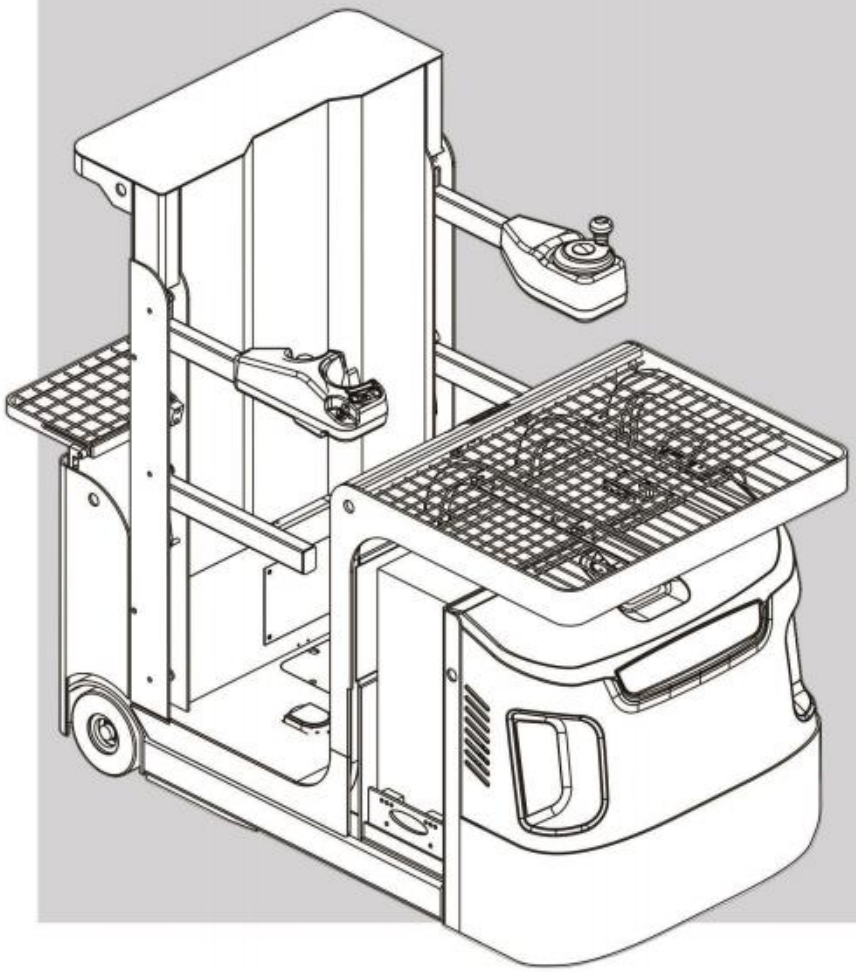
J1HD
Operation Manual



CE CERTIFICATE

Part No.508000003143
V1 10/2019

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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

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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.

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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".

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Foreword

Thanks for purchasing our task support vehicle.

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 !

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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.

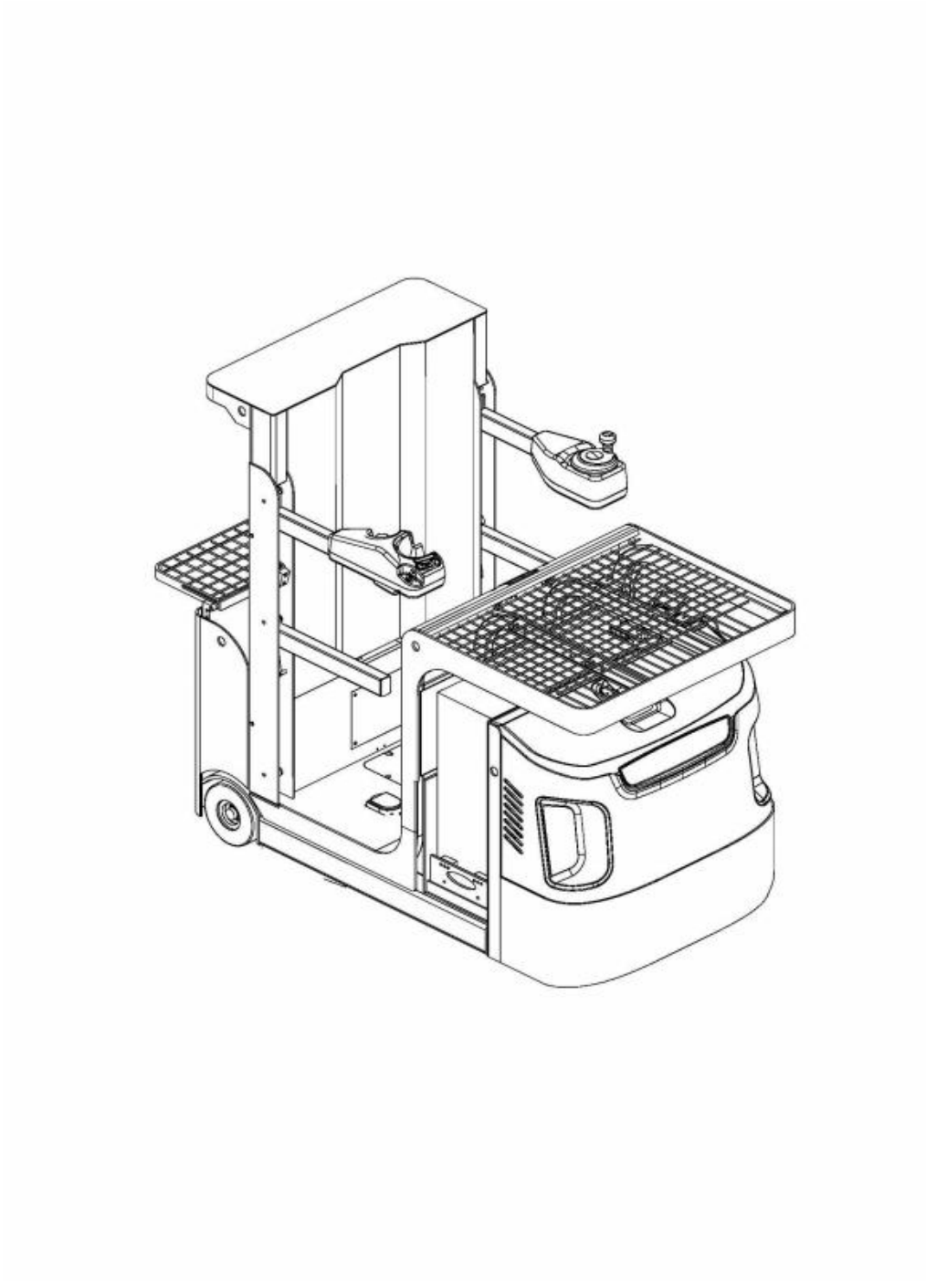
1. Truck Description

1.1 Application

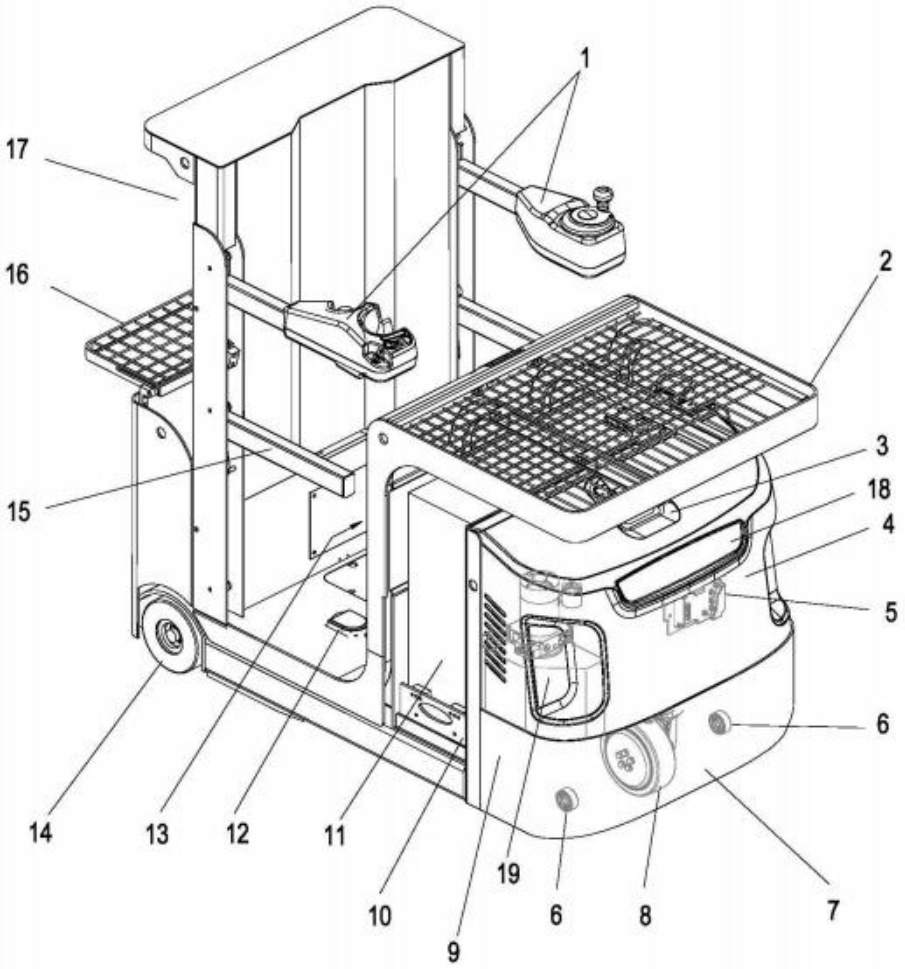
The J1HD is an electric truck.The J1HD is designed to transport and pick goods on level surfaces.Loads can be stacked,unstacked and transported over long distances. The capacity can be obtained from the data plate.

Warning!

The truck can only be used indoors !



1.2 Truck Assemblies



Item	Component	Item	Component
1	Control panel	11	Battery
2	Load handler	12	Dead man switch
3	Warning lamp	13	Height-adjustable operator position
4	Cover	14	Load wheel
5	Controller	15	Gates
6	Balance wheel	16	Pallet
7	Frame	17	Mast
8	Drive wheel	18	Blue lamp
9	Hydraulic pump	19	White lamp
10	Battery baffle		

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.

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 magnetic switch valves. The varying oil requirements are controlled by the speed of the motor.

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

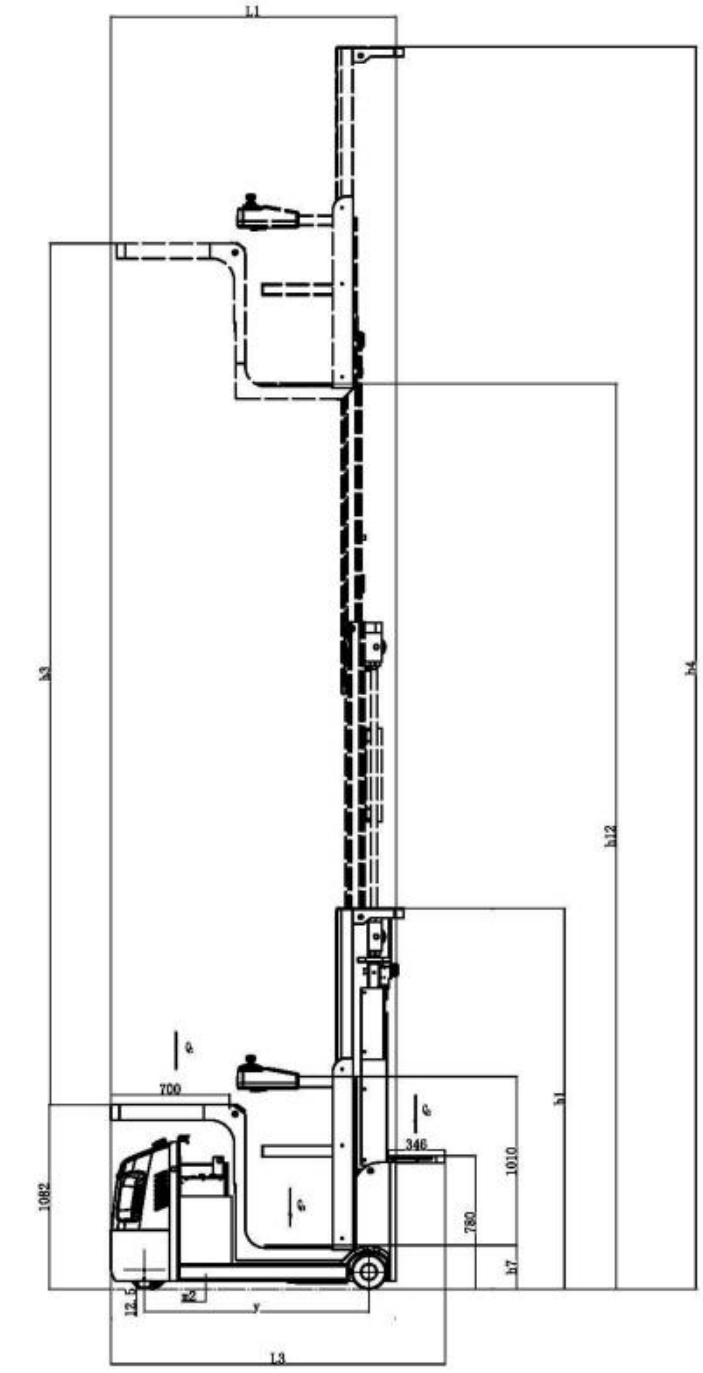
Technical specification details in accordance with VDI2198. Technical modifications and additions reserved.

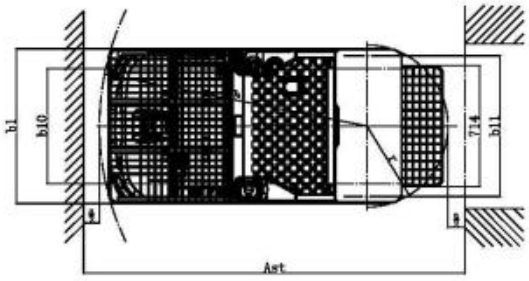
			Unit		
Distinguishing mark					
1.1	Manufacturer			EP	EP
1.2	Model designation			J1HD(4110)	J1HD(5330)
1.3	Drive unit			Electrics	Electrics
1.4	Operator type			standing	standing
1.5	rated capacity on front platform	Q_1	Kg	Δ318	Δ318
	rated capacity on behind platform	Q_2	Kg	137	137
	rated capacity on standing platform	Q_3	Kg	136	136
1.9	Wheelbase	y	mm	1300	1300
Weight					
2.1	Service weight （include battery）		kg	1440	1630
2.2	Axle loading, laden driving side/loading side		kg	740/1100	780/1220
2.3	Axle loading, unladen driving side/loading side		kg	520/820	540/990
Types,Chassis					
3.1	Tyre type, Driving wheels/Loading wheels			polyurethane /polyurethane	polyurethane /polyurethane
3.2	Tyre size, driving wheels （Diameter×Width）		mm	Φ260*125	Φ260*125
3.3	Tyre size, loading wheels （Diameter×Width）		mm	Φ204*76	Φ204*76
3.4	Tyre size, caster wheels（diameter×width）		mm	Φ74*48	Φ74*48
3.5	Wheels, number driving，caster/loading (x=drive wheels)		mm	1x,2/2	1x,2/2
Dimensions					
4.2	Height, mast lowered	h_1	mm	2120	2250
4.8	Seat height/standing height)	h_7	mm	250	250
4.14	Stand height, elevated	h_{12}	mm	4110	5330
4.19	Overall length	L1	mm	1685	1685
4.21	Overall width	b_1/b_2	mm	914	914
4.32	Ground clearance, center of wheelbase	m_2	mm	50	50
4.33	front cargo platform width	$B_0×L_2$	mm	900×700	900×700
4.34	initial height of front cargo platform	h_2	mm	1082	1082
4.35	Control handle height	h_5	mm	1010	1010

4.36	behind platform width	$L_4 \times B_1$	mm	346×714	346×714
4.37	Overall length platform launch	L_3	mm	2000	2000
4.38	The channel width	Ast	mm	2260	2260
4.39	Turning radius	Wa	mm	1600	1600
Performance data					
5.1	drive speed, laden/unladen		km/ h	10.5	10.5
	drive speed, laden/unladen		km/ h	5	5
	drive speed, laden/unladen		km/ h	3.2	3.2
	drive speed, laden/unladen		km/ h	1.6	1.6
5.2	Lifting speed, laden/ unladen		m/ s	0.20/0.28	0.20/0.28
5.3	Lowering speed, laden/ unladen)		m/ s	0.35/0.30	0.35/0.30
5.8	Max. gradeability, laden/unladen		%	0	0
5.10	Service brake type			Electromagnetic	Electromagnetic
Electric-engine					
6.1	Drive motor rating S2 60 min		kW	4	4
6.2	Lift motor rating at S3 15%		kW	4	4
6.3	The maximum allowed size battery		mm	300x840x670	300x840x670
6.4	Battery voltage/nominal capacity K20		V/ Ah	48V/360AH	48V/360AH
6.5	Battery weight		kg	300	300
Addition data					
8.1	Type of drive unit			AC	AC
10.5	Steering type			Electronic	Electronic
10.7	Sound pressure level at the driver’s ear		dB (A)	74	74

[1)] Including safety distance a = 200mm

J1HD

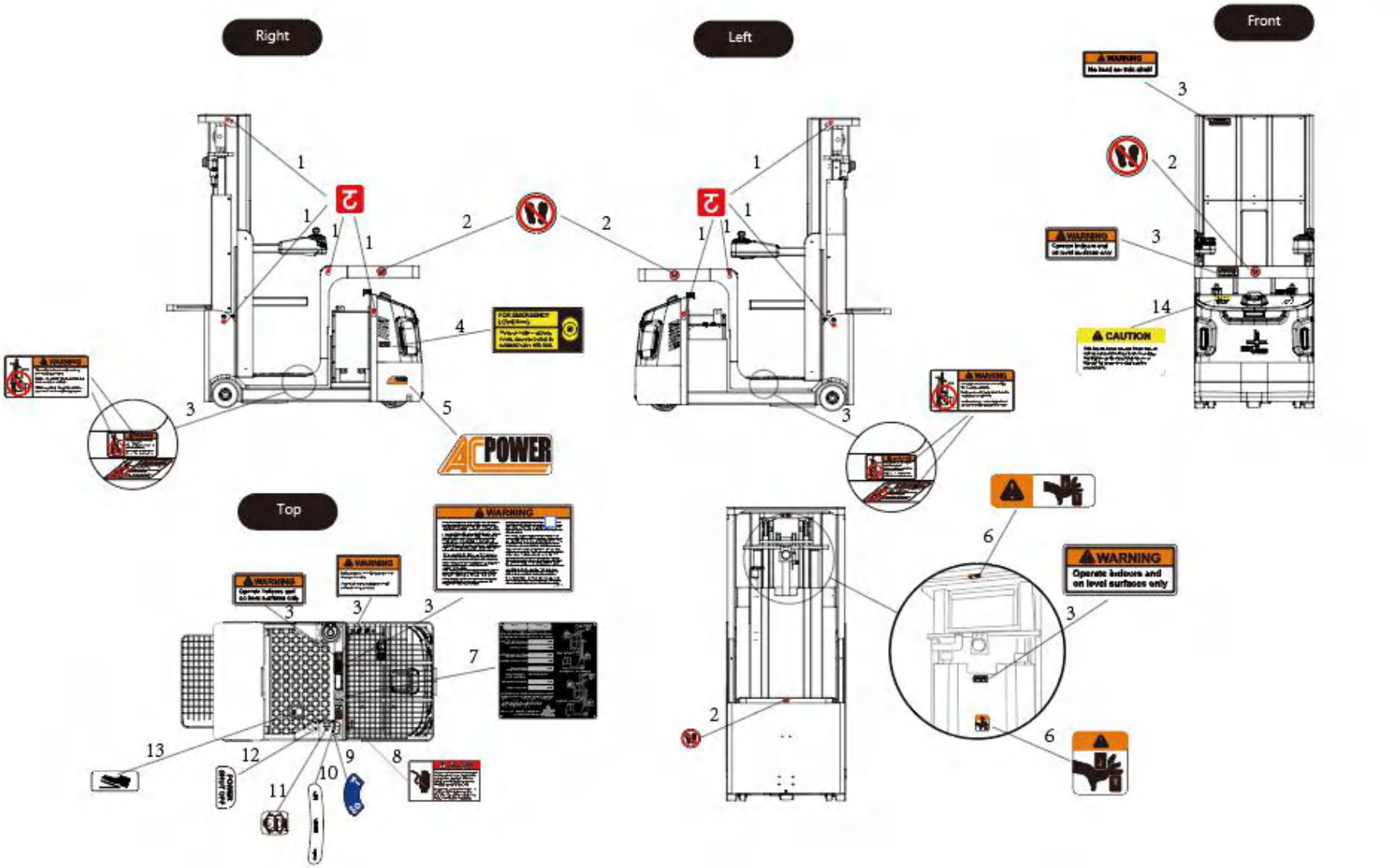




Ast=Wa+r+a

a=200

1.4 Identification points



Item	Description
1	Sling label
2	Information sign "Never standing"
3	Operator warning decal
4	Emergency Lowering label
5	AC Power Decal
6	“Never put your hands in inner and outer mast.“ warning
7	Nameplate
8	Operator danger decal
9	Key Switch decal
10	Lift Lower Horn decal
11	Forward/Reverse travel
12	Power shut off
13	Foot pedal label
14	Operator caution decal

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 "4.4 Battery removal and installation" on page 23) do not damage battery cable.
- Charge the battery, (see "4.3 Charging the battery" on page 23).

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.

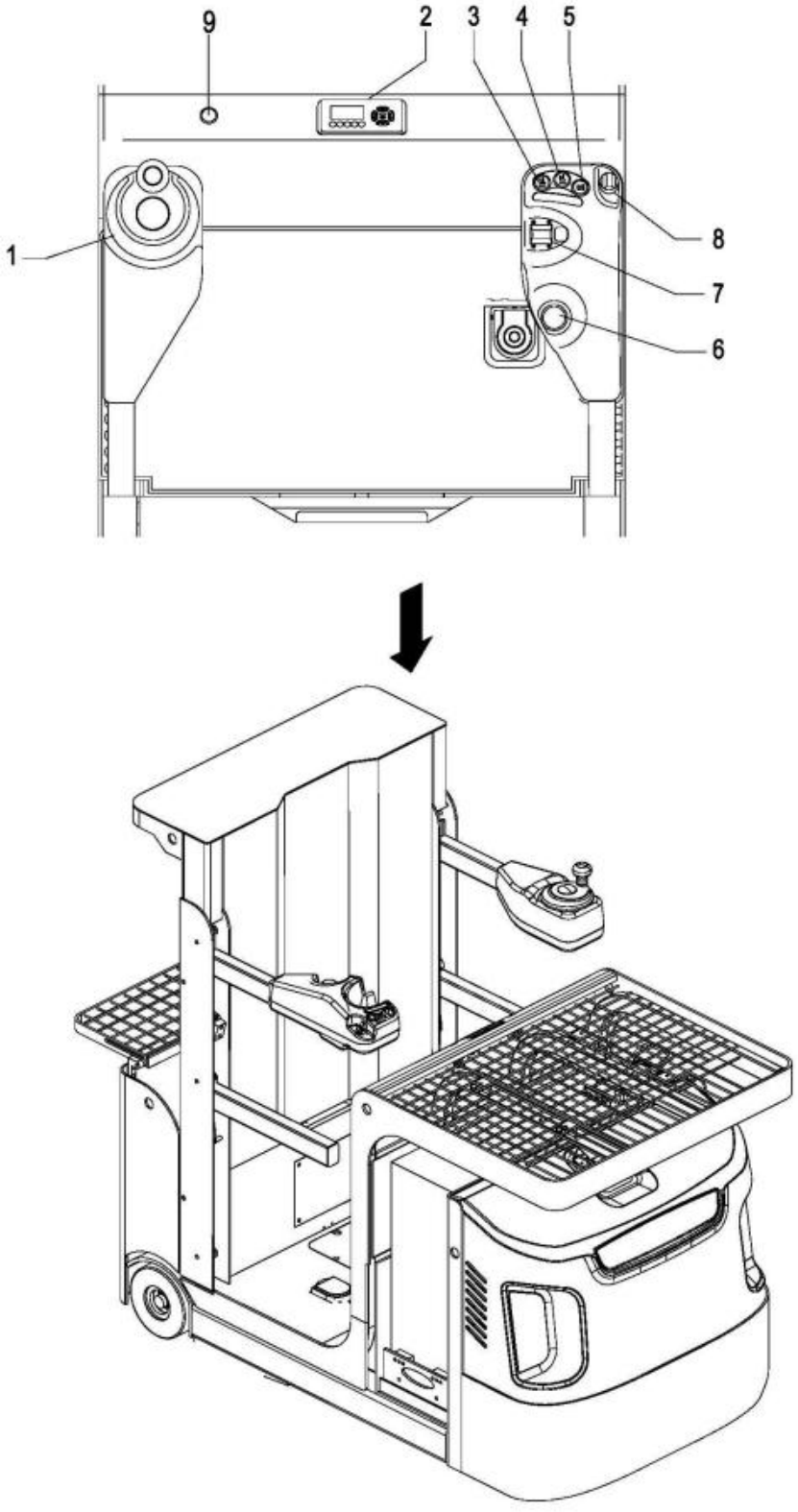
Hazardous area: A hazardous area is defined as the area in which a person is at risk due to truck movement, lifting operations, the load handler (e.g. forks or attachments) or the load itself. This also includes areas which can be reached by falling loads or lowering operating equipment.

- 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.

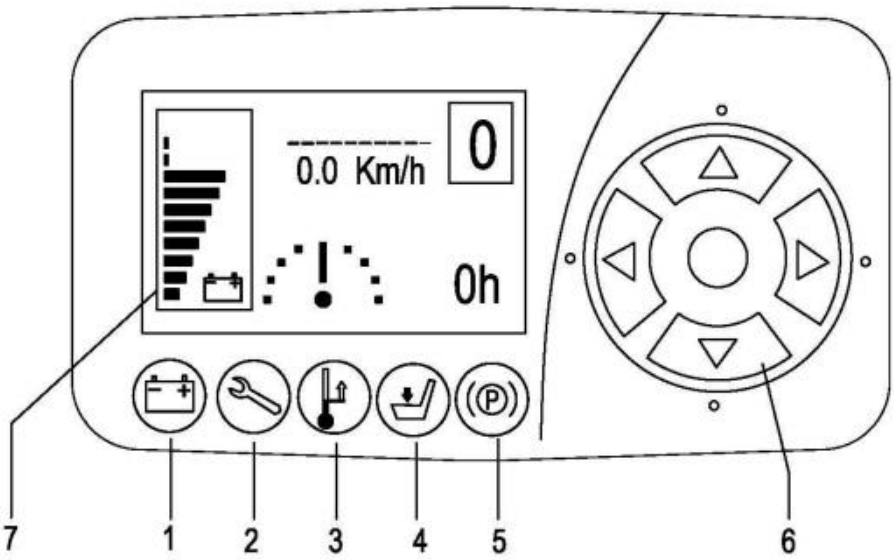
3.2 Controls and Displays

3.2.1 Control panel controls and displays



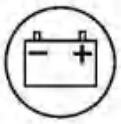
Item	Control / Display	Function
1	Steering wheel	Steers the truck in the required direction.
2	Display unit	Operating information and warning message display.
3	"Lifting" button	Lift the operator position.
4	"Lowering" button	Lower the operator position.
5	"Horn" button	Activates the horn.
6	Emergency stop 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.
9	White lamp button	Control white light lights on and off.

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 truck 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 truck temporarily.And when the temperature drop,continue to use.

---

4 Drive pedal alarm lamp

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

---

5 Brake alarm lamp

Stop driving.The lamp will illuminate.

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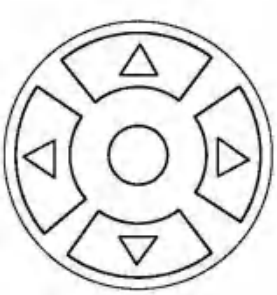
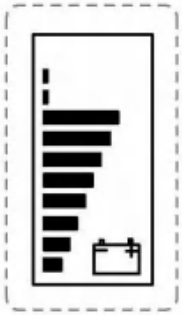
6 Function keys

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 truck 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 " ： High speed;

" " ： 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.

Caution!

When the operator platform rises to 59.06 *in* (triplex mast) ,the vehicle automatically enters crawl speed.

Driving speed of J1HD (triplex mast)					Unit:Km/h
Operator platform height (in)	**Speed mode** / **Driving mode**	**Mode 1**	**Mode 2**	**Mode 3**	**Mode 4**
0 - 22.05		1.4	2.3	3.0	3.8
	0h	2.1	3.2	4.4	5.5
22.05 - 74.80		1.4	2.2	3.0	3.8
74.80 - 102.36		1.1	1.6	2.1	2.5
102.36 - MAX.		0.4	0.6	0.8	1.0

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 truck 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 stop switch .

• Test horn.

• Check the operation of the brake.

Warning!

The blue lamp will always be on when the truck driving.

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.

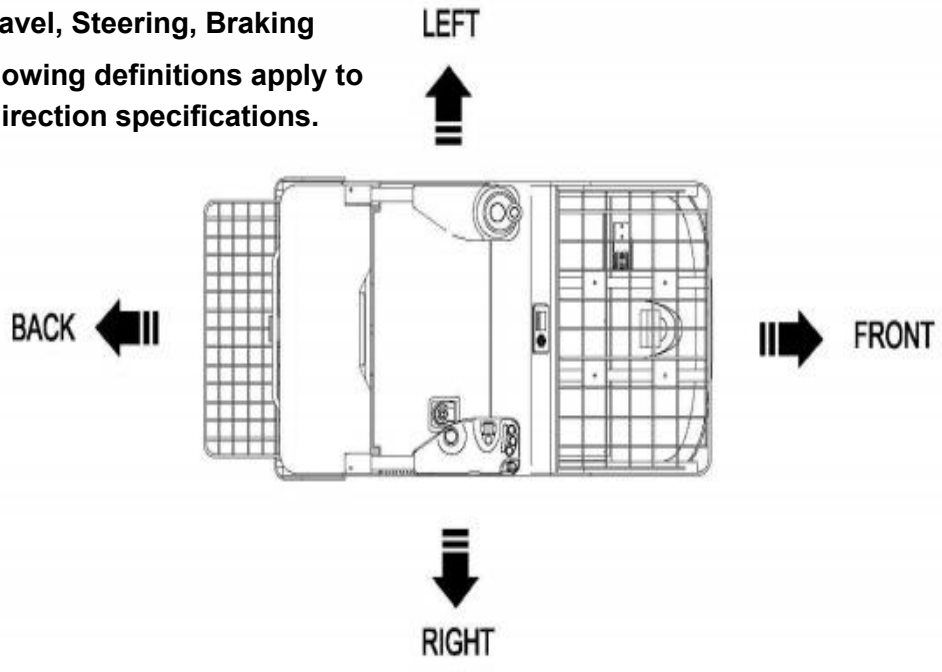
Driving conduct: The driver must adapt the travel speed to local conditions. The truck must be driven at slow speed when negotiating bends or narrow passageways, when passing through swing doors and at blind spots. The driver must always observe an adequate braking distance between the forklift truck 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.

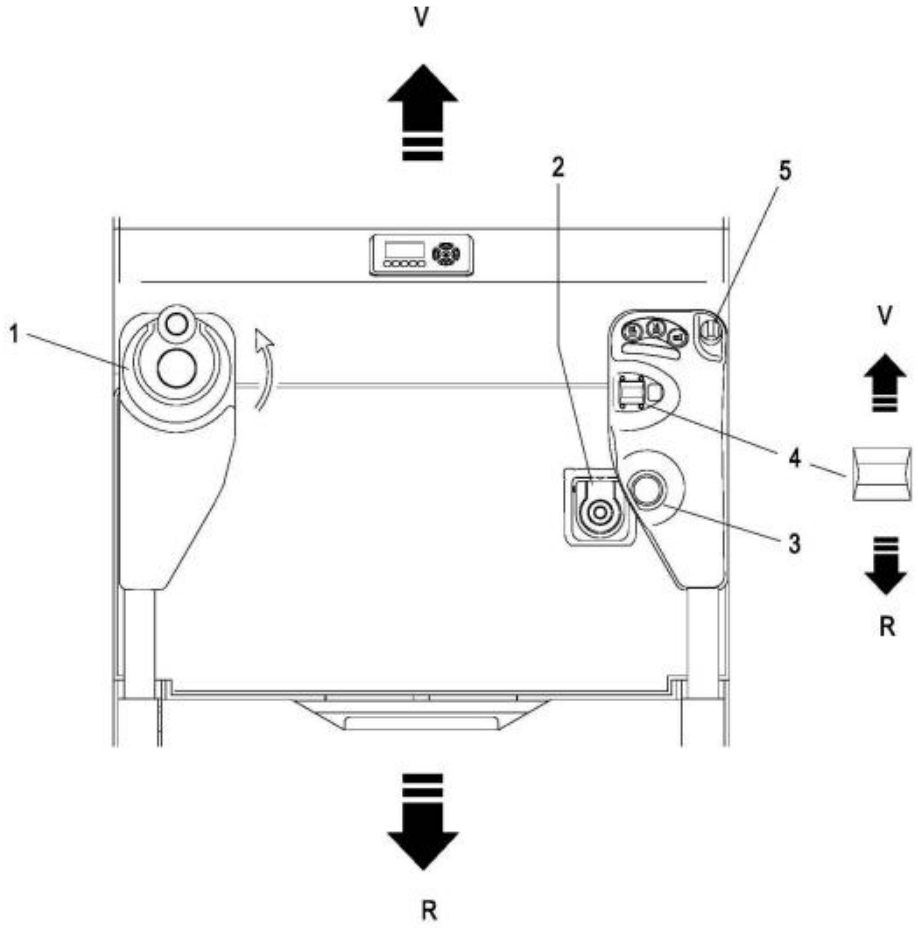
Nature of loads to be carried: The operator must make sure that the load is in a satisfactory condition. Only carry loads that are positioned safely and carefully. Use suitable precautions, e.g. a load guard, to prevent parts of the load from tipping or falling down.

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 stop switch(3) .

• Apply the drive pedal(2).

• Use the travel switch (4) to select the required driving direction.

Forward = V.

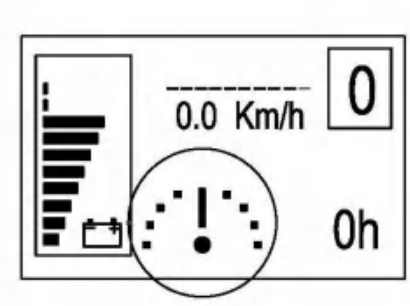
Backward = R .

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.

• The travel speed is governed by the speed mode .

• 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 travelling. 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 travelling press the travel switch (4). 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（3）.
The truck brakes until it comes to a halt.

Warning!
The emergency stop switch (3) must only be used in dangerous situations.

Warning!
The lift vehicle is equipped with a level sensor. When the vehicle is on a slope greater than 4.5 degree, the level sensor sounds a continuous alarm beeper. Once the platform is lowered, floor travel is again enabled to allow travel to a level area.

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.

Lifting

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

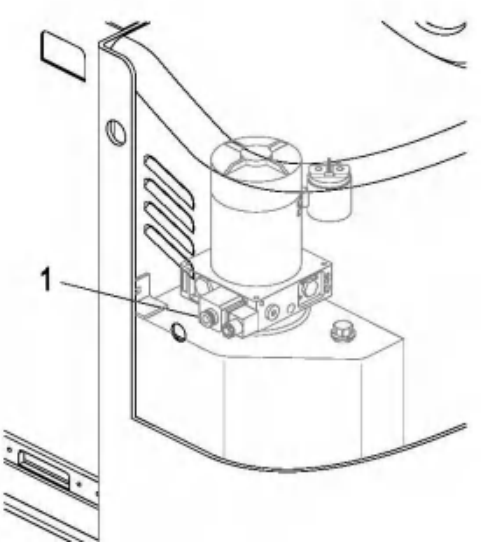
Lowering

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

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

Emergency Lowering Procedures

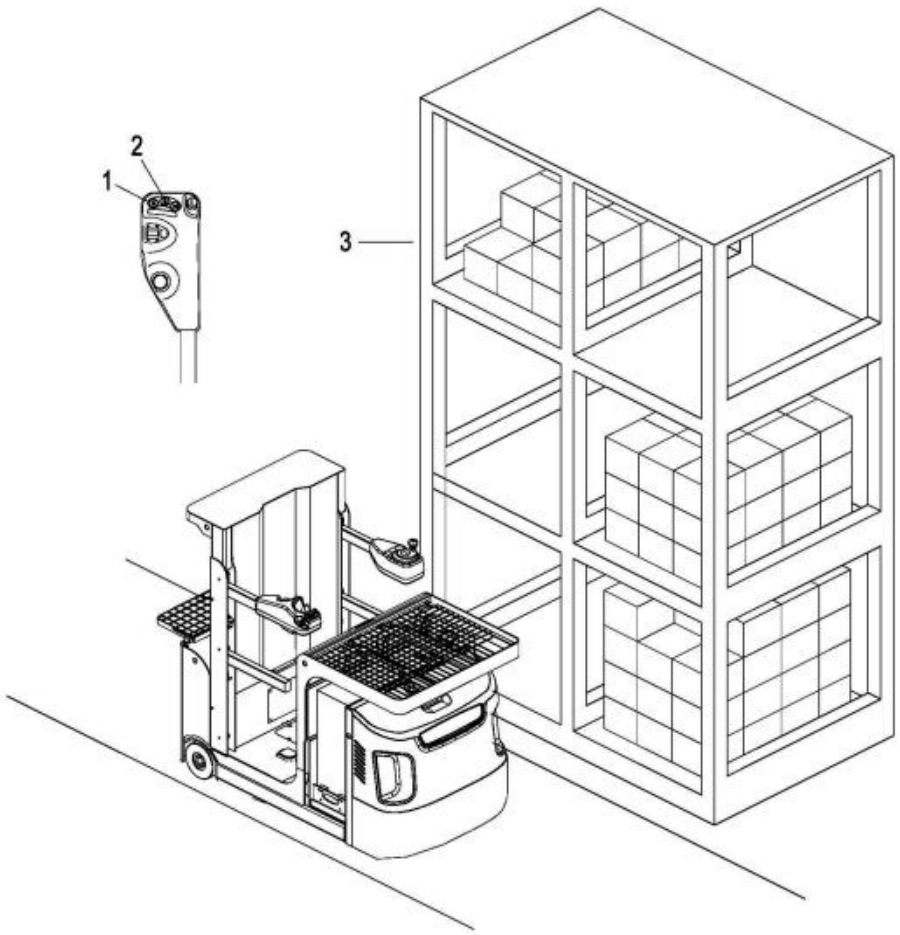
If you lose power while elevated in the cage, instruct someone on ground level to pull the emergency lowering valve(1),which can lower the operator position.



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 Order picking and placing load units



Picking up a load

- Drive the truck carefully up to the storage location（3）.
- Press the "Lifting" button(1) until load Handler reach the desired height.
- Pick the load to the load handler on the goods shelves.
- Pull the "Lowering" button(2) until load handler completely lowered.

CAUTION!
Before a load can be placed, the driver must ensure that the storage location is suitable for storing the load (size and capacity).

WARNING：When the operator position lifted, please try to avoid steering and emergency stop operation.

Transporting loads

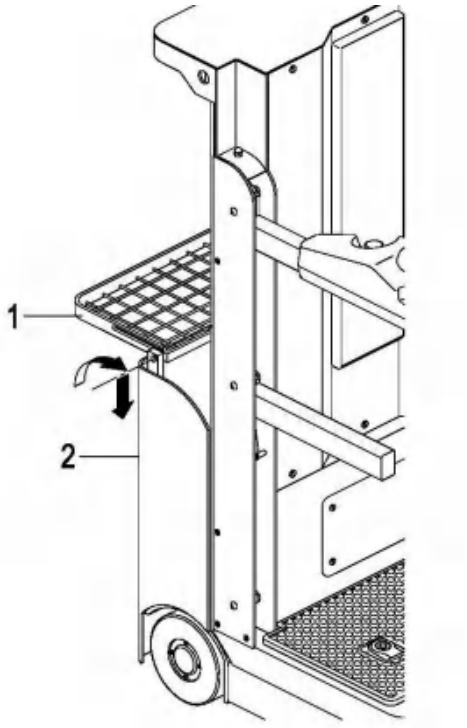
- Always transport loads with the mast completely lowered.
- Always transport loads with load handler or pallet.

• Gradually accelerate the truck.
• Travel at a constant speed.
• Always be prepared to brake. Only stop suddenly in dangerous situations.
• Reduce speed accordingly on narrow bends.

Placing loads

• Drive the truck carefully up to the storage location.
• Lift the load handler until you reach the desired lift height.
• Remove the load to the goods shelves on the load handler.
• Lower the mast.

CAUTION!
Avoid placing the load down suddenly to avoid damaging the load and the load lifting device.



Put away and open the pallet

• Rotate the pallet(1) to the vertical and horizontal plane.
• Put the pallet(1) into the shroud(2).

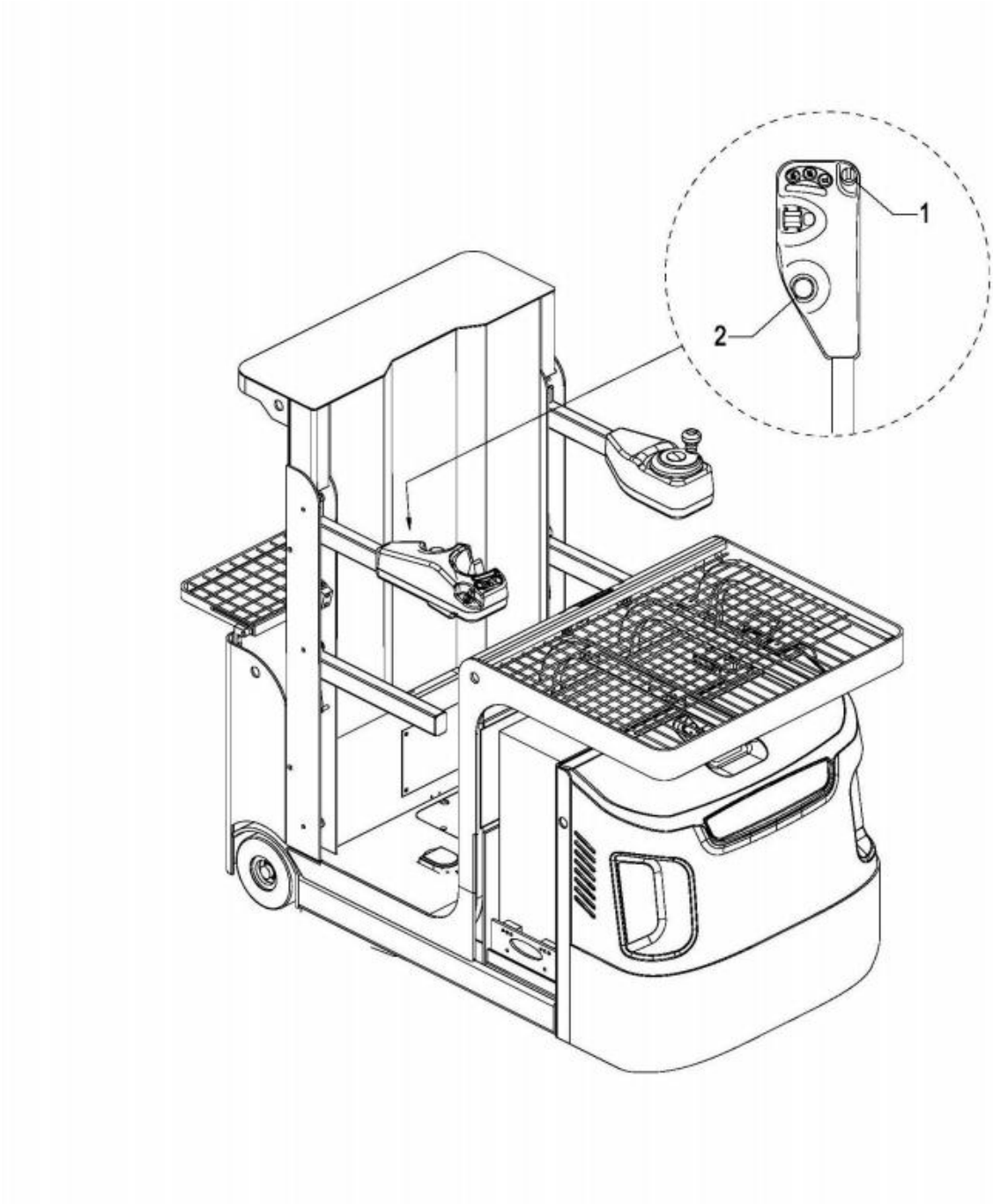
Opening the pallet is in the reverse order of operations.

3.5 Parking the truck securely

When you leave the truck 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 support fully.
• Set the emergency brake switch (2) “OFF”.
• Turn off the key switch and remove the key(1).

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


1
2

4.Battery Maintenance & Charging

4.1 Safety regulations for handling acid batteries

Park the truck 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 truck is parked for charging there shall be no inflammable material or operating fluids capable of creating sparks within 2 meters around the truck.
• The area must be well ventilated.
• Fire protection equipment must be provided.

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.

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

4.2 Battery type & dimension

The battery type & dimension is based on the local battery in the United States.

When replacing or installing batteries, ensure that the battery is correctly secured in the battery compartment of the truck.

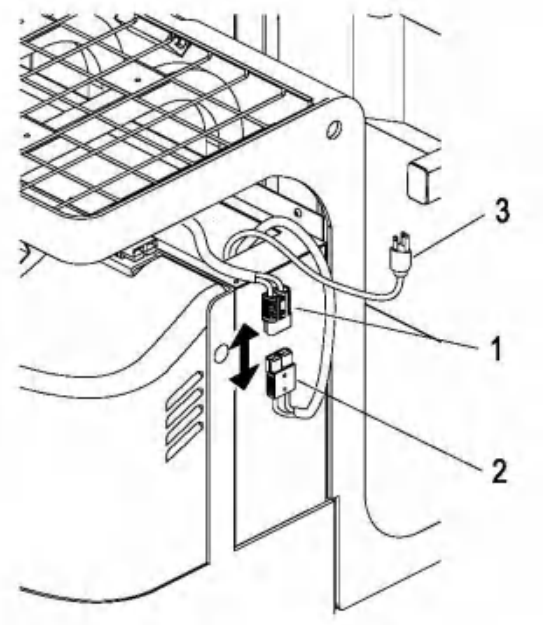
4.3Charging the battery

Safety regulations for Charging the battery

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

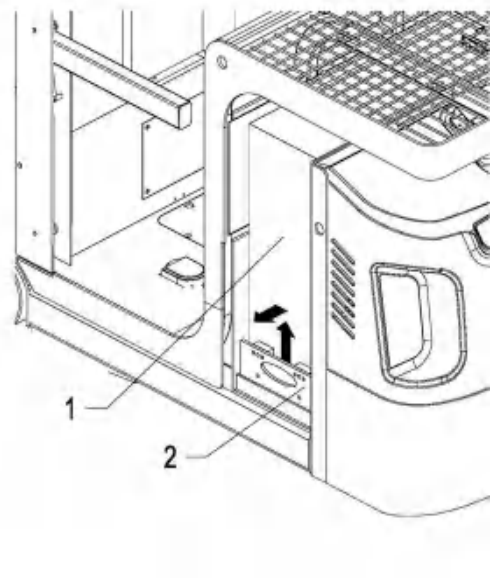
Charging step

• Check whether the condition is according with "Safety regulations for Charging the battery".
• Park the truck securely(See 3.5 Parking the truck securely Page20).
• Open the cover plate of the battery.
• Remove the plug (1).Connect the plug (1) with the charger (2).
• Connect the battery plug (3) with the charging lead of the stationary charger and turn on the charger.



4.4 Battery removal and installation

• Park the truck securely(See 3.5 Parking the truck securely Page 21).
• Place the battery plug or the battery cable in such a way that they will not get caught on the truck 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 stacker 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.

4.5 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.

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 fibre 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 4.3(see Page 23)

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 truck assemblies, in particular the safety mechanisms, is prohibited. The operational speeds of the truck 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 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.

• Upon completion of inspection and servicing, carry out the activities listed in the “Recommissioning (on page 31)” section.

5.2 Maintenance Safety Regulations

Maintenance personnel

trucks 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 truck is to be lifted, the lifting gear must only be secured to the points specially provided for this purpose.

When jacking up the truck, 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 truck.

Prior to cleaning, all safety measures required to prevent sparking (e.g. through short circuits) must be taken. For battery-operated trucks, 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 truck 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 truck, carry out the activities detailed in the “Recommissioning(on page 31)” section.

Electrical System

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

Welding
To avoid damaging electric or electronic components, remove these from the truck 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 truck. 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 truck 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

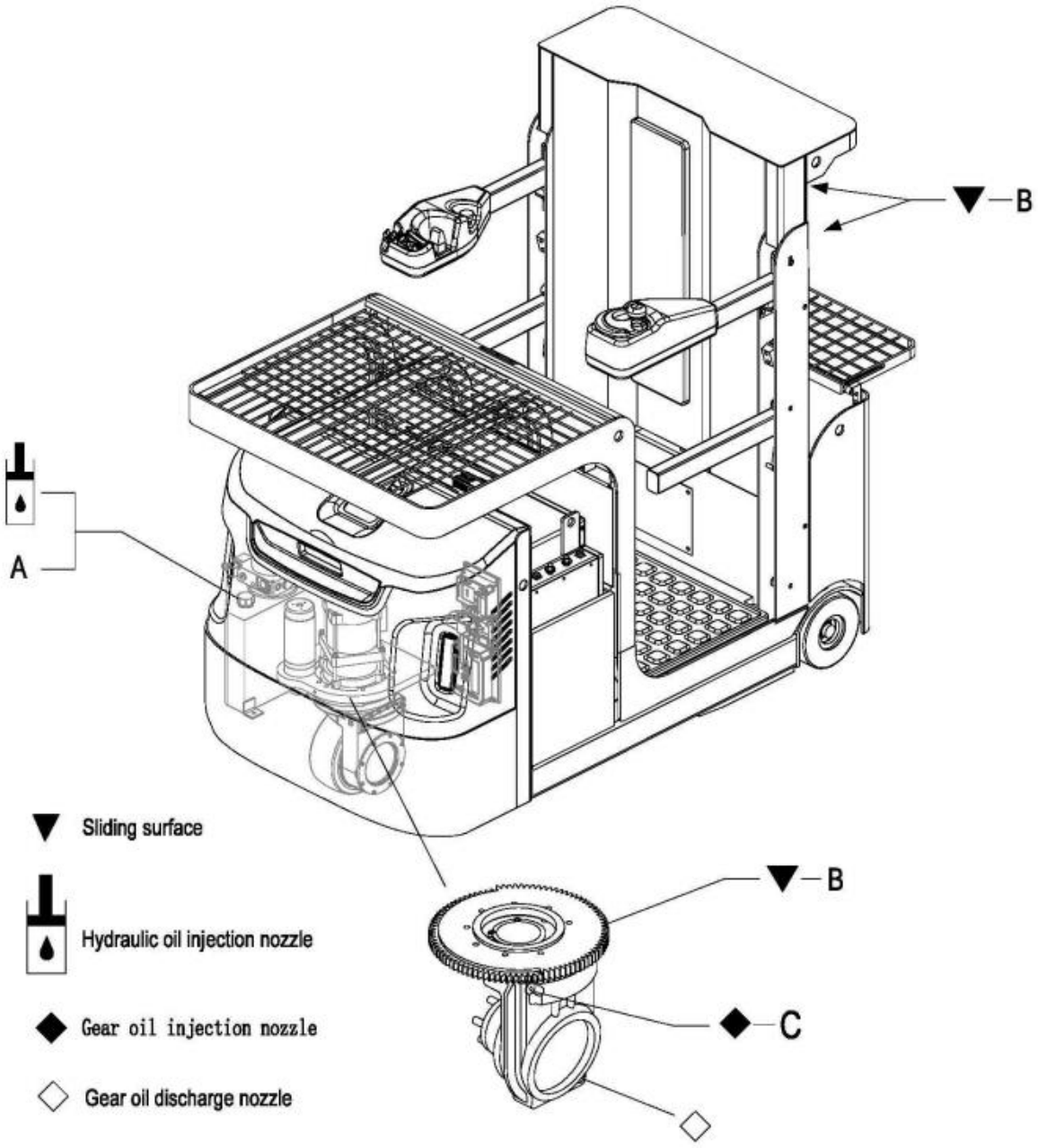
Thorough and expert servicing is one of the most important requirements for the safe operation of the truck. Failure to perform regular servicing can lead to truck failure and poses a potential hazard to personnel and equipment.
The service intervals stated are based on single shift operation under normal operating conditions. They must be reduced 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 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 toothing for wear and lubricate.			●	
Lubrication	Grease the vehicle in accordance with the lubrication schedule.			●	
Gearbox	After the initial operation of 150-500 hours, change the gear oil every 800-1000 hours.				

5.3.2 Lubrication Schedule



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	Type	Specification	Amount
A	Anti-wear hydraulic oil	L-HM32	See the table below
	Low temperature anti-wear hydraulic oil (cold storage)	L-HV32	
B	Multi-purpose grease	Polylub GA352P	Appropriate amount
C	Heavy duty gear oil	80W-90GL-5	1.8L (Align with oiling port)

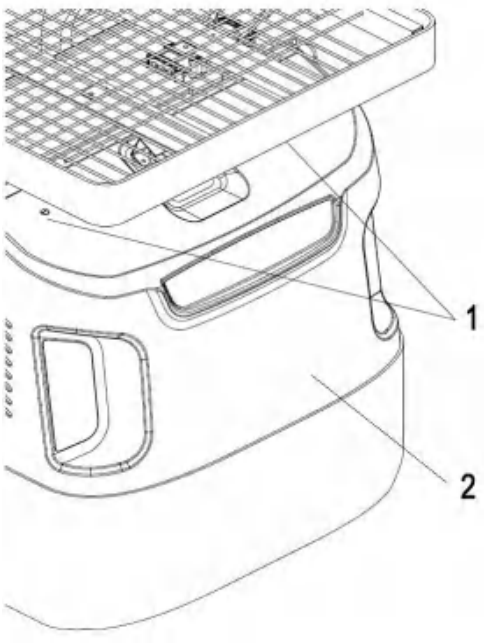
Application Amount of Hydraulic Oil		
Mast Series	Lifting height(mm)	Amount(L)
3-stage Mast	4200	8.5
	5330	10

5.3.3 Maintenance Instructions

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 3.5 Parking the truck securely Page 21).
- 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.



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 truck for maintenance and repairs (See 5.3.3 Maintenance Instructions Page30).

• Opening the cover.

• Add hydraulic oil of the correct grade (See 5.3.2 Lubrication Schedule P29) . Add hydraulic oil till you cant hear explosion sound during lifting.

Installation is the reverse order.

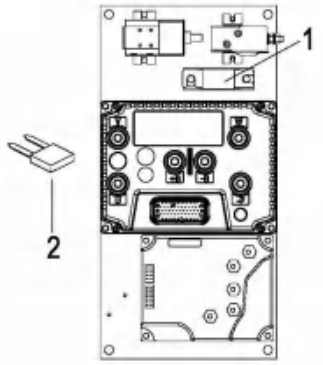
Warning!
Forbid adding hydraulic oil within impurity.

Checking electrical fuses

• Prepare the stacker for maintenance and repairs (See 5.3.3 Maintenance Instructions Page30).

• 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 truck 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 truck in accordance with the maintenance schedule.

5.4 Decommissioning the truck

If the truck 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 truck must be jacked up so that all the wheels are clear of the ground. This is the only way of ensuring that the wheels and wheel bearings are not damaged.
If the truck is to be out of service for more than 6 months , further measures must be taken in consultation with the manufacturer's service department.

5.4.1Prior to decommissioning

• Thoroughly clean the truck.
• Check the brakes.
• Check the hydraulic oil level and replenish as necessary (See 5.3.3 Maintenance Instructions Page30).
• Apply a thin layer of oil or grease to any non-painted mechanical components.
• Lubricate the truck in accordance with the maintenance schedule (See 5.3.2 Lubrication Schedule P29).
• Charge the battery (See 4.4Charging the battery P23).

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 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.

5.4.2 Restoring the truck to operation after decommissioning

• Thoroughly clean the truck.
• Lubricate the truck in accordance with the maintenance schedule (See 5.3.2 Lubrication Schedule P29).

• Clean the battery, grease the terminals and connect the battery.
• Charge the battery (See 4.4 Charging the battery P23).
• Check hydraulic oil for condensed water and replace if necessary.
• Run the truck (see 3.3 Run the truck P15).

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 truck 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 truck 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 truck and the effectiveness of the safety mechanisms based on the technical regulations and principles governing the inspection of trucks.

A thorough test of the truck must be undertaken with regard to its technical condition from a safety aspect. The truck 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 truck 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 truck 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
truck 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 • truck 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
Rapid travel disabled	• Operator platform (triplex mast) raised above 59.06 *in*	• Lower operator platform (triplex mast) below 59.06 *in*

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

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

6.1 Error Message

6.1.1 Traction Controller (COMBIAC0 _MASTER uc)

Error Message		Possible cause	Fault elimination
Error	**Error text**		
8	WATCHDOG	This is a safety related test. It is a self-diagnosis test that involves the logic between master and supervisor microcontrollers.	This alarm could be caused by a CAN bus malfunctioning, which blinds master-supervisor communication.
17	LOGIC FAILURE #3	A hardware problem in the logic board due to high currents (overload). An overcurrent condition is triggered even if the power bridge is not driven.	The failure lies in the controller hardware. Replace the controller
18	LOGIC FAILURE #2	Fault in the hardware section of the logic board which deals with voltage feedbacks of motor phases.	The failure lies in the controller hardware. Replace the controller.

19	LOGIC FAILURE #1	This fault is displayed w hen the controller detects an undervoltage condition at the KEY input. Undervoltage threshold depends on the nominal voltage of the controller	1-Fault can be caused by a key input signal characterized by pulses below the undervoltage threshold, possibly due to external loads like DC/DC converters starting-up, relays or contactors during switching periods, solenoids energizing or de-energizing. Consider to remove such loads. 2-If no voltage transient is detected on the supply line and the alarm is present every time the key switches on, the failure probably lies in the controller hardware. Replace the logic board. 3-If the alarm occurs during motor acceleration or when there is a hydraulic-related request, check the battery charge, the battery health and power-cable connections.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

28	PUMP VMN LOW	The pump motor output is lower than expected, considering the PWM duty cycle applied.	A) If the problem occurs at start up (the LC does not close at all), check: - Motor internal connections; - Motor power cables connections; - If the motor connection are OK, the problem is inside the controller. B) If the problem occurs after closing the LC (the LC closes and then opens back again), check: - Motor internal connections; - If motor windings/cables have leakages towards truck frame; - If no problem are found on the motors, the problem is inside the controller. C) If the alarm occurs during motor running, check: - Motor internal connections; - If motor windings/cables have leakages towards truck frame; - That the LC power contact closer properly, with a good contact; - If no problem are found on the motors, the problem is inside the controller, it is necessary to replace the logic board.
29	PUMP VMN HIGH	This test is carried out when the pump motor is turning (PWM applied). The pump motor output is higher than expected, considering the PWM applied.	-Motor internal connections -If motor windings/cables have leakages towards truck frame -If no problem are found on the motors, the problem is inside the -controller, it is necessary to replace the logic board.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

30	VMN LOW	Start-up test. Before switching the LC on, the software checks the power bridge: it turns on alternatively the high-side power MOSFETs and expects the phase voltages increase toward the positive rail value. If one phase voltage is lower than a certain percentage of the rail voltage, this alarm occurs. Motor running test. When the motor is running, the power bridge is on and the motor voltage feedback tested; if it is lower than expected value (a range of values is considered), the controller enters in fault state.	If the problem occurs at start up (the LC does not close at all), check: - motor internal connections (ohmic continuity); - motor power-cables connections; - if the motor connections are OK, the problem is inside the controller; replace it. If the alarm occurs while the motor is running, check: - motor connections; - that the LC power contact closes properly, with a good contact; - if no problem is found, the problem is inside the controller. Replace it.
31	VMN HIGH	Before switching the LC on, the software checks the power bridge: it turns on alternatively the low-side power MOSFETs and expects the phase voltages decrease down to -B. If the phase voltages are higher than a certain percentage of the nominal battery voltage, this alarm occurs. This alarm may also occur when the start-up diagnosis has succeeded and so the LC has been closed. In this condition, the phase voltages are expected to be lower than half the battery voltage. If one of them is higher than that value, this alarm occurs.	A)If the problem occurs at start-up (the LC does not close), check: - motor internal connections (ohmic continuity); - motor power cables connections; - if the motor connections are OK, the problem is inside the controller. Replace it. B) If the alarm occurs while the motor is running, check: - motor connections; - that the LC power contact closes properly, with a good contact; - if no problem is found, the problem is inside the controller. Replace it.
37	CONTACT OR CLOSED	Before driving the LC coil, the controller checks if the contactor is stuck. The controller drives the power bridge for several dozens of milliseconds, trying to discharge the capacitors bank. If the capacitor voltage does not decrease by more than a certain percentage of the key voltage, the alarm is raised.	It is suggested to verify the power contacts of LC; if they are stuck, is necessary to replace the LC.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

38	CONTACTOR OPEN	The LC coil is driven by the controller, but it seems that the power contacts do not close. In order to detect this condition the controller injects a DC current into the motor and checks the voltage on power capacitor. If the power capacitors get discharged it means that the main contactor is open.	LC contacts are not working. Replace the LC.
52	PUMP I=0 EVER	While the pump motor is running, the current feedback is constantly stuck to zero.	1-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; 2-If everything is ok for what it concerns the motor, the problem could be in the current sensor or in the related circuit.
53	STBY I HIGH	In standby, the sensor detects a current value different from zero.	The current sensor or the current feedback circuit is damaged. Replace the controller.
60	CAPACITOR CHARGE	When the key is switched on, the inverter tries to charge the power capacitors through the series of a PTC and a power resistance, checking if the capacitors are charged within a certain timeout. If the capacitor voltage results less than a certain percentage of the nominal battery voltage, the alarm is raised and the main contactor is not closed.	1-Check if an external load in parallel to the capacitor bank, which sinks current from the capacitors-charging circuit, thus preventing the caps from charging well. Check if a lamp or a dc/dc converter or an auxiliary load is placed in parallel to the capacitor bank. 2- The charging resistance or PTC may be broken. Insert a power resistance across line-contactor power terminals; if the alarm disappears, it means that the charging resistance is damaged. 3- The charging circuit has a failure or there is a problem in the power section. Replace the controller.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error**		

62	TH. PROTECTION	The temperature of the controller base plate is above 85 °C. The maximum current is proportionally decreased with the temperature excess from 85 °C up to 105 °C. At 105 °C the current is limited to 0 A.	It is necessary to improve the controller cooling. To realize an adequate cooling in case of finned heat sink important factors are the air flux and the cooling-air temperature. If the thermal dissipation is realized by applying the controller base plate onto the truck frame, the important factors are the thickness of the frame and the planarity and roughness of its surface. If the alarm occurs when the controller is cold, the possible reasons are a thermal-sensor failure or a failure in the logic board. In the last case, it is necessary to replace the controller.
65	MOTOR TEMPERAT.	This warning occurs when the temperature sensor is open (if digital) or if it has overtaken the MAX. MOTOR TEMP. threshold (if analog) (see paragraph 8.2.3).	1- Check the temperature read by the thermal sensor inside the motor through the MOTOR TEMPERATURE reading in the TESTER function. 2- Check the sensor ohmic value and the sensor wiring. 3- If the sensor is OK, improve the cooling of the motor. 4- If the warning is present when the motor is cool, replace the controller.
66	BATTERY LOW	Parameter BATTERY CHECK is other than 0 (SET OPTION) and battery charge is evaluated to be lower than BATT.LOW TRESHLD (ADJUSTMENTS).	1- Check the battery charge and charge it if necessary 2- If the battery is actually charged, measure the battery voltage through a voltmeter and compare it with the BATTERY VOLTAGE reading in the TESTER function. If they are different, adjust the ADJUST BATTERY parameter (ADJUSTMENTS list) with the value measured through the voltmeter. 3- If the problem is not solved, replace the logic board.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

74	DRIVER SHORTED	The driver of the LC coil is shorted.	1- Check if there is a short or a low impedance pull-down between NMC (A12) and -B. 2- The driver circuit is damaged; replace the logic board. 3-the SET POSITIVE PEB parameter is not correct
75	CONTACTOR DRIVER	The LC coil driver is not able to drive the load. The device itself or its driver circuit is damaged.	This type of fault is not related to external components; replace the logic board.
78	VACC NOT OK	At key-on and immediately after that, the travel demands have been turned off. This alarm occurs if the ACCELERATOR reading (in TESTER function) is above the minimum value acquired during the PROGRAM VACC procedure.	1- Check the wirings. 2- Check the mechanical calibration and the functionality of the accelerator potentiometer. 3- Acquire the maximum and minimum potentiometer value through the PROGRAM VACC function. 4- If the problem is not solved, replace the logic board.
79	INCORRECT START	Incorrect starting sequence. Possible reasons for this alarm are: 1- A travel demand active at key-on. 2- Man-presence sensor active at key on.	1- Check wirings. 2- Check microswitches for failures. 3- Through the TESTER function, check the states of the inputs are coherent with microswitches states. 4- If the problem is not solved, replace the logic board.
80	FORW + BACK	This alarm occurs when both the travel requests (FW and BW) are active at the same time.	1- Check that travel requests are not active at the same time. 2- Check the FW and BW input states through the TESTER function. 3- Check the wirings relative to the FW and BW inputs. 4- Check if there are failures in the microswitches. 5- If the problem is not solved, replace the logic board.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

82	ENCODER ERROR	This fault occurs when the frequency supplied to the motor is higher than 30 Hz and the signal feedback from the encoder has a too high jump in few tens of milliseconds. This condition is related to an encoder failure.	1- Check the electrical and the mechanical functionality of the encoder and the wires crimping. 2- Check the mechanical installation of the encoder, if the encoder slips inside its housing it will raise this alarm. 3- Also the electromagnetic noise on the sensor can be the cause for the alarm. In these cases try to replace the encoder. 4- If the problem is still present after replacing the encoder, the
86	PEDAL WIRE KO	——	——
105	AGV PLC E-STOP	PLC device has opened the Main Contactor and the Electric Brake coils (and the A19-DI5 input is closed to key)	This problem is due to PLC device (MIR)
106	AGV WAIT BOOT XX	"Zapi controller is waiting the right behaviour of the A19-DI5 input (drived by the PLC) to close the Main Contactor: ""XX"" = 1 --> From the key on event to ""BOOT TIME A19 LO"" the controller checks if the A19-DI5 input is open to key; ""XX"" = 2 --> From the end of the above check the controller wait ""BOOT TIME TOL LO"" the closing to key of the A19-DI5 input; ""XX"" = 3 --> From the end of the above check the controller check if the A19-DI5 input is closed to key for at least ""BOOT TIME A19 HI"" ; ""XX"" = 10 --> A19-DI5 input closed to key at the key on event; ""XX"" = 11 --> Check failed on point ""XX"" = 1; ""XX"" = 12 --> Check failed on point ""XX"" = 2; ""XX"" = 13 --> Check failed on point ""XX"" = 3;"	This problem is due to PLC device (MIR)

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

107	AGV WAIT RELEASE	The controller is waiting the traction requests to allow a state transition between "AGV mode" and "MANUAL mode"	This problem is due to AGV master device (MIR)
108	AGV CAN BUS KO	Missed or wrong at least one of the AGV messages (with ID 0x208, 0x218) from "AGV master device" (MIR)	This problem is due to AGV master device (MIR)
109	AGV SIGNAL MISM.	"With ""AGV CHECK LEVEL"" = 0 --> Alarm disabled and ""AGV mode"" request wired (A31-DI4) not evaluated for mode transitions; With ""AGV CHECK LEVEL"" = 1 --> Mismatch of CAN and wired (A31-DI4) ""AGV mode"" requests; With ""AGV CHECK LEVEL"" = 2 --> Mismatch of CAN and wired (A31-DI4) ""AGV mode"" requests or mismatch of CAN ""AGV mode"" requests on messages ID 0x208 (traction) and 0x218 (EPS);"	This problem is due to AGV master device (MIR)
110	AUX OUT OF RNG	Aux pot out of the normal range	——
111	VACC AUX NOTOK	The output of aux pot is present, but the enable switch is not active	——
112	ALL ACQU. AUX	Done the wrong way of aux pot teaching	——
113	HEIGHT ENC ERROR	"'DIAG ENC ERROR' Encoder error diagnosis. Activates 'HEIGHT ENC ERROR' alarm in case of fork height delta over 'ENC ERROR TH. MM' in less of 'ENC ERROR MS'.	——

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

114	SHELF WRONG REQ.	Height request under ‘0-SENSOR POS MM’;	——
115	SHELF WAIT HEIG.	"Shelf selector activation request before the initialization of the height measurement	release sheld selectior request and check the heifh measuramente system
116	SHELF WR. INP:	"‘SHELF WR. INP: xx’ : Bit 0 of xx: pick and place request bits both actived or both not actived; ‘SHELF WR. INP: xx’ : Bit 1 of xx: Changed pick and place request bits or ‘height request’ during the state machine sequence; ‘SHELF WR. INP: xx’ : Bit 2 of xx: ‘HEIGHT OFFS A MM’ higher than ‘HEIGHT OFFS B MM’; ‘SHELF WR. INP: xx’ : Bit 3 of xx: ‘HEIGHT OFFS A MM’ out of range; ‘SHELF WR. INP: xx’ : Bit 4 of xx: ‘HEIGHT OFFS B MM’ out of range; ‘SHELF WR. INP: xx’ : Bit 5 of xx: ‘SHELF CUTBACK MM’ out of range; ‘SHELF WR. INP: xx’ : Bit 6 of xx: ‘SHELF CUTBACK SP’ out of range; ‘SHELF WR. INP: xx’ :Bit 7 of xx: ‘HEIGHT TOLER. MM’ out of range or higher than (‘HEIGHT OFFS B MM’ - ‘HEIGHT OFFS A MM’) / 2;	——
117	CAN SHELF SELEC.	CAN message timeout of the shelf selector messages between traction and pump controller.	Check can wiring

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

118	HEIGHT WR. TOL	Bit 0 of xx: height region 3 is not present. There is a tolerances intersection; Bit 1 of xx: height region 0 is not present. The lower ‘FREE LIFT TOL.’ border goes under zero millimeters	——
119	HEIGHT ZERO	"‘DIAG UNDER MIN.’ Under minimum diagnosis. Activates the bit 0 of xx of the ‘HEIGHT ZERO xx’ alarm in case of under zero millimeters forks height detection; ‘DIAG Z.SW LEVEL’ Switch level diagnosis. Activates the bit 1 of xx of the ‘HEIGHT ZERO xx’ alarm in case of switch excited on height regions 0, 1, 2, 3. Activates the bit 4 of xx of the ‘HEIGHT ZERO xx’ alarm in case of switch not excited on height region 6; ‘DIAG Z.SW VS SPD’ Zero switch vs encoder speed diagnosis. Checks if the zero switch edges matches with encoder speed. Activates the bit 2 of xx of the ‘HEIGHT ZERO xx’ alarm in case of zero switch positive edge and negative encoder speed. Activates the bit 3 of xx of the ‘HEIGHT ZERO xx’ alarm in case of zero switch negative edge and positive encoder speed. This diagnosis is made on height regions 4, 5;	——
120	HEIGHT ENC LOCK.	"Encoder locked diagnosis. Actived on forks height regions 3, 4, 5, 6. Activates ‘HEIGHT ENC LOCK.’ alarm in case of height not increased over the value of ‘MOVING THRES. MM’ for more than ‘MAX STILL T. MS’ and lift function actived over ‘PUMP SPD THRES.’ speed or in case of height not decreased over the value of ‘MOVING THRES. MM’ for more than ‘MAX STILL T. MS’ and lower function actived;	——

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

121	CAN ENC IN ALARM	Can Encoder in alarm	——
122	CAN ENC SDO	"Wrong/failed can encoder setting 'CAN ENC SDO xx' xx bit 0: CAN ENCODER has not responded to 10 attept to set the configuration #5; 'CAN ENC SDO xx' xx bit 1: CAN ENCODER has a wrong configuration; 'CAN ENC SDO xx' xx bit 7: Traction SDO state machine for CAN ENCODER management in error;	——
123	LIFT LIMIT ERROR	Limit SW in alarm	Check the lift limit switch perform a reset of te switch (lift above the SW and lower below the SW"
124	ENCODER PHASES	CHA and ACHB value is continuosly checked. If a wrong patters is detected (filtered) the alarms is set	Check encoder signal/wiring change the encoder
125	WRONG INV. MODEL	Model TYPE and Inverter Type do not match with the HW	Check the coherence between the HW and the parameter settings
129	WRONG CONFIG	wrong set of controller type and model type	1-check the parameter controller type in ""sepcial adjustment"" menu 2-check the parameter model type in ""special adjustment"" menu
130	REACH OUT OF RNG	reach pot out of the normal range	1-do the teaching again 2-check the wiring of the reach pot
131	VACC REACH NOTOK	the output of reacht pot is present,but the enable switch is not active	1-check the reach pot 2-check the wiring

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

132	ALL ACQU. REACH	do the wrong way of reach pot teaching	do the teaching in correct way
133	TLT OUT OF RANGE	tilt pot out of the normal range	1-do the teaching again 2-check the wiring of the tilt pot
134	VACC TILT NOT OK	the output of tilt pot is present,but the enable switch is not active	1-check the tilt pot 2-check the wiring
135	SFT OUT OF RANGE	sideshift pot out of the normal range	1-do the teaching again 2-check the wiring of the sideshift pot
136	VACC SHFT NOT OK	the output of sideshift pot is present,but the enable switch is not active	1-check the sideshift pot 2-check the wiring
137	ALL ACQU. TILT	do the wrong way of tilt pot teaching	do the teaching in correct way
138	ALL ACQU. SHIFT	do the wrong way of sideshift pot teaching	do the teaching in correct way
139	NO CAN TILL EP	the controller lost the communication with EP tiller at least once,when the truck is using	1-check the wiring of can cable 2-try to replace the EP tiller 3-replace the controller

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

140	WAIT TILL EP	wait the EP tiller CAN-BUS communication when key-on	1-check the wiring of can cable 2-try to replace the EP tiller 3-replace the controller
141	NO CAN BRAKE EP	if set the PEDAL BRK TYPE is optio#1,but the controller can't get the can message from brake,the alarm occurs	1-check the wiring of can-brake 2-check if the can-brake is broken 3-try to set the PEDAL BRK TYPE=NONE
142	WAIT ACTIVATION	if downlaod a SW with activation function,but haven't do any activation before,the alarm occrus	do activation with EP TOOLS
143	WRONG PASSWORD	if the EP PASSWORD function is active but haven't enter the correct password,the alarm occurs	1-enter the correct password 2-disable the password function
144	NO CAN DISP EP	When the truck is running, if the DISPLAY TYPE=5,but the controller lose the communication with EP DISPLAY,this alarm occurs	1-check the communication wiring between EP DISPLAY and controller 2-check if the EP DISPLAY is broken
145	WAIT DISP EP	if the DISPLAY TYPE=5,but the controller can't get message from EP DISPLAY when the truck start,this alarm occurs	1-check the communication wiring between EP DISPLAY and controller 2-check if the EP DISPLAY is broken 3-try to set the DISPLAY TYPE into a correct value
146	RENTAL TIMEOUT	if the rental function is actived,but the rental enable time is run out,this alarm occurs	1-check the rental hour left in TESTER menu 2-use EP TOOLS to disable the rental function

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

147	NO CAN BMS EP	if the communication between BMS and controller is out of time,this alarm occurs	1-check the communication wiring between BMS and controller 2-there's a fault on BMS can device,repalce the BMS
148	EP BMS MC OPEN	if the battery charge level is to low,the BMS require the main contactor open,this alarm occurs	1-check the battery charge level 2-check if the battery is ok 3-replace the BMS
149	EP BMS TRAC CTB	if the battery charge level is to low,the BMS require the controller to reduce the traction speed,this alarm occurs	1-check the battery charge level 2-check if the battery is ok 3-replace the BMS
150	EP BMS LIFT STOP	if the battery charge level is to low,the BMS require the controller to stop the lift function,this alarm occurs	1-check the battery charge level 2-check if the battery is ok 3-replace the BMS
151	EP BMS TRAC STOP	if the battery charge level is to low,the BMS require the controller to stop the traction function,this alarm occurs	1-check the battery charge level 2-check if the battery is ok 3-replace the BMS
153	OFFSET SPD.SENS.	It is necessary to acquire the offset angle between the stator and the speed sensor, i.e. they mutual angular misalignment. An automatic function is dedicated to this procedure.	Perform the teaching procedure: in OPTIONS, select ABS SENS. ACQUIRE.
155	WAIT MOTOR STILL	The controller is waiting for the motor to stop rotating. This warning can only appear in controllers for brushless motors	——

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

161	RPM HIGH	This alarm occurs in Gen. Set versions when the speed exceeds the threshold speed.	——
170	WRONG KEY VOLT.	The measured key voltage is not the right one for the inverter.	1- Check if the SET KEY VOLTAGE parameter in the ADJUSTMENTS list is set in accordance with the key voltage. 2- Check if the key voltage is ok using a voltmeter, if not check the wiring. 3- In case the problem is not solved, replace the logic board.
177	COIL SHOR. EB.	This alarm occurs when an overload of the EB driver occurs.	1- Check the connections between the controller outputs and the loads. 2- Collect information about characteristics of the coil connected to the driver and ask for assistance to a EP technician in order to verify that the maximum current that can be supplied by the hardware is not exceeded. 3- In case no failures/problems have been found, the problem is in the controller, which has to be replaced.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

178	MOTOR TEMP. STOP	The temperature sensor has overtaken the threshold defined by STOP MOTOR TEMP.	1- Check the temperature read by the thermal sensor inside the motor through the MOTOR TEMPERATURE reading in the TESTER function. 2- Check the sensor ohmic value and the sensor wiring. 3- If the sensor is OK, improve the cooling of the motor. 4- If the warning is present when the motor is cool, replace the controller.
179	STEER SENSOR KO	The voltage read by the microcontroller at the steering-sensor input is not within the STEER RIGHT VOLT ÷ STEER LEFT VOLT range, programmed through the STEER ACQUIRING function	1- Acquire the maximum and minimum values coming from the steering potentiometer through the STEER ACQUIRING function. If the alarm is still present, check the mechanical calibration and the functionality of the potentiometer. 2- If the problem is not solved, replace the logic board.
180	OVERLOAD	The motor current has overcome the limit fixed by hardware.	If the alarm condition occurs again, ask for assistance to a EP technician. The fault condition could be affected by wrong adjustments of motor parameters.
181	WRONG ENC SET	Mismatch between parameters ENCODER PULSES 1 and ENCODER PULSES 2	Set the two parameters with the same value, according to the adopted encoder
182	EVP2 COIL OPEN	No load is connected between the EVP2 output and the electrovalve positive terminal.	1- Check the EVP2 condition. 2- Check the EVP2 wiring. 3- If the problem is not solved, replace the logic board.

Error Message	Possible cause	Fault elimination

Error	Error text		
183	EVP2 DRIV. SHORT	1- The EVP2 driver is shorted. 2- The microcontroller detects a mismatch between the valve set-point and the feedback of the EVP2 output.	1- Check if there is a short circuit or a low-impedance conduction path between the negative of the coil and -B. 2- Collect information about: o the voltage applied across the EVP2 coil, o the current in the coil, o features of the coil. Ask for assistance to EP in order to verify that the software diagnoses are in accordance with the type of coil employed. 3- If the problem is not solved, it could be necessary to replace the controller.
184	EVP2 DRIVER OPEN	The EVP2 driver is not able to drive the EVP2 coil. The device itself or its driving circuit is damaged.	This fault is not related to external components. Replace the logic board.
186	WAIT MOT.P STILL	If DC Pump option is set to ON, the software expects the voltage on -P output to be at a “steady state” value, before switching the LC on. If the voltage is different, it could be due to the fact that the motor connected to -P is not still. For this reason, the software waits 30 seconds for the voltage to be at the “steady state” value (and for the pump motor to be still). After this time, the software assumes that the problem is not due to the fact that the pump motor is not still, and show the PUMP VMN NOT OK alarm.	1- If the motor connected to -P is still moving, just wait for it to be still. 2- If not, in 30 seconds the alarm PUMP VMN NOT OK will appear.

Error Message	Possible cause	Fault elimination

Error	Error text		
187	MANY PUMP REQ.	if there's more than one pump function request,e.g. lift+tilt,the alarm occrus	1-check the microswitches status 2-check the wiring of pump functions 3-disconnect the wire on the controller side 4-If the problem is not solved, replace the logic board.
188	PUMP VACC NOT OK	The minimum voltage of the lift potentiometer is not correctly set.	1-It is suggested to repeat the acquiring procedure of MIN LIFT and MAX LIFT 2-check the wiring of the lift pot 3-check if it's the lift pot fault
189	PUMP INC START	Man-presence switch is not enabled at pump request	1- Check wirings. 2- Check microswitches for failures. 3- Through the TESTER function, check the states of the inputs are coherent with microswitches states. 4- If the problem is not solved, replace the logic board.
190	PUMP VMN NOT OK	Switching the LC on, the software checks the output voltage on -P connector, and expects that it is at a “steady state” value (if DC PUMP option is set to ON, see HYDRO SETTINGS). If the voltage is too low, this alarm occurs.	1- The motor connected to -P must be completely still before this alarm occurs. The software waits 30 seconds before showing this alarm. During this time it shows the WAIT MOTOR STILL warning. 2- Motor internal connections 3- Motor power cables connections 4- Motor leakage to truck frame 5- If the motor connections are ok, the problem is inside the controller it is necessary to replace the logic board.
191	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, because the pump current is not zero.	This type of fault is not related to external components; replace the controller.

Error Message	Possible cause	Fault elimination

Error	Error text		
192	PUMP VACC RANGE	For COMBIAC0 and COMBIACX. it means the output of lift pot is out of the normal range	
193	SMARTDRIVER KO	There is a hardware problem in the smart driver circuit . The driver is set to be ON but the output voltage does not increase	1- Verify that the EB coil is connected correctly between pin A2 and pin A4. 2- Verify that the parameter POSITIVE E.B.is set in accordance with the actual configuration (see paragraph 8.2.5). The software, in fact, depending on specific parameter value, makes a proper diagnosis; a wrong configuration of this parameter could generate a false fault. 3- In case no failures/problems have been found, the problem is in the controller, which has to be replaced.
194	AUX BATT. SHORT.	For the versions where the smart driver is not installed (36/48V and 80V), it is possible to decide where the positive supply for pin A2 comes from by choosing a dedicated hardware configuration. The parameter POSITIVE E.B. has to be set in accordance with the hardware configuration, because the software makes a proper diagnosis depending on the parameter; a wrong setting could generate a false fault. The available choices are: - 0 = PEB is managed by the smart driver (available for 24V version only). - 1 = PEB comes from the TILLER input (A1). - 2 = PEB comes from PEV (A3). PEV must be connected to terminal +B of the controller. This is the default configuration for 36/48V and 80V version. This alarm can only appear if POSITIVE E.B. is set as 1 TILLER/SEAT.	1- Verify that the parameter POSITIVE E.B. is set in accordance with the actual coil positive supply (see paragraph 8.2.5). 2- In case no failures/problems have been found, the problem is in the controller, which has to be replaced.

Error Message		Possible cause	Fault elimination
Error	**Error text**		
195	POS. EB. SHORTED	The voltage on pin A2 is high even if the smart driver is turned OFF	1- Verify that the parameter POSITIVE E.B. is set in accordance with the actual coil positive supply 2- Check if there is a short or a low impedance path between pin A2 and of the +B. In case no failures/problems have been found, the problem is in the controller, which has to be replaced.
196	MOT.PHASE SH.	Short circuit between two motor phases. The hexadecimal value “XX” identifies the shorted phases: 36: U – V short circuit 37: U – W short circuit 38: V – W short circuit	1- Verify the motor phases connection on the motor side. 2- Verify the motor phases connection on the inverter side. 3- Check the motor power cables. 4- Replace the controller. 5- If the alarm does not disappear, the problem is in the motor. Replace it.
197	WRONG SLAVE VER.	Wrong software version on supervisor uC.	Upload the correct software version
198	M/S PAR CHK MISM	At start-up there is a mismatch in the parameter checksum between the master and the supervisor microcontrollers.	Restore and save again the parameters list.
199	PARAM TRANSFER	Master uC is transferring parameters to the supervisor.	Wait until the end of the procedure. If the alarm remains longer, re-cycle the key.
200	VDC OFF SHORTED	The logic board measures a voltage value across the DC-link that is constantly out of range, above the maximum allowed value	1- Check that the battery has the same nominal voltage of the inverter. 2- Check the battery voltage, if it is out of range replace the battery. 3- If the battery voltage is ok, replace the logic board.
201	TORQUE PROFILE	There is an error in the choice of the torque profile parameters.	Check in the HARDWARE SETTINGS list the value of those parameters

Error Message		Possible cause	Fault elimination
Error	Error text		
202	VDC LINK OVERV.	This fault is displayed when the controller detects an overvoltage condition. Overvoltage threshold depends on the nominal voltage of the controller. Nominal voltage 24V 36/48V 72/80V 96V Overvoltage threshold 35V 65V 115V 130V As soon as the fault occurs, power bridge and MC are opened. The condition is triggered using the same HW interrupt used for undervoltage detection, uC discerns between the two evaluating the voltage present across DC-link capacitors: - High voltage Overvoltage condition - Low/normal voltage Undervoltage condition	If the alarm happens during the brake release, check the line contactor contact and the battery power-cable connection.
203	HW FAULT MC	the Mcu and the Scu check the status of the main contactor is different from each other.	This type of fault is related to internal components. Replace the logic board.
204	BRAKE RUN OUT	The CPOT BRAKE input read by the microcontroller is out of the range defined by parameters SET PBRK. MIN and SET PBRK. MAX	1- Check the mechanical calibration and the functionality of the brake potentiometer. 2- Acquire the minimum and maximum potentiometer values. 3- If the alarm is still present, replace the logic board.
205	EPS RELAY OPEN	The controller receives from EPS information about the safety contacts being open.	Verify the EPS functionality

Error Message		Possible cause	Fault elimination
Error	Error text		
206	INIT VMN HIGH	Before closing the LC, the software checks the power-bridge voltage without driving it. The software expects the voltage to be in a “steady state” value. If it is too high, this alarm occurs. The hexadecimal value “XX” identifies the faulty phase: 81: phase U 82: phase V 83: phase W	1- Check the motor power cables. 2- Check the impedance between U, V and W terminals and -B terminal of the controller. 3- Check the motor leakage to truck frame. 4- If the motor connections are OK and there are no external low impedance paths, the problem is inside the controller. Replace it.
207	INIT VMN LOW	Before closing the LC, the software checks the power-bridge voltage without driving it. The software expects the voltage to be in a “steady state” value. If it is too low, this alarm occurs. The hexadecimal value “XX” identifies the faulty phase: 01: phase U 02: phase V 03: phase W	1- Check the motor power cables. 2- Check the impedance between U, V and W terminals and -B terminal of the controller. 3- Check the motor leakage to truck frame. 4- If the motor connections are OK and there are no external low impedance paths, the problem is inside the controller. Replace it.
208	EEPROM KO	the connection of the EEPROM is not ok	This type of fault is related to internal components. Replace the logic board.
209	PARAM RESTORE	The controller has restored the default settings. If a CLEAR EEPROM has been made before the last key re-cycle, this warning informs you that EEPROM was correctly cleared.	1- A travel demand or a pump request does cancel the alarm. 2- If the alarm appears at key-on without any CLEAR EEPROM performed, replace the controller.
210	WRONG RAM MEM.	The algorithm implemented to check the main RAM registers finds wrong contents: the register is “dirty”. This alarm inhibits the machine operations.	Try to switch the key off and then on again, if the alarm is still present replace the logic board.

Error Message		Possible cause	Fault elimination
Error	Error text		
211	STALL ROTOR	The traction rotor is stuck or the encoder signal is not correctly received by the controller	1- Check the encoder condition. 2- Check the wiring. 3- Through the TESTER function, check if the sign of FREQUENCY and ENCODER are the same and if they are different from zero during a traction request. 4- If the problem is not solved, replace the logic board.
212	POWER MISMATCH	The error between the power setpoint and the estimated power is out of range.	Ask for assistance to a EP technician about the correct adjustment of the motor parameters.
213	POSITIVE LC OPEN	The positive voltage of LC is different from expected.	1- Verify LC coil is properly connected. 2- Verify CONF. POSITIVE LC parameter is set in accordance with the actual coil positive supply (see paragraph 8.2.5). Software, depending on the parameter value, makes a proper diagnosis; a mismatch between the hardware and the parameter configuration could generate a false fault. 3- In case no failures/problems have been found, the problem is in the controller, which has to be replaced.
214	EVP COIL OPEN	No load is connected between the EVP output (A24) and the electrovalve positive terminal.	1- Check the EVP condition. 2- Check the EVP wiring. 3- If the problem is not solved, replace the logic board.

Error Message		Possible cause	Fault elimination
Error	Error text		
215	EVP DRIV. SHORT.	1- The EVP driver (output A24) is shorted. 2- The microcontroller detects a mismatch between the valve set-point and the feedback of the EVP output.	1- Check if there is a short circuit or a low-impedance conduction path between the negative of the coil and -B. 2- Collect information about: o the voltage applied across the EVP coil, o the current in the coil, o features of the coil. Ask for assistance to EP in order to verify that the software diagnoses are in accordance with the type of coil employed. If the problem is not solved, it could be necessary to replace the controller.
216	EB. COIL OPEN	This fault appears when no load is connected between the NEB output (A4) and the EB positive terminal PEB (A2)	1- Check the EB coil. 2- Check the wiring. 3- If the problem is not solved, replace the logic board.
217	PEV NOT OK	Terminal PCOM is not connected to the battery or the voltage is different from that defined by parameter SET POSITIVE PEB (see the ADJUSTMENTS list, paragraph 8.2.3). This alarm can occur if output NAUX1 is present (and the related setting is active) or the AUX OUT function is active.	1- Check PCOM terminal: it must be connected to the battery voltage (after the main contactor). 2- Set the nominal PCOM voltage in parameter SET POSITIVE PEB in ADJUSTMENTS list (see paragraph 8.2.3).
218	SENS MOT TEMP KO	The output of the motor thermal sensor is out of range.	1- Check if the resistance of the sensor is what expected measuring its resistance. 2- Check the wiring. 3- If the problem is not solved, replace the logic board.
219	PEB-PEVP NOT OK	only for AC3 and ACE3，thePEB and PEV voltage is not match the parameter setting	1- Check PCOM terminal: it must be connected to the battery voltage (after the main contactor). 2- Set the nominal PCOM voltage in parameter SET POSITIVE PEB in ADJUSTMENTS list.

Error Message		Possible cause	Fault elimination
Error	Error text		
220	VKEY OFF SHORTED	At key-on, the logic board measures a voltage value of the KEY input that is constantly out of range, below the minimum allowed value.	1- Check that the battery has the same nominal voltage of the inverter. 2- Check the battery voltage, if it is out of range replace the battery. 3- If the battery voltage is ok, replace the logic board.
221	HANDBRAKE	Handbrake input is active.	1- Check that handbrake is not active by mistake. 2- Check the SR/HB input state through the TESTER function. 3- Check the wirings. 4- Check if there are failures in the microswitches. 5- If the problem is not solved, replace the logic board.
222	SEAT MISMATCH	This alarm can appear only in a Traction + Pump configuration or in a multimotor one. There is an input mismatch between the traction controller and the pump controller relatively to the TILLER/SEAT input (A1): the two values recorded by the two controllers are different.	"1- Check if there are wrong connections in the external wiring. 2- Using the TESTER function, verify that the seat inputs are in accordance with the actual state of the external switch. 3- In case no failures/problems have been found, the problem is in the controller, which has to be replaced.
223	COIL SHOR. MC (For Combi AC0/Combi ACX and ACE4)	This alarm occurs when an overload of the MC driver	1- Check the connections between the controller outputs and the loads. 2- Collect information about characteristics of the coil connected to the driver and ask for assistance to a EP technician in order to verify that the maximum current that can be supplied by the hardware is not exceeded. 3- In case no failures/problems have been found, the problem is in the controller, which has to be replaced.

Error Message		Possible cause	Fault elimination
Error	Error text		
224	WAITING FOR NODE	The controller receives from the CAN bus the message that another controller in the net is in fault condition; as a consequence the controller itself cannot enter into an operative status, but it has to wait until the other node comes out from the fault status.	Check if any other device on the CAN bus is in fault condition.
226	VACC OUT RANGE	1- The CPOT input read by the microcontroller is not within the MIN VACC ÷ MAX VACC range, programmed through the PROGRAMM VACC function . 2- The acquired values MIN VACC and MAX VACC are inconsistent.	1- Acquire the maximum and minimum potentiometer values through the PROGRAM VACC function. If the alarm is still present, check the mechanical calibration and the functionality of the accelerator potentiometer. 2- If the problem is not solved, replace the logic board.
227	HW FAULT	At start-up, some hardware circuit intended to enable and disable the power bridge or the LC driver (output A12) is found to be faulty. The hexadecimal value “XX” facilitates EP technicians debugging the problem.	This type of fault is related to internal components. Replace the logic board.
228	TILLER OPEN	Tiller/seat input has been inactive for more than 120 seconds.	1- Activate the tiller/seat input. 2- Check the tiller/seat input state through the TESTER function. 3- Check the wirings. 4- Check if there are failures in the microswitches. 5- If the problem is not solved, replace the logic board.
229	HW FAULT EB.	At start-up, the hardware circuit dedicated to enable and disable the EB driver (output A4) is found to be faulty. The hexadecimal value “XX” facilitates EP technicians debugging the problem.	This type of fault is not related to external components. Replace the logic board.

Error Message		Possible cause	Fault elimination
Error	Error text		
230	LC COIL OPEN	This fault appears when no load is connected between the NMC output A12 and the positive voltage (for example the KEY voltage).	1- Check the wiring, in order to verify if LC coil is connected to the right connector pin and if it is not interrupted. 2- If the alarm is still present, than the problem is inside the logic board; replace it.
232	CONT. DRV. EV	AUX valve driver is not able to drive the load.	The device or its driving circuit is damaged. Replace the controller.
233	POWERMOS SHORTED	The DC-link voltage drops to zero when a high-side or low-side MOSFET is turned on.	1- Check that motor phases are correctly connected. 2- Check that there is no dispersion to ground for every motor phases. 3- In case the problem is not solved, replace the controller.
234	DRV. SHOR. EV	AUX valve driver is shorted.	1- Check if there is a short circuit or a low impedance path between the negative terminal of the coils and -B. 2- If the problem is not solved, replace the logic board.
235	CTRAP THRESHOLD	it is a controller internal check fault	Check the parameter DUTY PWM CTRAP is correct.If the alarm is still,Ask for assistance to a EP technician
236	CURRENT GAIN	The maximum current gain parameters are at the default values, which means that the maximum current adjustment procedure has not been carried out yet.	Ask for assistance to a EP technician in order to do the adjustment procedure of the current gain parameters.

Error Message		Possible cause	Fault elimination
Error	Error text		
237	ANALOG INPUT	This alarm occurs when the A/D conversion of the analog inputs returns frozen values, on all the converted signals, for more than 400 ms. The goal of this diagnosis is to detect a failure in the A/D converter or a problem in the code flow that skips the refresh of the analog signal conversion.	If the problem occurs permanently it is necessary to replace the logic board.
238	HW FAULT EV.	At start-up, the hardware circuit dedicated to enable and disable the EV drivers is found to be faulty. The hexadecimal value “XX” facilitates EP technicians debugging the problem.	This type of fault is not related to external components. Replace the logic board.
239	CONTROL LER MISM.	The software is not compatible with the hardware. Each controller produced is “signed” at the end of line test with a specific code mark saved in EEPROM according to the customized part number. According with this “sign”, only the customized firmware can be uploaded.	1- Upload the correct firmware. 2- Ask for assistance to a EP technician in order to verify that the firmware is correct.
240	EVP DRIVER OPEN	The EVP driver is not able to drive the EVP coil. The device itself or its driving circuit is damaged.	This fault is not related to external components. Replace the logic board.

241	COIL SHOR. EVAUX	This alarm occurs when an overload of the EV drivers occurs.	1- Check the connections between the controller outputs and the loads. 2- Collect information about characteristics of the coils connected to the drivers and ask for assistance to a EP technician in order to verify that the maximum current that can be supplied by the hardware is not exceeded. In case no failures/problems have been found, the problem is in the controller, which has to be replaced.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		
242	OPEN COIL EV.	"This fault appears when no load is connected between one or more EV outputs and the positive terminal PEV (pin A3). For the meaning of code “XX”, refer to paragraph 10.5 EVP1=BIT 0 EV1=BIT 1 EV2=BIT 2 EV3=BIT 3 EVP2=BIT 4 EV4=BIT 5 EV5=BIT 7 HORN=BIT 6"	1- Check the coils. 2- Check the wiring. 3- If the problem is not solved, replace the logic board.
243	THROTTLE PROG.	A wrong profile has been set in the throttle profile.	Set properly the throttle-related parameters
244	WARNING SLAVE	Warning on supervisor uC.	Connect the Console to the supervisor uC and check which alarm is present.
245	IQ MISMATCHED	The error between the Iq (q-axis current) setpoint and the estimated Iq is out of range.	Ask for assistance to a EP technician in order to do the correct adjustment of the motor parameters.

246	EB. DRIV.OPEN	The EB coil driver is not able to drive the load. The device itself or its driving circuit is damaged.	This type of fault is not related to external components. Replace the logic board.
247	DATA ACQUISITION	Controller in calibration state.	The alarm ends when the acquisition is done.
248	NO CAN MSG.	CANbus communication does not work properly. The hexadecimal value “XX” identifies the faulty node.	1- Verify the CANbus network (external issue). 2- Replace the logic board (internal issue).
249	CHECK UP NEEDED	This is a warning to point out that it is time for the programmed maintenance.	Turn on the CHECK UP DONE option after that the maintenance service.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		
250	THERMIC SENS. KO	The output of the controller thermal sensor is out of range.	This kind of fault is not related to external components. Replace the controller.

251	WRONG SET BAT.	At start-up, the controller checks the battery voltage (measured at the KEY input A10) and it verifies that it is within a range of ±20% around the nominal value.	1- Check that the SET BATTERY parameter inside the ADJUSTMENTS list matches with the battery nominal voltage. 2- If the battery nominal voltage is not available for the SET BATTERY parameter inside the ADJUSTMENTS list, record the value stored as HARDWARE BATTERY RANGE parameter in the SPECIAL ADJUST. list and contact a EP technician. 3- Through the TESTER function, check that the KEY VOLTAGE reading shows the same value as the key voltage measured with a voltmeter on pin A10. If it does not match, then modify the ADJUST BATTERY parameter according to the value read by the voltmeter. 4- Replace the battery.
253	FIELD ORIENT. KO	The error between the Id (d-axis current) setpoint and the estimated Id is out of range.	Ask for assistance to a EP technician in order to do the correct adjustment of the motor parameters.
254	EB. DRIV.SHRT.	1- The EB driver is shorted. 2- The microcontroller detects a mismatch between the valve setpoint and the feedback at the EB output.	1- Check if there is a short or a low impedance path between the negative coil terminal and -B. 2- Check if the voltage applied is in accordance with the parameters settings 3- If the problem is not solved, replace the controller.

6.1.2 Traction Controller (COMBIAC0_SLAVE uc)

Error Message		Possible cause	Fault elimination
Error	Error text		

17	LOGIC FAILURE #3	A hardware problem in the logic board due to high currents (overload). An overcurrent condition is triggered even if the power bridge is not driven.	The failure lies in the controller hardware. Replace the controller
19	LOGIC FAILURE #1	This fault is displayed when the controller detects an undervoltage condition at the KEY input. Undervoltage threshold depends on the nominal voltage of the controller	1-Fault can be caused by a key input signal characterized by pulses below the undervoltage threshold, possibly due to external loads like DC/DC converters starting-up, relays or contactors during switching periods, solenoids energizing or de-energizing. Consider to remove such loads. 2-If no voltage transient is detected on the supply line and the alarm is present every time the key switches on, the failure probably lies in the controller hardware. Replace the logic board. 3-If the alarm occurs during motor acceleration or when there is a hydraulic-related request, check the battery charge, the battery health and power-cable connections.
194	AGV CAN BUS KO	Missed or wrong at least one of the AGV messages (with ID 0x208, 0x218) from "AGV master device" (MIR)	This problem is due to AGV master device (MIR)
195	WRONG CONFIG	wrong set of controller type and model type	1-check the parameter controller type in "sepcial adjustment" menu 2-check the parameter model type in "special adjustment"menu
196	NO CAN TILL EP	the controller lost the communication with EP tiller at least once,when the truck is using	1-check the wiring of can cable 2-try to replace the EP tiller 3-replace the controller
197	NO CAN DISP EP	When the truck is running, if the DISPLAY TYPE=5,but the controller lose the communication with EP DISPLAY,this alarm occurs	1-check the communication wiring between EP DISPLAY and controller 2-check if the EP DISPLAY is broken

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

200	STEER SENSOR KO	The voltage read by the microcontroller at the steering-sensor input is not within the STEER RIGHT VOLT ÷ STEER LEFT VOLT range, programmed through the STEER ACQUIRING function	1- Acquire the maximum and minimum values coming from the steering potentiometer through the STEER ACQUIRING function. If the alarm is still present, check the mechanical calibration and the functionality of the potentiometer. 2- If the problem is not solved, replace the logic board.
201	WRONG ENC SET	Mismatch between parameters ENCODER PULSES 1 and ENCODER PULSES 2	Set the two parameters with the same value, according to the adopted encoder
202	VDC LINK OVERV.	This fault is displayed when the controller detects an overvoltage condition. Overvoltage threshold depends on the nominal voltage of the controller. Nominal voltage 24V 36/48V 72/80V 96V Overvoltage threshold 35V 65V 115V 130V As soon as the fault occurs, power bridge and MC are opened. The condition is triggered using the same HW interrupt used for undervoltage detection, uC discerns between the two evaluating the voltage present across DC-link capacitors: - High voltage Overvoltage condition - Low/normal voltage Undervoltage condition	If the alarm happens during the brake release, check the line contactor contact and the battery power-cable connection.
208	EEPROM KO	the connection of the EEPROM is not ok	This type of fault is related to internal components. Replace the logic board.

Error Message		**Possible cause**	**Fault elimination**
Error	**Error text**		

209	PARAM RESTORE	The controller has restored the default settings. If a CLEAR EEPROM has been made before the last key re-cycle, this warning informs you that EEPROM was correctly cleared.	1- A travel demand or a pump request does cancel the alarm. 2- If the alarm appears at key-on without any CLEAR EEPROM performed, replace the controller.
210	WRONG RAM MEM.	The algorithm implemented to check the main RAM registers finds wrong contents: the register is “dirty”. This alarm inhibits the machine operations.	Try to switch the key off and then on again, if the alarm is still present replace the logic board.
211	AGV WAIT BOOT	Zapi controller is waiting the right behaviour of the A19-DI5 input (drived by the PLC) to close the Main Contactor: ""XX"" = 1 --> From the key on event to ""BOOT TIME A19 LO"" the controller checks if the A19-DI5 input is open to key; ""XX"" = 2 --> From the end of the above check the controller wait ""BOOT TIME TOL LO"" the closing to key of the A19-DI5 input; ""XX"" = 3 --> From the end of the above check the controller check if the A19-DI5 input is closed to key for at least ""BOOT TIME A19 HI"" ; ""XX"" = 10 --> A19-DI5 input closed to key at the key on event; ""XX"" = 11 --> Check failed on point ""XX"" = 1; ""XX"" = 12 --> Check failed on point ""XX"" = 2; ""XX"" = 13 --> Check failed on point ""XX"" = 3;	This problem is due to PLC device (MIR)
212	W.SET. TG-EB XX	the slave controller find the status of the maincontactor is different between hardware and CAN-BUS	This type of fault is related to internal components. Replace the logic board.

Error Message	Possible cause	Fault elimination

Error	Error text		
213	INPUT MISMATCH	the slave controller find the status of the input is different between hardware and CAN-BUS	This type of fault is related to internal components. Replace the logic board.
217	AGV PLC E-STOP	PLC device has opened the Main Contactor and the Electric Brake coils (and the A19-DI5 input is closed to key)	This problem is due to PLC device (MIR)
227	OUT MISMATCH XX	the slave controller find the status of the output is different between hardware and CAN-BUS	This type of fault is related to internal components. Replace the logic board.
229	NO CAN WR MSG.XX	CANbus communication does not work properly. The hexadecimal value “XX” identifies the faulty node.	1- Verify the CANbus network (external issue). 2- Replace the logic board (internal issue).
230	SOFTWARE ERROR	it means the software of the slave controller is wrong	This type of fault is related to internal components. Replace the logic board.
237	ANALOG INPUT	This alarm occurs when the A/D conversion of the analog inputs returns frozen values, on all the converted signals, for more than 400 ms. The goal of this diagnosis is to detect a failure in the A/D converter or a problem in the code flow that skips the refresh of the analog signal conversion.	If the problem occurs permanently it is necessary to replace the logic board.
239	CONTROLLER MISM.	The software is not compatible with the hardware. Each controller produced is “signed” at the end of line test with a specific code mark saved in EEPROM according to the customized part number. According with this “sign”, only the customized firmware can be uploaded.	1- Upload the correct firmware. 2- Ask for assistance to a EP technician in order to verify that the firmware is correct.

Error Message		Possible cause	Fault elimination
Error	Error text		
240	OUT MISMATCH PU	This is a safety related test. Supervisor µC has detected that master µC is driving the pump motor in a wrong way (not corresponding to the operator request).	1- Checks the matching of the parameters between Master and Supervisor. 2- Ask for assistance to a EP technician. 3- If the problem is not solved, replace the logic board.
241	SP MISMATCH PUMP	This is a safety related test. The supervisor µC has detected a mismatch in the DC-pump speed setpoint with respect to the master µC.	1- Check the matching of the parameters between master and supervisor. 2- Ask for assistance to a EP technician. 3- If the problem is not solved, replace the logic board.
242	SP MISMATCH XX	This is a safety related test. The supervisor µC has detected a mismatch in the speed setpoint with respect to the master µC. The hexadecimal value “XX” facilitates EP technicians debugging the problem.	1- Check the matching of the parameters between master and supervisor. 2- Ask for assistance to a EP technician. 3- If the problem is not solved, replace the logic board.
248	NO CAN MSG. XX	CANbus communication does not work properly. The hexadecimal value “XX” identifies the faulty node.	1- Verify the CANbus network (external issue). 2- Replace the logic board (internal issue).

6.1.3 Steering Controller (EPS-AC0)

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.

Error Message		Possible cause	Fault elimination
Error	Error text		
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.

Error Message		Possible cause	Fault elimination
Error	Error text		
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.

Error Message		Possible cause	Fault elimination
Error	Error text		
210	ENCODER GEARBOX	——	——
211	WAIT ACTIVATION	If downlaod a SW with activation function,but haven't do any activation before,the alarm occrus	Do activation with EP TOOLS
212	AUTOC. MALFUNC.	——	——
213	A213	——	——
214	A214	——	——
215	A215	——	——
216	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.
217	MICRO SLAVE #3	——	——
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.
224	EMERGENCY	——	——

Error Message		Possible cause	Fault elimination
Error	Error text		
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

Error Message		Possible cause	Fault elimination
Error	Error text		
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.
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.

Error Message		Possible cause	Fault elimination
Error	Error text		
229	LOOK. FOR PATH	——	——
230	PATH OUT	——	——
231	LATERAL OUT	——	——
232	ANGLE	——	——
233	LOSING PATH	——	——
234	LOSING STRAIGHT	——	——
235	WRONG ANT. RECEP	——	——
236	ANT. MISSING	——	——
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.	——
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.	——
240	KEYOFF	——	——

Error Message		Possible cause	Fault elimination
Error	Error text		
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.

Error Message		Possible cause	Fault elimination
Error	Error text		
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.

Error Message		Possible cause	Fault elimination
Error	**Error text**		
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.