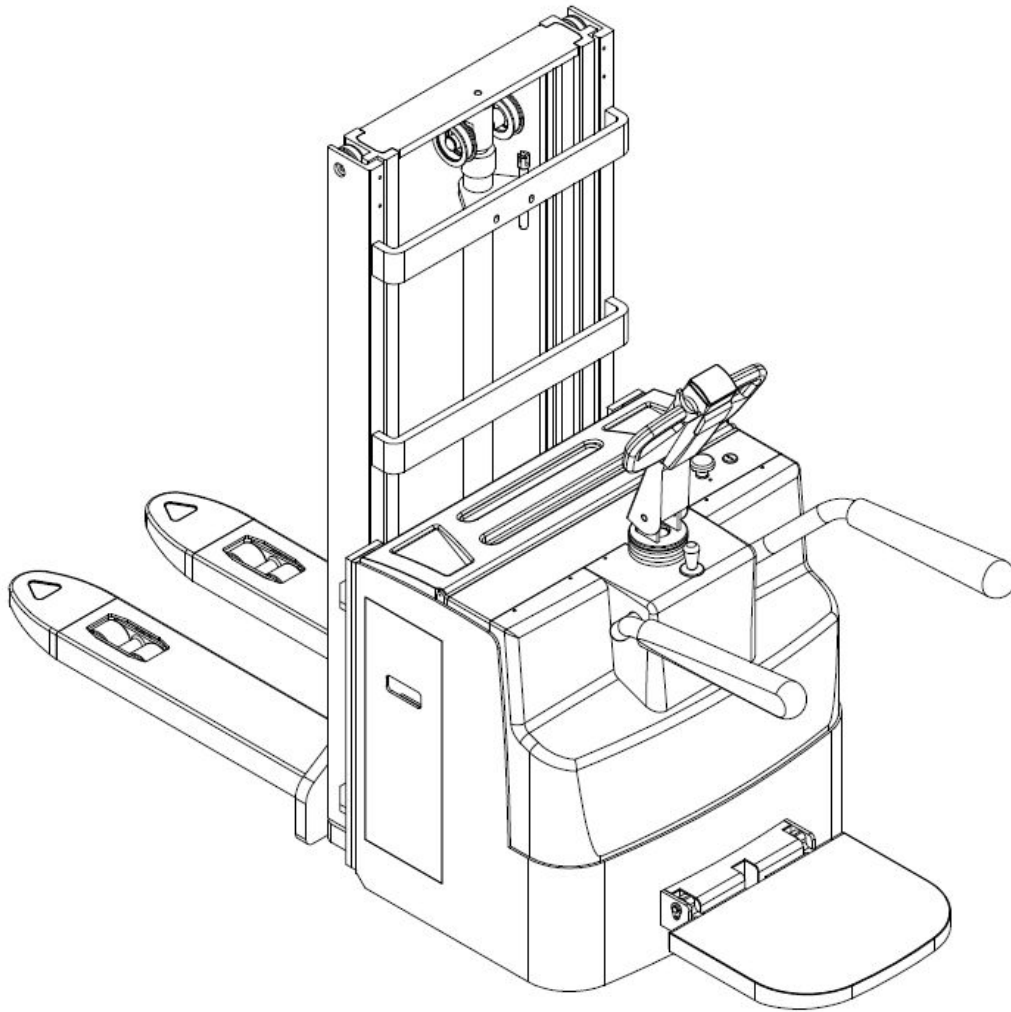




Niuli Machinery Manufacture CO.,Ltd

Operation and maintenance manual of electric pallet stacker



**You must fully understand this manual and the Warning label on the
equipment before operation**



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Foreword

Thank you for using our electric pallet stacker. The main purpose of writing this manual is to tell you how to fully understand and operate this model electric pallet stacker correctly, the possible problems in using process and the troubleshooting.

We sincerely suggest that you read though this manual and well remember all the contents, only in this way can make the machine reduce the faults and give full play to the highest function of safety under normal operation and proper maintenance. Refitting the vehicles privately by the user is forbidden, if cause any consequence, our company is not responsible for that. If every driver can do comply with the safety rules listed in this manual, we believe it has a great help for everyone's safety operation, we feel honor if you prevent the accidents in accordance with the safety regulations in this manual, it achieved our aim.

Please pay more attention to the black font part when you read this manual.

As our products are constantly being developed and renewed, we manufacturer reserves the right to modify our product design and specifications at any time without prior notice, if you want to know the latest product specifications, please contact with us. All of the information provided in this manual is based on the data available at the moment of we write this manual.

The majority of this stacker consists of steel, it can be completely recycled. Waste material in the process of using, maintenance, cleaning and disassembling must be collected and disposed of in an environment-friendly way and in accordance with the provisions of the local. Such work must be carried out in areas intended for this purpose by professionals, such as hydraulic oil, batteries and the electronic equipment waste will have a negative effect on the environment, or health, if handled incorrectly.



1. Safety operation regulation

1.1 Driver requirements: the stacker must be operated by the special trained personnel, he well known all the operations and can tell other people how to operate the stacker clearly.

1.2 Rights, obligations and responsibility of the driver: Drivers must be clear of his rights and obligations: if you have got through the truck operation training already, you must be familiar with the contents of the relevant operating instructions at the same time. If the stacker is walking type, the driver also must wear safety shoes during operation.

1.3 Do not operate without authority: the driver must be responsible for the stacker during the work; he must prevent the unauthorized personnel to drive or operate the stacker.

1.4 Fault and defect: the stacker failure or defects must be notified the managerial personnel immediately. It must stop using if the stacker can not be operated safely (for example: the wheel wears or brake failure) until it was completely repaired.

1.5 Safety operation and environmental protection:
Safety operation and environmental protection: the inspection and maintenance must be executed in accordance with the time interval of the content on the maintenance list. The components and parts of the stacker can not be changed without permission, especially for the safety device, operating speed of the stacker must not be changed. All the original spare parts have been inspected by the quality assurance department, in order to ensure the safety and reliability of the stacker operations; you must only use the stacker manufacturer's spare parts. The replacement of the parts, for example the oil and the fuel, must be handled in accordance with the relevant environmental protection rules.

1.6 Dangerous area: The dangerous areas always refer to the following scope: the stacker or its load lifting device has danger to people when running or lifting, or the area is ongoing the transportation load. Usually this scope extends to load landing or the area of the stacker accessories landing.

Unauthorized personnel must leave the dangerous area. The drivers



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must give warning if the situation may cause some kind of injury to the personnel, if the drivers asked the people to leave but he did not leave the dangerous area, the stacker must be stopped immediately.

It may squeeze or cut the personnel when use the stacker.

1.7 High-risk environment: the operation, use and maintenance of the stacker must base on the information of this manual. Any other functions are not listed may cause damage to the people or the stacker. First, avoid overload or unbalanced load. Please do not exceed the rated load of the stacker. Maximum load marked on the nameplate. Stacker can not be used in corrosive or very dirty areas, if use in flammable environments, it may cause an explosion.

Notice: no special design for the special environment for this truck.

1.8 Safety device and warning signs: safety device 、 warning signs and the warning notice mentioned earlier in the operating instructions must cause enough attention.

1.9 Driving in public places: the stacker is only can be used in special places, the public place is prohibited.

1.10 The distance between the stackers: please remember, the stacker in front of you may stop suddenly at any time, so please keep the proper distance.

1.11 Passenger: it is forbidden to carry or lift personnel.

1.12 Free height: it is prohibited to use the stacker in the environment that the cargo and the mast lower then the free height.

1.13 Use in the elevator and operation of the loading platform: if the carrying capacity is enough and does not affect the operation of the stacker, also with the approval of the stacker's user, the elevator and loading platform can be used to transport stacker. The stacker drivers must confirm personally before entering the elevator or the loading platform. The cargos must be put in the front and occupy a proper place when the stacker entering the elevator, so as not to touch the wall around the elevator. When the people and the stacker take the elevator together, the people must enter after the stacker entered and stopped safely, the people must before the stacker when to leave.

1.14 Travel Channel and working area: the stacker must park in specially designated channel, non-related personnel must leave the working area, and the cargo should be stacked in the designated places.

1.15 Operations management: the traveling speed must be



adapted to the local conditions. The truck must slow down when pass through the corners, narrow aisle, revolving door, and obstructed places. The driver must be able to gauge the enough braking distance between your stacker and the stacker in front of you; at the same time, drivers must always control his stacker. Suddenly stop (unless urgent need), quickly reverse turn and chasing each other in the obstructed places are prohibited. It is forbidden to hang out to operate the truck.

1.16 Visibility: In order to insure that the channel in front of you is clearly visible, the operator must pay attention on the driving direction. If invisible because of the delivered cargo, the second person must walk in front of the stacker and give the appropriate guidance and warning.

1.17 passed slope: it is only allowed to pass the known slope, the slope should be clean, non-slip and the technical specifications allow the stacker to pass this slope. The heavy objects on the forks must face the down slope. It is not allowed to turn around, move diagonally or park on the slope. You must be slowly and be ready to brake at any time when pass the slope.

1.18 Load of the ground: please pay attention to the stacker when working, body weight, the load capacity or the pressure of the wheels to the ground does not exceed the capacity of the ground.

1.19 Transportation : in addition to handle the goods, the forks should be kept less than 300mm during the operation. In order to get a good view and mobility, you'd better drive the stacker in the opposite direction of the fork. The fork forward operator type may lead to unpredictable mobility problems.

1.20 speed: in according to the ground conditions, follow the visibility and the principles of safe operation to choose the right driving speed. During operation, the movements of sudden acceleration, stop, sharp reversal, etc may result in the overturning of goods as well as body are prohibited.

1.21 Driving on the loading platform or approach bridge: please check maximum load capacity of approach bridge and the device to prevent the approach bridge of sliding when drive to the loading platform or the approach bridge of another truck. The operators must check the maximum load capacity of the truck and the device to prevent the truck of sliding.

1.22 Safe parking: caution when stop, the truck can not be parked on the slope and grade. The forks must be completely dropped to the



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lowest position after parking, in order to avoid the unauthorized personnel operating the stacker; you must turn off the electricity lock switch and remove the key. If there is a longer time before you use the stacker again, please disconnect the battery line for sure.

1.23 Signal: the truck horn can be used to send warning signal.

1.24 Protective shoes: in accordance with the European EN - 345-1 - S1 technical standard, you must wear standard protective shoes when working on the stacker.

1.25 Car changes: any change or alter may have influence on the rated load, stability and safe operation must permitted by the written approval of the original stacker manufacture or its replacement in advance. Nameplates, labels and markings, operation and maintenance manual should be correspondingly changed after the change and alter are approved by the stacker manufacture.

If the stacker manufacture has not exist already, and there is no replacement, following are the steps for the user to change the truck:

A. Please change and alter after arrange an industrial truck to design and test by the security experts.

B. Make a permanent record of design, test and complement for the change and alter.

C. The label of rated load, designs, markings and operation and maintenance manual must be correspondingly changed.

D. Stick a permanent and well-marked label on the truck to indicate the change parts, change time and change people or organization.

If you do not follow these instructions and cause damage to the truck, you will lose the quality assurance. This also applies to the illegal export products of the customer or a third party without the permission of the manufacturer.



2. Technical Manual

This series of electric pallet stacker is suitable for short distance or middle distance cargo handling and stacker operations.

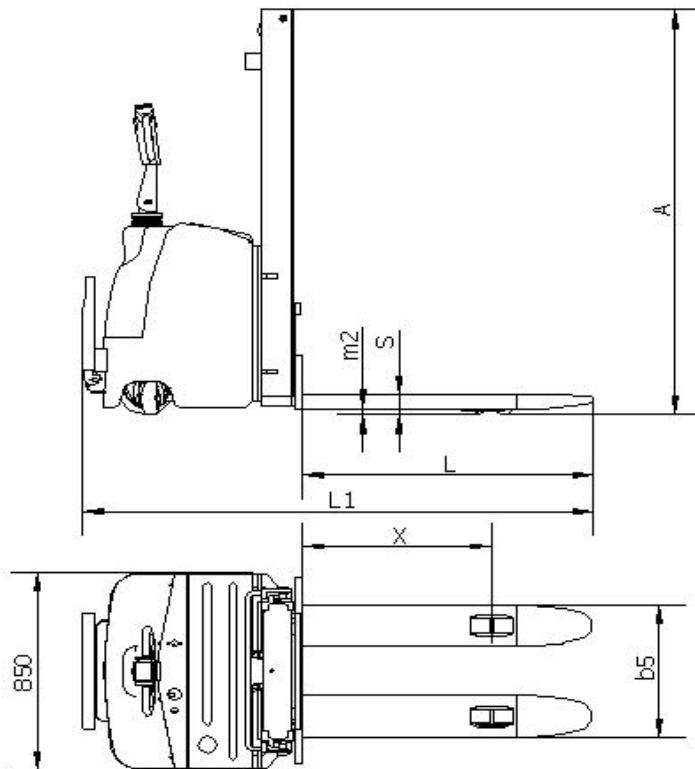
2.1 Technical parameter:

character	1.1	Model		CTQN15	CTQN15
	1.2	Capacity	kg	1500	2000
	1.3	Load center	mm	500	500
	1.4	Power Type		Electric	Electric
	1.5	Control Type		Standing Steer Type	Standing Steer Type
	1.6	Front overhang X	mm	747	747
	1.7	Wheelbase	mm	1362	1417
	1.8	Unloaded Wight(without battery)	kg	1100	1140
wheels	2.1	dimension of driving wheel	mm	φ230×75	φ230×75
	2.2	dimension of load wheel	mm	φ80×60	φ80×60
	2.3	dimension of balance wheel	mm	φ140×55	φ140×55
	2.4	track distance of load wheel	mm	390/500	390/500
	2.5	track distance of balance wheel	mm	680	680
dimension	3.1	lifting height (range)	mm	2500-4000	2500-5000
	3.2	S mast lowered height	mm	<90	
	3.3	overall length L1	mm	2020	2070
	3.4	overall width	mm	850	850
	3.5	Fork Dimensions	mm	1150×180×60	
	3.6	minimum ground clearance	mm	20	



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	3.7	Outer width of fork	mm	570/680	
	3.8	Turning Radius	mm	1675/2080	1630/2030
performance	4.1	lifting speed (with load/ without load)	mm/s	90/150	120/185
	4.2	lowering speed(with load/ without load)	mm/s	240/100	200/100
	4.3	Gradability	%	3/5	
electrical	5.1	Driving Motor Power	kw	1.5	1.5
	5.2	Lifting Motor Power	kw	2.2	3
	5.3	Battery Specification		24V/240Ah	24V/240Ah
	5.4	Battery Weight	kg	220	220
	6.1	Noise level at driver's ear	dB	<70	<70



This table was made in accordance with regulations VDI2198; only



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provide the technical parameters of the standard stacker. The technical parameter of the non-standard stacker and the stacker with accessory or other optional attachments is different from the table above. We reserve the right to update these technical parameters of the stacker.

2.2 Technical standards:

Continuous noise level must be < 70 db, refer to ISO4871 standards.

Noise level is the average value measured in the process of driving, lifting and idling according to the standard, the measuring position is in the operator's ear.

Electromagnetic Compatibility (EMC)

Manufacture confirm the stacker is up to the EN 12895 and relevant standards about the limit of electromagnetic radiation, electromagnetic interference, electrostatic discharge testing has been carried out at the same time. You can change the components of the electric system only after you get the written approval of the manufacture.

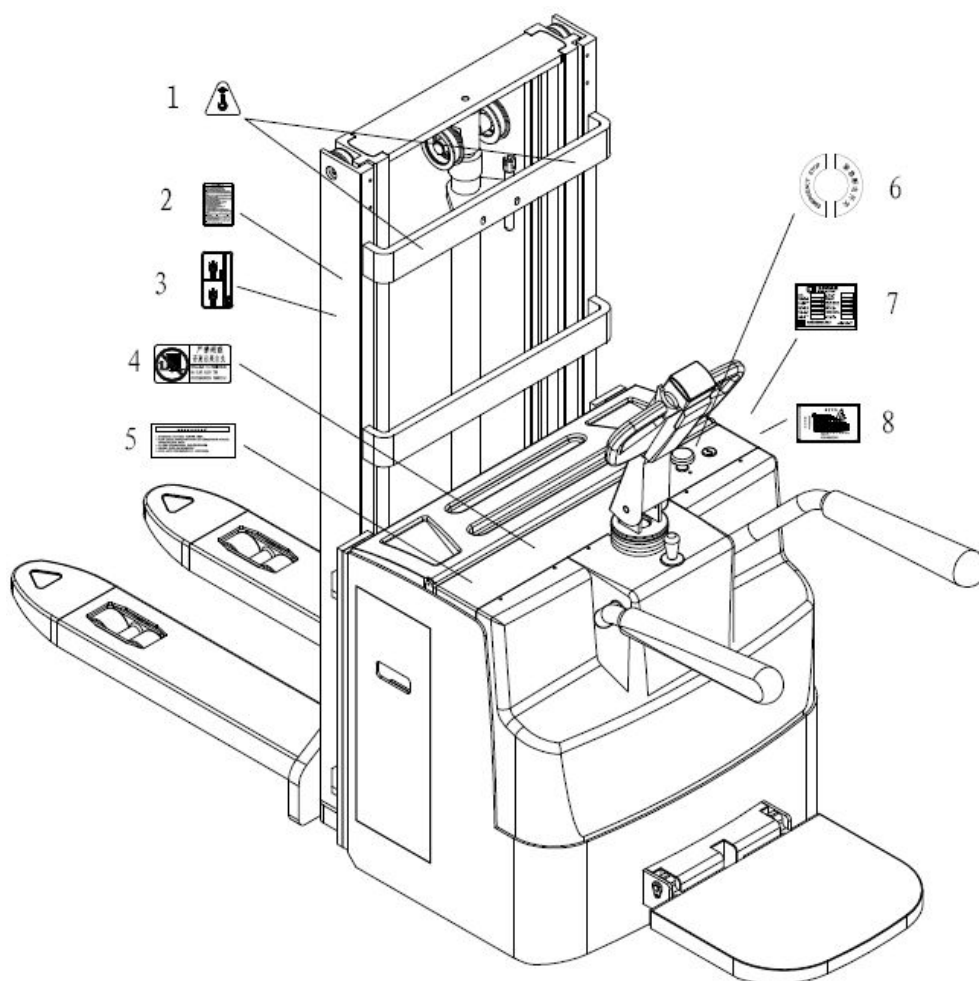
2.3 Applicable condition

Use environment temperature: $5^{\circ}\text{C} \sim 40^{\circ}\text{C}$.

Some special instruments must taken when the truck work under the environment of the temperature is below 5 degrees or the heavy moisture.

Height above sea level: $< 2000\text{m}$

2.4 Location and description of the marks:



No.	name	quantity	Remark
1	Lifting logo	2	bilateral symmetry
2	Notice of the forklift	1	
3	Warning logo	2	bilateral symmetry
4	Overload forbidden logo	1	
5	Charging identifier	1	
6	power-off switch logo	1	
7	Nameplate	1	
8	Load Curve	1	

As the appearance of various models is different, the labeling position may change slightly, it will be subject to the actual stacker.

If the stacker has quality problem or you need to order the parts, please indicate the manufacturing number on the nameplate of the stacker.



3. Transportation and trial run

3.1 using the lifting equipment to transport:

The lifting equipment should have enough carrying capacity (delivery weight= the net weight of the stacker + battery weight, net weight of the stacker and the battery weight are on the nameplate)

- Park the truck in the safe place.
- The focus of the lifting equipment must be tied to the lifting position.

The focus of the lifting equipment must be tied to the lifting position and make sure it will not slip; the lifting equipment must attach to the lifting position and can not touch the stacker.

3.2 Trial run:

The stacker only can use the battery as the power, change to the AC will damage the electrical circuit, and the cable to connect the battery is less than six meters.

In order to make the stacker can work normally after the delivery and transportation; the following operations must be completed:

- Make sure all the nameplates are on the right position and can be seen clearly before you use, or you should replace the new one.
- check whether all the components of the truck are in its integrity and meet the requirements or not.
- If necessary, the cable of the battery can not be damaged when install the battery.
- Charge the battery immediately.
- If the consumers want to replace it with a free maintenance battery, he should check whether the electricity meter model of the battery match the battery (or get the after-sales service personnel's permission of the manufacture)

3.3 Move the stacker in case of the drive failure.

The stacker only can be moved after electromagnetic brake release when in an emergency.

- **Press the emergency stop button, turn off the power switch and pull out the key**
- Open the electrical cover.
- Counter-clockwise rotation of the 3 screws on drive motor until the electromagnetic brake does not work.

Now, you can drag the stacker. The electromagnetic brake should be recovered when arrived in the destination.

This operation can not be carried out on the sloping roads and slopes.



4. The battery

4.1 Lead-acid battery safe operating procedures:

Please insure the stacker parked well and in a safe place before carrying out any operation on the stacker.

4.1.1 Maintenance personnel:

The charging、maintenance and replacement of the battery must be carried out by the qualified personnel. You must read the instructions, including maintenance manual, supplies to prepare and the charging requirements carefully before operation.

4.1.2 Fire protection measures:

No smoking and open flame on site when operation on the battery. The battery should be charged in time and far away from the flammable objects, the distance should be kept at least 2 meters, the place to store the battery must be well ventilated and equipped with fire-fighting facilities.

4.1.3 Maintenance of the battery:

1) screws on each unit need to be kept dry and clean, in order to prevent corrosion, tighten every terminal and cable ends then use the brush to paint the clean grease on them. The exposed terminal and the binding post must be covered by a non-slip insulating cover.

2) cable contactor of each two units should be good contact. Check if there is any loose for every nuts of the pole, if have, must tighten.

3) keep the surface of the battery clean and dry. Use the cotton yarn or the brush to clean the spilled acid liquid, if necessary, wet towel can be used to clean.

4) Batteries should be avoid over-charge and over-discharge, fast charging and insufficient charge should be prohibited, or that may affect battery life;

5) it is not allowed to put the conductive objects on the surface of the battery (including metal tools), or they may cause the short-circuit of the battery, even an explosion.

6) spilling the harmful liquid substance or solid substance on the surface of the battery is prohibited. Clean the surface, no any impurities when use the density meter or the thermometer.

7) the discharged battery should be charged immediately, you can not delay more then 24 hours, or it may damage the battery. In the cold weather, the battery in the outside may not be charged; you should move it into the warm place.

8) The battery should be full charged once a month at least when



not in use for a long time.

9) In the process of charging or use, due to water evaporation, electrolyte level is low, please add distilled water. Electrolyte is not allowed.

10) you should check the cause of the fault and the failed unit when individual unit fails, repaired soon, or replace when can not be repaired.

11) in order to avoid hydrogen explosion, well ventilated, no smoking and no open flame on site when charging.

12) Electrolyte in the battery is toxic and corrosive, whatever operate in any condition, you must wear work clothes and protective glasses, avoid body contact and damage.

13) if your clothes, skin or eyes stained with acid liquid, please use plenty of water to wash them immediately, if necessary, go to the hospital soon. Please handle the spilled acid liquid with the neutralization method.

14) the weight and the size of the battery have a great influence on the stability of the stacker, you can not change the model of the battery until you get the approve of the manufacture.

15) large current discharge is prohibited, the driving and lifting can not be performed simultaneously.

Insure safety operation; please install the battery cover before using the stacker.

4.1.4 Disposal of waste batteries:

The scrapped battery must be recycled in accordance with the relevant laws in the local place and be stored in the required environmental area or the required disposal area; these works must be carried out by a qualified professional firm.

4.2 specification of the battery and the matching charger:

battery		charger	
rated voltage: 24V	rated capacity: 165Ah	input: 220V, 50HZ	output: 24V30A
	rated capacity: 210Ah		
	rated capacity: 270Ah		output: 24V40A

The non-insulated battery binding post must be covered with an insulating cover. The stacker must be in disconnected state and the switch must be in off position when connect the battery or connect the plug. You must insure the battery is fixed in the battery box when you replace it or assemble it.



4.3 storage and installation of the battery:

The stacker must be parked on a level surface. To avoid a short circuit, the battery terminals and exposed binding post must be covered with insulating cover. When the battery is removed, the removed battery connectors and cables must be placed properly, they shall not impede the access to the battery.

When handling the battery lifting device, make sure the lifting device has sufficient load capacity (the battery weight is indicated on the battery and nameplate of the stacker). The lifting device must pull in the vertical direction, so as to avoid damage to the battery box. The hook lifting devices must be safely, the hook must not fall in the single battery of the battery pack.

- Press the emergency power-off switch and turn the power switch to the off position.
- Open the connector of the battery cable.
- Connecting the lifting device to the lifting hole;
- Hanging out directly above the battery, remove it with the handling equipment.
- The installation process is in accordance with the opposite step.

Insure the battery placed correctly and the connection is reliable. Check all the connections of the cables and plugs for damage after reinstallation.

4.4 Battery power display (electricity meter) :

Battery power display: the discharging of the battery will display on the table in each grid with a 10% increase in the amount of 10 display bar. With the consumption of battery capacity, this shiny display bar will change from the more to the less.

When the battery's remaining power in the following cases, pre-designed "WARNING" mark will appear: 30% of the standard Battery, "Warning" mark will appear, and then you can charge the battery.

When the battery's remaining power in the following cases, the pre-designed "WARNING" mark and a flashing "stop" mark will appear: 20% battery remaining, the "Stop" mark appears, and remains lit when "stop" mark is displayed, the lifting function of the truck will be locked and switched off automatically.



If the electricity meter shows the lack of the electricity soon after lifting the heavy weights, only when the battery recharged to 70% capacity, the lifting function will be regained.

4.5 charging:

Our electric stacker was equipped with dedicated charger.

Please read the battery instruction manual carefully before you charge.

Keep well ventilated when charging the battery. Insure there are no metal objects placed on the battery; check if there are obvious defects on all the connection parts of the cables and plugs. All safety instructions such as battery recharge provisions, battery charging preparation should be complied with strictly.

4.5.1 Equalizing charge

Battery used after a period, the battery voltage and concentration of electrolyte between every battery will be different. By equalizing charge can eliminate this difference, thus maintaining the battery performance

Equalizing charge is required in following situations:

- the voltage of the single battery often below 1.7V;
- the heavier load battery pack (for example: the battery pack which supply the power to start motor and lifting motor)
- the battery pack without recharge in time after discharge.
- the battery discharged excessively or is not used for a long time.

Equalizing charge steps:

A、 charging with 0.1I₅A current

B、 Voltage reaches 2.5V, halved current((ie 0.05I₅A) to continue charging when there are bubbles in the electrolyte.

C、 stop 0.5 hours when in fully charged state, then halved current (ie 0.025I₅A) to charge one hour.

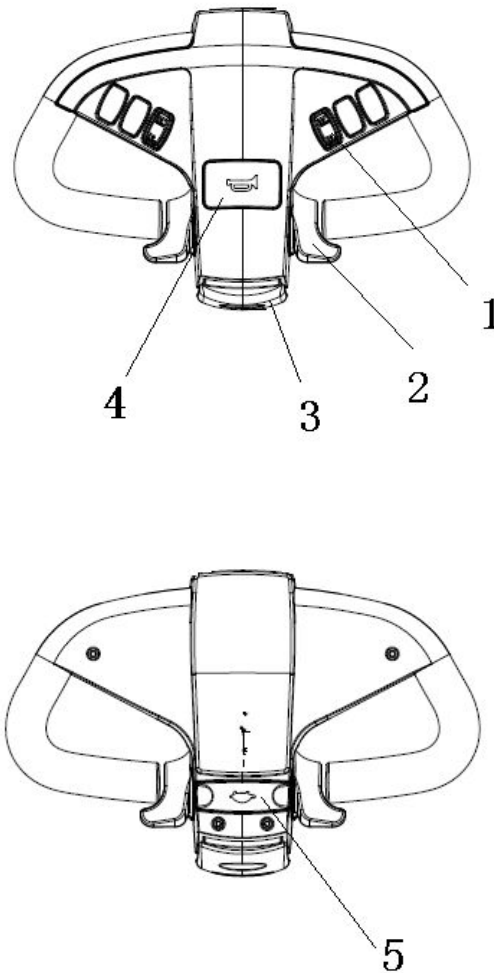
D 、 stop 0.5 hours again, then charge one hour with 0.025I₅A current.

E、 repeat D step until there are many bubbles in a closed switch battery charging machine

Normally used battery should have an equalizing charge once a month.

5. Operations

5.1 The schematic diagram of handle



1. Button of lifting and dropping
2. Knob of back and forward
3. Emergency reverse switch
4. The horn switch
5. Turtle speed switch (on the back)

5.2 starting the stacker:

You must insure there is nobody in the dangerous zone before you start and operate or lifting the weights.

Daily checks before starting:

- Check the appearance of the entire stacker for any damage (especially the wheels and lifting accessories);
- Check the battery is solid, cable connection is good.



starting the truck:

- turn on the emergency stop switch;
 - Put the key into the electric switch and rotate to the right position.
 - waiting for the electricity meter show the current capacity;
 - Check horn function is normal;
 - Check the brake function of the Control handle is normal;
- Now, the preparation before starting is completed.

5.3 operation of the stacker:

5.3.1 operation of starting 、 driving and parking:

You should be careful when starting and driving, especially when the driver's body parts protruding stacker contours, you can not take any other people in the stacker during operation.

Emergency stop:

Press the emergency power-off switch which would cut off all the electrical control functions

Forced braking;

The stacker will brake (emergency stop) automatically when release the control handle. The control handle will go into the brake rang automatically.

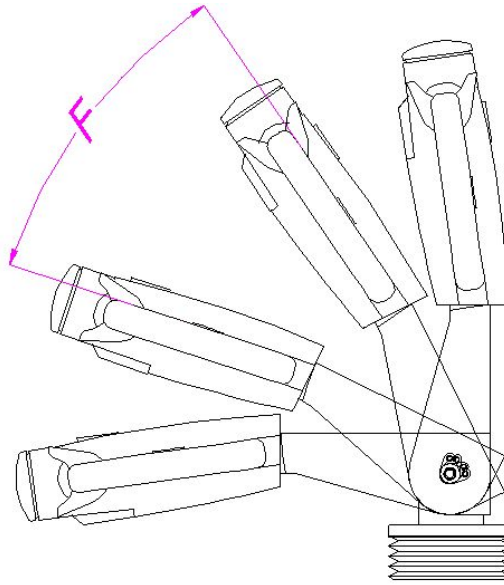
If the control handle go into the brake range slowly, so find out the reason and repair it, if necessary, replace the gas spring of the control handle.

Starting:

Please insure the battery box is closed and be in a reliable situation when you starting.

The speed of the stacker depends on the controller.

Rotate the control handle to the driving regions within "F" , adjust the control handle to the direction you need, and then turn the forward and back knob , the stacker will move in the direction you choose .

**Direction control :**

Control the direction by turning the handle to the right or left.

When the truck meet the obstacles, the operation force should be smaller then that operating the truck under normal conditions. In this case, turn the steering wheel / steering arm carefully, make the truck backward and forward carefully then try to get rid of the obstacles.

Slope traveling:

The goods must below the slope when deliver the goods on the slope.

Please take the safety measures when the stacker going downhill: pluck the handle back forward quickly, the driver can control the downhill speed by releasing the brake in accordance with your need.

When the stacker overturns, the operator should leave the truck timely.

Brake:

The driver must clear on that the brake performance depends on the ground conditions.

Stacker brake in three ways:

- using electromagnetic brake (control handle);
- Using reverse current brake (forward and backward knob);
- using the inertia brake (release type brake).

Using electromagnetic brake:

In an emergency situation, you must use the electromagnetic brake, the specific methods of operation are: up or down rotating the operating handle to the brake range (out of F range) rapidly, then the electromagnetic brake applied and the motor axis is mechanical lock.

Using reverse current brake:



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If the control system or the drive power fails, then it is possible to use reverse current brake. Specific methods of operation are: rotating the "forward and back knob" in the opposite direction of the truck traveling direction, until the truck stop. Then release the knob. Braking time depends on the displacement of the knob.

Using the inertia brake:

When the "forward and back button" to be released into the zero position, relying on the inertia of the motor to brake.

This function can be canceled; the brake can only use the first two methods when this function is canceled.

5.3.2 The operation of lifting or lowering the goods:

The operator must confirm the goods completely on pallets before lifting, the weight of the goods does not exceed the capacity of the stacker pallets, the stacker is not allowed to deliver the goods full load for a long-term, the stacker pallets should under the goods as possible.

The speed is constant when lifting or lowering.

Lifting the goods:

Press the control key "fork up", release the key until the forks reach the height you want.

Lowering the goods:

Press the control key "fork down", release the key until the forks lower the height you want.

When lifting or lowering the forks, standing under the forks is prohibited. Prevent the people from being squeezed or cut.

If you need to install the backrest, then the height 、 width and the open dimension of the backrest must minimize the possibility that the load move to the mast. Backrest should not obstruct the view, open dimension should not exceed 150mm.

5.3.3 Safe stop:

Pay attention to safety when parking, you'd better park in the required space, the truck must not be parked on the slope, the forks must in the lowest position after parking. Press the emergency stop switch, and remove the key.



6. Maintenance of electric pallet stacker

The parts of the stacker, especially the safety device, can not be changed without permission; the operating speed of the stacker must not be allowed to change. In order to insure the safety and reliability, all original spare parts have been verified by quality assurance department, so you must only use the manufacturer's spare parts. The replaced parts such as oils and fuels must be processed in accordance with appropriate environmental protection rules.

6.1 Safety procedures of maintenance and repair:

Maintenance personnel: stacker repair and maintenance must be carried out by the specialized personnel which trained by the manufacturer. The service agency of the manufacturer has a special technician there, so they can be entrusted to sign on the maintenance record in the maintenance division which is appointed by the manufacturer.

Stacker lift: When a stacker is to be lifted, the lifting device must be safe and reliable, especially the lifting point. When the stacker is lifted, it must take appropriate measures to prevent the truck from slipping or tipping (wedges, wooden blocks can be used).the lifting device can be used to lift only when the fork fixed and the rope connected with sufficient strength.

Cleaning: Never use the flammable liquids to clean the stacker, the safety measures must be taken to prevent sparking (eg: caused by a short circuit) before cleaning. The plug of the battery must be removed when operating the battery. Only weak suction air and compressed air, non-conductive and antistatic brush can be used for cleaning electrical or electronic components.

If use water spray or high pressure cleaner to clean the stacker, all electrical and electronic components must be covered carefully, the wet may cause functional errors. Steam nozzle is not allowed to clean the stacker.

Operations of electrical system: the electrical system only can be operated by the professional personnel, all the safety measures must be taken to prevent the electric shock before operating the electrical system. Please separate the battery connector to cut off the power of the stacker before operating the battery.

Traction motor and lift motor are short-time work, the traction motor: S2 = 60min, lift motor: S3 15%.

Welding operations: in order to prevent the damage to the electric



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or electrical components, these components must be removed from the stacker before welding operations.

Installation: you must ensure that hydraulic components, electrical, electronics or components are installed in the original position when repairing or replacing them.

Wheels: The quality of wheels has a great influence on the stability and driving performance of the stacker. It can be changed after consultation with the manufacturer. You must keep the original balance of the stacker when replace the wheels (wheel must be replaced in pairs, for example: left and right together).

Lifting chains and rollers: if no good lubrication, the chains and rollers will wear quickly. Please have a cyclical lubrication in accordance with the requirements of the maintenance table below, lubrication cycle should be shorten when working in a poor condition (for example: dust and high temperature)

Hydraulic tubing: if the hydraulic tubing is damaged or aging, you must replace it.

6.2 Daily maintenance (before work):

6.2.1 Check the electrolyte liquid surface of the battery is level or not.

The liquid level will rise when charging.

6.2.2 Check every poles, cable and protective cover of the battery.

6.2.3 Check the battery is fixed firmly or not.

6.2.4 Check the oil leakage of the stacker.

6.2.5 Check the lifting chain, roller, pallet fork, oil tubing and horn.

6.2.6 Check the brake.

6.2.7 Check the wear condition of the driving wheel and load wheel.

6.3 Repairs and checking:

Comprehensive and professional maintenance of the stacker is a important preparation for the safe operation .it will lead to a stacker failure and has potential dangerous to the equipment and personnel if you do not maintain the stacker according to the Specified intervals. Maintenance cycle on the instructions refers to a single shift operation under normal operating conditions. If in dusty environments, or in which the environment temperature change is larger, in multi-shift operation situation, the maintenance cycle must be shortened.

Operate and execute according to the maintenance list below and comply with their maintenance cycle, following the maintenance cycle details:

1W = work 50 hours per week, maintain once a week at least.

3M = work every 500 hours, maintain once every three months at least.



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6M = work every 1000 hours, maintain once every six months at least.

12M = work every 2000 hours, maintain once every year at least.

In the commissioning phase of the truck, following are the extra operations will be finished:

(In the first 50 to 100 hours or after 2 months)

- Check the wheel bolts are loose, if loose, tighten;
- Check the hydraulic fittings for leaks, if necessary, tighten.
- Replace the hydraulic oil filter.

Maintenance list:

Item	Line Item	Specific description	Maintenance time			
			1W	3M	6M	12M
Chassis and Frame	1.1	Check all load bearing components for damage		▲		
	1.2	check all bolt connections		▲		
Driving part	2.1	check the noise and the leakage of the transmission system		▲		
	2.2	check the oil amount of the transmission system		▲		
	2.3	Replacement of oil			●	▲
wheel	3.1	check for wear and damage		▲		
	3.2	check the bearings in the wheel work closely with the wheels		▲		
Steering system	4.1	Check the steering system		▲		
brake system	5.1	Check the performance and regulation	●	▲		
	5.2	Check the gas spring reset function is appropriate		▲		
	5.3	Check the brakes for wear		▲		
	5.4	Check the brake cable connection		▲		



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Lifting device	6.1	Checking performance, wear and adjustment		▲		
	6.2	Check the forks for wear and damage	●	▲		
Hydraulic system	7.1	Performance Testing	●	▲		
	7.2	check all connections for leakage and damage	●	▲		
	7.3	Check the hydraulic cylinder for leakage and damage	●	▲		
	7.4	check the oil amount	●	▲		
	7.5	Replace hydraulic oil and filter			●	▲
	7.6	Check the pressure regulating valve parameters are correct			●	▲
Electrical system	8.1	Check the cable connection is reliable		▲		
	8.2	Check the contactor wear degree		▲		
	8.3	Check the warning devices function is correct	●	▲		
	8.4	check the wear condition of the motor carbon brush		▲		
	8.5	Check motor attached device is fully functional		▲		
	8.6	Check the wear condition of the motor commutator	●	▲		
Battery	9.1	Check the density of the electrolyte and the battery voltage	●	▲		
	9.2	check the terminal grease condition	●	▲		



	9.3	check the cable damage condition	●	▲		
Lubricating oil	10.1	paint the lubricating oil in accordance with the periodic table	●	▲		
comprehensive measurement	11.1	Check electrical system grounding is wrong or not				▲
	11.2	Check the travel speed and braking distance				▲
	11.3	Check the lifting and lowering speeds				▲
	11.4	check the safety device		▲		
Test run	12.1	Test run at rated load		▲		
	12.2	After completion of the above maintenance, truck is proved to be reliable	●	▲		

Where "▲" indicates required standard maintenance under normal use environment, "●" indicates required special maintenance in cold environments.

6.5 Repair, maintenance, operation instructions:

6.5.1 Well prepared truck for repair, maintenance and operation

Prepare all the necessary safety measures to prevent the accidents during repair and maintenance, following are some preparations must be finished:

- safely parked truck;
- press the emergency stop switch and remove the plug of the battery.

Notice: necessary measures must be taken to prevent the truck from overturning or slipping when the truck and fork are lifted, please refer to the content of “Transportation and trial run” chapter when lifting the truck.

6.5.2 Open the truck cover:

- safe stop;
- press the emergency stop switch, remove the four fixed screws from the instrument panel;
- Lift up the truck cover.



Installation steps are the opposite of open steps.

6.5.3 check the oil amount of the hydraulic oil:

- park the truck safely(the fork in the lowest position)
- open the truck cover;
- check the oil amount in the hydraulic oil tank.

6.5.4 Check electrical fuse:

- park the truck safely;
- open the truck cover;

Check the Fuse specification is correct or not. FU01 = A,

6.5.5 use the truck after repair and maintenance:

You can reuse the truck after you finished following operations:

- cleaning the stacker;
- check the brake is normal or not;
- Check the emergency stop switch function is normal or not;
- Check the emergency reverse switch function is normal or not;
- check the horn is normal or not.

6.6 Storage of stacker:

If the stacker will be parked more than two months, it must be parked in the anti-frost and dry places and the following steps must be finished during storage: you'd better overhead the stacker and insure the wheels completely off the ground, in order to protect wheels and bearings in the wheels; equalizing charge the battery once a month; if stored for more than six months, you must contact the manufacturer to increase a number of other necessary measures.

6.6.1 necessary operations before storage:

- clean the stacker thoroughly;
- check the brake is normal or not;
- check the oil amount of the hydraulic oil, if necessary, please fill.
- replace the lubricants of the stacker;
- Equalizing charge the battery;
- Disconnect and clean the battery, coated electrodes grease on the battery's electrodes.

6.2.2 Measures taken during storage:

Recharge the battery each month. It is very important to recharge the battery often, if the battery power is exhausted, there will be a self-discharge, resulting in damage to the battery.

6.6.3 Further test when reuse the truck:

- clean the stacker thoroughly;
- add the lubricants according to the lubricants adding table;
- clean the battery, coat the electrode grease on the battery



electrodes;

- recharge the battery;
- Check the hydraulic oil is sufficient or not;
- start stacker.

If there is switch failures of electrical system, use the contact cleaner to spray all exposed electrical connections, by repeating the operations to remove the oxide layer on the connections.

The first re-test is brake function test.

6.6.4 Common Failures and Causes:

The following table provides the user with some common failures; users can find out the cause of the failures based on the content and remove some simple failure:

failure	causes	Processing Method
the stacker can not move	- Battery connector is not connected - Key switch is not turned on; - Emergency stop switch is not turned on; - Battery is not charged; -the control handle is not in “F” range; - Fuse damage.	-Connect the connectors; - Turn on the key switch; -Turn on the emergency stop switch; -charge the battery; -move the control handle to in “F” range; - replace the fuse
forks can not lift	- The stacker does not start; - The hydraulic oil is too little; - The battery power is low; -Lifting micro switch is damaged or poor contact.	- Start the stacker; - - Add the hydraulic oil; - - charge the battery; - Replace or adjust the switch.
Forks can not lower	- Oil-way blockage; -Lowering electromagnetic valve is not open or damaged.	- Clean the oil-way; - Change the lowering electromagnetic.
lifting can not be stopped	- Lifting micro switch is damaged;	-replace the lifting micro switch;
only can move in one direction	- Micro switches and cables are poor contact.	-replace the micro switch or check the cables.
The stacker travels slowly	- Lack of battery power; - Electromagnetic brake is too tight; -The cable is poor contact.	- Charge the battery; - Adjust the brake clearance; - - Check the cable.
the stacker start suddenly	- Controller is damaged; -Forward and back knob is not reset.	- Change the controller; - Replace or repair.

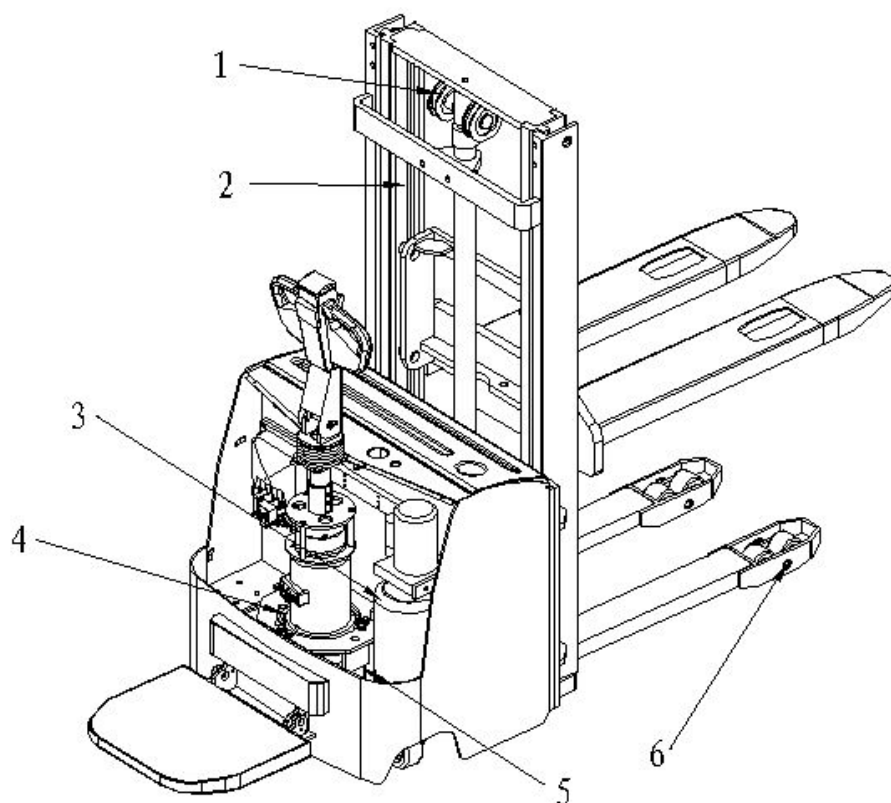
If the failures can not be removed in according to the troubleshooting



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methods in the above table, please contact with the sales service department of the manufacture.

6.6.5 oil and grease:



No.	Refueling location	Lubrication cycle			sort
		500h	1000h	2000h	
1	chain	L			A
2	the inside of the frame channel	L			B
3	Hydraulic Tank	C		O	C
4	Rotation bearing		L		D
5	Speed reducer			O	E
6	All bearings, bushings	L			F

L = lubricate C = check, O = replace.

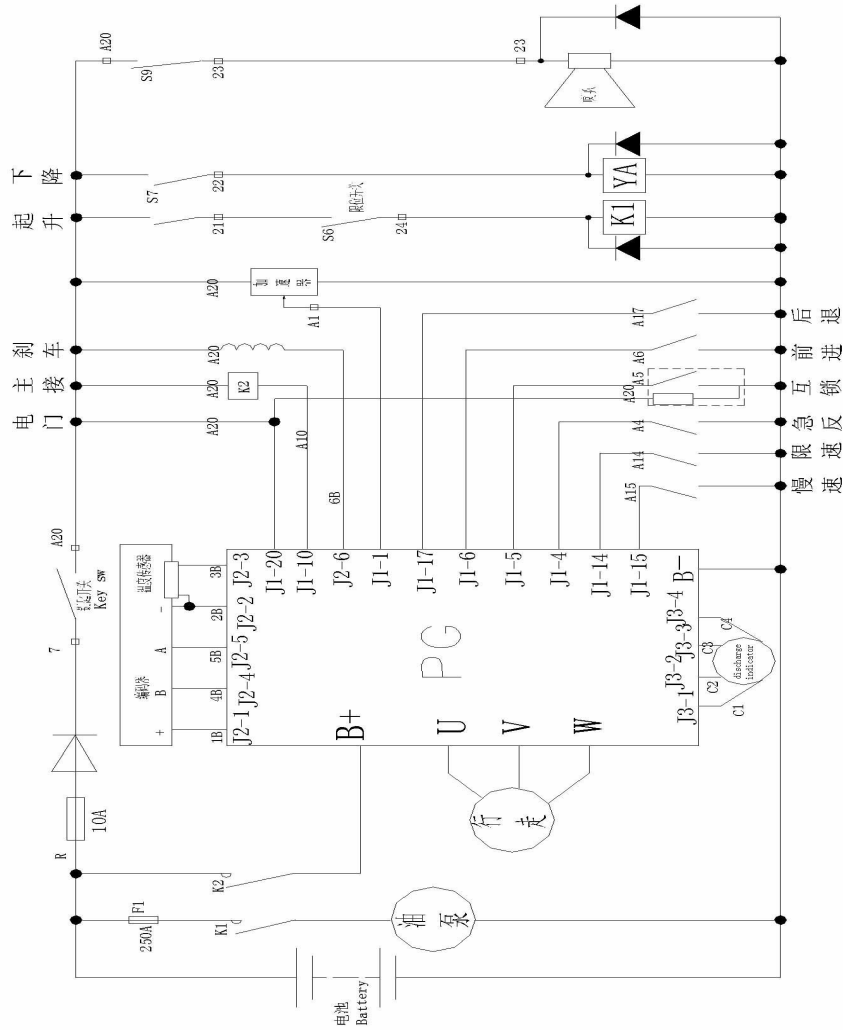


Description table of oil and grease:

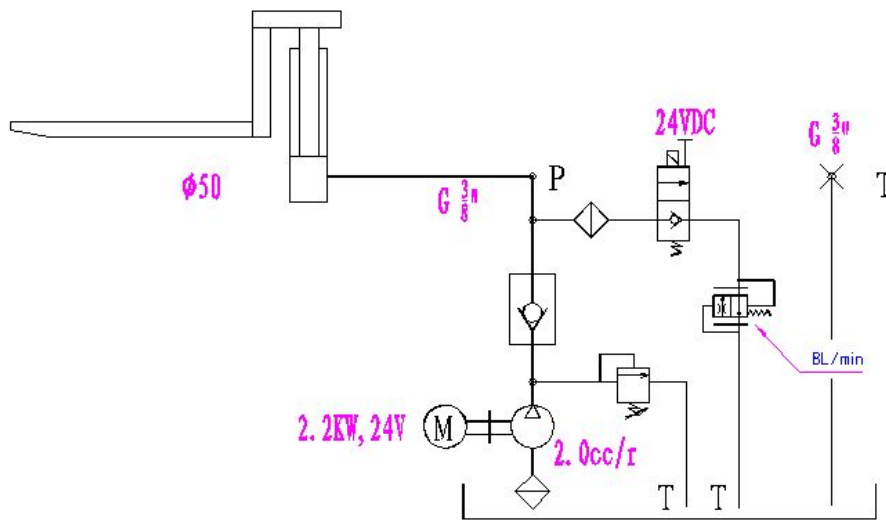
Type of grease		Name of lubricant		Lubrication area
		>-15℃	<-15℃	
A	Grease	2# Lithium grease	2# Lithium grease	chain
B	Grease	2# Lithium grease	2# Lithium grease	the inside of the frame channel
C	Hydraulic oil	46 # hydraulic oil	32# hydraulic oil	fuel tank
D	Grease	2# Lithium grease	2# Lithium grease	Rotation bearing
E	Gear Oil	85W/90 gear oil	85W/90 gear oil	Speed reducer
F	Grease	2# Lithium grease	2# Lithium grease	All bearings, bushings

7. Electrical, hydraulic diagram

7.1 Circuit diagram



7.2 hydraulic diagrams:



The parameter on this diagram is for single cylinder mast, the hydraulic station parameters are 24V, 3KW for double cylinder.



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