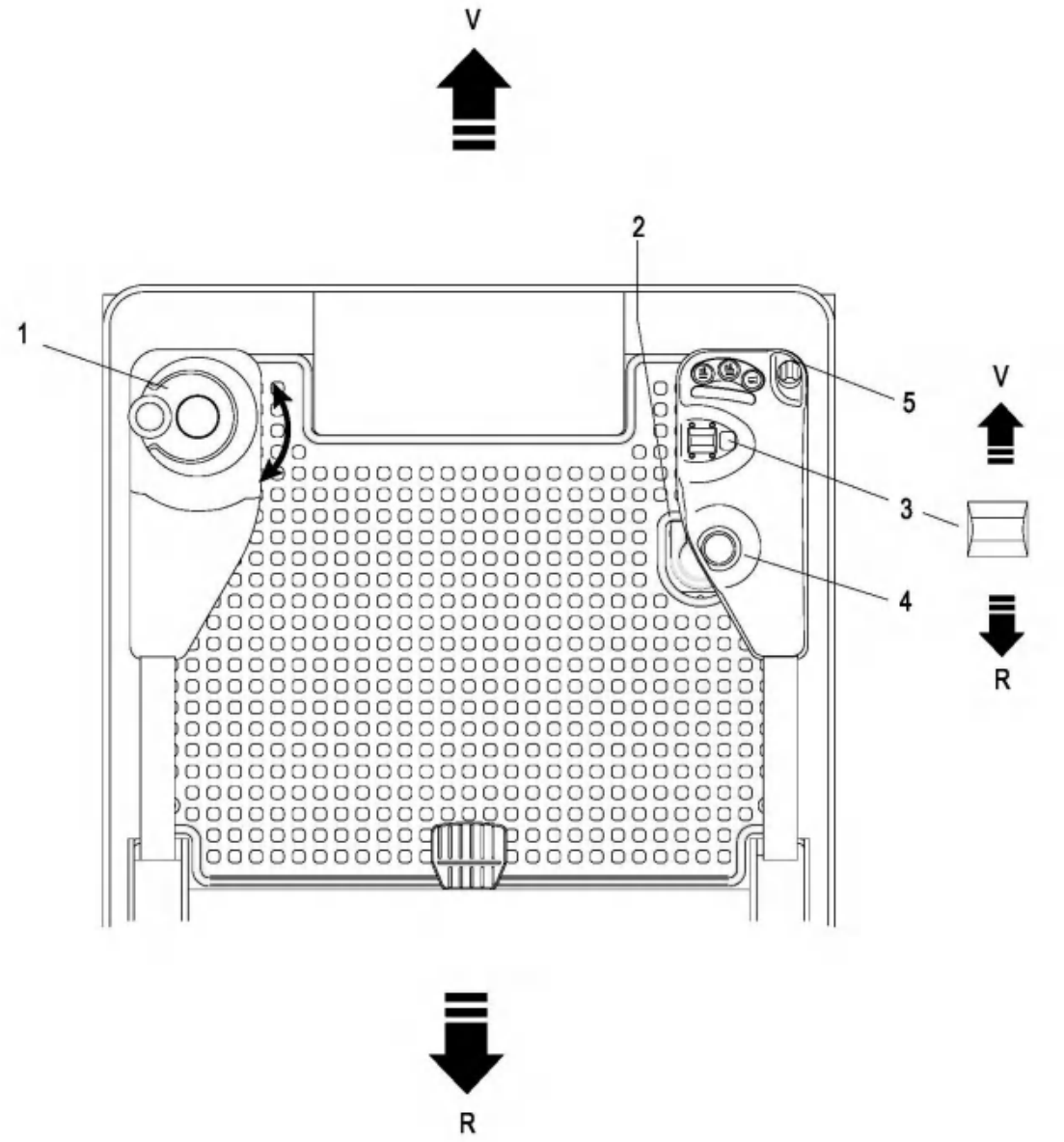
Nature of loads to be carried: The operator must make sure that the load is in a satisfactory condition. Only carry loads that are positioned safely and carefully. Use suitable precautions, e.g. a load guard, to prevent parts of the load from tipping or falling down.

3.4.2 Travel, Steering, Braking

The following definitions apply to travel direction specifications.



Do not drive the truck unless the panels are closed and properly locked.
When you start up the truck the drive pedal must be applied.



1.Driving

• Close the safety gates.

• Insert the key in the key switch(5) and turn it to the “ON” position .

• Pull up the emergency brake switch(4) .

• Apply the drive pedal(2).

• Use the travel switch (3) to select the required driving direction.

Forward = V.

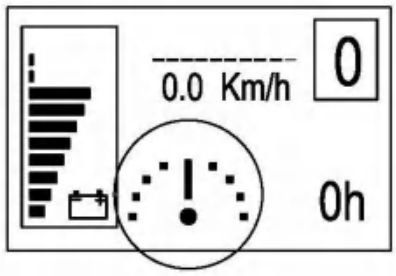
Backward = R .

• The travel speed is governed by the speed mode .

Warning!
When the circuit is switched on, the vehicle will have a self-test process.Make sure the lamps on the display unit stop flashing before operation.

• Use steering wheel (1) to steer the truck in the required direction.

2.Steering



Use steering wheel (1) to steer the truck in the required direction.The drive wheel position is indicated in the driver's display.

3.Braking

The brake pattern of the truck depends largely on the ground conditions. The driver must take this into account when operating the truck.The driver must be looking ahead when traveling. If there is no hazard, brake moderately to avoid moving the load .The truck can brake in three different ways:

- with the reversing brake
- with the coasting brake
- with the emergency brake

• With the reversing brake

While the truck is traveling press the travel switch (3). It switches to the opposite travel direction and the truck decelerates through the traction current controller until it starts to move in the opposite direction.

Warning!
This method of braking only acts as a parking brake and not as a service brake.

• With the coasting brake

Not apply the drive pedal (2): Travel inhibited, truck decelerates.

• With the emergency brake

Press the emergency brake switch（4）The truck brakes until it comes to a halt.

Warning!
The emergency brake switch (4) must only be used in dangerous situations.

3.4.3 Lifting - Lowering

Ensure there are no other people standing underneath the raised load and driver's cab.Instruct other people to move out of the hazardous area.

Operator position

Lifting

Pull the "Lifting" button (1) until you reach the desired lift height.

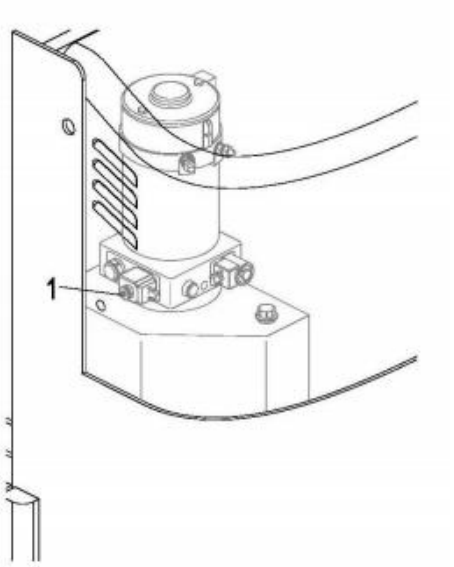
Lowering

Pull the "Lowering" button (2) until you reach the desired height.

Caution!
Lowering,the vehicle sounds an intermittent alarm beeper.

Emergency Lowering Procedures

If you lose power while elevated in the cage, instruct someone on ground level to pull the emergency lowering valve(1),which can lower the operator position or fork.



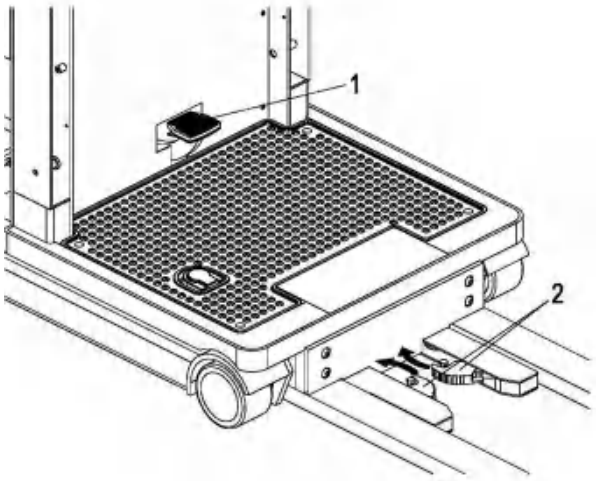
Warning!

Do not climb out of the lift cage while the operator position is elevated. The lift mast cannot be climbed safely. An elevated operator position has a high center of gravity and can be tipped easily. Standing on or leaning out from the outside of a cage rail may cause the lift vehicle to tip over. Tipping the lift vehicle over can cause severe injury or death and equipment damage.

3.4.4 Fixture

Pick pallet

When fork is going to pick pallet, press on pedal switch (1) ,and then fixture plate (2) is rotated. While the plate is in an open state, the pallet can be picked; release the pedal switch(1) after picking pallet,and make the plate stuck pallet.



Unload pallet

When fork is going to unloaded pallet, press on pedal switch (1) , and then the plate (2) is rotated. While the plate is in an open state,the pallet can be unload; release the pedal switch (1) after unloading pallet.

CAUTION!

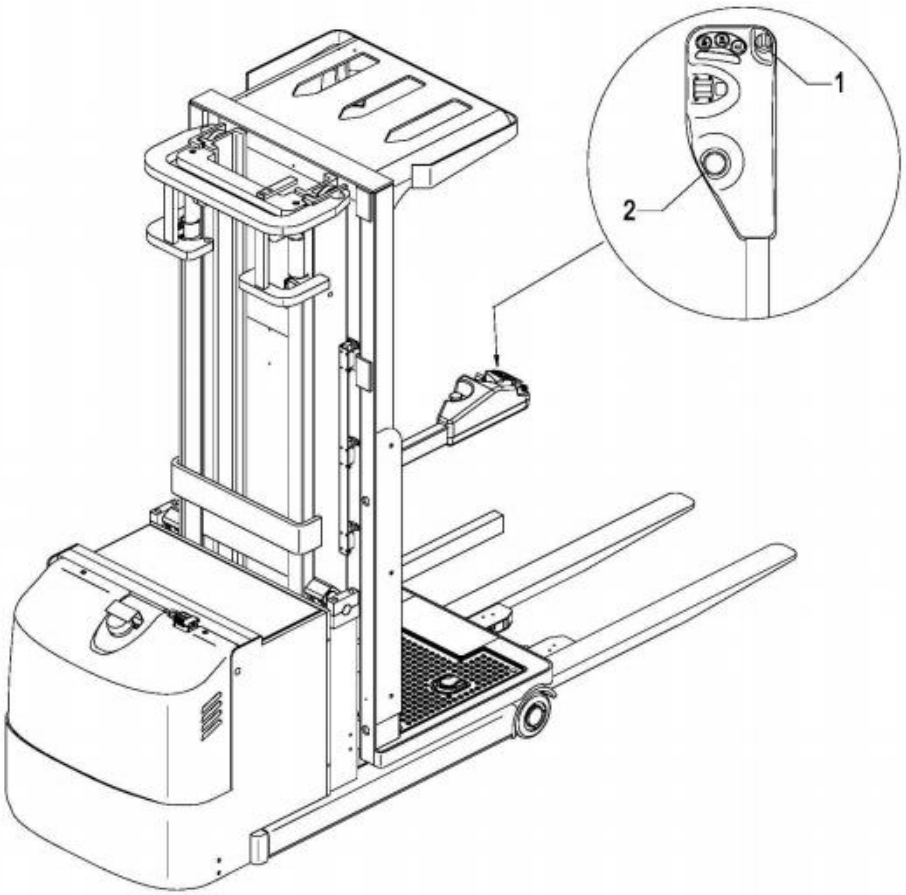
Fixture must clamp pallet before transporting.

3.5 Parking the order picker securely

When you leave the order picker it must be securely parked even if you only intend to leave it for a short time.

• Lower the load completely and position it horizontally.
• Retract the mast and fork fully.
• Set the emergency brake switch (2) “OFF”.
• Turn off the key switch and remove the key(1).

Warning!
Do not park the order picker on a slope. The load must always be lowered to the ground.



4.Battery Maintenance & Charging

4.1 Safety regulations for handling acid batteries

Park the order picker securely before carrying out any work on the batteries.

Maintenance personnel : Batteries may only be charged, serviced or replaced by trained personnel .The present operator manual and the manufacturer ’s instructions concerning batteries and charging stations must be observed when carrying out the work.

Fire protection :

• Smoking and naked flames must be avoided when working with batteries.

• Wherever a order picker is parked for charging there shall be no inflammable material or operating fluids capable of creating sparks within 2 meters around the order picker.

• The area must be well ventilated.

• Fire protection equipment must be provided.

Protection against electric shock:

• Battery has high voltage and energy.

• Do not bring short circuit.

• Do not approach tools to the two poles of the battery，which can cause the sparkle.

4.2 Charging the battery

Safety regulations for Charging the battery

• To charge the battery, the tractor must be parked in a closed and properly ventilated room. When charging, the tops of the battery cells must be exposed to provide sufficient ventilation.

• Do not place any metal objects on the battery.

• Before charging, check all cables and plug connections for visible signs of damage.

• Forbid add water to battery directly.

• Before start and finish charging to make sure power is turn OFF.

• It is essential to follow the safety regulations of the battery and charging station manufacturers.

Warning!
Before closing the battery cover make sure that the battery lead cannot be damaged.

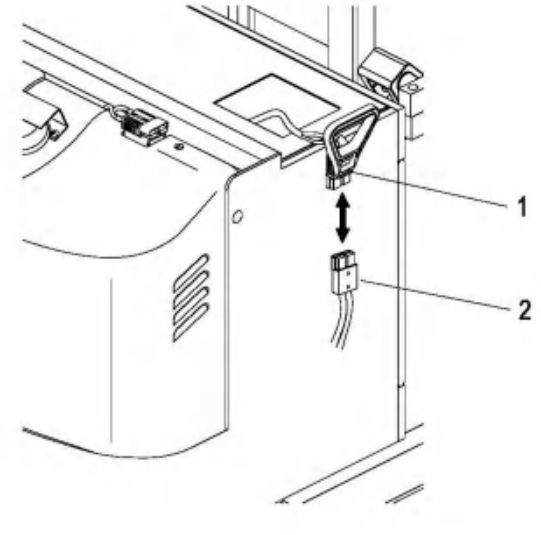
Charging step

• Check whether the condition is according with "Safety regulations for Charging the battery".

• Park the order picker securely(See 3.5 Parking the order picker securely).

• Remove the plug (1).

• Connect the battery plug (1) with the charging lead of the stationary charger(2) and turn on the charger.



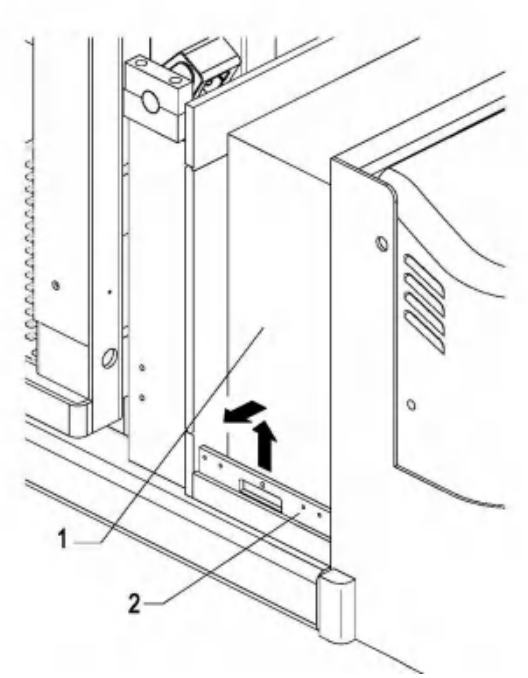
4.3 Battery removal and installation

• Park the truck securely(See 3.5 Parking the order picker securely).

• Place the battery plug or the battery cable in such a way that they will not get caught on the order picker when the battery(1) is removed.

• .Remove battery baffle(2).Pull the battery out from the side.

• Installation is in the reverse order of operations.



CAUTION!

The truck must be parked on level ground.

When transporting batteries using a crane, ensure that the crane is of adequate Capacity.

The lifting gear must exert a vertical pull so that the battery container is not compressed.

4.4 Battery maintenance

Do not overuse battery:

• If you use up the energy of battery till the forklift immovability, you will shorten its working hours.

• Shower for battery appears need for charge，please charge it quickly.

Inspection for electrolyte:

• Do not using tow which is absent electrolyte.

• Inspection for electrolyte level every week.

• When electrolyte level is low，you must add distilled water to the level appointed.

Battery maintenance:

The battery cell covers must be kept dry and clean. The terminals and cable shoes must be clean, secure and have a light coating of dielectric grease.Batteries with non insulated terminals must be covered with a non slip insulation mat.

Warning!

1. Do not use dry cloth or fabric cloth to clean the battery，avoiding static to bring the explosion.
2. Unfixing battery plug.
3. Cleaning with wet cloth.
4. Wearing glasses for protecting eyes rubber overshoes and rubber glove.

Battery storage：

If batteries are taken out of service for a lengthy period they should be stored in the fully charged condition in a dry, frost-free room. To ensure the battery is always ready for use a choice of charging methods can be made:

- a monthly equalizing charge as in point 4.2.

4.5 Battery Disposal

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

Batteries contain an acid solution which is poisonous and corrosive . Therefore , always wear protective clothing and eye protection when carrying out work on batteries . Above all avoid any contact with battery acid.

Nevertheless, should clothing, skin or eyes come in contact with acid the affected parts should be rinsed with plenty of clean water-where the skin or eyes are affected

call a doctor immediately. Immediately neutralize any spilled battery acid.

Only batteries with a sealed battery container may be used.

The weight and dimensions of the battery have considerable affect on the operational safety of the tractor. Battery equipment may only be replaced with the agreement of the manufacturer.

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 servicing checklists.

• Any modification to the order picker assemblies, in particular the safety mechanisms, is prohibited. The operational speeds of the order picker must not be changed under any circumstances.

• Only original spare parts have been certified by our quality assurance department. To ensure safe and reliable operation of the order picker, 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.

• Upon completion of inspection and servicing, carry out the activities listed in the “Recommissioning” section.

5.2Maintenance Safety Regulations

Maintenance personnel

Order pickers must only be serviced and maintained by the manufacturer’s trained personnel.

The manufacturer’s service department has field technicians specially trained for these tasks. We therefore recommend a maintenance contract with the manufacturer’s local service center.

Lifting and jacking up

When a order picker is to be lifted, the lifting gear must only be secured to the points specially provided for this purpose.

When jacking up the order picker, take appropriate measures to prevent it from slipping or tipping over (e.g. wedges, wooden blocks). You may only work underneath a raised load handler if it is supported by a sufficiently strong chain.

Cleaning

Do not use flammable liquids to clean the order picker.

Prior to cleaning, all safety measures required to prevent sparking (e.g. through short circuits) must be taken. For battery-operated order pickers, the battery connector must be removed. Only weak suction or compressed air and non-conductive antistatic brushes may be used for cleaning electric or electronic assemblies.

If the order picker is to be cleaned with a water jet or a high-pressure cleaner, all electrical and electronic components must be carefully covered beforehand as moisture can cause malfunctions.

Do not clean with pressurised water.

After cleaning the order picker, carry out the activities detailed in the “Recommissioning” section.

Electrical System

Only suitably trained personnel may operate on the order picker's electrical system.
Before working on the electrical system, take all precautionary measures to avoid – electric shocks.
For battery-operated order pickers, also de-energise the order picker by removing the battery connector.

Welding

To avoid damaging electric or electronic components, remove these from the order picker before performing welding operations.

Settings

When repairing or replacing electric or electronic components or assemblies, always note the truck-specific settings.

Tyres

The quality of tyres affects the stability and performance of the order picker. When replacing factory fitted tyres only used original manufacturer's spare parts, as otherwise the data plate specifications will not be kept.
When changing wheels and tyres, ensure that the order picker does not slew (e.g. when replacing wheels always left and right simultaneously).

Hydraulic hoses

The hoses must be replaced every six years. When replacing hydraulic components, also replace the hoses in the hydraulic system.

5.3 Servicing and inspection

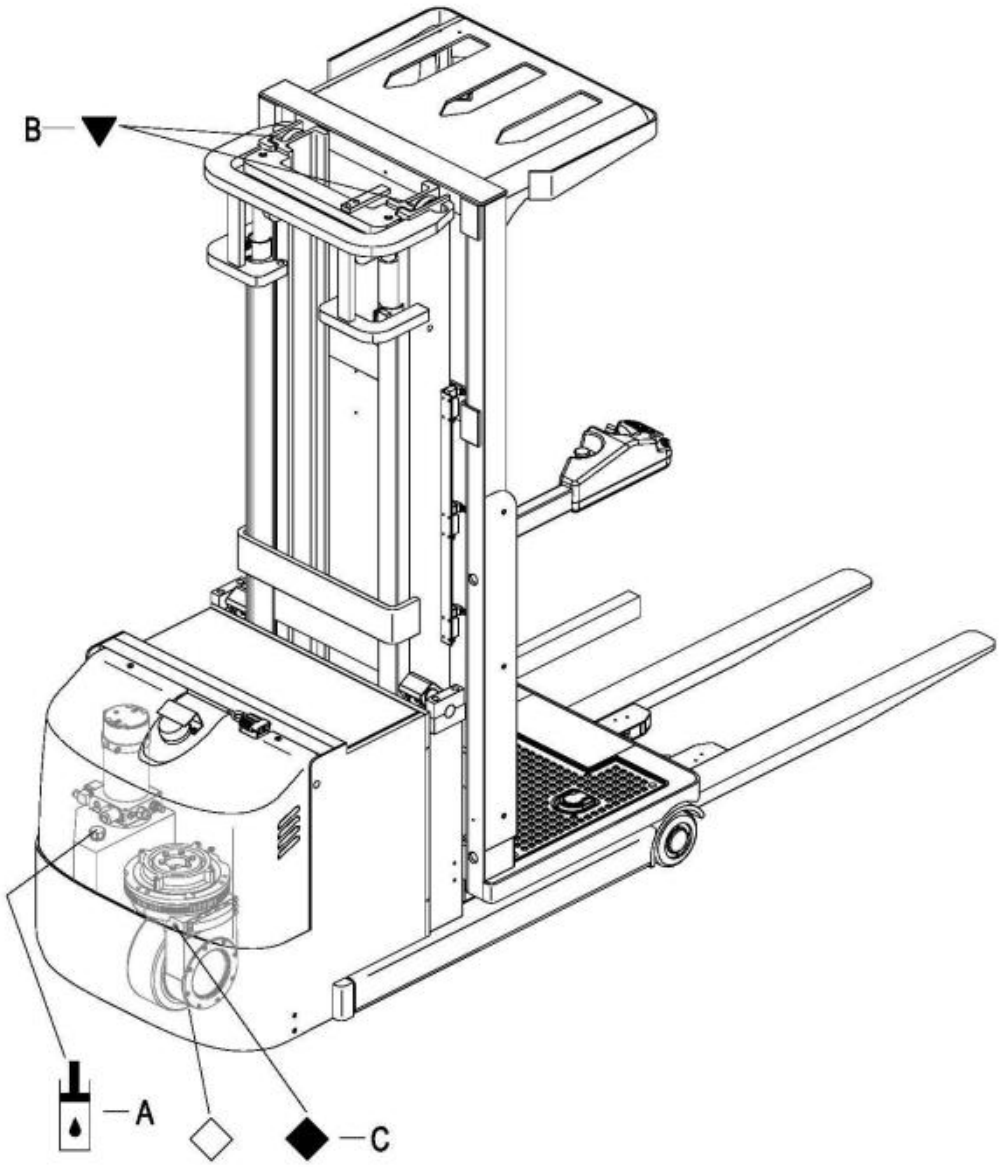
Thorough and expert servicing is one of the most important requirements for the safe operation of the order picker. Failure to perform regular servicing can lead to truck failure and poses a potential hazard to personnel and equipment.
The service intervals stated are based on single shift operation under normal operating conditions. They must be reduced accordingly if the order picker 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 weekly
A = Every 250 operating hours
B = Every 500 operating hours, or at least annually
C = Every 2000 operating hours, or at least annually
W service intervals are to be performed by the customer.
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 Maintenance Checklist

		Maintenance interval ●			
		W	A	B	C
Braking	Check magnetic brake air gap.			●	
Electrical system	Test instruments, displays and control switches.	●			
	Test warning and safety device.		●		
	Make sure wire connections are secure and check for damage.			●	
	Test micro switch setting.	●			
	Check contactors and relays.			●	
	Fix the motor and cable.			●	
Power supply	Visually inspect battery.			●	
	Visually inspect battery plug.			●	
	Check battery cable connections are secure, grease terminals if necessary.			●	
Travel	Check transmission for noise and leakage.			●	
	Check travel mechanism, adjust and lubricate if necessary.			●	
	Check wheels for wear and damage.			●	
	Check wheel suspension and attachments.			●	
	Check drive support plate.			●	
Truck frame	Check chassis for damage.			●	
	Check labels.			●	
	Check mast attachment.			●	
	Check screw connections.			●	
	Check gates and panels are secure and free of damage.			●	
Hydraulic operations	Test hydraulic system.		●		
	Check that hose and pipe lines and their connections are secure, check for leaks and damage.		●		
	Check cylinders and piston rods for damage and leaks, and make sure they are secure.			●	
	Check hydraulic oil level.			●	
	Replace hydraulic oil.				●

		Maintenance interval ●			
		W	A	B	C
Lifting	Check lifting chains and chain guides for wear, adjust and grease			●	
	Check Load handler and Pallet for wear and damage.			●	
	Perform sight check of rollers, sliding elements, and stops			●	
Steering system	Test electric steering.	●			
	Check steering toothed for wear and lubricate.			●	
Lubrication	Grease the vehicle in accordance with the lubrication schedule.			●	

5.3.2 Lubrication Schedule



▼ Contact surfaces

Filler plug for hydraulic oil

◆ Filler plug for transmission oil

◇ Drain plug for transmission oil

Consumables

Handling consumables type material: Consumables must always be handled correctly. Follow the manufacturer's instructions.

Improper handling is hazardous to health, life and the environment. Consumables must only be stored in appropriate containers. They may be flammable and must therefore not come into contact with hot components or naked flames.

Only use clean containers when filling up with consumables. Do not mix consumables of different grades. The only exception to this is when mixing is expressly stipulated in the Operating Instructions.

Avoid spillage. Spilled liquids must be removed immediately with suitable bonding agents and the bonding agent/consumable mixture must be disposed of in accordance with regulations.

Code	Description	Used for
A	L-HM46	Hydraulic oil
	L-HV32(Low temperature)	
B	Lubrication grease	Lubrication surface
C	GL-80W-90	Gear case

5.3.3 Maintenance Instructions

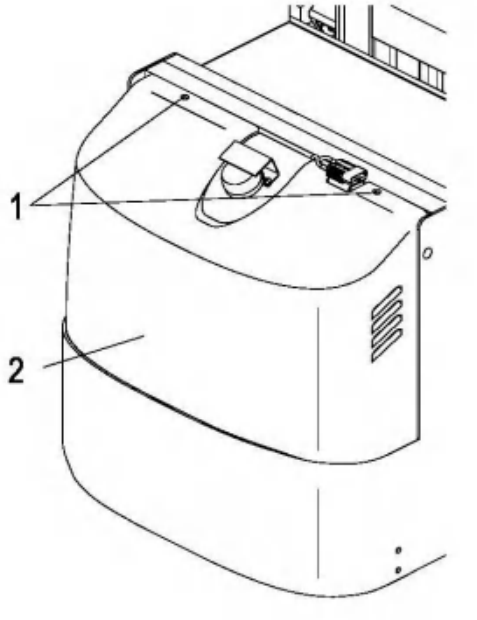
Prepare the order picker for maintenance and repairs

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

• Park the order picker securely (See 3.5 Parking the order picker securely).

• Remove the key to prevent the order picker from accidentally starting.

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



Open the cover

• Remove the two screws (1).

• Carefully open the cover (2) up.

Replacing the drive wheel

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

Check the hydraulic oil level

It is going to add hydraulic oil when you heard explosion sound from pipe during lifting.

• Prepare the order picker for maintenance and repairs (See 5.3.3 Maintenance Instructions).

• Opening the cover.

• Add hydraulic oil of the correct grade (See 5.3.2 Lubrication Schedule) .

Add hydraulic oil till you cant hear explosion sound during lifting.

Installation is the reverse order.

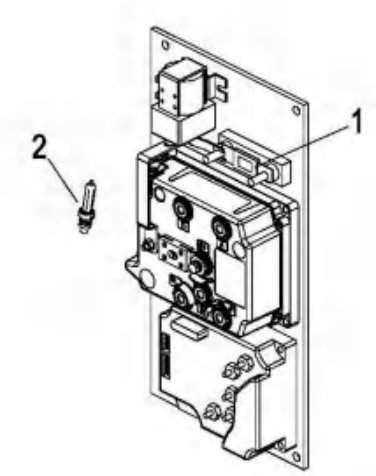
Warning!
Forbid adding hydraulic oil within impurity.

Checking electrical fuses

• Prepare the truck for maintenance and repairs (See 5.3.3 Maintenance Instructions).

• Open the cover.

• Check rating of all fuses in accordance with table, replace if necessary.



Item	To protect:	Rating
1	Traction / Lift / Steer motor Fuse	200A
2	Controller Fuse	10A

5.3.4 Recommissioning

The order picker may only be recommissioned after cleaning or repair work, once the following operations have been performed.

• Test horn.

• Test Emergency brake switch.

• Test brake.

• Lubricate the order picker in accordance with the maintenance schedule.

5.4 Decommissioning the order picker

If the order picker is to be decommissioned for more than two months , e.g. For operational reasons,it must be parked in a frost-free and dry location and all necessary measures must be taken before, during and after decommissioning as described.
On decommissioning the order picker must be jacked up so that all the wheels are clear of the ground. This is the only way of ensuring that the wheels and wheel bearings are not damaged.
If the order picker is to be out of service for more than 6 months , further measures must be taken in consultation with the manufacturer's service department.

5.4.1Prior to decommissioning

• Thoroughly clean the order picker.
• Check the brakes.
• Check the hydraulic oil level and replenish as necessary (See 5.3.3 Maintenance Instructions).
• Apply a thin layer of oil or grease to any non-painted mechanical components.
• Lubricate the order picker in accordance with the maintenance schedule (See 5.3.2 Lubrication Schedule).
• Charge the battery (See 4.2Charging the battery).
• Disconnect the battery, clean it and apply grease to the terminals.
In addition, follow the battery manufacturer's instructions.
• Spay all exposed electrical contacts with a suitable contact spray.

Warning !
Charge every months:
• Charge the battery.
Battery powered trucks:
The battery must be charged at regular intervals to avoid depletion of the battery through self-discharge. The sulfatisation would destroy the batterv.

5.4.2 Restoring the order picker to operation after decommissioning

• Thoroughly clean the order picker.
• Lubricate the order picker in accordance with the maintenance schedule (See 5.3.2 Lubrication Schedule).
• Clean the battery, grease the terminals and connect the battery.
• Charge the battery (See 4.2 Charging the battery).
• Check hydraulic oil for condensed water and replace if necessary.
• Run the order picker (see 3.3 Run the truck).

Battery powered trucks:
If there are switching problems in the electrical system, apply contact spray to the exposed contacts and remove any oxide layers on the contacts of the operating controls by applying them repeatedly.
Perform several brake tests immediately after re-commissioning the truck.

5.5 Safety checks to be performed at regular intervals and following any unusual incidents

Carry out a safety check in accordance with national regulations. We have a special safety department with trained personnel to carry out such checks. The order picker must be inspected at least annually (refer to national regulations) or after any unusual event by a qualified inspector. The inspector shall assess the condition of the order picker from purely a safety viewpoint, without regard to operational or economic circumstances. The inspector shall be sufficiently instructed and experienced to be able to assess the condition of the order picker and the effectiveness of the safety mechanisms based on the technical regulations and principles governing the inspection of order pickers.

A thorough test of the order picker must be undertaken with regard to its technical condition from a safety aspect. The order picker must also be examined for damage caused by possible improper use. A test report shall be provided. The test results must be kept for at least the next 2 inspections.

The owner is responsible for ensuring that faults are immediately rectified.
A test plate is attached to the order picker as proof that it has passed the safety inspection. This plate indicates the due date for the next inspection.

5.6 Final de-commissioning, disposal

Final, proper decommissioning or disposal of the order picker must be performed in accordance with the regulations of the country of application. In particular, regulations governing the disposal of batteries, fuels and electronic and electrical systems must be observed.

6.Troubleshooting

This chapter is designed to help the user identify and rectify basic faults or the results of incorrect operation. When locating a fault, proceed in the order shown in the table.

If the fault cannot be rectified after carrying out the remedial procedure, notify the manufacturer ’ s service department ,as any further troubleshooting can only be performed by specially trained and qualified service personnel.The manufacturer has a customer service department specially trained for these tasks.

Fault	Possible cause	Action
order picker does not start.	• Battery connector not connected. • Key switch in “OFF” position • Safety gates open • EMERGENCY DISCONNECT switch pressed • Foot switch not pressed • Battery charge too low • Faulty fuse • order picker in charge mode	• Check the battery connector and connect if necessary. • Set key switch to “ON” • Close the safety gates • Unlatch EMERGENCY DISCONNECT switch • Press foot switch • Check battery charge, charge battery if Necessary • Test fuses • Interrupt charging
Load can not be lifted	• Hydraulic oil level too low • Excessive load • Fuse blown	• Check the hydraulic oil level • Note maximum capacity (see data plate) • Check fuses

To provide targeted and rapid response to faults, the following details are useful and important to provide for the customer service department:

- Order picker serial number
- Display unit error number (if present)(see 6.1 Error Message)
- Error description
- Current location of order picker.

6.1 Error Message

COMBIACX CONTROLLER

Error Message		Possible cause	Fault elimination
Code	**Error text**		
99	SLIP PROFILE	There is an error on the choice of the parameters of the slip profile.	Check in the hardware setting menu the value of those parameters.
80	FORW+BACK	This alarm occurs when both the travel demands (Fwd and Bwd) are active at the same time.	Check the wiring of the Fwd and Rev travel demand inputs (use the readings in the TESTER to facilitate the troubleshooting). Check the microswitches for failures. A failure in the logic is possible too. So, when you have verified the travel demand switches are fine working and the wiring is right, it is necessary to replace the controller.
79	INCORRECT START	This is a warning for an incorrect starting sequence.	The possible reasons for this alarm are (use the readings in the TESTER to facilitate the troubleshooting): A) A travel demand active at key on B) Presence man sensor active at key on Check the wirings. Check the micro-switches. It could be also an error sequence made by the operator. A failure in the logic is possible too; so when all of the above conditions were checked and nothing was found, replace the controller.

78	VACC NOT OK	The test is made at key-on and after 20sec that both the travel demands have been turned off. This alarm occurs if the ACCELERATOR reading in the TESTER menu' is 1,0V higher than PROGRAM VACC min acquisition when the accelerator is released.	Check the mechanical calibration and the functionality of the potentiometer.
62	TH. PROTECTION	This alarm occurs when the temperature of the base plate is higher than 85°. Then the maximum current decreases proportionally with the temperature increases from 85° up to 105°. At 105° the Current is limited to 0 Amps.	Improve the air cooling of the controller. If the alarm is signalled when the controller is cold, the possible reasons are a thermal sensor failure or a failure in the logic card. In this case, it is necessary to replace the controller.
65	BATTERY LOW	It occurs when the battery charge is calculated being less than or equal to 10% of the full charge and the BATTERY CHECK setting is other than 0 (refer to SET OPTION menu).	Get the battery charged. If it doesn't work, measure with a voltmeter the battery voltage and compare it with the value in the BATTERY VOLTAGE parameter. If they are different adjust the value of the ADJUST BATTERY function.
71	EEPROM KO	It's due to a HW or SW defect of the non-volatile embedded memory supporting the controller parameters. This alarm does not inhibit the machine operations, but the truck will work with the default values.	Try to execute a CLEAR EEPROM operation (refer to Console manual). Switch the key off and on to check the result. If the alarm occurs permanently, it is necessary to replace the controller. If the alarm disappears, the previously stored parameters will have been replaced by the default parameters.

65	MOTOR TEMPERATURE	This warning occurs when the temperature sensor is opened (if digital) or has overtaken the threshold of 150°C (if analog).	Check the thermal sensor inside the motor (use the MOTOR TEMPERATURE reading in the TESTER menu); check the sensor ohmic value and the sensor wiring. If the sensor is OK, improve the air cooling of the motor. If the warning is present when the motor is cool, then the problem is inside the controller.
61	THERMIC SENSOR KO	The output of the controller thermal sensor is out of range.	This type of fault is not related to external components; replace the controller.
	CHECK UP NEEDED	This is just a warning to call for the time programmed maintenance.	It is just enough to turn the CHECK UP DONE option to level ON after the maintenance is executed.
	DATA ACQUISITION	Acquisition of the current gains.	The alarm ends when the acquisition is done.
86	PEDAL WIRE KO	The SW continuously checks for the connection of the two supply ends of the potentiometer in the accelerator. The test consists of reading the voltage drop on a sense diode, connected between NPOT (CNA#30) and GND and cascaded with the potentiometer: if the potentiometer gets disconnected on PPOT (CNA#25) or NPOT, no current flows in this sense diode and the voltage on the NPOT connection collapses down. When the NPOT voltage is less than 0.3V this alarm occurs. This alarm occurs also when the NPOT voltage is higher than 2Vdc (to detect also the condition of a broken sense diode).	Check the voltage on NPOT and the potentiometer connections.

51	TILLER OPEN	Warning: when the tiller is released, after a fixed period of time of standby (30 seconds) the main contactor open.	At the next travel request the warning disappear.
92	CURRENT GAIN	The Maximum current gain parameters are at the default values, which means the maximum current adjustment procedure has not been carried out yet.	Ask the assistance of a Zapi technician to do the correct adjustment procedure of the current gain parameters.
68	WAITING FOR NODE	The controller receives from the CAN the message that another controller in the net is in fault condition; as a consequence the ACE0 controller itself cannot enter an operative status, but has to WAIT for the other controller coming out from the fault status.	
76	VALVE COIL SHORTED	This alarm occurs when there is a short circuit on an on/off valve coil.	A) If the fault is present at start up, it is very likely that the hw overcurrent protection circuit is damaged, it is necessary to replace the controller. B) If the fault is present when the controller drives the outputs, the problem is located in the harness and in the coils.
74	EV1 DRIVER SHORTED	Electrovalve EV1 driver is shorted.	Check if there is a short or a low impedence between the negative of one of those coils and –BATT. Otherwise the driver circuit is damaged and the controller must be replaced.

74	EV2 DRIVER SHORTED	Electrovalve EV2 driver is shorted.	Check if there is a short or a low impedance between the negative of this coil and –BATT. This warning occurs also if the external load is not present and the parameter EV2 in the “Set Options” menu is set “PRESENT”, in this case the warning disappears setting the EV2 parameter “ABSENT”. Otherwise the driver circuit is damaged and the controller must be replaced.
74	EV3 DRIVER SHORTED	Electrovalve EV3 driver is shorted.	Check if there is a short or a low impedance between the negative of this coil and –BATT. This warning occurs also if the external load is not present and the parameter EV3 in the “Set Options” menu is set “PRESENT”, in this case the warning disappears setting the EV3 parameter “ABSENT”. Otherwise the driver circuit is damaged and the controller must be replaced.
56	PUMP I NO ZERO	In standby condition (pump motor not driven), the feedback coming from the current sensor in the pump chopper gives a value out of a permitted range,	This type of fault is not related to external components; replace the controller.
52	PUMP I=0 EVER	This test is carried out when the pump motor is running, and it verifies that the current feedback sensor is not constantly stuck to 0.	A) Check the motor connection, that there is continuity. If the motor connection is opened, the current cannot flow, so the test fails and the error code is displayed. B) If everything is ok for what it concerns the motor, the problem could be in the current sensor or in the related circuit.

75	CONT. DRV. EV1	The EV1 valve driver is not able to drive the load (cannot close).	The device or its driving circuit is damaged, replace the controller.
75	CONT. DRV. EV2	The EV2 valve driver is not able to drive the load (cannot close).	The device or its driving circuit is damaged, replace the controller.
75	CONT. DRV. EV3	The EV3 valve driver is not able to drive the load (cannot close).	The device or its driving circuit is damaged, replace the controller.
89	PUMP VACC NOT OK	The minimum of the lift potentiometer is not correctly set.	It is suggested to repeat a “PROGRAM VACC” procedure.
67	SENS.MOT. TEMP. KO	A) The motor temperature sensor is not correctly connected to A22. B) The motor temperature sensor is damaged.	- Check the correct connection of the motor temperature sensor. - If the current sensor is correctly connected, replace it. - If the problem persist, it is due to the controller.
85	VACC OUT RANGE	The voltage on CNC#4 is outside of the parameters’ range.	Please re-acquire the VACC parameters with a PROGRAM VACC procedure.
11	STALL ROTOR	The traction rotor is stuck or the encoder signal is not correctly received by the controller.	Please check if the sign of FREQUENCY and ENCODER on the tester menu are the same and different than zero during a traction request.
48	EVP DRIVER OPEN	The EVP driver is damaged or the EVP coil impedance is too law.	Please check the EVP coil impedance. If the EVP impedance is OK, the problem is inside the controller.
49	MANY PUMP REQS	More than one pump functions were requested at the same time.	Just one pump function at a time can be requested. Please reset all the requests and try again.

79	PUMP INC START	This is a warning for a pump incorrect starting sequence.	The possible reasons for this alarm are: A) Pump request active at keyon. B) Pump request active without man presence. Check the wirings. Check the micro-switches. It could also be an error sequence made by the operator. A failure logic is possible too. When all of the above conditions were checked and nothing was found, replace the controller.
90	PUMP VACC RANGE	The voltage on CNC#9 is outside of the parameters range.	If the EVP TYPE parameter is set to ANALOG, please acquire again the values of MIN LOWER and MAX LOWER. If the controller is in Combiacx configuration and the PROPORTION. LIFT parameter is set to ON, please acquire again also the values of MIN LIFT and MAX LIFT.
13	PARAM RESTORE	This warning appears when the controller restored the default values.	If a CLEAR EEPROM was mode before the last keyon-recycle, this warning just means that the EEPROM was correctly cleared. A travel demand or a pump request cancel the alarm. If this alarm appears at keyon without any CLEAR EEPROM request by the operator, there could be a problem inside the controller.

EPS-AC0 CONTROLLER

Error Message		Possible cause	Fault elimination
Error	Error text		
6	SERIAL ERR #1	Main uC and Slave uC communicate via a local serial interface. This alarm occurs when the slave uC does not receive the communication from the main uC through this serial interface.	It is necessary to replace the controller.
13	EEPROM KO	It occurs if a test to write and read one location in EEPROM fails. The SW expects to read the written value. It occurs also when the hour counter gives different values between the three redundant locations in which it is recorded. It occurs also when the busy bit of the EEPROM does not rise within 12 msec.	It is necessary to replace the controller.
16	LOGIC FAILURE #4	This alarm occurs in the rest state if the output of the voltage amplifier of the phase Vw-Vv have a drift larger than ±0.25 V.	It is necessary to replace the controller.
17	LOGIC FAILURE #3	This alarm occurs in the rest state if the output of the voltage amplifier of the phase Vu-Vw have a drift larger than ±0.25 V.	It is necessary to replace the controller.
18	LOGIC FAILURE #2	This alarm occurs when the real voltage between phases W and V of the motor is different from the desired.	It is necessary to replace the controller.

19	LOGIC FAILURE #1	This alarm occurs when the real voltage between phases W and U of the motor is different from the desired.	It is necessary to replace the controller.
32	VMN NOT OK	This alarm occurs in the initial rest state after key on if the outputs of the motor voltage amplifiers are not in the window from 2.2 to 2.8 Vdc.	It is necessary to replace the controller.
48	MAIN CONT. OPEN	This alarm occurs only when the setting CAN BUS is PRESENT. Then the eps-ac0 waits for a via CAN information that the traction controller has closed the main contactor. If this information lacks more than about 1.5 secs, this alarm occurs.	Find, on the traction controller, the reason for keeping the main contactor open.
53	STBY I HIGH	This alarm occurs two ways: 1) In the initial rest state after key on, if the outputs of the current amplifiers are not comprised in the window 2.2 to 2.8 Vdc. 2) After the initial diagnosis this alarm occurs when the outputs of the current amplifiers at rest have a drift larger than ±0.15 V.	It is necessary to replace the controller.
61	HIGH TEMPERATURE	This alarm occurs if the temperature of the controller base plate overtakes 75 degrees.	Improve the cooling of the controller; otherwise it is necessary to replace the controller.

65	MOTOR TEMPERAT.	This alarm occurs only when DIAG MOTOR TEMP is on and the thermal sensor inside the motor measures a temperature higher than 150 degrees. It occurs also when trying to acquire the motor resistance with a temperature in the motor higher than 150 degree (still with DIAG MOTOR TEMP to ON).	Check the thermal sensor in the motor is right working. If it is, improve the cooling of the motor.
70	HIGH CURRENT	This alarm occurs if the circuit to limit via hardware the current in the motor is either always active at key-on or repeatedly active when the motor is turning.	Check the motor is suited to work with the eps-ac0 (not oversized). Otherwise it is necessary to replace the controller.
71	POWER FAILURE #3	This alarm occurs when the current in the phase V of the motor is zero and the motor is commanded for moving.	Check the power fuse is OK. Check the battery positive arrives to the controller. Check the continuity of the wire in the phase V of the motor. Otherwise it is necessary to replace the controller.
72	POWER FAILURE #2	This alarm occurs when the current in the phase U of the motor is zero and the motor is commanded for moving.	Check the power fuse is OK. Check the battery positive arrives to the controller. Check the continuity of the wire in the phase U of the motor. Otherwise it is necessary to replace the controller.

73	POWER FAILURE #1	This alarm occurs when the current in the phase W of the motor is zero and the motor is commanded for moving.	Check the power fuse is OK. Check the battery positive arrives to the controller. Check the continuity of the wire in the phase W of the motor. Otherwise it is necessary to replace the controller.
83	BAD ENCODER SIGN	It occurs in applications with toggle switches when the applied frequency (FREQUENCY) and the motor speed (ENC SPEED) have opposite sign.	Swap in between the two encoder channels (CNB#7 with CNB#8).
84	STEER SENSOR KO	This alarm occurs if the command potentiometer (CPOC1 on CNA#9 or CPOC2 on CNA#8) changes with a jerk larger than MAX SP SLOPE (see 12.4.6.3). This alarm is used to catch a discontinuity in the voltages of the command potentiometer.	Change the twin pot.
85	STEER HAZARD	This is just a warning to inform that the steering controller is limiting the angle in the steering direction. No speed reduction occurs on the traction.	——
218	CLOCK PAL NOT OK	The main uC sends an analog signal towards the slave uC to reset the slave uC on demand. When the slave uC detects this analog signal external to a window from 2.2 to 2.8 and not in the range to generate the reset on demand, the slave uC raises this alarm.	It is necessary to replace the controller.

99	INPUT ERROR #1	It occurs when the voltage on CNA#4 (NK1: Lower Potential Terminal of the Safety Contacts (see 7.6) is higher than 12 V before to turn the safety contacts closed.	When the safety contacts are open, the voltage on CNA#4 is expected to be close to 0 Vdc and this is independent from whether the safety contacts are connected to a plus battery or to a minus battery . In the first case (safety contacts connected to a plus battery), when the safety contacts are open, CNA#4 is connected to a minus battery through a load. Only a harness mistake may connect NK1 to a higher than 12 V voltage.
212	MICRO SLAVE #8	It occurs when the encoder counting of the main uC is not matched with the encoder counting of the slave uC.	It is necessary to replace the controller.
219	STEPPER MOTOR MISM	This alarm occurs if the frequency and the amplitude of the voltages from the stepper motor lines are mismatched in between In normal condition when the amplitude of the stepper motor lines increases, the frequency of the stepper motor lines must increase too.	It is necessary to replace the controller.
220	MOTOR LOCKED	This alarm occurs if the current in the steering motor stays close to the maximum current longer than 1 sec.	Search for a mechanical problem locking the motor. To make easier the fault catching, set DEBUG OUTPUT to level 11.

221	MICRO SLAVE #4	It occurs in one of the following conditions: (Open loop application only) If the slave uC detects the stator voltage phasor rotates in the opposite direction respect to the sign of the stepper motor speed, this alarm occurs. (Closed loop application only) If the slave uC detects the stator voltage phasor rotates in the opposite direction respect to the commanded position, this alarm occurs.	It is necessary to replace the controller.
222	FB POT LOCKED	In application with a feedback potentiometer, this alarm occurs if the feedback potentiometer (CPOT on CNB#6) does not change (or changes in the opposite direction) its value even if commanded to change. In application with toggle switches with ENCODER CONTROL to off, this alarm occurs if the feedback encoder counting does not change its value even if commanded to change.	In application with the feedback potentiometer, verify the feedback potentiometer is not mechanically loosened. Check there is not a mechanical block of the steered wheel. Be sure the wiper has not reached its own electrical limit because of too much angle of the steered wheel. Besides, this alarm may occur at the installation when the motor rotates in the wrong direction turning away from the wished
223	JERKING FB POT	This alarm occurs if the feedback potentiometer (CPOT on CNB#6) changes with a jerk larger than 0.3 V in 16 msec. This alarm is used to catch a discontinuity in the voltages of the feedback potentiometer.	Change the feedback potentiometer.

225	CURRENT GAIN	This alarm occurs when the parameters to compensate for the gain of the current amplifiers (ADJUSTMENT #03 and ADJUSTMENT #04) have the default values	It is necessary to send the controller to Zapi to perform the maximum current regulation.
226	NO SYNC	Every 16msec, inside the code cycle, the main uC rises and then lowers an input for the slave uC (SYNC). When the slave uC detects no edge for more than 100 msec on this input, this alarm occurs. This is just a watch dog function: when the main uC does not execute the code cycle it does not update the SYNC signal and the slave uC cuts off the steer and traction.	It is necessary to replace the controller.
227	SLAVE COM. ERROR	Main uC and Slave uC communicate via a local serial interface. This alarm occurs when the main uC does not receive the communication from the slave uC through this serial interface.	It is necessary to replace the controller.
237	WAITING DATA	This warning occurs only if CAN BUS is PRESENT. At key-on the eps-ac0 asks to the traction controller to send a list of parameters via CAN Bus. From the request until the parameters are correctly relieved, this warning occurs. The steer is not activated yet, and the safety relays remain open when this warning is present.	——

228	POSITION ERROR	This alarm occurs for an error in the redundant test of the feedback sensors.	Check the potentiometer connected to CNB#6 is right working. If toggle switches are connected to CNA#2 and CNA#3, verify they are right working and the setting AUX FUNCTION 11 is correct. Verify also the sensor bearing in the motor (encoder) has not a slip (the sensor bearing has two rings: one is connected to the rotor shaft; the other is connected to the motor frame. Check these two rings are strictly connected to their structure without slip.
238	EPS NOT ALIGNED	This is a real alarm that cut off the traction. It occurs at the initial alignment if the straight-ahead condition is not matched within 6sec. Throughout this 6 secs delay, the steer is not activated yet, the safety relays are open and the traction is stopped.	——
239	WAITING FOR TRAC	At key-on the eps-ac0 needs an assent from the traction controller to close the safety contacts and to turn onto operational mode. Until this assent is not relieved, this warning occurs. The steer is not activated yet and the safety relays remain open when this warning is present.	——

241	ENCODER ERROR	It occurs when ENCODER CONTROL is set ON and the real frequency does not pursuit the commanded frequency	This condition is several times due to either, a mismatching between the Encoder resolution used in the SW and the real encoder resolution, or a wrong connection between the two encoder channels. In this latest case exchange in between the two encoder channels.
242	Q LINE SENSOR KO	This alarm occurs when the mean voltage on the Quadrature line of the stepper motor (connection CNA#8) is not null: the voltage on every stepper motor line is a sine wave with null mean voltage.	Check the continuity of the stepper motor connections. In particular the resistance between CNA#8 and the minus battery (with the stepper motor at rest) is expected being very low (close to 30 ohms).
243	D LINE SENSOR KO	This alarm occurs when the mean voltage on the Direct line of the stepper motor (connection CNA#9) is not null: the voltage on every stepper motor line is a sine wave with null mean voltage.	Check the continuity of the stepper motor connections. In particular the resistance between CNA#9 and the minus battery (with the stepper motor at rest) is expected being very low (close to 30 ohms).
245	DATA ACQUISITION	This alarm occurs when the acquiring the motor resistance or when adjusting the parameters to compensate for the gain of the current amplifiers (maximum current factory adjusted).	Recycle the key.

244	GAIN EEPROM KO	The parameters to compensate for the gain of the current amplifiers (ADJUSTMENT #03 and ADJUSTMENT #04) are recorded in a not volatile memory (eeprom) with a redundant handling. In fact every adjustment is recorded in three eeprom locations. If the values in these three locations are different in between this alarm occurs.	It is necessary to send the controller to Zapi to execute the maximum current regulation.
246	MICRO SLAVE KO	In stepper motor application, this alarm occurs if the main uC is detecting a direction of the stepper motor not matched with the one that the slave uC is detecting. In closed loop application, this alarm occurs if the main uC is detecting a direction of the steering error not matched with the one that the slave uC is detecting. Furthermore, this alarm occurs also if the main uC is detecting no steering limitation meanwhile the slave uC is detecting e steering limitation.	It is necessary to replace the controller.
247	CAN BUS KO	This alarm occurs only when the setting CAN BUS is PRESENT. Then the eps-ac0 must receive the event messages from the traction controller. If these messages lack more than about 1 sec, this alarm occurs.	Check the CAN Bus communication system and analyse the frames from the traction controller to the steer controllers.

248	S.P OUT OF RANGE	This alarm occurs for a fault on the command potentiometer (CPOC1 on CNA#9, CPOC2 on CNA#8). When a single command pot is chosen, the alarm occurs if its wiper (CPOC1) exits the range from 0.8 Vdc to 4.2 Vdc. When the twin pot is chosen, the alarm occurs if the sum of the two wiper voltages (CPOC1+CPOC2) exits the range from 4.5 Vdc to 5.5 Vdc.	Check the connections of the potentiometer. This alarm occurs when one connection of the command potentiometer is broken.
249	F.B OUT OF RANGE	This alarm occurs for a fault on the feedback potentiometer (CPOT on CNB#6). This alarm occurs if CPOT exits the range from 0.3 Vdc to 4.7 Vdc.	Check the connections of the feedback potentiometer. This alarm occurs when one connection of the feedback potentiometer is broken.
250	MICRO SLAVE	It occurs when the information on the status bus between the main uC and the slave uC is frozen to the 0xFF value (the slave uC does not update the status bus configuration).	It is necessary to replace the controller.
251	KM OPEN	This alarm occurs if the slave uC detects the safety contact, of the main uC, open when expected being closed.	It is necessary to replace the controller.
252	KS OPEN	This alarm occurs if the main uC detects the safety contact, of the slave uC, open when expected being closed.	It is necessary to replace the controller.

253	KM CLOSED	This alarm occurs at key on if the slave uC detects the safety contact, of the main uC, closed prior to be commanded.	This alarm occurs if the connection CNA#5 (K1) is around a voltage of 12 Vdc when switching on the key. In fact, when the safety contacts are open, K1 is expected being connected to a battery voltage (not 12 V). Search for a harness problem or replace the controller.
254	KS CLOSED	This alarm occurs if the main uC detects the safety contact, of the slave uC, closed prior to be commanded.	This alarm occurs if the connection CNA#4 (NK1) is around a voltage of 12 Vdc when switching on the key. In fact, when the safety contacts are open, NK1 is expected being connected to a minus battery voltage (not 12 V). Search for a harness problem or replace the controller.