OPSM Mini Order Picker

- **Operation Manual**
- **Parts Catalogue**

This manual is the main technical document for safe operation, maintenance and upkeeping for the order picker. It mainly includes the order picker's structural characteristics, working principles, technical characteristics, operations, precautions, common faults and troubleshooting, maintenance requirements, transportation and storage and so on. For operators of the order picker, before using it, please read this operation manual carefully, and operate, maintain and upkeep it strictly according to the requirements specified in this manual in order to ensure that the order picker can work reliably and efficiently, and to achieve the greatest economic benefits of the order picker.

Before using the order picker, operators should read this manual carefully, and be trained on it to get familiar with all the operaion procedures, and get fully acquainted with the technical performance of the truck. Otherwise, due to improper operations, the truck will be disabled to achieve its performance; besides, its service life may be shortened and even accidents may occur.

Brief Introduction

This order picker is a self-propelled high altitude order-picking device, mainly used for material picking operations in narrow places such as warehouse with shelves below 5m and narrow-aisle warehouse. The truck is designed to reduce the intensity of labor and improve the safety and efficiency of work, characterized in that:

1) It has functions of lifting/lowering, travelling, steering, braking and so on; it has small size in outline, capable of flexible operations.
2) It is powered by storage battery and driven by motor with small vibration and low noise, without pollution to environment.
3) It adopts mast-type lifting mechanism which has high strength and good guidance quality and stability, capable of stable lifting and lowering. The load platform has a large area with low retrieve height, convenient for people and cargo to get on/off.
4) The travelling and braking systems are controlled interconnectedly, successfully avoiding dangerous working conditions caused by maloperations.

- **Service environment**
  a) The altitude shall not exceed 1000m;
  b) Ambient air temperature shall be between -25℃and 40℃;
  c) When the ambient temperature is 40℃, the relative humidity should not exceed 50%; at a lower temperature, greater relative humidity is allowed;
  d) For hard and flat ground;
  e) Never use this truck in a flammable or explosive environment or corrosive environment with acid or alkali.

Instructions

Truck operators shall keep this manual and read it carefully for several times;

This manual includes correct operations, easy maintenance and routine inspections;

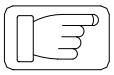
Please read this manual carefully before operations in order to ensure safe and efficient operating through correct driving and proper maintenance;

Due to product improvement, content of this manual may be different from the actual trucks;

When rent or transfer a truck, please rent or transfer this manual along with it;

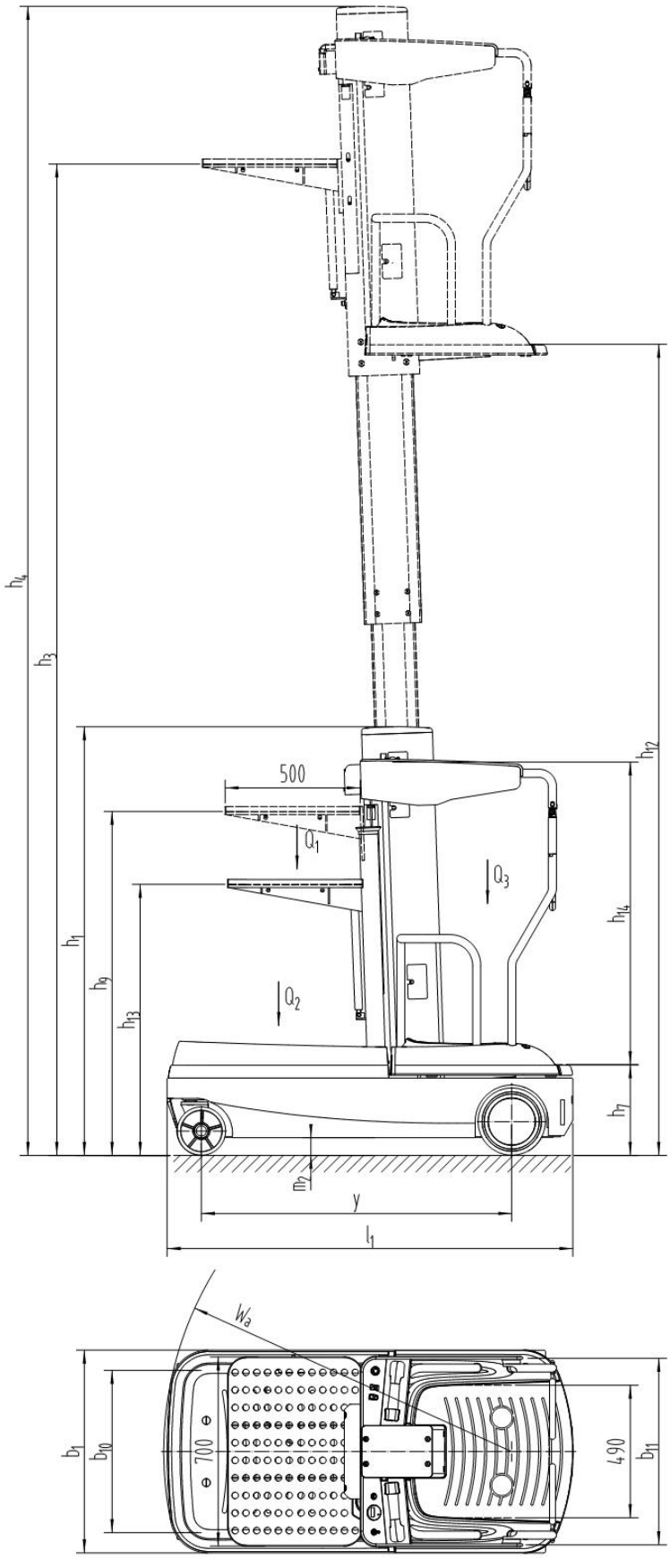
Please contact our sales department if you have any question.

Instructions of labels: these labels contain information vital for safety of you and others; please conform to them

	**Danger**	Indicating upcoming dangerous situations which, if not avoided, will result in death or serious injuries; you must conform to the instructions.
	Warning	Indicating potential dangerous situations which, if not avoided, will result in death or serious injuries; you must conform to the instructions.
	Caution	Indicating potential dangerous situations which, if not avoided, will result in moderate injuries; you must conform to the instructions.
	**Attention**	These are words related with personnel safety and truck maintenance in a direct or indirect way which deserve your attention.

Contents

1. Outline Drawing



● Main Technical Parameters (lead-acid battery type)

Features	1.2	Manufacturer's type designition		OPSM	OPSM
	1.3	Drive: electric (battery type, mains, ...), diesel, petrol, fuel gas		Electric(Lead-acid battery)	Electric(Lead-acid battery)
	1.4	Operator type: hand, pedestrian, standing, seated, order-picker		Order-picker	Order-picker
	1.5.1	Load capacity at Q_1	Q_1 (kg)	90	90
	1.5.2	Load capacity at Q_2	Q_2 (kg)	150	150
	1.5.3	Load capacity at Q_3	Q_3 (kg)	130	130
	1.9	Wheelbase	y (mm)	1147	1147
Weight	2.1	Service weight	kg	755/775	755/775
	2.3	Axle loading, unladen front/rear	kg	310/445	310/445
Tyres	3.1	Tyres: solid rubber, superelastic, pneumatic, polyurethane		Polyurethane	Polyurethane
	3.2	Tyre size, front		φ180×50	φ180×50
	3.3	Tyre size, rear		φ250×60	φ250×60
	3.5	Wheels, number front/rear (× = driven wheels)		2/2x	2/2x
	3.6	Tread, front	b_{10} (mm)	600	600
	3.7	Tread, rear	b_{11} (mm)	690	690
Dimensions	4.2	Height, mast lowered	h_1 (mm)	1590	1590
	4.3	Free lift	h_2 (mm)	270	270
	4.4	Lift	h_3 (mm)	3665	3665
	4.5	Height, mast extended	h_4 (mm)	4255	4255
	4.8	Seat height relating to SIP/stand height	h_7 (mm)	335	335
	4.9	Height drawbar in driving position min./max.	h_{14} (mm)	1120	1120
	4.11	Additional lift	h_9 (mm)	1270	1270
	4.14	Stand height, elevated	h_{12} (mm)	3000	3000
	4.15	Height, lowered	h_{13} (mm)	1000	1000
	4.19	Overall length	l_1 (mm)	1500	1500
	4.21	Overall width	b_1/b_2 (mm)	750	750
	4.22	Pallet dimensions	$s/e/l$ (mm)	700×500	700×500
	4.32	Ground clearance, centre of wheelbase	m_2 (mm)	66	66
	4.34	Aisle widthc	A_{st} (mm)	1750	1750
	4.35	Turning radius	W_a (mm)	1300	1300
Performance Data	5.1	Travel speed, laden/unladen	km/h	4.5	6.5
	5.2	Lift speed, laden/unladen	m/s	0.16/0.18	0.16/0.18
	5.3	Lowering speed, laden/unladen	m/s	0.15/0.15	0.15/0.15
	5.8	Max. gradeability, laden/unladen	%	5/8	5/8
	5.10	Service brake		Electromagnetic	Electromagnetic
Motors	6.1	Drive motor rating S2 60 min	kW	0.5(DC)	0.68(AC)
	6.2	Lift motor rating at S3 15%	kW	2.2	2.2
	6.4	Battery voltage/nominal capacity K_{20}	V/Ah	24/105(250)	24/105(250)
	6.5	Battery weight	kg	52(140)	52(140)
		Battery dimensions (LXWXH)	mm	260×168(180)×217(275)	260×168(180)×217(275)
	10.7	Sound pressure level at the driver's seat	dB (A)	70	70

● Main Technical Parameters (Lithium battery type)

Features	1.2	Manufacturer's type designition		OPSM	OPSM
	1.3	Drive: electric (battery type, mains, ...), diesel, petrol, fuel gas		Electric(Lithium battery)	Electric(Lithium battery)
	1.4	Operator type: hand, pedestrian, standing, seated, order-picker		Order-picker	Order-picker
	1.5.1	Load capacity at Q_1	Q_1 (kg)	90	90
	1.5.2	Load capacity at Q_2	Q_2 (kg)	150	150
	1.5.3	Load capacity at Q_3	Q_3 (kg)	130	130
	1.9	Wheelbase	y (mm)	1147	1147
Weight	2.1	Service weight	kg	775	775
	2.3	Axle loading, unladen front/rear	kg	320/455	320/455
Tyres	3.1	Tyres: solid rubber, superelastic, pneumatic, polyurethane		Polyurethane	Polyurethane
	3.2	Tyre size, front		φ180×50	φ180×50
	3.3	Tyre size, rear		φ250×60	φ250×60
	3.5	Wheels, number front/rear (× = driven wheels)		2/2x	2/2x
	3.6	Tread, front	b_{10} (mm)	600	600
	3.7	Tread, rear	b_{11} (mm)	690	690
Dimensions	4.2	Height, mast lowered	h_1 (mm)	1590	1590
	4.3	Free lift	h_2 (mm)	270	270
	4.4	Lift	h_3 (mm)	3665	3665
	4.5	Height, mast extended	h_4 (mm)	4255	4255
	4.8	Seat height relating to SIP/stand height	h_7 (mm)	335	335
	4.9	Height drawbar in driving position min./max.	h_{14} (mm)	1120	1120
	4.11	Additional lift	h_9 (mm)	1270	1270
	4.14	Stand height, elevated	h_{12} (mm)	3000	3000
	4.15	Height, lowered	h_{13} (mm)	1000	1000
	4.19	Overall length	l_1 (mm)	1500	1500
	4.21	Overall width	b_1/b_2 (mm)	750	750
	4.22	Pallet dimensions	$s/e/l$ (mm)	700×500	700×500
	4.32	Ground clearance, centre of wheelbase	m_2 (mm)	66	66
	4.34	Aisle width	A_{st} (mm)	1750	1750
	4.35	Turning radius	W_a (mm)	1300	1300
Performance Data	5.1	Travel speed, laden/unladen	km/h	4.5	6.5
	5.2	Lift speed, laden/unladen	m/s	0.16/0.18	0.16/0.18
	5.3	Lowering speed, laden/unladen	m/s	0.15/0.15	0.15/0.15
	5.8	Max. gradeability, laden/unladen	%	5/8	5/8
	5.10	Service brake		Electromagnetic	Electromagnetic
Motors	6.1	Drive motor rating S2 60 min	kW	0.5(DC)	0.68(AC)
	6.2	Lift motor rating at S3 15%	kW	2.2	2.2
	6.4	Battery voltage/nominal capacity K_{20}	V/Ah	24/100	24/100
	6.5	Battery weight	kg	30	30
		Battery dimensions (LXWXH)	mm	560×180×270	560×180×270
	10.7	Sound pressure level at the driver's seat	dB (A)	70	70

2. Brief Introduction of Structure

The truck is mainly composed of truck frame, mast column, lifting oil cylinder, operation handle, steering mechanism, drive wheel, battery pack, hydraulic power unit, electric control system and so on. (refer to structural drawings and schematic drawings of main components)

3. Safety Norms

Warning

Pay attention to the following items before using the truck:

1) The electric truck is designed for hard and flat indoor ground; never use it in a flammable or explosive environment, or a corrosive environment like acid or alkali.
2) Only trained and recognized drivers are allowed to drive this truck.
3) Please read this manual carefully and grasp the performance of truck before operate it; everytime before use, check carefully whether the truck is in a normal state; never use a faulted truck; never repair the truck unless you've been trained on it.
4) Overloading is strictly prohibited.
5) Never press the lifting/lowering button while the truck is travelling; never switch the lifting/lowering button in a fast and frequent manner because it will cause damage to truck and cargo!
6) Do not leave cargo on the truck for an extended period of time!
7) Never make sharp turns in narrow aisles when you should decelerate and turn slowly to ensure safety of personnel and cargo.
8) Never put any part of human body under truck frame or standing platform!
9) This order picker is designed for operations on a flat ground or flat working platform; never park it or use it on a ramp.
10) Overloading or overramp running is strictly prohibited, otherwise wheels will skid, damaging wheels and motor as well as impairing safety of cargo and human bodies.
11) Never use the truck below the specified voltage 20.4V.
12) Never charge by connecting the plug with AC power directly.

3.1 Norms for safe operations:

1) Training of drivers:

Attention

Even for trucks with the same technical parameters, they may differ in characteristics such as braking and accelerated speed. Therefore, do not drive the truck until you have got familiar with all the operations.

2) Wearing when driving the truck

Attention

Please put on safety shoes and working clothes; for safety reasons, do not wear clothes that are too loose in order to prevent the danger of getting hooked.

3) Necessary to obey rules:

Attention

Do not drive the truck when you feel tired, not concentrated, or have adopted anesthetics or drunk.

Please conform to safety norms when operate and repair the truck.

4) Safety of working sites:

Attention

The electric truck is only designed for hard and flat indoor ground; never use it in a flammable or explosive environment or a corrosive environment like acid or alkali.

A. Keep paths in good conditions; the paths shall not be blocked.
B. The working sites should be well-lighted.
C. Places where the truck is to be used and charged must be equipped with firefighting devices. Fire extinguishers must live up to putting out fire of solid combustibles and electric parts.
D. The noise level in this manual refers to the tested value of a new truck working on a flat, smooth and hard ground; if your ground is not in good condition or the wheels are damaged, the noise level will be higher.

5) Ensure integrity of truck:

Warning

Do not modify the truck

A. When operate, check and repair the truck, please conform to the safety norms and norms of your working site.
B. Without written permission of our company, it is not allowed to modify the truck. Modifications on the truck may influence its safe operations. Without written permission of the original manufacturer, authorized agents or its commissions, never modify an electric industrial truck on the condition that it may influence the truck load capacity, stability or safety requirements. Such influence includes the truck braking performance, steering, visibility and adding additional devices. When any modification is approved by the manufacturer or its agents, the capacity plate(s), decals, tags and instruction handbook shall also be modified accordingly.

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

a) arrange for the modification or alteration to be designed, tested and implemented by engineer(s) expert in industrial trucks and their safety;
b) maintain a permanent record of the design, test(s) and implementation of the modification or alteration;
c) affix a permanent and readily visible label to the truck stating the manner in which the truck has been modified or altered together with the date of the modification or alteration, and the name and address of the organization that accomplished the tasks.

6) Set up procedures for safe operations：

Before using the truck, please set up safe operation procedures according to actual situations. When setting up working procedures, please fully consider the element of safety.

7) Never operate the truck under unsafe conditions:

A. Never use the truck where the ground is uneven, the path is blocked or other unsafe elements exist; never lift the truck on a ramp.
B. Never use a faulted truck.
C. Make sure to inspect the truck every day; if any abnormal situation is discovered, please repair or make replacement.

8) Overloading is strictly prohibited:

Warning

Never overload, otherwise it will damage the truck or injure human bodies.

9) Check electrical system:

Attention

When checking the electrical system, turn off key switch and emergency isolation switch.

3.2 Norms for safe driving:

1) Check safety conditions around the truck

Attention

Before start the truck, make sure there is nobody around.

Attention

When transporting bulky cargo which blocks your sight, please drive reversely or be guided by another person.

Attention

When driving reversely, make sure there is nobody around the truck.

Attention

When travel in narrow aisles, it must be guided by another person.

Attention

At crossroads or other sight-blocked places, the driver should park and start again after confirming that there is nobody around the truck.

Attention

Be concentrated while driving and operating.

Caution

Different from normal trucks, the driving mechanism of this truck is installed at the front end of the truck. When turning, the swing speed at the front will be relatively higher, therefore, when the front end of the truck approaches other objects, make sure to drive or turn slowly to prevent collision.

2) Brutal driving is strictly prohibited

Attention

Do not start, brake or steer suddenly.

Attention

Conform to all the safety regulations of the working sites. When driving by other trucks decelerate and honk the horn. Do not drive in sight-blocked places.

Attention

Make sure there is certain gap between the truck and the entrance/exit.

3) Do not drive by road sides

Attention

Make sure there is enough distance between the truck and roadside or platform edge (when driving on narrow roads or platforms, make sure to keep a certain safe distance from the edges to prevent the truck from falling).

Warning

Do not make steering or loading/unloading operations on ramps; otherwise, the truck will be endangered by overturning.

3.3 Norms for operations:

1) Never overload
2) Never carry a second person
3) Never operate the handle suddenly
4) Make slow lifting/lowering, and pay attention to safety around.
5) For a faulted truck, park it where it won't block the path, hang on a warning plate and pull out the key.
6) The driver must handle travel speed according to actual situations. When turning, driving in narrow aisles, driving across swing doors, or driving in sight-blocked places, make sure to drive slowly, keep adequate braking distance from the forklift in the front, and keep the truck in control all the time. Never stop suddenly, turn swiftly or overtake other trucks in dangerous or sight-blocked places (except for unexpected situations). Never reach your body out of the driving compartment or stretch your hand out of it.
7) **Driver's sight during driving:** The driver must keep his sight in the travel direction, and pay attention to situations on the path all the time.
8) **Travel uphill or downhill:** When travel uphill or downhill, the travel route must be the stipulated route.

The road surface shall be clean, no skidding, live up to technical performance of the stacker, and be safe and rebliable. When travel uphill with load, the forks shall always face forward; when downhill, drive reversely. Never turn, drive obliquely or park the stacker during travelling uphill/downhill. When travel downhill, decelerate and be prepared to brake.

3.4 Precautions after work:

1) Parking: Park the truck at an appointed place; never park it on a ramp.
Turn off the key switch before leave the truck.

2) Clean the truck:

> **Attention**
>
> Use compressed air to clean the electrical system of truck; never use water to clean the electrical system.

3) Charging:

> **Warning**
>
> There shall not be open flame in the charging area, otherwise it will cause explosion or fire disaster.

Keep good records of the charging situations. Refer to the battery operation part for charging method.

4. Initial operation

4.1 Initial operation

4.1.1 The truck shall only be driven by battery power. Rectified AC power will damage the truck's electric components.

4.1.2 If the truck is driven by an external battery through a towline, lifting will not be allowed. Length of battery cable (towline) shall not exceed 6m.

4.1.3 Before putting the truck into use for the first time, conduct the following inspections:

a) Check whether the equipment is complete and in normal state.

b) If the truck has not been installed with battery, install battery and take care not to damage battery cable.

c) Check if the brakeswitch and lift/lower switch on the ground console are OFF. If not, turn them to OFF

4.1.4 If the truck has been parked for too long a time, the ground plane of wheels may be flattened a little bit; the flattened position will restore automatically after the truck travels for some distance.

4.2 If the order picker is not driven by its own driving devices

> **Warning**
>
> Never drag the truck on a ramp.

4.2.1 In order to enable to drag the truck in emergency, the electromagnetic controlled brake must be released by toggling the brake-releasing switch to ON.

4.2.2 After the truck has been parked at the appointed place, the electromagnetic controlled brake must be braked by toggling the brake-releasing switch to OFF again so that the truck can return to the braked state.

5. Instructions for Use and Operations

The order picker adopts storage battery as its power source to travel and lift, used for picking cargo on low/middle shelves; correct use and operations will bring great convenience for your work while incorrect use and operations will damage the truck or cause danger to human bodies and cargo.

5.1 Before use

Warning

Never use a faulted truck.

5.1.1 Check whether the truck is normal before use: whether hydraulic pipelines leak or not; each wheel works normally or not; whether there is any stuck phenomenon; never use a faulted truck.

5.1.2 Check if the battery is charged, turn on the emergency stop switch and key switch on the frame, and turn on the emergency button on the operation console. Check the energy meter on the truck dashboard. If the battery shows a low battery state, charge the battery. It is strictly prohibited to use the truck without power, as this will greatly reduce the battery's service life and even damage the battery.

5.1.3 Check whether braking of truck is normal; check whether lifting, lowering, travelling forward/backward and other movements are normal or not.

5.2 During use

5.2.1 Move the right handle forward and backward, and the left handle forward and backward to turn left and backward to turn right. There is an induction switch at the handshake of the right hand handle. During driving, the right hand must hold the handle, otherwise a malfunction will be reported and it will not be possible to move forward or backward. Release the right handle and only move the left handle knob to rotate the truck in place. The button in front of the right handle is the platform up and down button, horn button, and emergency stop button. The ground console below the frame is equipped with a charging port, lift/lower button, emergency stop button, brake release lock, and lifting switch lock. The hydraulic station solenoid valve head is equipped with a manual lowering knob (used in emergency situations) when opening the frame cover.

5.2.2 Speed limit

If the standing platform is lifted about 500mm, the travel speed will be 50% of full speed. If the platform is lifted about 1000mm from ground, the travel speed will be 25% of full speed.

5.3 Treatment of abnormal situations during use

5.3.1 When the lift/lower button is pressed, the platform can lift, but when the lift/lower button is released, the platform is still lifting and in a state of uncontrolled lift. At this time, the emergency stop button should be immediately pressed. And move the truck to a safe position and inspect the truck's electrical circuits.

5.3.2 If braking failure occurs during use, stop use immediately and check the truck.

5.4 After use

Park the truck at a fixed parking position after use. Conduct routine maintenance according to specified items and charge the truck.

6. Use, Maintenance and Charging of Storage Battery

Charging operation method: The truck is equipped with a built-in charger. First, open the hidden cover at the front of the truck, then plug one end of the power cord into the charging port of the truck, and then plug the other end into the power socket. After a few seconds, start charging.

Warning

There is hydrogen accumulated in battery box during charging, therefore the charging environment shall be well-ventilated; no open flame is allowed, otherwise it will lead to explosion or fire disaster. (except for maintenance-free batteries)

6.1 Initial charge

6.1.1 Initial charge shall be conducted for new batteries, i.e. the first-time charge.

6.2 Use and maintenance

6.2.1 In order to ensure service life of battery, all the batteries in use should be fully charged; never use batteries that are not fully charged. During use, pay close attention to discharge degree, and over-discharge is strictly prohibited.

6.2.2 Cells in normal use should avoid over-charge, but over-charge must be properly conducted for the cells in following situations, i.e. equalizing charge.

a) The "lag-behind" cells--- cells with a voltage lower than that of the other cells in the discharging process and the cells having been repaired for failure. (When equalizing charge is conducted, the positive and negative poles of the "lag-behind" cell should be respectively connected with the positive and negative ends of the charger, the DC power supply, and the charge should be conducted independently.)
b) Equalizing charge should be conducted for cells in normal use every 2-3 months.
c) Equalizing charge should be conducted for the cells which have not been used for a long period of time before use them again.

6.3 Keep and storage

The storage battery shall be kept in clean, dry and ventilated warehouse within the temperature range of 5 to 40°C. The valid storage period is 2 years. Within the storage period, keep the battery according to the following requirements:

a) Avoid direct sunlight. The distance from heat source shall be no less than 2m.
b) Avoid contact with any harmful substance. No metal impurity shall fall into the battery.
c) No inversion; no mechanical collision or heavy weight is permitted.

6.4 Charger

If you are using a self-equipped electric charger, your charger must live up to the following requirements:

a) Charger output voltage: 24V
b) Charger output current: 10A，25A（Lead-acid），25A（Li-ion）

6.5 User Requirements for the Secondary On-board Li-ion Battery System

This URD (user requirement document) is generally applied into the usage , maintenance and any other operations occur to the Li-ion batteries (Secondary On-board Li-ion Batteries System) on both electric storage and logistic trucks.

6.5.1 Requirements on operators

1) Relevant people who are able to use, maintain and take any actions to Li-ion batteries on all electric storage and logistic trucks (hereinafter referred to as operators).
2) Any operators are only allowed to operate the Li-ion batteries under the backgrounds of professional training , acquiring certain knowledge of Li-ion batteries, and obtaining certifications from relevant departments.

6.5.2 Safety Regulation

1) These signs shown below might be found either on the Li-ion battery cases or on the trucks, which are set on considerations of the safeties of the batteries as well as the operators. All the operations

must be under the guidance of them.

High Voltage Warning：

It indicates a possible danger of lightning shock. All the electric work of the equipment must be finished only by qualified professional workers. Unauthorized disassembly is prohibited

Corrosive Risk Sign：

It indicates to pay attention to protect the products when unsafe factors exist over the production.

Waterproof & Humidity proof Sign：

It indicates to protect the products from rain, water and humidity.

No Fire Sign：

It indicates that fire is prohibited in this area when the product is on.

Do Not Step Sign：

It indicates the products must not be stepped on.

2) The use of Li-ion battery trucks shall be in accordance with the requirements of temperature, humidity and environment specified in the truck instructions, and the maintenance and disassembly of lithium battery shall be carried out when the battery case is clear without any foreign bodies, especially metal tools, and there are no impurities or blockages in the air duct.
3) Operators are forbidden to short-circuit connect lithium batteries, otherwise the system will be seriously damaged and people will be injured.
4) Li-ion batteries should be kept away from heat , fire and avoid long time direct sunlight. Li-ion batteries must not be placed in liquid (such as water, solvent) or high humid environment to avoid damages caused by leakage or short circuit.
5) Installation, commissioning and maintenance of lithium batteries in rain and snow weather should be carried out indoors to prevent short circuit caused by rainwater entering Li-ion battery system.。
6) Because of the communication protocol between the management of lithium batteries and trucks, it is prohibited to interchange lithium batteries with the same voltage and capacity on different trucks without the permission of the host plant.

   It is forbidden to mix Li-ion batteries with other batteries in one truck. For the truck that is about to replace batteries, it is necessary to check up whether the new batteries are with the same model and with the same group or not before restart it.
7) The Li-ion battery cases shall be transported and moved strictly in accordance with the regulations

without any improper operations like towing, prying and kicking, which will cause mechanical impact on the batteries, such as dropping, impacting and pressing. It's highly prohibited to overlap, upside down and side-up lithium battery cases.

8) It is necessary to ensure the correct connection and normal operation of the lithium battery management system whether charging or discharging, and to ensure the normal communication between the lithium battery management system and the truck system.
9) Li-ion batteries are prohibited to contact and to be placed together with objects that will possibly cause a short circuit. Sharp stuff and workers in clothes and accessories with metal are not permitted to get close to Li-ion batteries.
10) Periodically check the lithium battery information displayed by truck meters. If there is any problem, do not open and operate the battery case by yourself. Contact relevant technical personnel immediately for further guidance.
11) Unauthorized disassembly, damage and installation of lithium battery components are strictly prohibited. It is forbidden to dissect lithium batteries or lithium battery groups without authorization in order to avoid danger. Non-professional workers are forbidden to replace the data transmission interface and voltage acquisition interface of lithium battery management system to prevent short-circuit damages to system components and even cause fire. Safety warning signs must be obeyed for safety 's sake.
12) If operators find any of the following situations or have any concerns about the safety of the product, shut down the truck first, and take measures like disconnecting the power connection to ensure the safety of both the operators and the truck, then immediately contact the relevant personnel for further guidance. Solutions provided as follow:

    Contact relevant technicians for emergency repair when see the signs of overheating, smoking, sparking; battery pack damage (such as rupture), battery leakage; battery system case and power cord take in water.

    Contact relevant technicians for an overhaul when see ruptures or damages of the power cord, plug, extension cord, protective device; or when confronted with the problems that don't threat personal or trucks'safety , like the truck fails to work normally.

6.5.3 Requirements on Charging the Li-ion batteries

1) The charging temperature range is 0-50℃. Li-ion batteries are not allowed to charge in the environment below 0℃ except those with heating system. Low-temperature charging will cause lithium evolution and affect the service life of Li-ion batteries.
2) The charging place should keep clean and well ventilated, and always keep away from inflammable and explosive articles. Fireworks are strictly prohibited in the charging area.
3) Operators are suggested to help themselves to charge only with the certain charging equipment coming with the truck from the manufacture to maximize the safety performance of Li-ion batteries. Make sure to connect the positive and negative poles correctly and never do reverse charging.
4) After the battery is fully charged, unplug the charging line in time to avoid other safety problems.
5) Abnormal termination of charging may occur during the charging process of lithium batteries. For example, if the charging voltage is too high or the charging current is too large. The phenomenon is defined as "Abnormal Termination of Charging". When it occurs, it may indicate the leakage of lithium batteries or failure of some parts. It is necessary to notify relevant technicians for a complete inspection, finding out the causes and solving them before resuming the charge.

6.5.4 Requirements on discharging the Li-ion batteries

1) Discharge temperature range is -20-60℃.
2) When a lithium battery fault is found in display during the start-up or operation of a truck, the cause

of the fault should be inquired according to the display code and the schedule of the truck instruction, and the technical personnel should be notified to deal with it in time.

3) It is necessary to ensure that lithium batteries are not less than 50% charged before maintenance or repair.
4) To prevent damages of lithium batteries caused by over discharge, it is necessary to charge lithium batteries in time when the instrument displays low charge alarm.

6.5.5 Requirement on transportation and unloading

1) Firm out packages are highly required when Li-ion batteries are about to transport.
2) Sign of water proof, sing of humidity, sign of upward, sign of careful and light handling shall be attached to the out packages. In case of being damaged, the battery cases must be placed upward according to the sign.
3) When the lithium batteries are dislocated or extruded during transportation, the exposed wiring harness and connectors should be checked to see if the lithium batteries are damaged or deformed. In case of smoke, sparking, stay away from the scene immediately, and professional technicians should be notified.

6.5.6 Requirements on the storage

1) The storage of lithium batteries should be in clean and ventilated rooms with ambient temperature ranging from - 10 ~35 ℃ (recommended storage temperature ranging from 0 ~25℃). Long-term storage batteries (more than 3 months) should be placed in an environment with temperature of 25 ±3 ℃) and relative humidity of 65 (±20%).
2) The contact between lithium battery and corrosive chemicals or gases shall be avoided, so as to prevent the corrosion of lithium battery or its connecting parts, affecting the appearance and service life of the battery.
3) Keep Lithium batteries away from fire and heat, meanwhile, keep the batteries dry.
4) Insulation, waterproof and dustproof are required over the storage. Make sure that the protective cover plate above the lithium battery case is fixed tightly without defects and damages. The battery case should be covered with insulation materials and sealed if there is no sealing cover plate.
5) When lithium batteries are to be stored, the charge should be above 30%. In order to prevent over discharge during long-term storage (more than 3 months), batteries should be charged regularly, keeping the charge at 50%-80%.
6) It is required to conduct a charge check once a month for those long-term parking trucks. After check, make sure the charge is between 50% and 80%. Charge it till the required amount if the charge is insufficient.
7) Long-term idle lithium batteries need periodic charge-discharge activation and a standard charge-discharge cycle once a month

7. Inspections before operations

In order to ensure safe operations and keep the truck in a good condition, full inspections shall be carried out before operations, which is a legal duty. If any problem is discovered, please contact our sales department.

7.1 Check point and check content:

	NO.	Check point	Check content
Braking system	1	Brake clearance	The brake clearance shall be kept between0.2-0.8mm.

Steering system	2	Operation handle	Degree of tightness and flexibility of turning.
Hydraulic system	3	Oil pipe	Leak or not.
	4	Hydraulic oil	Proper amount of oil.
	5	Lifting oil cylinder	Leak or not.
Wheel	6	Pins, screws and all fasteners	If any pin, screw and fastener of each wheel becomes loose or falls or not.
	7	Wearing condition	Compared with parameter list, replace the wheel if the diameter has reduced by 5%.
Storage battery	8	Charging	Check battery capacity indication.
	9	Connecting wire	The connecting wire and socket should be firm.
Horn	10	Horn	Whether the horn honks after horn button ispressed.
Instrument	11	Function	Turn on electric lock switch to see whether instrument display is normal.
Others	12	Truck frame and other structural parts	Have damage or cracking or not.
	13	Function	Lifting/lowering, travelling forward/backward, turning left/right and other movements are normal or not; any abnormal sound or not.

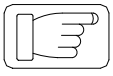
8. Inspections after operations

After work is completed, wipe out dirt on truck, and inspect the truck in the following aspects:

1) Keep all the warning signs, nameplates, warning plates and other image-text information complete and clear. Such image-text signs have a certain guidance, reminder and warning for the operators.
2) Check if there is any deformation, distortion, damage or breaking condition.
3) Add lubrication oil according to the actual situation.
4) Replace faulted spare parts.

9. Periodic Maintenance

Full inspections on truck can prevent faults and that the truck cannot live up to its service life. The hours listed in the maintenance procedures are based on the condition that the truck works 8 hours per day and 200 hours per month. For safe operations, please maintain the truck according to the maintenance procedures.

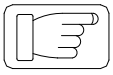


Attention

All the repair work should be conducted by professionals.

For the service work such as adjusting or replacing spare parts, please contact our sales department.

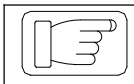
9.1 Precautions for maintenance:



Attention

Replace by the authentic spare parts of our company. All the spare parts should be replaced by those of equal safety requirements with the original design. Adopt the recommended lubrication oil and hydraulic oil.

1) Site for maintenance:



Attention

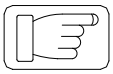
It should be an appointed place, able to provide service mechanisms like hoisting and safety protective devices.

It should be a flat ground.

It should be well-ventilated.

It should be equipped with firefighting devices

2) Precautions before maintenance:



Attention

No smoking.

Ensure self-protection.

Wipe out the run out oil timely.

Before add lubrication oil, first clean the dirt oil or dust on the joints with a brush or cloth.

Except for some occasions, turn off the key switch and plug out the power socket.

When maintaining the truck, place the forks to the lowest position.

When disassembling high-pressure oil pipe, make sure there is no cargo on the truck and the forks are in the lowest position, in order to release the pressure within hydraulic system.

Before contact the main circuit terminal, first discharge the circuit. There is a capacitor in the circuit, and a small amount of electricity may exist.

Clean the electrical part with compressed air; never clean it with water.

When it is required to maintain the truck at heights, the maintenance personnel should be protected.

9.2 Inspections and maintenance before starting a new truck

In order to conform to relative industrial regulations and ensure absolute safety of truck during transportation, it is probable that the battery is not equipped with electrolyte (except for inland sales) before starting for the first time.

When the truck leaves the factory, the prepared electrolyte is with it. Before first use, pour the electrolyte into the battery by professional personnel. First, place the truck in a well-ventilated place, open the cap of the battery box, and open the plastic cap on the battery top completely. Lift the plastic pot filled with the electrolyte with a plastic funnel, pour the electrolyte into the battery slowly till the liquid level can be seen. When the battery is filled, conduct initial charge for the battery in time according to the operation instructions given in 5.1. (You don't need to add electrolyte for maintenance-free batteries.)

9.3 Routine inspections

Check hydraulic oil level;

Check battery power;

Refer to use and maintenance of storage battery.

9.4 Inspections according to needs

Clean the truck

Check and fasten each fastener

Check wearing condition of wheels

9.5 Inspections and maintenance after 50 hours (weekly)

Braking system	1	Oil dirt and dusts on the steering gear should be wiped clean.
	2	The brake clearance should be kept between 0.2-0.8mm.
Electrolyte capacity	3	Check liquid level of electrolyte. Supplement by pure water if it is too low. (except for maintenance-free batteries)
Electrolyte density	4	Check density after charging. It should be 1.28g/ml. (except for maintenance-free batteries)
Clean storage battery	5	Fasten the cap and rinse with tap water. (except for maintenance-free batteries)
Check contactor	6	Polish the rough surface of contacts with abrasive paper.

9.6 Inspections and maintenance after 200 hours (monthly)

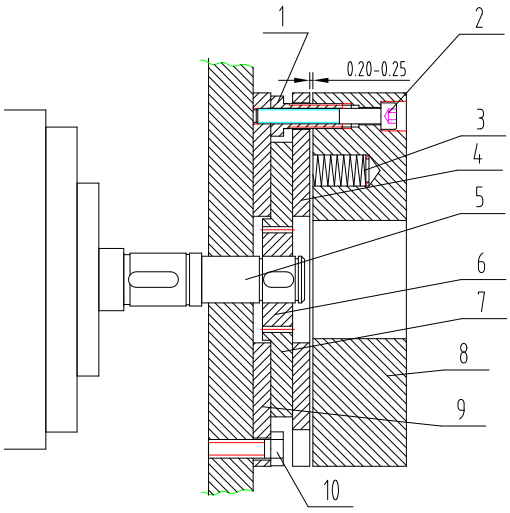
Besides weekly maintenance, the following is required.

Through inspections, if there is any need for adjustment or replacement, please contact repair personnel of our company (monthly repair records shall be kept).

	NO.	Check point	Check content
Whole truck	1	Overall condition	Any abnormal condition or not
	2	Horn	Sound
Steering system; braking system; hydraulic system; lifting system	3	Brake clearance	The brake clearance should be kept between 0.2-0.8mm.
	4	Operation handle	Degree of tightness and flexibility of turning.
	5	Truck frame and fasteners	Functions, crack or not, lubrication condition, fasteners become loose or not.
	6	Connecting rod and wheel carriage	Functions, crack or not, distortion and disformation, lubrication condition.
	7	Oil pipe	Leak or not.
	8	Hydraulic oil	Proper amount of oil.
	9	Lifting oil cylinder	Leak or not.
	10	Electrolyte	Liquid level, density, degree of cleanness (except for maintenance-free batteries)
Storage battery; charger; electric system	11	Plug	Function, damaged or not
	12	Key switch	Function
	13	Contactor	Contact performance and functions
	14	Controller	Function

	15	Drive motor	Wearing condition of carbon brush and communtator
	16	Lifting motor	Wearing condition of carbon brush and communtator
	17	Steering motor	Wearing condition of carbon brush and commentator (except for no steering motor)
	18	Fuse	Complete or not
	19	Wiring harness and terminals	Loosened and damaged or not

Methods for adjusting brake clearance



1 Hollow screw 2 Connecting screw 3 Spring 4 Armature 5 Motor shaft 6 Spline housing 7 Friction plate 8 Solenoid coil 9 Mounting cover plate 10 Mounting screw

Structure of brake is shown in the drawing. After the truck has been used for some time, the braking performance will decline with the wearing of brake plate, or the brake plate locks and cannot release the brake, then the brake clearance needs adjustment. As shown in the drawing, under the braked condition, first measure the gap between the brake plate and the magnetic steel with a feeler gauge. If the gap is greater than 0.5mm, the clearance needs adjustment. Before adjustment, first wipe out dirt and dust on the friction plate.

When adjusting, first release the connecting screw, adjust the length of adjusting screw 1, and then, fasten the fastening screw. After adjustment, the clearance between brake plate and magnetic steel should be between 0.2-0.3mm. Pay attention to adjust the three adjusting screws evenly to make the clearance between brake plate and magnetic steel spread evenly around. After adjustment, connect the brake with 24V DC power, and crisp sounds of suction shall be heard.

9.7 Maintenance after 600 hours (every 3 months)

For maintenance every 3 months, repeat the monthly maintenance procedures. If the spare parts need adjustment or replacement, please contact our repair stuff.

Contactor	Polish the uneven contacts with abrasive paper
	Replace when it functions badly
Motor	Wearing condition of carbon brush and communtator
Brake	Clean the dirt and dust on the brake friction plate; check the wearing condition of friction plate

9.8 Maintenance after 1200 hours (every half a year)

For maintenance every half a year, repeat the maintenance procedures for every 3 months. If the spare parts need adjustment or replacement, please contact our repair stuff.

Contactor	Polish the uneven contacts with abrasive paper
	Replace when it functions badly
Motor	Wearing condition of carbon brush and commentator.
Filter	Clean
Brake	Clean the dirt and dust on the brake friction plate; check the wearing condition of friction plate
Hydraulic system	Replace hydraulic oil; check whether lifting oil cylinder leaks or not; replace sealings when necessary
Forkwheel and forkwheel bearing	Check wearing condition, and replace when function badly

9.9 Recommended working medium:

1) Hydraulic oil:

A. For normal load, we recommend:

Hydraulic oil: LHPISOVG46, according to standard DIN51524T.2, average continuous temperature 40-60 degrees.

B. For heavy load, we recommend:

Hydraulic oil: LHPISOVG68, according to standard DIN51524T.2, average continuous temperature above 60 degrees.

C. For light load in low temperature, we recommend:

Hydraulic oil: HLPISOVG32, according to standard DIN51524T.2, average continuous temperature below 60 degrees.

For variable load occasions, we recommend:

D. For all the working conditions mentioned above, hydraulic oil LHPISOVG46 according to standard DIN51524T.2 can be adopted. Such lubrication oil has a very high viscosity (mostly used for hydraulic oil).

When it is difficult to purchase hydraulic oil, hydraulic oil HLP68 can be replaced by engine oil SAE20W/20.

2) Lubrication grease: NO.3 lithium base grease

All the wasted hydraulic oil, gear oil and grease will pollute the environment, therefore, please recycle the replaced working medium or dispose it according to local regulations.

9.10 Maintenance periods for consumables and some components:

Item	Maintenance content	Maintenance period	Remarks
Sealing	Replace	1200 h	Replace anytime damage is discovered
Gearbox	Replace lubrication oil (lubrication grease)	1000 h	
Hydraulic oil	Replace	1000 h	
High-pressure oil pipe	Replace	2000 h	Replace anytime damage is discovered
Filter screen of hydraulic oil tank	Clean	1000 h	
Oil pump motor	Check carbon brush and bearing	1000 h	

10. Storage, transportation, loading/unloading of the truck

10.1 Truck storage

If the truck will not be put into use for over 2 months, it should be parked in a well-ventilated, frostless, clean and dry room, and the following measures are required.

1) Clean the truck thoroughly.
2) Lift and lower the pl for several times to see whether they work normally.
3) Descend the forks to the lowest position.
4) Support the end of truck which is close to driver with wood beam, to make the drive wheels away from ground.
5) Apply a layer of thin oil or grease to the surface of all exposed mechanical parts.
6) Lubricate the truck.
7) Check the condition of storage battery and electrolyte, and apply non-acid lubrication grease on the battery terminals.
8) Spray all the electrical contacts with proper contact spray.

10.2 Truck transportation

If the truck will be transported for a long distance, support the end of truck close to driver with wood beam to make the drive wheels away from ground; fix the two front wheels with wood wedge, and fasten the truck with the transportation truck with ropes.

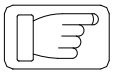
10.3 Truck loading/unloading

Before load or unload the truck, please first check the total weight marked on the nameplate, and choose the proper hoisting device. Keep horizontal during hoisting and touch the ground slowly. People around should take care, and the operation should be guided by another person. If load or unload with a truck, first observe the bottom condition of the truck under loading/unloading. Operate cautiously when the forks are inserted into the truck bottom to prevent forks from damaging the drive wheels and balance wheels of the truck.

11. Battery replacement

Procedures for replacing battery are as follows:

1) Open and take down upper cover of truck;
2) Dismantle connecting wire of battery and take out the battery;
3) Procedures for mounting battery pack are the opposite.



Attention

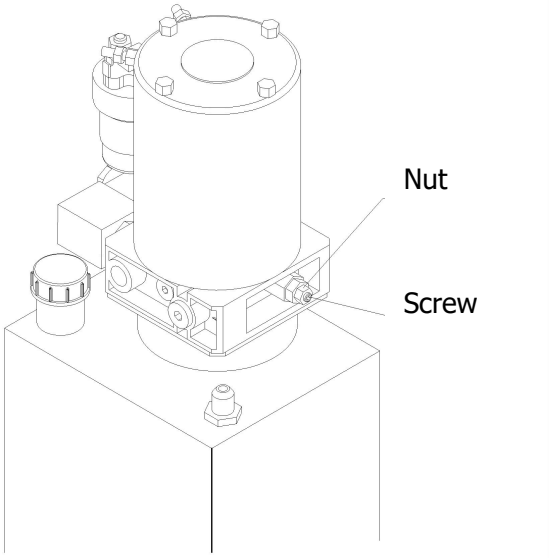
When hoist or transport battery, handle it lightly, otherwise it may damage the battery or human body.

12. Common Fault and Troubleshooting

NO.	Fault	Cause	Troubleshooting
1	Order picker cannot start (contactor doesn't work, either)	Fuse of control circuit burnt	Replace
		Power switch has bad contact or damaged	Repair or replace
		Fuse of main circuit burnt	Replace
		Electric lock switch has bad contact or damaged	Repair or replace
		Battery has loose connection or falls	Fasten
	Order picker cannot start (contactor works)	Brake of drive wheel does not close, and the truck is in braked condition	Repair or replace
		Magnet exciting coil of travel motor disconnected or has bad contact	Repair or replace
		Contacts of contactor have bad contacting performance	Repair or replace
		MOSFET circuit board faulted	Repair or replace
		Contactor does not contact well or burnt	Repair or replace
2	Order picker can only move forward (or backward)	Circuit board faulted	Repair or replace
		Contacts of contactor damaged; moving contact does not restore	Cut off power supply and replace contact
3	Braking failure	Brake has loose connection or burnt	Fasten bolts or repair brake
		Brake plate worn	Replace brake plate
4	Platform does not lift	Relief valve pressure too low	Adjust it higher
		Abnormal inner leakage of lifting oil cylinder	Replace sealings
		Inadequate hydraulic oil	Add a proper amount of filtered hydraulic oil
		Inadequate battery voltage	Charge battery
		Oil pump motor damaged	Repair or replace
		Oil pump damaged	Repair or replace
		Lifting button switch damaged	Repair or replace
		Electric lock not opened or damaged	Repair or replace
		Serious undervoltage of battery	Charge
		Mast disformed due to overloading	Repair or replace
5	Lifting platform cannot lower after lifted	Mast disformed due to overloading	Repair or replace
		Solenoid valve of hydraulic pump out of control	Exclude solenoid valve fault

12.1 Methods for adjusting pressure of the relief valve

The pressure of relief valve has already been adjusted before the truck leaves the factory. The user is not allowed to adjust at will, otherwise it will cause danger for the hydraulic system and safety of the truck. If the oil pressure does not accord with the stipulated value, please adjust by professional personnel according to the following methods which conform to the testing methods stipulated in JB/T3300 standards:



1) Unscrew the high-pressure oil pipe, and mount a pressure gage with measuring range greater than 20Mpa on the exit of high-pressure oil.
2) Press the lifting operation button and measure the system pressure. The rated load is determined by each truck model.
3) When the oil pressure does not accord with the stipulated value, unscrew the locknut of relief valve, and adjust the pressure to the stipulated value by rotating the pressure-adjusting screw left/right. When the screw is adjusted inward, the system pressure will rise; when the screw is adjusted outward, the system pressure will fall.
4) Fasten the locknut after adjustment

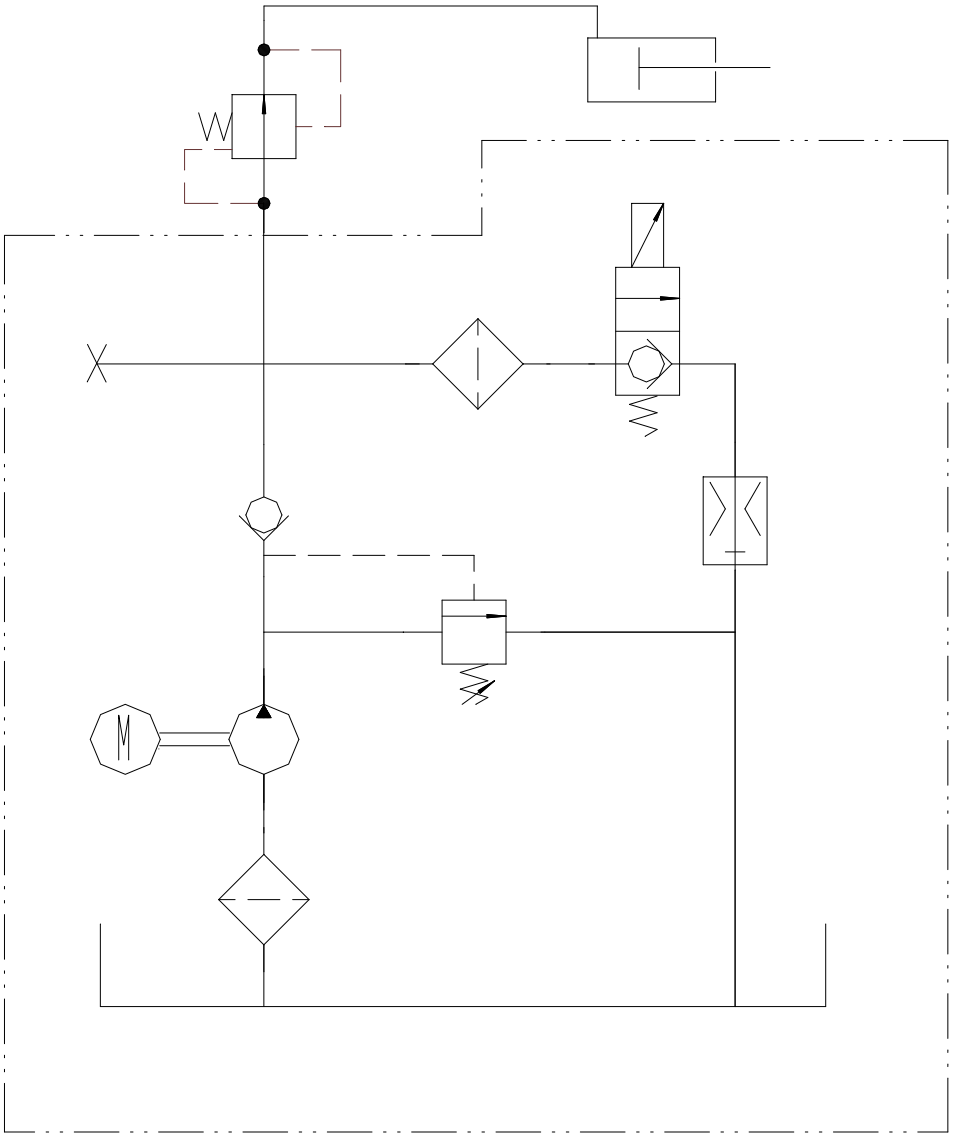
13. List of Accessories, Spare Parts and Wearing Parts

13.1 List of accessories, spare parts and wearing parts

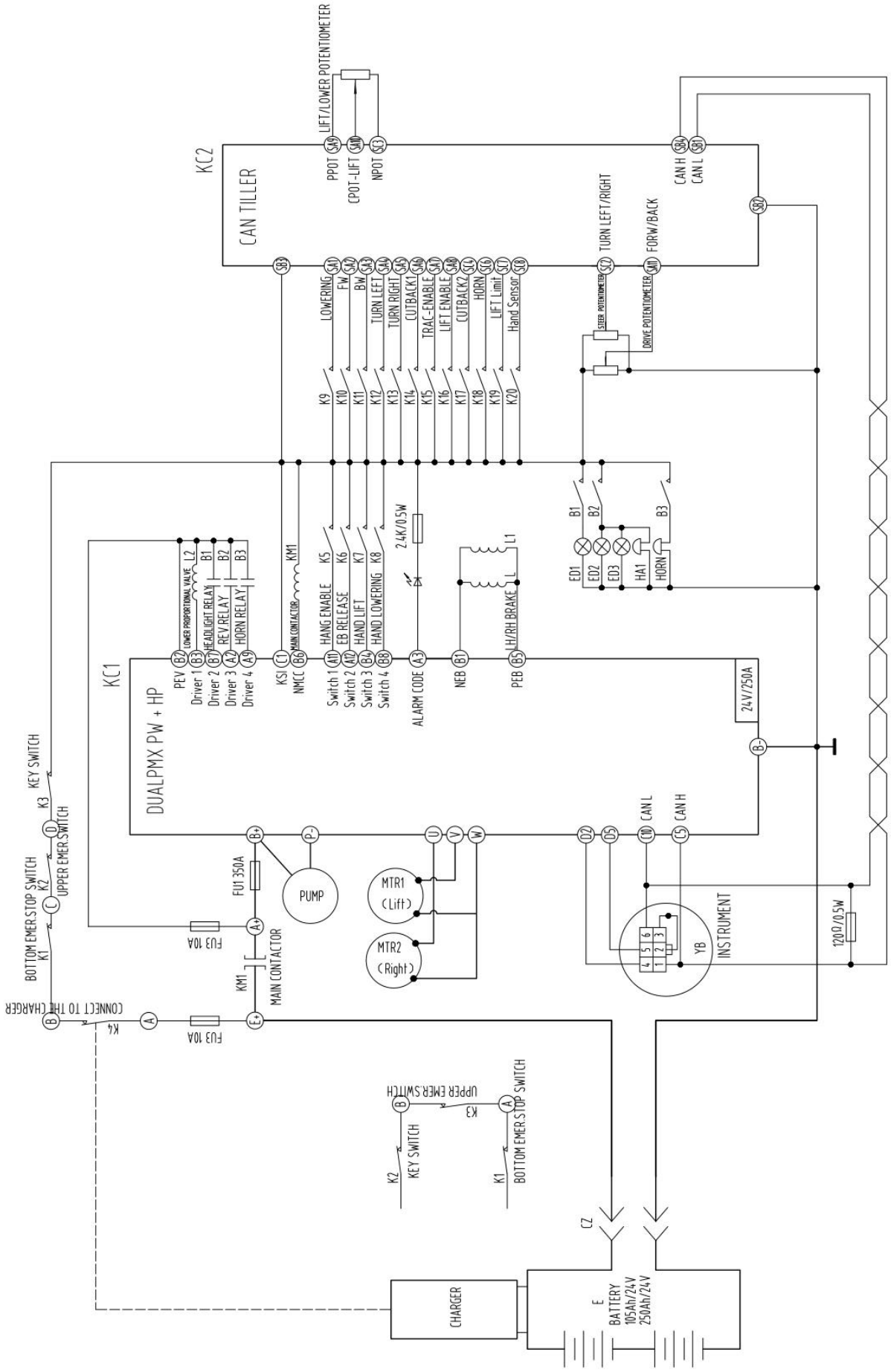
NO.	Name	Use position	Model & Specification	Q'ty	Remarks
1	Key	Open electric lock	JK219-1	2	
2	Fuse	Electric part	10A	2	
3	Seal ring	Oil cylinder	UHS45	1	
4	O-seal ring	Oil cylinder	54.5x3.55	1	
5	Combination ring	Oil cylinder inlet	D14	1	
6	Dust ring	Oil cylinder	DHS40	1	
7	Seal ring	Oil cylinder	UHS40	1	

14. Schematic Drawings of Main Components

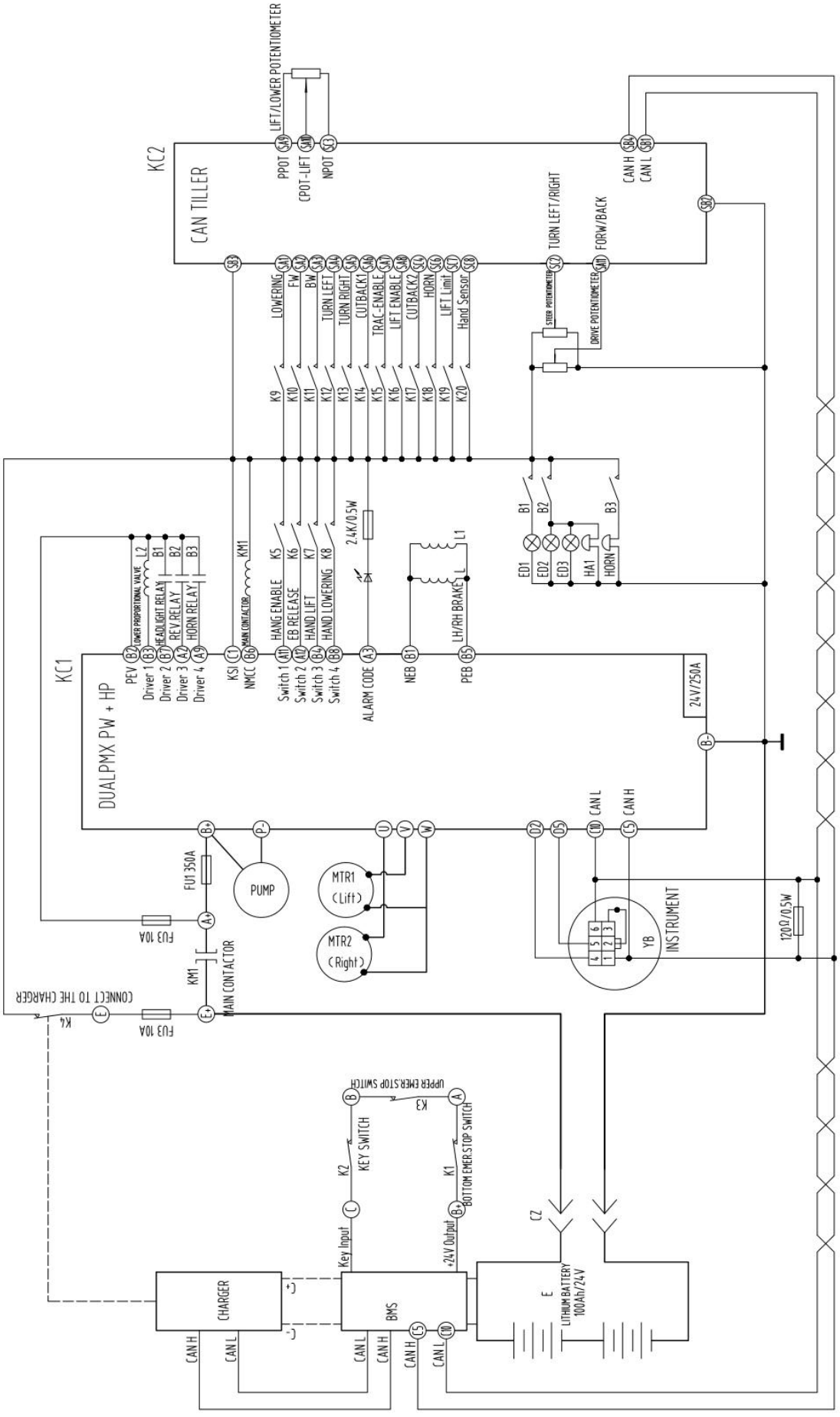
- **Hydraulic schematic drawing**



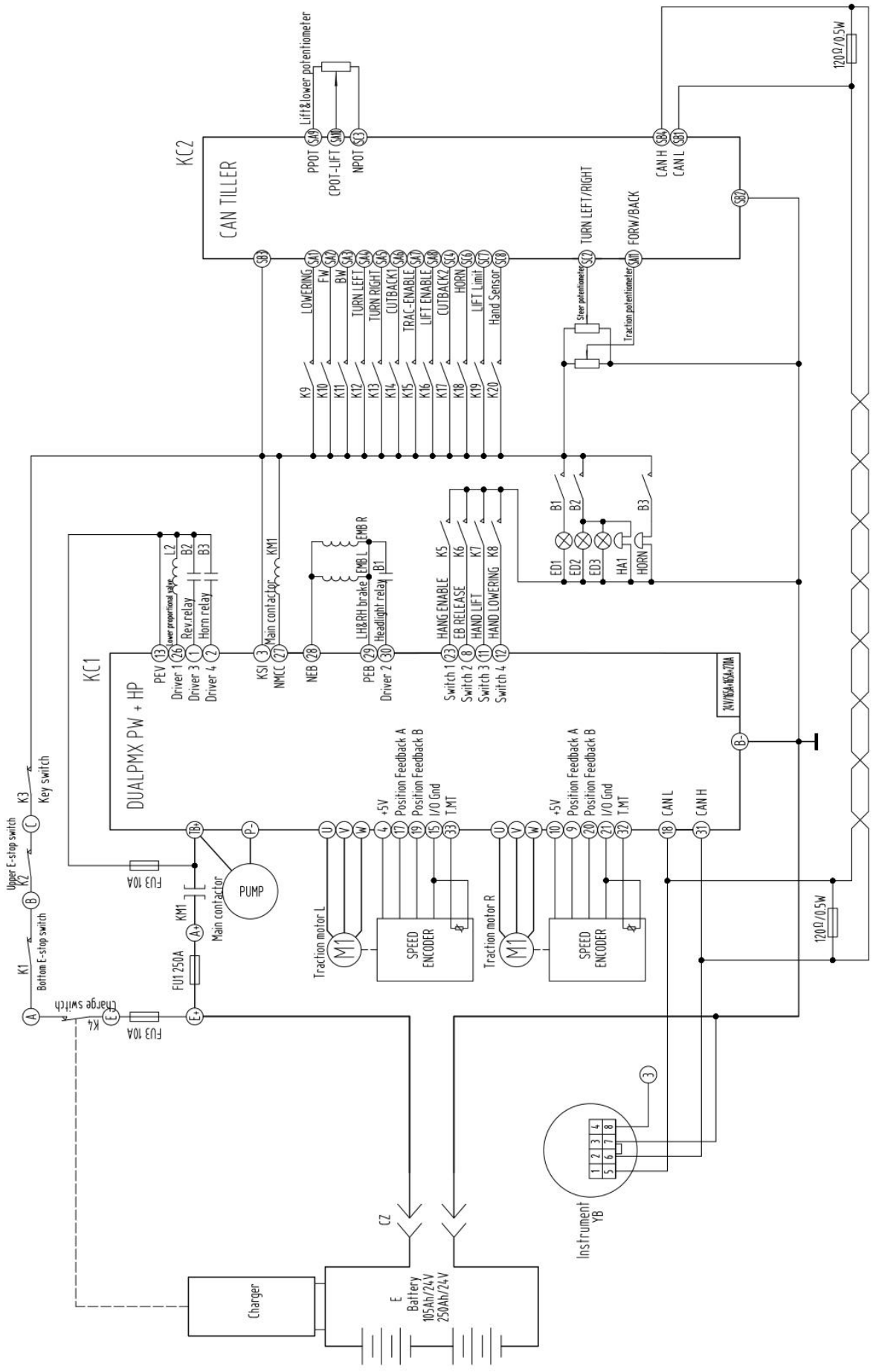
- **Lead-acid battery electrical schematic diagram（DC control system）**



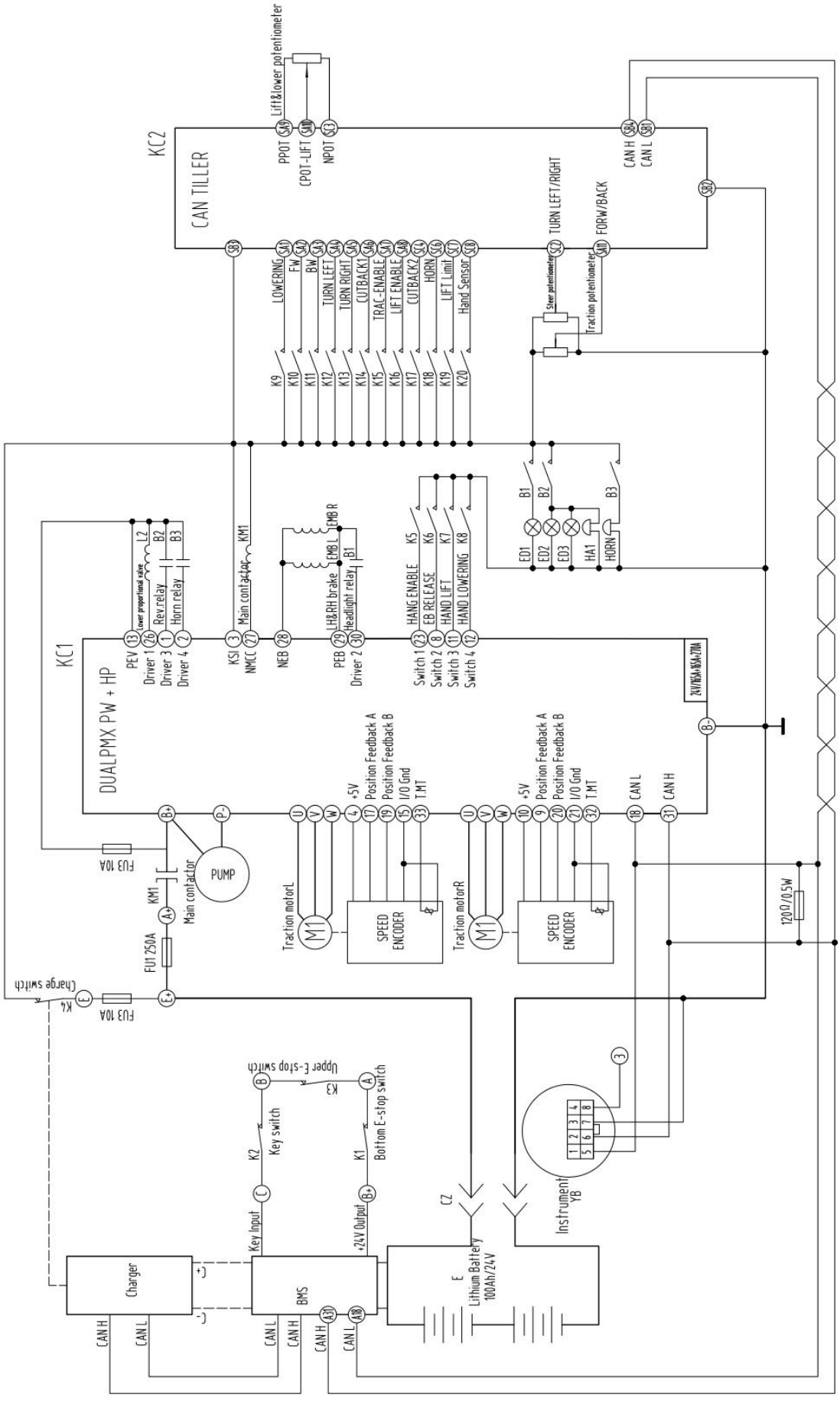
- **Lithium battery electrical schematic diagram（DC control system）**



- **Lead-acid battery electrical schematic diagram（AC control system）**



- **Lithium battery electrical schematic diagram（AC control system）**



15. Packing List

Packing List of Order Picker

Consignee: Manufacturing NO.:

Contract NO.: Date of production:

NO.	Name	Q'ty	Net weight (kg)	Outline dimension (l x w x h)	Remarks
1	Order picker	1			Whole machine
2	Accessory bag	1			Technical documents, accessories and spare parts within

Note: 1 The following documents are included in the technical file package:

① Operation manual of order picker 1 volume

② Packing list 1 piece

③ Certificate of quality 1 piece

2.Accessories and spare parts

NO.	Name	Use position	Model & Specification	Q'ty	Remarks
1	Key	Open electric lock	JK219-1	2	
2	Fuse	Electric part	10A	2	
3	Seal ring	Oil cylinder	UHS45	1	
4	O-seal ring	Oil cylinder	54.5x3.55	1	
5	Combination ring	Oil cylinder inlet	D14	1	
6	Dust ring	Oil cylinder	DHS40	1	
7	Seal ring	Oil cylinder	UHS40	1	

● Record card for repair and maintenance

Item	Time	Maintenance position	Material used	Personnel	Remarks

● Customer Feedback

Item	Time	Fault position	Cause	Troubleshooting	Remarks