CPD15S-E/CPD15S-ELi Li-ion Powered 3-Wheel Electric Forklift

- Operation Manual
- Parts Catalogue

Thank you for choosing CPD15S-E electric truck! Hope our electric trucks would bring great convenience to your work！

- Please read the manual carefully before operation.
- This manual is a common manual. We reserve the right to modify technology of the electric pallet truck. If there is anything in the manual that is not consistent with the actual truck, the actual truck should be considered correct and the manual is only for reference.

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Warning

Operators must strictly conform to ISO 21262:2020 "Industrial trucks — Safety rules for application, operation and maintenance". Untrained personnel are not allowed to operate the truck.

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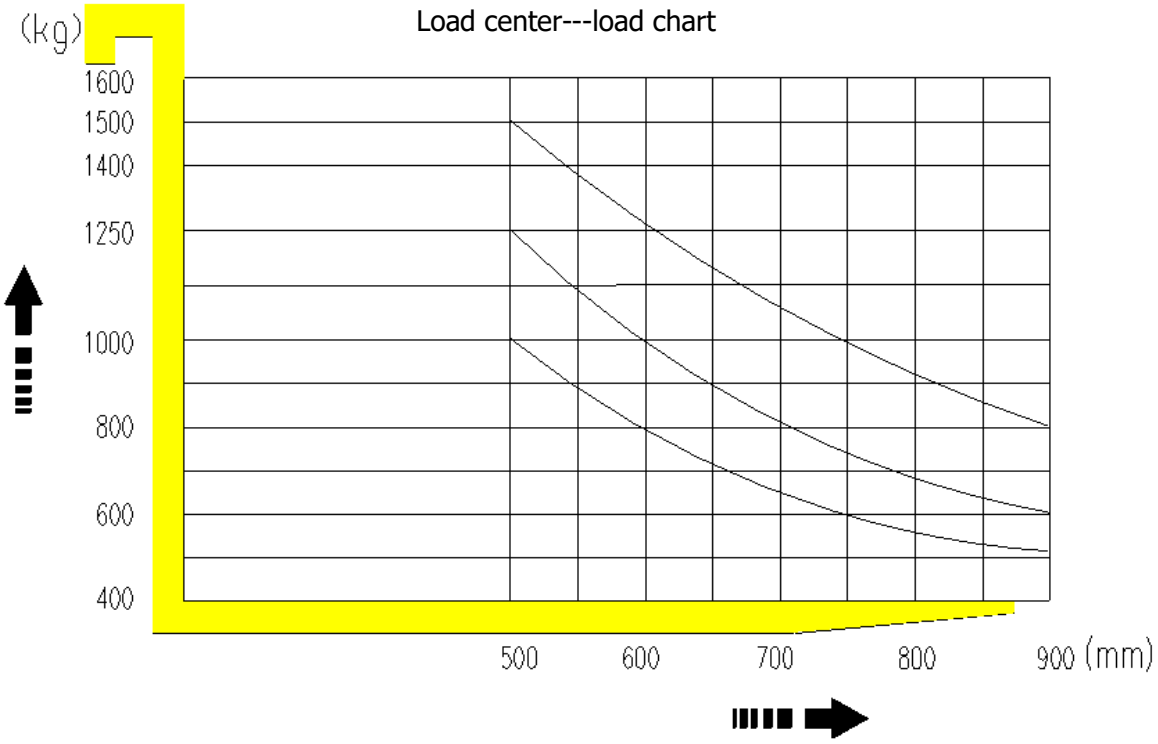
According to ISO 21262:2020 "Industrial trucks — Safety rules for application, operation and maintenance", the load capacity and lifting height of our CPD15S-E three-wheel electric forklift is regulated as follows:

I. Load chart：

——When the lifting height of CPD15S-E three-wheel electric forklift is below 3000mm (including 3000mm), the max. capacity of the truck is the rated capacity, forbid overloading

1. Capacity plate information：the capacity plate is under the overhead guard，it contains: truck serial number, capacity information (load, load center and lift height), truck type (fire safety rating), truck weight with battery (does not include load), attachment information.
2. Reading capacity plate：capacity may be reduced as lift height increases. For example （CPD15S-E）：on the sample plate,1500kg can be lifted to 3000mm. But above 3000mm to 4800mm， capacity is reduced from 1500kg to 800kg.
3. Capacity is reduced as load center increase. For example（CPD15S-E）：on the sample plate，1500kg can be lifted if the load center is 500mm.The load center is increased from 500mm to 600mm, capacity is reduced from 1500kg to 1300kg.
4. You may not increase capacity if load center is less than shown on your capacity plate. Contact our company for load center distance, lift height and max. capacity.
5. Truck weight：Dock boards、elevators and some floors have limited capacity. Check the capacity plate for the weight of your truck. Make sure you use the correct units of measure.
6. Some truck types are not permitted in areas where there are fire hazards. Watch for marked areas. For example: you must not drive a type E or ES truck into an area restricted EE or EX trucks.
7. Attachment data：If an attachment on your truck does not match the information given here on your capacity plate, do not operate your truck. Your capacity plate maybe wrong. Report the problem to your supervisor.
8. Braking reduced: For added stability and comfort, braking may be reduced at some lift heights. Check your capacity plate and allow a longer stopping distance above that lift height.

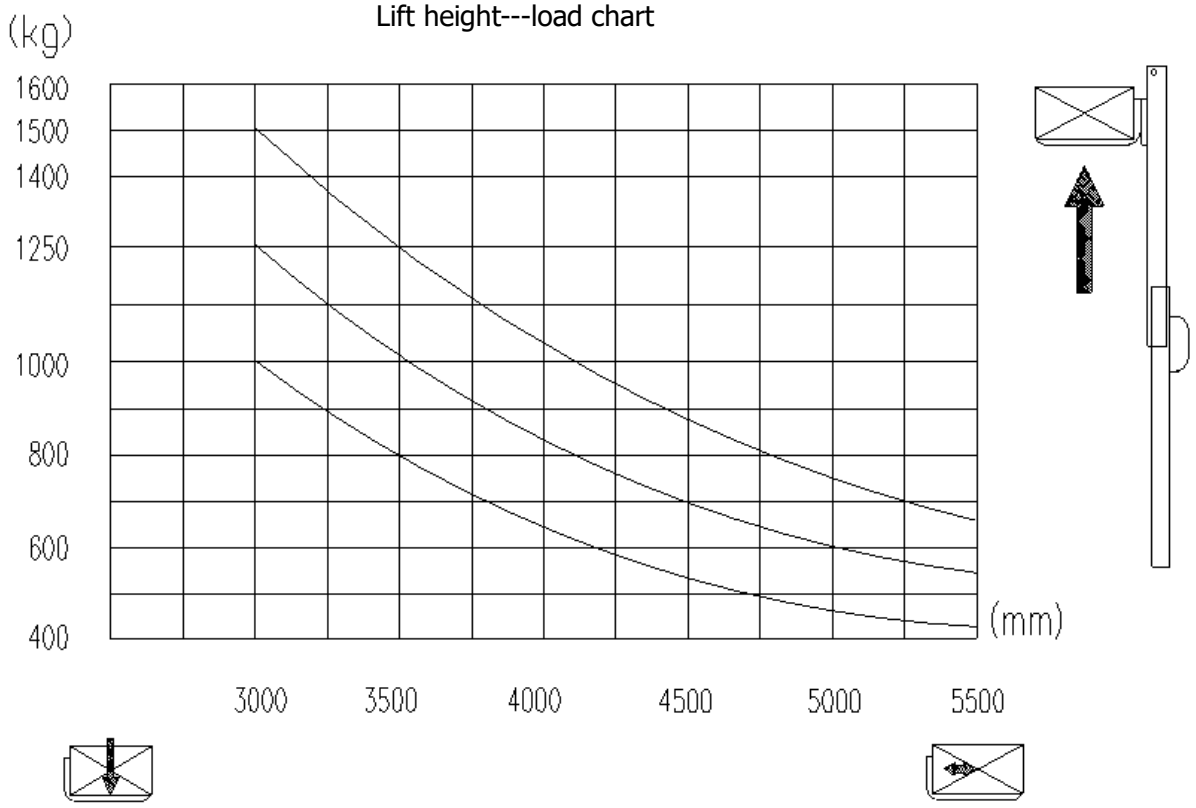
Load center---load chart



Note：

Vertical coordinate stands for load capacity, cross coordinate stands for the load center. The load center is calculated from the front forks, the base point of standard load capacity refers to 1000mm center of the cube. When the mast has tilting forward、using nonstandard fork or load exceeding that in the normal width, which will reduce the load capacity, understand the load capacity in all load centers in time by the load chart. Reduce 200kg when adding side-shifter.

Lift height---load chart

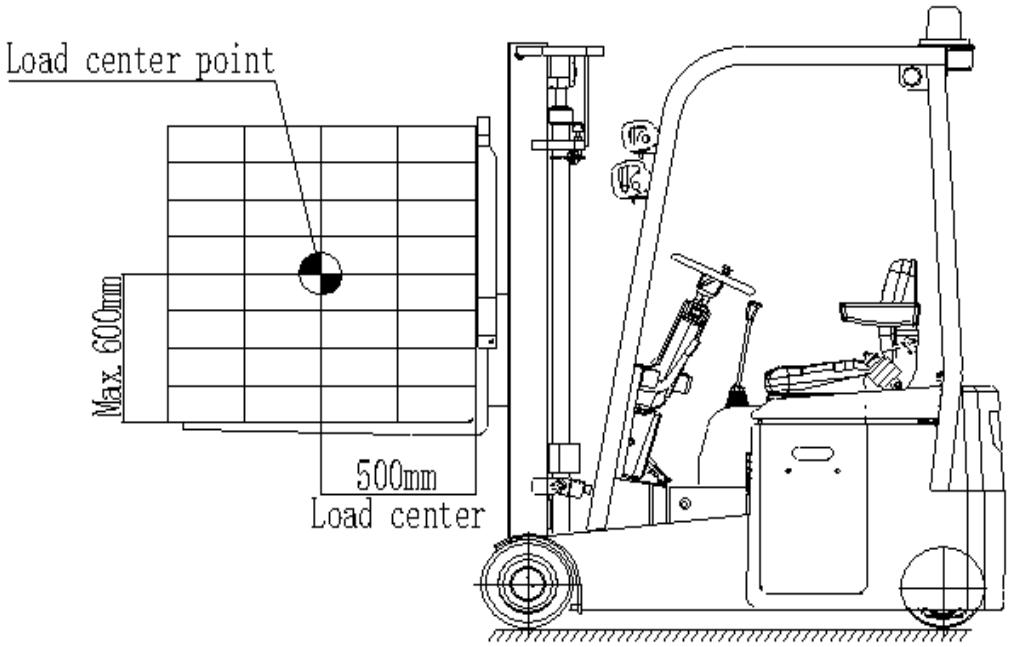


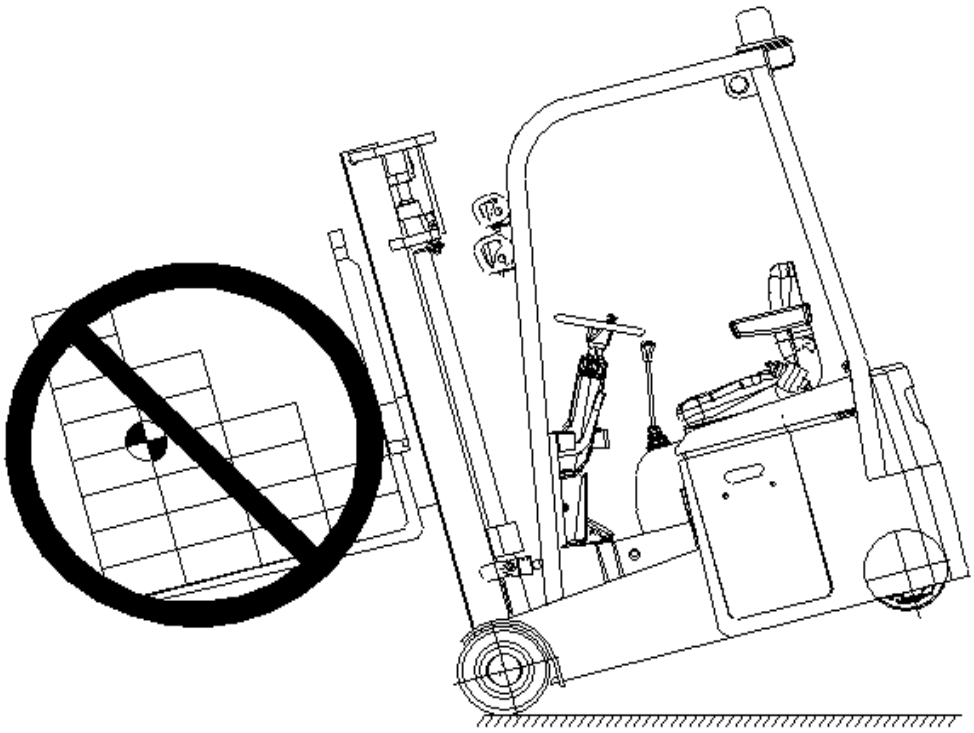
Note：

Vertical coordinate stands for the load capacity, cross coordinate stands for lift height. understand the load capacity in all load centers in time by the load chart. Reduce 200kg when adding side-shifter.

II. Capacity & Load Center

1. What is your truck capacity？
   Capacity is the load that can be lifted to a given height at a given load center. See the capacity plate on your truck. Make certain you use the correct units of measure.
2. What is load center？
   Load center is the distance from the end of the operator platform to the center of an evenly distributed load.
3. Loads must be evenly distributed
   Your truck could tip over, in any direction, if a load is placed or shifted to the front, back or side of a pallet, cart, platform or container. Make sure you spread the load evenly as you load a pallet.





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Brief introduction：

CPD15S-E/CPD15S-ELi series electric forklift is powered by storage/Li-ion battery, and driven by AC motor. This kind of truck travels by means of gear transmission. The fork is lifted by means of DC motor and hydraulic actuation, which motivate hydraulic cylinder up and down to lift fork and goods together. As this truck is electrically driven for traveling and lifting, driving is stand, power steering in wheel it possesses many characteristics as labor-saving, high efficiency, stability in operation, simple and easy operation, safety and reliability, little noise and environmental friendly, etc. This truck adopts 24V large capacity battery cell, which greatly extends service time within one charge.

The kind of truck is applicable for goods transportation on hard and flat ground.

Allowed environment for using:

a. Height above sea level shall not be over 1000m;
b. Ambient temperature shall not be higher than +40℃ and no lower than -25℃.
c. When the ambient temperature reaches +40℃, the relative humidity should not exceed 50%; at a lower temperature, higher relative humidity is allowed.
d. Hard and flat ground.
e. It is prohibited to use the truck in a flammable, explosive or corrosive environment with acid and alkali.

Description:

The instruction manual shall be kept by the operator, and shall be read by the operator until he gets a full understanding.

The instruction manual is composed of correct operation, convenient and simple maintenance, and routine inspection.

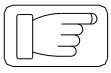
The instruction manual shall be carefully read before operation, for purpose of correct drive and suitable maintenance to ensure safe and effective material transportation.

The instruction may be in disagreement with practical product due to product innovation.

The instruction manual shall be accompanied with in case of truck leasing or transfer.

Please come into contact with our sales department in case of any problem.

Description of symbol：Regulations of the following symbols are of great importance to your safety and others as well. Please obey these rules.

	Danger	Indicates an impending danger. Deaths or severe injuries would be resulted without any precaution or avoidance. You must observe those requirements.
	Warning	Indicates a potential danger. Deaths or severe injuries would be resulted without any precaution or avoidance. You must observe those requirements.
	Caution	Indicates a potential danger. Moderate injuries would be resulted without any precaution or avoidance. You must observe those requirements.
	Notice	You shall pay attention to statements that are in direct or indirect relation with personal security and truck maintenance.

Three-wheel electric forklift

3-wheel electric forklift can lift side-shift and stack goods; it is designed specially to operate in the warehouse with narrow aisle.

Fork function, standard function and optional function

Standard fork or hydraulic function：lift and lower fork and tilting mast.

Also include other parts, such as side-shifter, carton clip or push-puller. The company can determine the relative function according to the working area and conduct relevant training.

How to drive the forklift

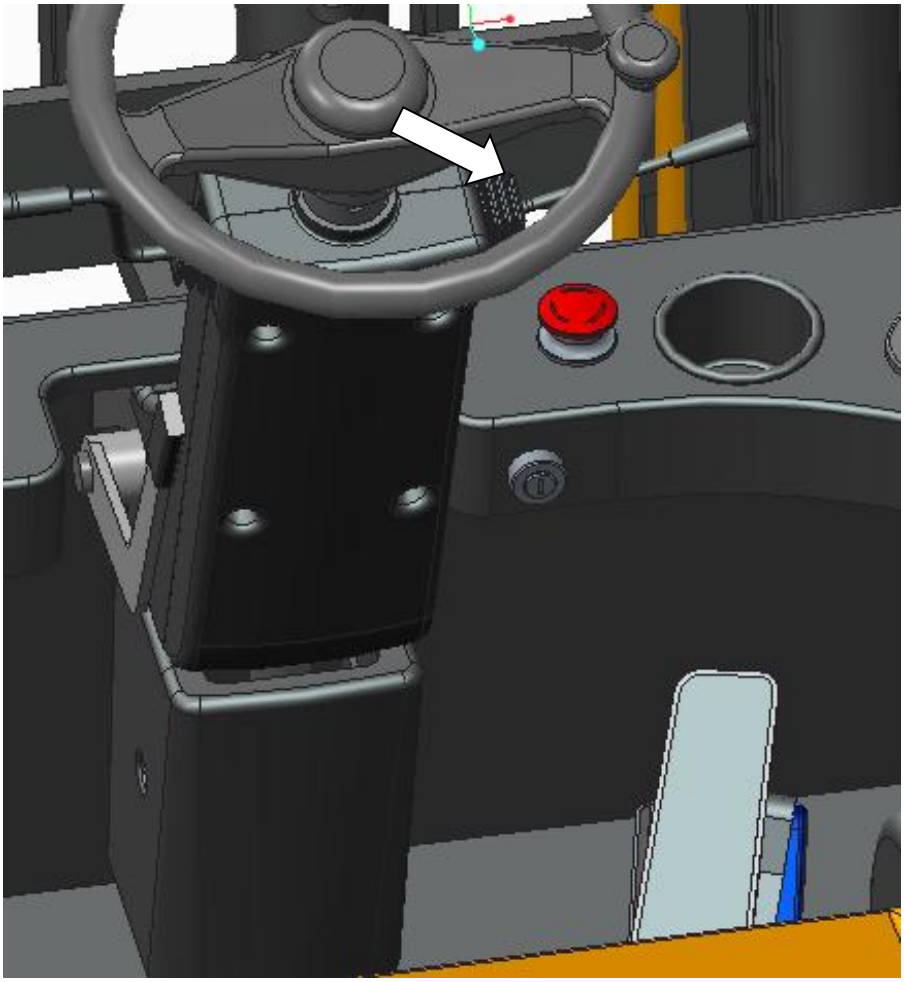
Forklift can be equipped with the soft cushion, adjustable handrail and moveable pedal in the operation area. The operator stands on the side and back on the soft cushion when driving. What's more, the hand and the foot are on the control handle and the pedal respectively, which can be comfortable and stable. In addition, observe the other direction when turning the head and drive in this direction.

Key switch

The key switch is on the right side of the operating table：

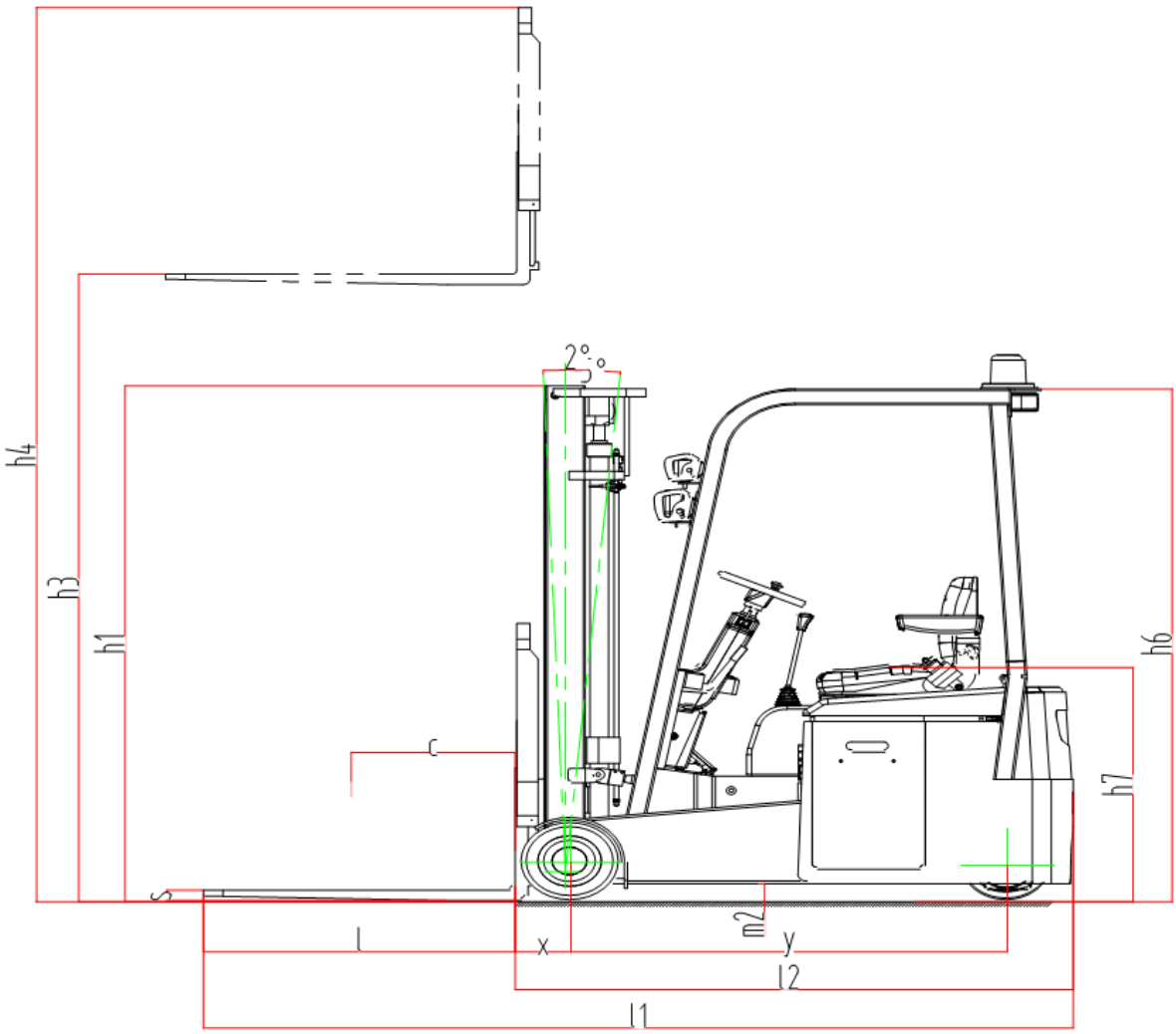
OFF –turn the key switch to OFF，disconnect the circuit.

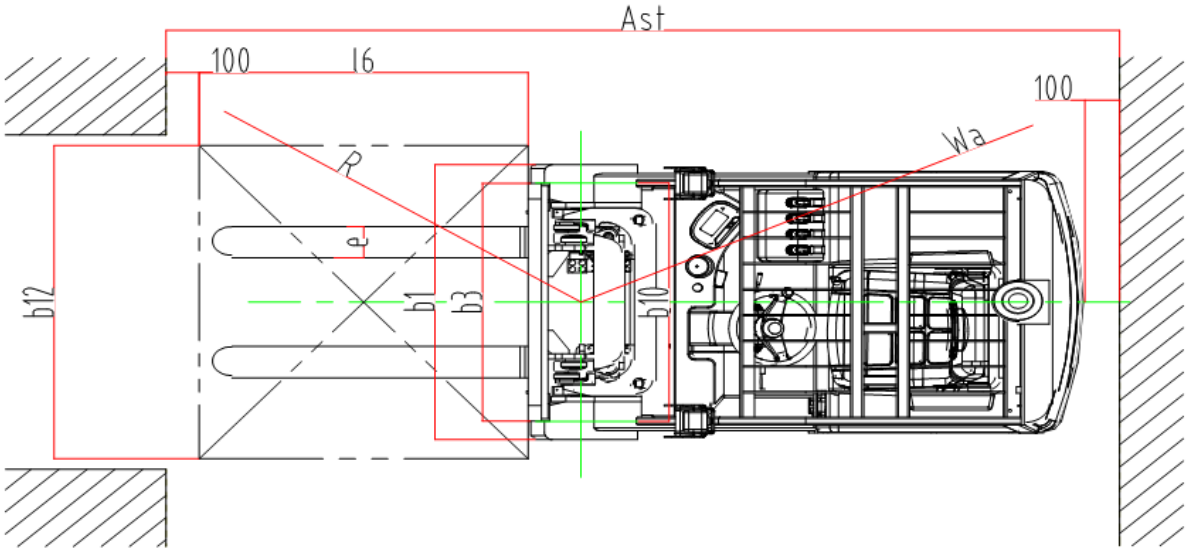
ON-- turn the key switch to ON，connect the circuit.



1. Outline drawing

1.1 CPD15S-E Outline drawing



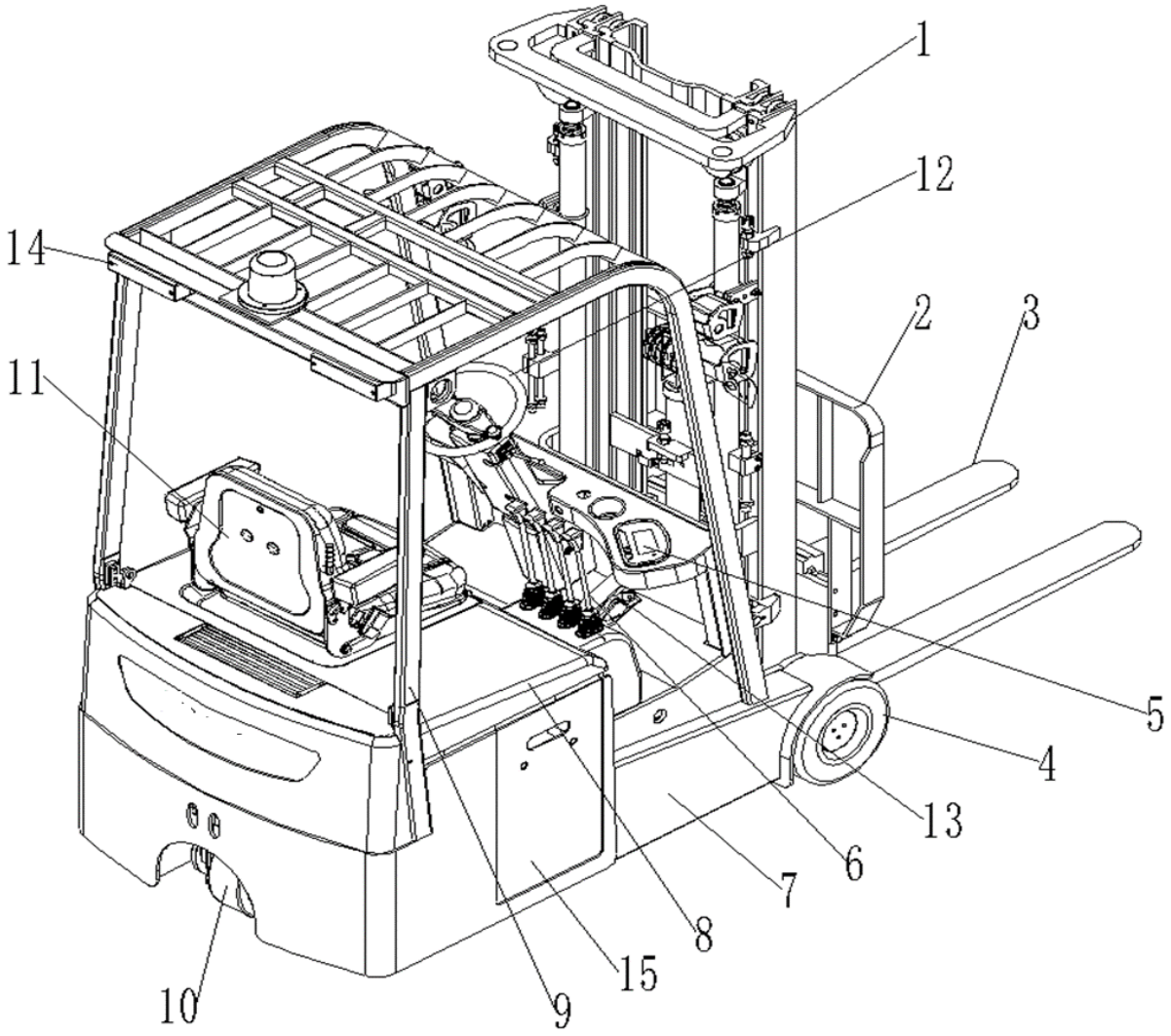


1.2 Main technical parameters

Characteristics	1.1	Model		CPD15S-E
	1.2	drive type		
	1.3	operation type		Seated
	1.4	rated capacity	Q(kg)	1500
	1.5	load center	c(mm)	500
	1.6	distance from front axle to support	x(mm)	170
	1.7	wheel base	y(mm)	1348
Weight	2.1	weight(no battery）	kg	2600
	2.2	axle load, laden front/rear	kg	3280/810
	2.3	axle load, unladen front/rear(with Max. battery)	kg	975/1625
Wheels	3.1	wheel size front	spring solid wheel	305X140
	3.2	wheel size rear	solid wheel	280X100
	3.3	wheel number-front		2
	3.4	wheel number-rear		1
	3.5	thread-front	b10(mm)	912
	3.6	thread-rear	b11(mm)	0
Dimensions	4.1	mast/fork frame tilting angle，front		2
	4.2	mast/fork frame tilting angle，rear		5
	4.3	mast height,lowered	h_1(mm)	1980
	4.4	free lift height	h_2(mm)	Optional
	4.5	lift height	h_3(mm)	2500-5600
	4.6	max. height, mast extended	h_4(mm)	3500-6600
	4.12	overall width	b_1(mm)	1055
	4.13	thickness	s(mm)	35
	4.14	width	e(mm)	100
	4.15	length	l(mm)	950（1070）
	4.16	fork frame type		A type
	4.17	fork frame width	b_3(mm)	680
	4.18	bottom of mast ground clearance,laden	m_1(mm)	68
	4.19	truck body ground clearance	m_2(mm)	68
	4.2	aisle width for pallets 1000x1200 crossways	A_{st}(mm)	3050
	4.21	aisle width for pallets 800x1200 lengthways	A_{st}(mm)	3150
	4.22	turning radius	W_a(mm)	1550
Performance	5.1	travel speed,laden	km/h	7
	5.2	travel speed, unladen	km/h	7
	5.3	lift speed,laden	mm/s	100
	5.4	lift speed, unladen	mm/s	150
	5.7	gradeability,laden	%	10
	5.8	gradeability, unladen	%	15
	5.11	brake		Electric braking
Motor	6.1	drive motor power	KW	2.2（AC）
	6.2	pump motor power	KW	2.2
	6.3	system pressure	bar	140
Li-ion Battery	7.1	Voltage	V	24
	7.2	Capacity	Ah	250（300）
	7.3	Battery weight	kg	95(115)
Battery	7.1	voltage	V	24
	7.2	capacity	Ah	320（400）
	7.3	battery weight	kg	300
Others	8.1	travel control		AC frequency conversion
	8.2	average noise	Db(A)	68

2. **Introduction of structure**（refers to the structure diagrams, schematics of main components）

The truck mainly consists of mast 1.load backrest 2.fork 3.Load wheel 4.multifunction liquid crystal combined instrument 5.multi-valve operating mechanism 6.truck frame 7.hood 8.overhead guard 9.drive wheel 10.seat（with switch）11.steering operation system 12.electrical control system 13.lamp system 14.side-way storage/Li-ion battery 15 and other components.



No.	CPD15S-E	Name
1	●	Mast
2	●	load backrest
3	●	fork
4	●	Load wheel
5	●	multifunction liquid crystal combined instrument
6	●	multi-valve operating mechanism
7	●	Truck frame
8	●	Hood
9	●	overhead guard
10	●	Drive wheel
11	●	seat（with switch）
12	●	steering operation system
13	●	electrical control system
14	●	lamp system
15	●	side-way storage/Li-ion battery
●=Standard		○=Option

3. Safety Norms:

Warning

Please pay attention to the following items first before operation of the truck:

1) This electric truck is only limited to utilization indoor with a hard flat floor. Operation in inflammable, explosive environment or corrosive environment such as acid or alkaline condition shall be strictly forbidden.
2) Only drivers who have received formal training or are authorized can be allowed to drive the truck.
3) Read this instruction carefully before operation so as to master the performance of the truck; check the truck whether it is in its normal condition before each operation. It is forbidden to use faulty truck; repair by untrained persons is forbidden as well.
4) Overloading operation is forbidden.
5) As for goods carrying and operation, center of gravity of the goods must be within range of the two forks. It is forbidden to transport loose goods
6) The truck shall travels slowly when forks pass in or out of pallet.
7) It is strictly forbidden to press the lifting or lowering button during the traveling of the truck. Meanwhile, don't switch lifting and lowering buttons rapidly or frequently, because rapid and frequent lifting or lowering will cause damage to the truck and goods.
8) Don't load heavy goods on the forks rapidly.
9) Don't lay the goods on the truck for a long time!
10) It is strictly forbidden to make sharp turn on narrow aisle. When it is turning, slow down the truck so as to ensure the safety of personnel and goods.
11) Descend the forks to the lowest position when the truck is not used.
12) It is strictly forbidden to put any part of the body under heavy goods and forks.
13) This truck is suitable to be used on flat ground or flat platform. Don't put the truck on the slope for a long time.
14) Overloading operation is forbidden. Otherwise the wheel will skid, resulting in the damage of wheel and motor as well as danger of the human body and goods.
15) It is strictly to use the truck under stipulated voltage of 20.4V.
16) It is strictly forbidden to conduct charge by connecting the plug to AC power directly.
17) It is strictly forbidden to put the operator's head, hand and foot out of the cabin.
18) It is strictly forbidden to drive when the forks are in lifting position.

3.1 Safety operation norms:

1) Training of driver:

Notice

Even though each truck may have the same technical parameters, there may be differences on features of braking and acceleration as well. Never drive the truck until you get familiar with all those operations.

2) Wear of the driver during truck driving:

Notice

Please put on safety shoes and protective clothes. Do not wear clothes that are too loose for sake of being caught, which would result in danger.

3) Rules that must be observed:

Notice

Never drive the truck when you are tired or un-concentrated, with an injection of drug, or after a liquor drinking.

A. Safety rules and regulations shall be observed during operation or maintenance of the truck.
B. Avoid sudden start or stop. Operate all parts smoothly.
C. It is forbidden to turn around on slopes. Drive smoothly.
D. It is forbidden to load on slopes or travel while the forks are lifting
E. Lowering the speed before turn around particularly in unladen cases.

4) Self protection

Notice

Before operating the truck make sure to fasten the safety belt and traction rope. Fix the chain and guardrail in appropriate position.

5) Safety of working place:

Notice

This kind of electric truck is only limited to utilization indoor with a hard flat floor. Operation in inflammable, explosive environment or corrosive environment such as acid or alkaline condition shall be strictly forbidden.

A. Good roadway condition shall be kept and the traffic should be smooth.
B. Sufficient light ray shall be ensured on working place.
C. Fire extinguishing appliances shall be equipped in the places where truck and charging is operated. The extinguishing appliances shall comply with the requirements of extinguishing fire of solid combustible matter and electric apparatus.
D. The value of truck noise mentioned in instruction is measured under the condition of new truck running on flat, smooth and hard ground. If the traffic surface is bad or the tyre of truck is damaged, the noise may be amplified.

6) Integrity of the truck shall be realized:

Warning

Do not make modifications on the truck.

A. Please observe safety rules and regulations of your working place during operation, inspection, and maintenance of the truck.
B. No modification or addition shall be made to the truck without written permission by our company. A modification of the truck may have a negative effect on its safe operation.
No modifications or alterations to a powered industrial truck, which may affect, for example, capacity, stability or safety requirements of the truck, shall be made without the prior written approval of the original truck manufacturer, its authorized representative, or a successor thereof. This includes changes affecting, for example braking, steering, visibility and the addition of removable attachments. When the manufacturer or its successor approve a modification or alteration, they shall also make and approve appropriate changes to capacity plate, decals, tags and operation and maintenance handbooks.
Only in the event that the truck manufacturer is no longer in business and there is no successor in the interest to the business, the user may arrange for a modification or alteration to a powered industrial truck, provided, however, that the user shall:
    a) arrange for the modification or alteration to be designed, tested and implemented by an 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) approve and make appropriate changes to the capacity plate(s), decals, tags and instruction handbook;
    d) 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.

7) Prepare safety operation procedure:

Safety operation procedure shall be formulated with consideration of practical situations before operation of the truck. Safety shall be taken into full consideration in preparation of the safety operation procedure.

When lifting the truck please be careful of the space, particularly the space overhead.

8) Operation of truck under unsafe condition is strictly forbidden:
A. Operation under unsafe condition is forbidden, such as under conditions with uneven floor, or impeded road. Goods lifting on slope is strictly forbidden.
B. Faulty truck is forbidden to use.
C. Make sure a daily inspection of the truck would be taken. Please immediately repair or replace in case of any abnormal conditions.

9) Overloading operation of truck is forbidden:

Warning

Overloading operation of truck is forbidden. Overloading operation would cause damage to the truck or bring harm to operator.

10) Use suitable pallet:

A. The pallet shall be of suitable dimensions, neither too wide nor too large.
B. Fix the pallet or lifting table. If pallet is installed on the truck make sure the clip to the pallet is fastened. If there no pallet or pallet clip make sure lifting is safely fixed.
C. Make sure the pallet or lifting table is well fixed or the stability on the forks. If there is pallet on the truck make sure the forks are in the outside edge to decrease the possibility of tilt of the truck .
D. Put the goods evenly within the pallet limited size.
E. Only allow to load stipulated weight and within the load center. Refer to plate.
F. Keep well the focus of the goods and make sure the forks are under the goods.

11) Pay attention to load area:

Notice

Check the width of the board, loaded goods and safety. Pay attention to the strength of the ground.

12) Electrical System Inspection:

Notice

Before checking the electrical system, turn off the key switches and the emergency isolation switches.

3.2 Safety Operation Specification：

1) Check the safety condition around the truck:

Notice

Before starting up the truck, please ensure that there is no person around it.

Notice

If the driver's view is shielded by the bulky goods carried, please drive backwards or drive under the guidance of other working personnel.

Notice

No travelling while lifting or descending which is not safe.

Notice

Ensure no people around the truck when driving backwards.

Notice

Driving through the narrow access shall be guided by working personnel.

Notice

At crossroad or other places impeditive for view, the driver shall not drive until there is no person at both sides.

Notice
Keep concentration when operating truck.

Caution
The driving mechanism of truck is installed on the front. Due to this difference from common vehicles, the front of truck swings comparatively fast when turning around. For this reason, to prevent collision with other objects nearby the front of truck, do drive or turn slowly.

2) Strictly forbid harsh driving：

Notice
Never start up, brake or turn abruptly.

Abrupt start-up or braking may cause the falling of goods.

Abrupt turning during traveling may cause the tilting of truck and result in serious accident. Do decelerate and take care to turn.

Notice
Observe all items of safety rules on working place. Decelerate and sound horn when travel by other truck or vehicles. Avoid driving in places with bad view.

Notice
Ensure to provide certain clearance between truck and entrance.

3) Never drive too close to roadside：

Notice
Ensure to provide enough distance between the truck and roadside or platform edge.

When running on narrow road or platform, keep a certain safety distance with the edge against falling of the truck.

Warning
Avoid turning or loading and unloading operation on slope; otherwise the truck can go tilting.

3.3 Operation norms：

Notice
The truck can only carry goods under rated capacity.

1) Forbid overloading operation.
2) Forbid deflective transportation.
3) Passengers on truck must be forbidden.
4) Never push or pull the handle abruptly
5) Never use the truck as towing vehicle.
6) When transporting over-wide goods, the driver shall be extremely careful to turn slowly to keep balance of the goods. Decelerate when ascent and descent, meanwhile, watch around for sake of safety.
7) The faulty truck for future repair must not be parked at places impeditive for traffic. Lower down the fork arms to the lowest position and put on the warning board. Pull off the key.
8) The truck cannot be operated when the protective cover for the mast and other protective facility are not installed.
9) Avoid wind risk while loading.

Notice
Avoid wind risk while loading.

10) The driver must control the speed according to the on spot situation. The driver must drive slowly when turn around, passing narrow aisle, passing rotating door, and view impeding places. Appropriate braking distance must be kept with the other truck in front and control the electric well at all time. It is prohibited to stop abruptly (except there is an accident), turn around quickly or surpass the other truck in dangerous or view impeded position. It is prohibited to put the body or the hand out of the cabin.
11) Driver's view during driving: The driver must keep his view in the driving direction and mind the situation on the road. If the transported goods impede the driver's view the goods must be moved to the back of the driver. If the goods cannot be adjusted an additional personnel is needed at the side front to guide the driver.
12) Up and down slopes: Up and down slopes must be on the stipulated driving road. The road surface should be clean and not slippery. The road must be suitable for stackers and safe and reliable. Up slopes laden the forks must be forward and down slopes backward. No turn around side drive or loading and unloading during up or down slopes. Deceleration is necessary down slopes and is ready to brake at any time.
13) Drive the stack to elevator or loading table: If it is necessary to drive the stacker to elevator or loading table make sure that the elevator or loading table is able to stand the weight and the structure is capable of bearing the stacker and at the same time to get permission from the equipment user. All needs to be done before hand. When driving the stack into elevator the goods must comes in first. Choose a suitable place to stand to avoid collision with the tunnel wall during lifting or descending. If there is working staff going together with the stacker make sure to wait until the stacker is positioned well to come in. After reaching the destination level the working staff will leave the elevator first.
14) Necessary conditions for the transported goods: The stack driver must check the goods carefully to make sure no danger will happen. Before transporting the goods make sure the goods is well placed and fixed. If there is the possibility that the goods may be upside down or fall off protective facility (such as guardrail) must be installed.

3.4Protective facility for the operator

Warning

The overhead guard is a protective facility for the operator to avoid possible falling objects. But it will not guard from all possible hit. It is forbidden to dismantle the overhead guard.

3.5Important notice after operation:

1) Parking: Park the truck at appointed place. Never park the truck on slope.
   Ensure the following points to be achieved before leaving away the truck:
   a) Lay down the fork to the lowest position naturally.
   b) Turn the steering wheel to the middle position.
   c) Turn off the key switch.
2) Clean up the truck:

Notice

When cleaning up the electrical system, use compressed air but not water.

3) Charge:

Warning

Open flame is forbidden to appear at the charge places, otherwise, explosion or fire disaster can be caused.

Make a record of charge. As for the charge method, refer to the part about storage/Li-ion battery operation.

4. Initial operation

4.1 Initial operation:

4.1.1 In order to stop power supply in dangerous situation the battery plug(not included in shipment) must be connected with the emergence stop plug of the electric truck.

Warning

No operation of the truck without the emergency stop plug.

4.1.2 The stack can only be driven by the power from the battery. Rectified alternating current can damage the electric components of the stacker. The cable of the battery (towing cable) is no longer than 6 m.

4.1.3 If the stack is driven by an external battery via a towing cable it is forbidden to increase the load.
4.1.4 Inspection before use:
a) If the equipment is complete and in normal condition.
b) If the battery is not installed, install the battery. Pay attention not to damage the battery cable.
4.1.5 Adjust the characteristic curve of the charger (charging curve)
4.1.6 After the stacker being idle for a long time the side touching the ground of the wheel is a lot bit flat. After it travel for a while the flat part will recover.

4.2 The stacker is not driven by the steering device of itself:

Warning
It is strictly forbidden to pull or to drag the stacker on slopes.

4.2.1 If pull or drag the stacker in emergence cases the Embrake must be loosened.
4.2.2 After park the electric truck in stipulated area the Embrake must be fixed well again so that the stacker can resume back to the embrake condition.

5. Operation instruction

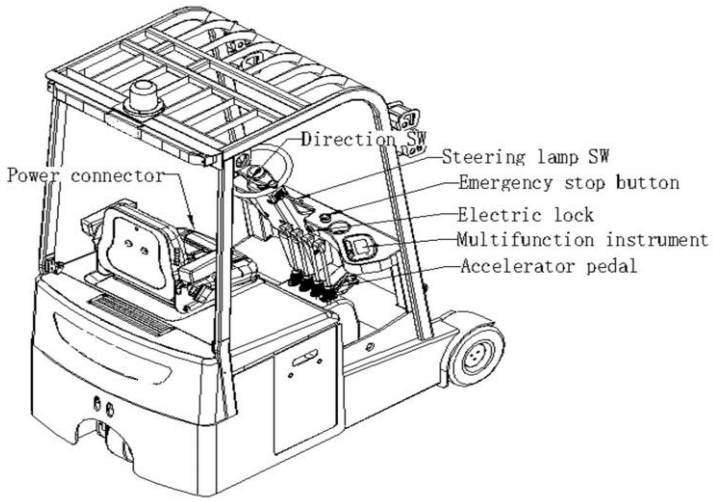
Electric stacker travel and lift by battery for short distance transportation and stacking; Proper use of the truck will bring you great convenience in work and improper use will damage the truck and bring danger to your personal safety and the goods as well.

5.1 Prepare before operation：

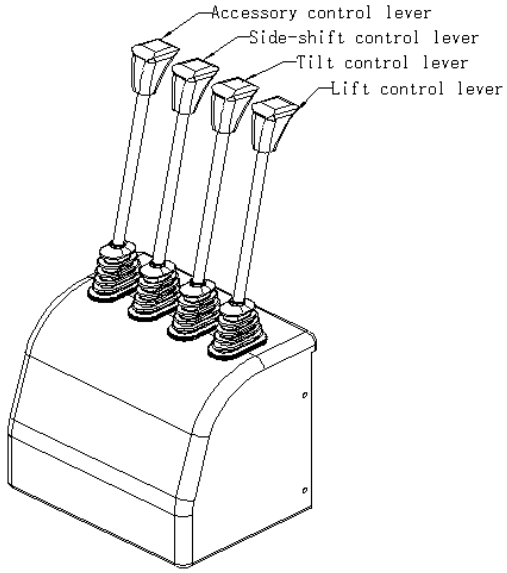
For your own safety and maximum service life of the lift truck, make a thorough walk-round inspection before mounting the lift truck or starting to move it. Look for such items as loose bolts, trash build-up, oil leakage, condition of tires, mast, carriage, forks, or attachments.

Warning
Never use the faulty truck.

5.1.1 Inspect the truck before operation：1.Check whether there is loosening the screws. 2.clean any mud or debris from the floor plates for safe footing. 3.check the instrument panel for damage to the indicator display. 4.Check Mast, chains, horns and other devices.5.Check the frame, mast, forks and accessories for wear and damage, if there is no fixed installation screws.6.check the tires and wheels for proper inflation. cuts, gouges, foreign objects and loose or missing nuts. 7.check the overhead guard for damage. loose or missing mounting bolts. 8.check the hydraulic system for leaks, worn hoses or damaged lines. 9.check the drive axle housing for oil leaks. 10.check the battery compartment for loose connection, frayed cables and properly secured battery restraint.11.observe the electrolyte level for proper level(Li-ion battery do not have this option). 12.check the light for proper operation. 13. Check the support wheel whether it works or not, there is unimpeded phenomenon of death or not, prohibited the use of faulty vehicles.
5.1.2 Check whether the battery/Li-ion battery has power, the method shown in Figure 1, pull out the power switch to open the main power, turn on the electric locks, check the truck's power meter on the dashboard, if left last grid is on, at this time the battery/Li-ion battery has no electricity, charging the battery/Li-ion battery, prohibited the use of the truck in case of the absence of electricity, which will greatly reduce battery life, or even damage to the battery/Li-ion battery.



Pic.1



Pic.2

5.1.3 Check the braking of truck and the ascent, descent, running forward and backward.

The check method is shown in picture 2:

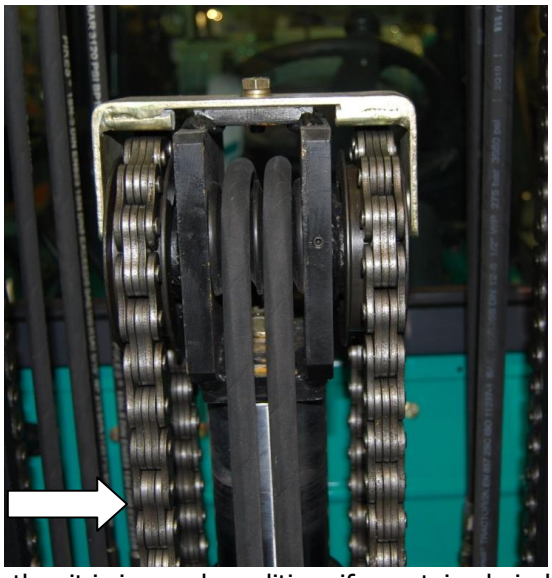
1) Press down the ascent, descent button on the tiller to check the ascent, descent, of the forks.
2) Turn the speed control button on picture 2 right the truck moves forward and to turn it left the truck moves backward and it control the speed of moving forward or backward as well.
3) As shown in picture 2 the speed control button returns back to middle position from forward and backward driving position the truck should be braked immediately.
4) As shown in picture 2 the direction control handle turns clockwise is turn right and turns anti-clockwise is turn left.

Through the above check if the truck is trouble free it can be used and if it has trouble it is prohibited to use a faulty truck.

Warning

When forking goods or moving goods, never rotate the accelerator knob rapidly to speed up the truck abruptly.

5.1.4 Lifting chain



1) Check the whole chain whether it is in good condition, if a certain chain bent, then moving on sprockets will cause wearing by friction with each other.
2) Check to ensure that every section of the chain pin is not exposed out.
3) If a section of the chain pin head has exposed out, indicating that the interior of the chain pin of this section has been broken.

4) Check chain joints and fixing holes for wearing.

5.2 During operation：

5.2.1 Note: The truck is equipped with a magnetic brake near the drive wheel motor shaft, the stacker can operate only when energized, power braking.

5.2.2 operator seated

5.2.2.1 operator gets into the operating table, put down the barricade switch, switch off the left foot, left hand steering wheel, right hand operating grip handle.

5.2.2.2 The operating handle controls the lift and lower, tilt-forward/backward, side-shift of the mast.

5.2.2.3 open the electric lock and emergency stop switches, meters lights, warning lights flashing, the truck enters the standby state.

5.2.3 Driving

5.2.3.1 In the lower left side of the instrument has a speed selection button, pressing, H, L, S character will appear on the LCD screen, corresponding to the maximum speed truck 7km / h, 5km / h and 3km / h. Select the appropriate speed according to the working environment requirement or proficiency of operator.

5.2.3.2 Check before traveling, no matter the truck is under load or overload conditions, do not let the forks touch the ground directly.

5.2.3.3 Rotate the accelerating knob clockwise, the truck moves forward. rotate the accelerating knob counter-clockwise, the truck moves backwards.

5.2.3.4 Counter-clockwise rotation of the steering wheel with the left hand, the truck turned left. Clockwise rotation of the steering wheel with the left hand, the truck turned right.

5.2.3.5 The truck has a regenerative brake and electrical brake. When accelerating the knob back to the middle position, the truck brakes themselves.

5.2.4 Lifting of the fork

5.2.4.1 rotate the lift handle counter-clockwise, the fork lifts. Vice versa, the fork lowers.

5.2.4.2 Lowering of the fork is buffered. When the fork drops to about 600 mm from the ground will slow down in order to avoid heavy impact on the ground when lowered.

5.2.5 Tilting forwards and backwards

5.2.5.1 Press the control button up, the mast tilts forward. Vice versa, the mast tilts backward.

5.2.6 Side shift of the fork

5.2.6.1 Press the control button forward, the fork shifts left. Vice versa, the fork shifts right.

5.2.7 Operating order and security settings

5.2.7.1 When the driver leaves the driving station , the truck can not lift and lower.

5.2.7.2 The power display of the battery/Li-ion battery on the instrument is used to monitor the discharging of battery/Li-ion battery. When the battery discharges to 20%(the Li-ion battery is discharged to 15%)(the power display remains one grid), the truck can only travel and lower, lift is forbidden.

5.2.8 Transport and stack operation:

Notice

The following items should be checked before operating the truck:
Make sure in the loading area no goods will fall off or be damaged.
Make sure no goods or objects will impede safety.

As shown in Figure 1, Pull out the main power switch to turn on the main power and the electric lock, drive the truck near heap (the fork head is in 300mm distance from the stockpiles), according to the operating handle shown in Figure 2 lowers the forks, adjust the fork height into place, insert the fork slowly as deep as possible into the cargo pallets, operate the handle lifting fork to 200-300mm height from the ground, driving the truck to stop the arrival of shelf space and slow prong at a distance of 300mm shelf unit, then operate the handle lifting fork up to proper height of the shelf (bottom of the pallet is over the shelf 100mm or so), slowly move the cargo to the exact position of shelf. At last, operating the handle lowering fork, carefully placing goods on the shelves, and made the forks leaving the cargo, slowly drive the truck, so that make the fork out of the shelf (the fork head is in 300mm distance from the shelf), lower the fork down to about 300mm from the ground, the truck leave the shelves . It should be noted the obstacles around in the process of moving, slow down when turning.

Notice

Unlike the common truck the driving steering device of this truck is installed in the front of the truck. When turning around the front of the truck swing fast. When the front of the truck reaches near other objects be sure to drive or turn around slowly to avoid collision.

5.2.9 The operation of taking down the goods from the shelf：

As shown in Figure 1, pull out the emergency stop switch, turn on the main power and the electric lock, drive the truck near the goods shelf (the fork head is in 300mm distance from the good shelf), according to the operating handle shown in Figure 2 lowers the forks, adjust the fork height into place, insert the fork slowly as deep as possible into the goods pallets, operate the handle lifting the goods to the height that the bottom of the pallet is 100mm over the shelf, slowly drive the truck, so that make the goods out of the shelf (the fork head is in 300mm distance from the shelf), lower the fork down to about 200-300mm off the ground, the truck leave the shelves. Then park the truck after travel to the needed position, at last, lower the fork and the goods, make the fork leave the goods completely, shift the fork out of the pallet slowly.

5.3 Treatment of abnormal circumstance in operation:

5.3.1 Pull back the tiller the forks are lifted, but when the tiller released back to the middle position the forks are still ascending. Lifting is out of control. In case of that, switch off the power immediately. Move the truck to safe place and lower down the goods manually. Inspect the circuit.

5.3.2 If brake is found not working immediately stop operation and inspect and repair the truck.

5.4 After use:

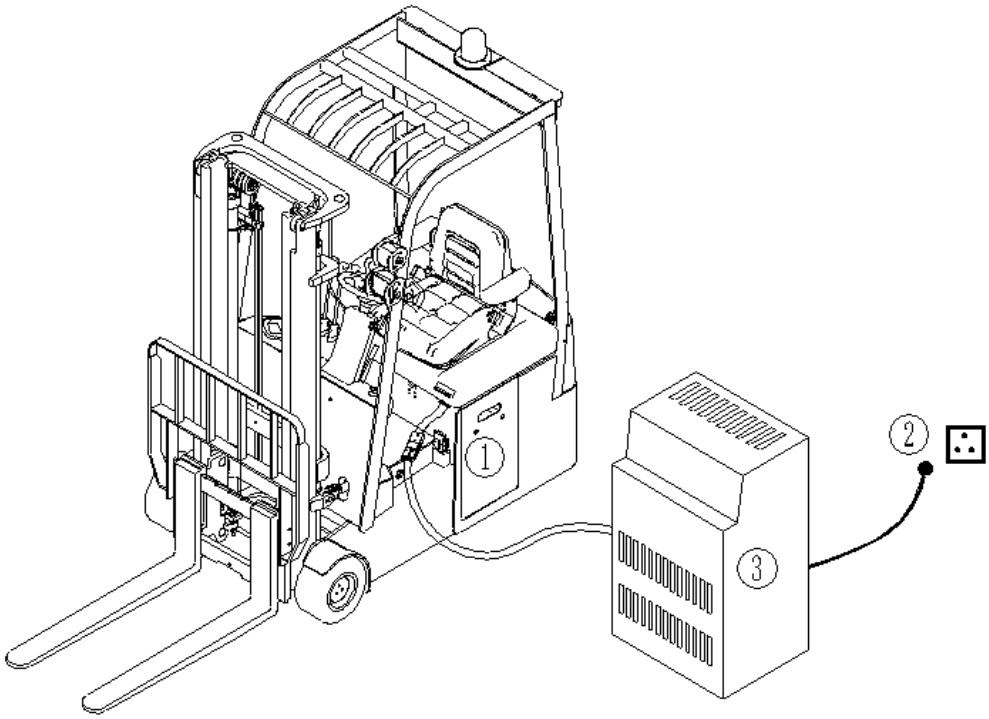
Park the truck to fixed area after use and make daily maintenance in line with clause 6. Charge the truck.

6. Usage, maintenance and charge of storage battery

The truck is equipped with external charger, the charging method is as follows.

Charging method of external charger

1) Pull out the charging connector from the side of the truck；
2) Insert the charging connector into the fixed connector of charger；
3) Then insert the plug of charger to two phase AC power system；
4) Turn on the charger, and it starts to charge after several seconds.



Schematic diagram of external charger

Warning

Hydrogen is aggregated in the battery box when charging. For this reason, the charging condition shall be good ventilated. In avoidance of explosion and fire disaster, open flame is forbidden.

6.1 Initial charge

6.1.1 Initial charge shall be made for new battery, i.e. the first time charge. Clean up the surface of the battery before the initial charge, and then check for damage to ensure reliable connection.

6.1.2 Open gas cap.

6.1.3 When the charging equipment is able to operate normally, pour the sulfuric acid electrolyte with a density of 1.260±0.005 (25℃) and a temperature of lower than 30℃ into the batteries. The electrolyte level should be 15-25mm higher than the protective board. In order to reduce the temperature rise caused by

chemical reaction of the electrolyte and let the electrolyte fully penetrates into the pores of the polar plates and the baffles, the batteries should be placed still for 3-4 hours, not exceeding 8 hours. The initial charging can only be conducted when the electrolyte temperature reduces to below 35℃. (When necessary, the batteries can be put into cold water for temperature reduction). After the still placement, if the electrolyte level reduces, electrolyte should be added.

6.1.4 The sulfuric acid electrolyte is prepared with battery sulfuric acid complying with the state standard GB4554-84 and distilled water. Never use industrial sulfuric acid and running water. The standard temperature （25℃）and density of the electrolytic solution can be converted as follows:

$$D25 = Dt + 0.0007 (t-25)$$

Where: D25: the density of the electrolytic solution at 25℃
Dt: the actual density of the electrolytic solution at t ℃.
t: temperature of the electrolytic solution when testing the density.

6.1.5 Dry up the electrolyte spilled on the surface of battery. Connect the positive and negative poles of batteries with those of D.C. source (charger) respectively and then turn on the power. Charge with the current of 30A (the current of the first stage). After the charge voltage achieves 43.2V (18×2.4V=43.2V), switch to the 15A current of the second stage for continuative charge. When charging, the temperature of electrolyte shall never exceed 45℃. When the temperature raising up nearly to 45℃, reduce the current by half or stop charging temporarily. After the electrolyte temperature reduce below 35℃, continue charging. However the charge time need to be extended appropriately.

6.1.6 Fully charged basis: When the voltage during the second stage charging reaches 46.8V (18 ×2.6V = 46.8V), the variation of the voltage is no greater than 0.005 (V). The density of the electrolytic solution reaches 1.280 ±0.005 (25℃), no apparent changes in 2 hours and there are fine air bubbles appear violently, it can be deemed that the batteries are fully charged. The charged power capacity is 4-5 times of the rated capacity and the charging time is about 70 hours.

6.1.7 In order to accurately control the sulfuric acid content of the electrolytic solution, the electrolytic solution density of the batteries should be examined during the last period of charging. If there is inconsistence, adjust with distilled water or sulfuric acid with a density of 1.40. The electrolytic solution density and the liquid surface should be adjusted to the stipulated value within two hours in the charging state.

6.1.8 After the initial charging is completed, the surface of the batteries should be cleaned. Close the cover of the open cover type liquid hole plug and then the batteries can be used.

6.2 Use and maintenance

6.2.1 In order to guarantee the service life of the batteries, the batteries in use should be fully charged. Insufficiently charged batteries must not be used. During the process of use, close attention should be paid to the discharge extent. Over discharge is prohibited---the voltage reduces to 1.7V per battery (when the total voltage reduces to 1.7V×18 = 30.6V). When the density of the electrolytic solution reduces to 1.17, discharging should be stopped and charging should be conducted at once. The batteries should not be placed idle for a long period of time. The supplementary charging frequently conducted during the process of use is called common charge.

6.2.2 Common charge: The first stage current of common charge is 30A and that of the second stage is 15A. The charging method is the same as that of initial charge. The charged volume is 130-140 % of the discharged volume and the charging time is about 12 hours.

6.2.3 The batteries in normal use should avoid over-charge, but over-charge must be properly conducted for the batteries in following situation, i.e. balance charge.

a) The "lag-behind" batteries--- batteries with a voltage lower than that of the other batteries in the discharging process and the batteries having been repaired for failure. (When balance charge is conducted, the positive and negative poles of the "lag-behind" battery 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) Balance charge should be conducted for the batteries in normal use every 2-3 months.
c) Balance charge should be conducted for the batteries that have not been used for a long period of time before use.

6.2.4 Equalizing charge:

a) Charge with a 4A current
b) When the charge voltage reaches46.8V (18 ×2.6V = 46.8V) and air bubbles occur in the electrolyte, the current should be reduced by 50% (2A) and continue to charge.
c) When the batteries are fully charged, stop charging for 0.5 hour and charge again with a 1A current for one more hour.
d) Stop charging for another 0.5 hour and charge with a 1A current for another one hour.
e) Repeat according to item d till air bubbles occur violently in the batteries once the charger is switched on.

6.3 Storage

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

a) Avoid direct sunlight. The distance from heat source shall not less than 2m.
b) Avoid contact with any harmful substance. No metal impurity shall fall inside the battery.
c) No inversion, no mechanical collision or heavy weight is permitted.
d) Storage with electrolyte is forbidden. Under special cases that the storage with electrolyte is necessary, the density and solution level of electrolyte shall be adjusted to the specified value. Whenever one month of storage period expires, a complementary charge shall be made with the common charge method.

Warning

The operator has to wear the protective equipment when operating the electrolyte

6.4.Operation of electrolyte

1) Density check

The suction type density meter shall be used to check density. During operation, avoid spilling out the electrolyte, and do wear protection appliance.

2) Operation besides check

Consult professional personnel, especially when complementing electrolyte (dilute sulfuric acid).

3) Electrolyte leakage

As for the electrolyte leakage resulting from storage battery tilting and damage, emergency treatment shall be made at once (See emergency treatment item).

6.5.Operation of storage batteries during the final stage of their lifetime

1) Operation of storage batteries during the final stage of their lifetime

When the lifetime of storage battery is about to terminate, the electrolyte in single battery reduces very fast. For this reason, distilled water shall be complemented every day.

2) Treatment of waste battery

As for the waste battery, draw out the electrolyte and decompose the battery. It can be discussed that whether the waste battery shall be recycled by the battery manufacturer. The waste electrolyte can be disposed according to relevant local rules and regulations.

6.6.Emergency treatment

1) The electrolyte spills on skin: wash with large amount of water
2) The electrolyte spills into eyes: wash with large amount of water, and then seek help from specialized doctor.
3) The electrolyte spills on clothes: take off clothes right away, wash with water, and then flush with week basic soap solution.
4) The electrolyte leakage: in case of electrolyte leakage outside, neutralize it with lime, strong carbonic acid soda or carbonic acid soda, and then flush with large amount of water.

6.7.Charger

If the charger you use is full automatic type. It must meet with the following 2 requirements:

a) The output voltage of charger: 36V
b) The output current of charger: 100A

If the charger you use is semi-automatic or manually adjustable, please charge the battery pack according to the requirements of use and maintenance mentioned in the second tip.

7. Usage, maintenance and charge of Li-ion battery

7.1 Requirements on operators

7.1.1 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).

7.1.2 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.

7.2 Safety Regulation

7.2.1 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-on Sign:

It indicates the products must not be stepped on.

7.2.2 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.

7.2.3 Operators are forbidden to short-circuit connectlithium batteries, otherwise the system will be seriously damaged and people will be injured.

7.2.4 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.

7.2.5 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..

7.2.6 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.

7.2.7 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.

7.2.8 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.

7.2.9 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.

7.2.10 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.

7.2.11 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.

7.2.12 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.

7.2.13 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.

7.3 Requirements on Charging the Li-ion batteries

7.3.1 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.

7.3.2 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.

7.3.3 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.

7.3.4 After the battery is fully charged, unplug the charging line in time to avoid other safety problems.

7.3.5 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.

7.4 Requirements on discharging the Li-ion batteries

7.4.1 Discharge temperature range is -20-60℃.

7.4.2 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.

7.4.3 It is necessary to ensure that lithium batteries are not less than 50% charged before maintenance or repair.

7.4.4 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.

7.5 Requirement on transportation and unloading

7.5.1 Firm outer packages are highly required when Li-ion batteries are about to transport.

7.5.2 Sign of water proof, sing of humidity, and 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.

7.5.3 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.

7.6 Requirements on the storage

7.6.1 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%).

7.6.2 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.

7.6.3 Keep Lithium batteries away from fire and heat, meanwhile, keep the batteries dry.

7.6.4 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.

7.6.5 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%.

7.6.6 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.

7.6.7 Long-term idle lithium batteries need periodic charge-discharge activation and a standard charge-discharge cycle once a month

7.7Charger

7.7.1 This charger is specially designed for lithium battery charging. Please do not use it for other purposes.

7.7.2 Electrical safety

1) The charger must be connected with the power supply system specified in the product specification.
2) The accessories attached must be used. To ensure the safety of use, do not replace the accessories without permission.
3) If the cable, connector or other accessories are damaged, the charger must be stopped immediately, Contact the technical service center for repair or replacement.

7.7.3 Charging environment

1) Smoke, water, flame and corrosive gas shall be prevented from entering the charger.
2) If a small amount of liquid intrudes, please turn off the charger immediately and send it to the designated professional technician for maintenance.
3) The protection grade of the charger is IP20, which means that it has only basic dust-proof and completely waterproof functions.
4) Working environment of the charger is：-20℃~40℃。
5) Storage temperature of the charger is：-40℃~70℃。
6) Working and storage relative humidity: generally 0%~95 %(non-condensing)

7.7.4 Battery installment

1) AC input wiring mode

The charger is equipped with industrial plug and socket accessories. The plug has been pre installed by our company. You need to install the socket accessories yourself. Please install the socket connection by professional electrician with electrician certificate.

2) DC output wiring mode

The charger you purchased may be the following DC output connectors: (DIN) no matter what kind of DC output connector you choose, be sure to connect the charger correctly according to the identification on the connector.

3) Precaution

Before use, please carefully check whether the AC input terminal and DC output terminal are respectively connected in place without looseness.

4) Charger display and simple troubleshooting

According to the different models you buy, the charger is equipped with a LCD or LED digital tube display, which can display the charging state. If you are unable to solve the charger failure by yourself, please contact the technical service center for assistance.

- Error code display Table

Error display	Description
Self checking (LCD)	In the process of checking whether the battery is faulty, whether charging is allowed, and whether the charger itself is faulty, etc
Ready (LCD)	External environment is normal and can be charged
Battery charging (LCD)	Battery is in charging
Full battery (LCD)	Charging completed
Shut down... (LCD	Power off, the main switch can be turned off at this time
Grid abnormal (LCD)	Charger input voltage above or below input voltage range
Please connect the output line (LCD)	Output line is not connected with the battery or hardware is not well connected.
Battery disconnection / mode error	(LCD) charger charging mode selection error
Fault E01	Charger output voltage above predetermined value
Fault E02	Charger output current above predetermined value
Fault E03	Charger communication fault
Fault E04	Charger temperature above set value
Fault E09	Charger temperature acquisition signal abnormal
Fault EB1	Battery voltage too high
Fault EB2	Battery current too high
Fault EB3	Communication failure between charger and power management, charger cannot detect BMS message

Fault EB4	Battery temperature too high
Do not charge (LCD)	Charging is not allowed

Note: some of the above fault codes need to be sent out with BMS for display. If the battery has no BMS, some of the fault codes will not be displayed.

8. Inspection before operation:

For the sake of safety operation and good situation of the electric truck, it is compulsory to check the truck completely before operation. Contact the sales department of our company when founding problems. Unless authorized or trained, the manufacturer cannot modify any adjustment values (including motor speed, etc.). In particular, the safety equipment and switches are not allowed to dismantle and adjust, incorrect repair and adjustment, will cause the occurrence of dangerous situations when operation.

Any inspection, maintenance, investigation and other work related to forklift truck, please contact our dealer. Worthy of note is that our company does not take any responsibility of the secondary damage caused by improper operation and maintenance or incorrect repair and the usage of the unoriginal parts of our company.

8.1 Check point and check content:

	No.	Check point	Check content
Braking system	1	Operation handle	When we rotary concentrated control handle to see whether there is a noise from the brake.
	2	Brake clearance	The clearance between brakes should be kept between 0.2mm and 0.5mm.
Steering system	3	Operation handle	Degree of tightness and rotary flexibility.
Hydraulic system	4	Oil pipe	Leakage or not.
	5	Hydraulic oil	Appropriate oil quantity.
	6	Lifting oil cylinder	Whether there is any oil leakage.
Wheels	7	Pins, screws and all the fasteners	Check all the fasteners of the truck's wheels, i.e. pins or screws, loose or not.
	8	Wearing status	Compare the parameter list, replace the wheel when its diameter reduces by 5%.
Battery/Li-ion battery	9	Charge	Confirm the display state of the battery/Li-ion battery capacity.
	10	Electrolyte(the Li-ion battery does not have this option)	The solution level and density of electrolyte.
	11	Connecting wire	The connecting line and socket shall be firm.
Horn	12	Horn	Press down the horn button to check whether the horn sounds.
Instrument	13	Function	Turn on the switch of electric lock to check whether the instrument displays normally.
Others	14	Truck frame, etc	No damage, crank.
	15	Function	Check that whether lifting, lowering, forward & backward movement and support legs of the truck is normal, and if there is any abnormal noise.

9. Inspection after operation:

1) After operation, the smudge on truck shall be wiped out. Besides, the following check shall be carried out:
2) Keep visibility of all graphics context marks such as warning signs, nameplate and notice board. These marks are able to instruct, caution and warn the operator to some degree.
3) The situation about deformation, distortion, damage or breakage
4) Add lubricating oil and grease if necessary.
5) Replace faulty components.

10. Periodic maintenance and repair:

Comprehensive check for truck can avoid malfunction and ensure the service life. The hours listed in maintenance procedures is based on the cases that the truck works for 8 hours per day and 200 hours per month. For the sake of safety, maintenance shall be carried out according to maintenance procedure.

Notice

All the repair work shall be carried out by professional personnel.

Please contact the sales department of our company if you need to adjust or replace the components.

10.1 Precautions during maintenance:

Notice

The components for replacement shall be produced completely by our company. When replacing components of the truck, the components with the same safety requirement with the original design shall be used.

The lubricating oil and hydraulic oil in use shall be recommended by our company.

1) Places for maintenance:

Notice

The places for maintenance shall be appointed and can provide other services such as hoisting and safety protection facility etc.

The places shall have level ground and good ventilation.

The places shall be equipped with fire-extinguishing devices.

2) The matters needing attention before maintenance：

Notice

No smoking.

Arrange the self-protection work.

Wipeout the effusive oil in time.

Before adding lubricating oil, clean up the dirty oil or dust on the joint with brush or cloth.

Except certain situation, turn off the key switch and pull off the power socket.

Lower down the fork arms to the lowest point when carrying out maintenance.

Ensure no goods on the truck when demounting the high pressure oil pipe. Besides, the fork arms shall be descended to the lowest position, by this way, the pressure of hydraulic system can be released.

For the reason that there are capacitors storing a little amount of electric energy in circuit, so before contacting the binding post of the main circuit, discharge at first.

Clean the electric section with compressed air, never flush with water.

When the truck requires high-position maintenance, the altitude safety protection must be carried out for the repairing and maintenance personnel.

10.2 Inspection and maintenance before the new truck put into operation

In order to follow the industry related regulations and ensure the absolute security to the truck in the transportation, for new ex-factory truck, it is possible that there is no electrolyte inside storage battery before the first use (except the inland sale).

The electrolyte of storage battery is prepared well before the truck leave the factory, and it is filled into the storage battery by the professional personnel before the first use. First, place the truck to the site with good ventilation, open the lid of storage battery box, and open all the top plastic lids of storage battery. The plastic pot with storage battery electrolyte inside is raised using plastic funnel, and the electrolyte is poured into the storage battery in a slow way until the liquid level can be seen. After all the storage battery is filled, conduct initial charge to the storage battery timely according to the operation requirements of initial charge 6.1

10.3 Daily inspection

Inspection of hydraulic oil level: lower the fork to the lowest position, oil charge is 24L. Recommendatory trademark for the hydraulic oil should be chosen.

Check the capacity of storage battery: refer to the use and maintenance of storage battery.

10.4 The inspection according to the need

Clean the truck

Inspect and screw down each fastener

Inspect the damage state of wheels

10.5 The inspection and maintenance after 50 hours （Weekly）

Braking system	1	When we rotary concentrated control handle to see whether there is a noise from the brake.
	2	The oil dirt and dust on the turning gearwheel should be cleaned.
	3	The clearance between brakes should be kept between 0.2mm and 0.25mm
Capability of electrolyte	4	Inspect the liquid level of electrolyte, pure water can be used for supplement if the liquid level is too low.
Density of electrolyte	5	The specific gravity should be1.28g/ml after charged.
Clean the storage battery	6	Cover the lid, and flush with tap water.
Inspect the contactor	7	Burnish the coarse surface of contacts using sand paper.
Inspect the Li-ion battery	8	Temperature over discharge is lower than 60℃

10.6 The inspection and maintenance after 200 hours（Monthly）

Besides the weekly maintenance, the following maintenance should be carried out, and when the parts must be adjusted and replaced, please contact with maintenance personnel of our company. (keep monthly maintenance record)

	No.	Check point	Check content
Whole truck	1	Whole status	Abnormal or not.
	2	Horn	Sound
Steering system, Braking system, hydraulic system and lifting system	3	Safety seat switch	Seat safety switch closes when seated, there is a noise from the brake.
	4	Brake clearance	The clearance between brakes should be kept between 0.2mm and 0.8mm.
	5	Operation handle	Degree of tightness and rotary flexibility.
	6	Truck frame and fastener	Function，and check cracks, lubrication and tightness of fasteners.
	7	Fork clip mechanism	Function and check the cracks, bending, deformation.
	8	Oil pipe	Whether oil pipes leak or not.
	9	Hydraulic oil	Proper quantity of oil.
	10	Lifting oil cylinder	Whether there is any oil leakage or not.
Storage battery, charger and electric system Storage battery, charger and electric system	11	Electrolyte	Liquid level，specific gravity and cleanness
	12	Plug	Function, whether it is damaged or not
	13	Key switch	Function
	14	Contactor	Contact performance and function
	15	Micro switch	Function
	16	Controller	Function
	17	Driving motor	Wearing status of carbon brush and selenium rectifier.

	18	Lifting motor	Wearing status of carbon brush and selenium rectifier.
	19	Fuse	Whether it is perfect or not
	20	Wiring harness and connection terminals	Whether flexible and whether damaged or not.

10.7 Maintenance for 600 hours（every three months）

During the maintenance every three months, the monthly maintenance process shall be repeated. When the parts must be adjusted and replaced, please contact with maintenance personnel of our company.

Contactor	Burnish the coarse surface of contacts using sand paper.
	Replace according to the status when the function is not well.
Motor	Wearing status of carbon brush and commutator.
Brake	Clean the dirt and dust on friction plates of the brake, meanwhile check the wearing status of the friction plates.

10.8 Maintenance for 1200 hours（every six months）

During the maintenance for a half year, the maintenance process for three months shall be repeated. When the parts must be adjusted and replaced, please contact with maintenance personnel of our company.

Contactor	Burnish the coarse surface of contacts using sand paper.
	Replace according to the status when the function is not well.
Motor	Wearing status of carbon brush and selenium rectifier.
Reduction box	Replace the gear oil
Oil filter	clean
Brake	Clean the dirt and dust on friction plates of the brake, meanwhile check the wearing status of the friction plates.
Hydraulic system	Replace hydraulic oil. Check that whether there is any leakage in the lifting cylinder or not and replace the seals when necessary.
Fork wheel and bearings	Check the wearing condition, and replace them if necessary

10.9 Recommended working medium:

1) Hydraulic oil:
   A. When it is normally loaded, we advise:
      Hydraulic oil: LHPISOVG46, in accordance with standard DIN51524T.2, the average sustained temperature should between 40 degrees to 60 degrees.
   B. Heavy loaded, we advise:
      Hydraulic oil：LHPISOVG68，conform to the standard of DIN51524T.2, the average continuous temperature is over 60 degree.
   C. Low temperature light load, we advise:
      Hydraulic oil:HLPISOVG32, conform to the standard of DIN51524T.2, the average continuous temperature is below 60 degree.
   D. Various load，we advise：
      Use the hydraulic oil:LHPISOVG46 that conforms to the standard of DIN51524T.2 in the above working condition.
      The viscosity of the lubrication oil is high.(most use the hydraulic oil) .
      Use the SAE20W/20 engine oil instead of the HLP68 hydraulic oil when it is difficult to buy the hydraulic oil .
2) Gear oil：
   Heavy load gear oil 85W-90(GL-5)。
3) Lubricating grease:
   Lithium grease of type 3

All kinds of depleted hydraulic oil, gear oil and grease will pollute the environment. For this reason, recycle the replaced working medium or treat according to local pertinent regulations.

10.10 Maintenance period of consumables and partial parts:

Items	Maintenance content	Maintenance period	Remarks
Bearings of fork wheel	Replacement	1200 hours	
Wheel	Replacement	1200 hours	
Seals	Replacement	1200 hours	Replace when finding out damage
Gear box	Replacing lubricant grease	1000 hours	
Hydraulic oil	Replacement	1000 hours	
High pressure oil pipe	Replacement	2000 hours	Replace when finding out damage
Strainer of hydraulic reservoir	Cleaning	1000 hours	
Driving motor	Check for carbon brushes and bearings	1000 hours	
Steering motor	Check for carbon brushes and bearings	1000 hours	
Oil pump motor	Check for carbon brushes and bearings	1000 hours	

11. The storage, transportation and loading of truck:

11.1 The store of truck:

If the electric pallet truck is not used for over two months, it should be placed in the room which is in good ventilation, no frost, clean and dry; also the following measures should be taken:

Clean the truck thoroughly.

Lift the forks completely for several times, check it is normal or not.

Lower the forks to the lowest position.

Support the side near to driver of truck with square timber to lift the driving wheels of truck from the ground.

Apply a layer of flimsy oil or grease on all the bared surface of mechanical parts.

Lubricate the truck.

Check the status of storage battery and electrolyte, and imbrue the non-acid lubricating grease to the binding post of storage battery.

All the electrical contacts should be sprayed using appropriate contacts spray.

Check the condition of the Li-ion battery, and make sure that the power of the lithium battery is less than 20%.

11.2 transportation of truck:

If the truck needs to be transported for a long distance, support the side near to driver of truck with square timber to lift the driving wheels of truck from the ground. The two front wheels of truck shall be fixed stably by sphenoid wood block. Fasten the truck to transport vehicle with ropes.

11.3 Loading and unloading of truck:

Before loading the truck, check out the nameplate for the total weight of truck to choose appropriate hoisting handling equipment. The hoisting of truck shall be kept level, and landing shall be kept slow and stable. The personnel around shall watch for safety. One of the personnel is responsible for conducting. If the other truck is used for loading and unloading, please watch the bottom situation of the truck. Take care to insert the fork arms to the bottom, in avoidance of damaging the driving wheel, balance wheel and forward wheel.

12. Replacement of storage battery

The replacement procedure of storage battery is as follows:

1) Open the side door of storage battery and take it down.
2) Pull down the socket connector of storage battery from the truck.
3) Pull out the storage battery from the side way and take the storage battery away with special car or using hoisting method.
4) The mounting method of putting the storage battery back into the battery pack is opposite to the above procedures.

Notice

Handle the storage battery gently during hoisting and transportation of the battery. Otherwise it will cause damage to the battery or bring danger to human body.

13. Common faults and troubleshooting:

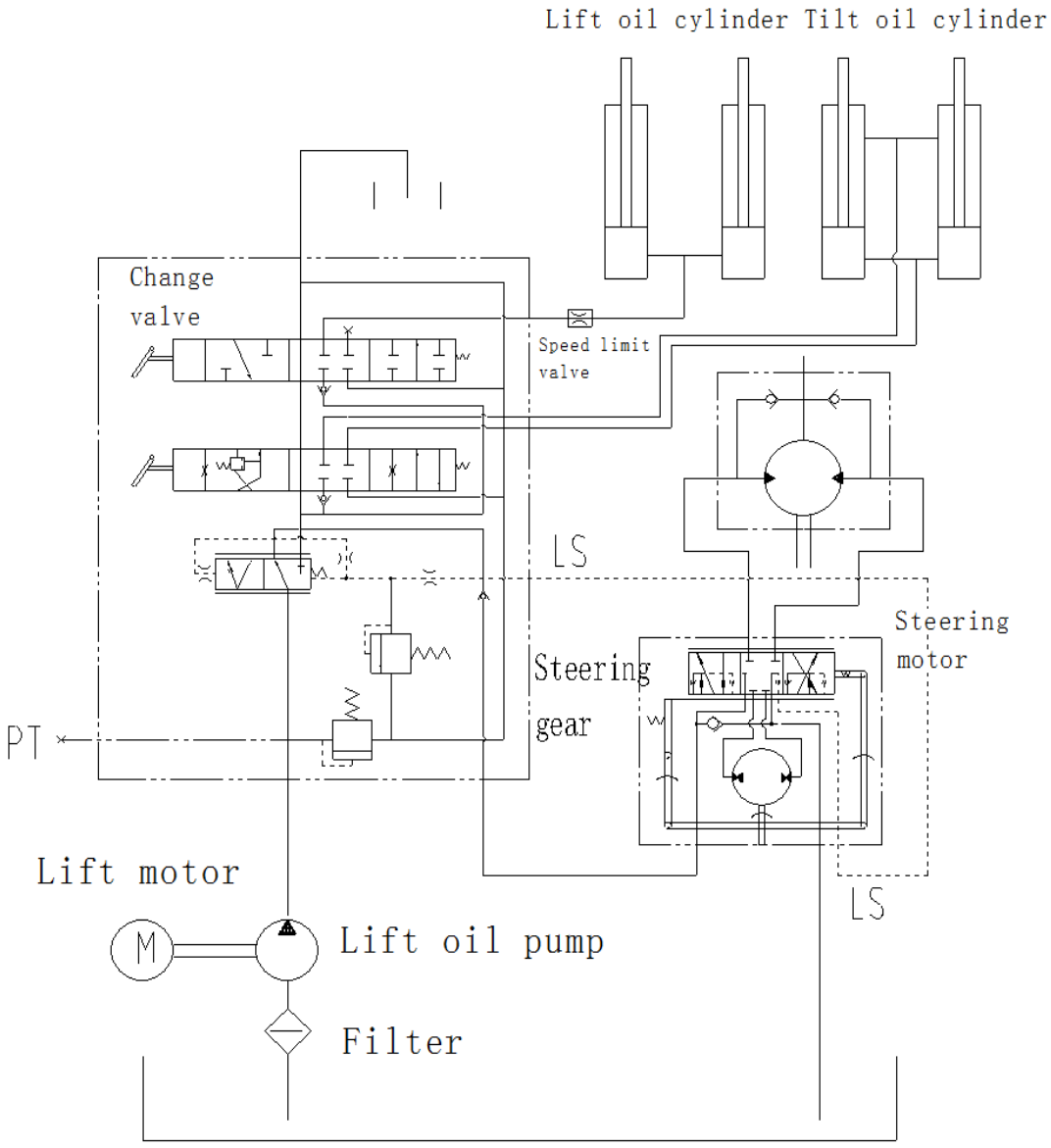
No.	Faults	Possible cause	Trouble shooting
1	The forklift cannot start (shout down of main contactor)	①blown fuse of controller circuit	change
		②power switch is not well connected or damaged	repair or change
		③blown fuse of main circuit	change
		④electric lock is not well connected or damaged	repair or change
		⑤connection of battery is loose or fall off	fasten
	The order picker cannot start (shout down of main contactor)	① steering wheel EM brake does not suck, the truck is in brake condition	repair or change
		②Potentiometer loose or the screw loosened	repair or change
		③walking motor magnetic coil is broken or terminal is not well connected	repair or change
		④tip of contactor is not well connected	repair or change
		⑤ MOSFET tube type circuit board in trouble	repair or change
		6）guardrail is not put down or guard rail switch damaged	put down or repair or change
2	Forklift can only move forward (or backward)	①contactor is not well connected or burned	repair or change
		②circuit board in trouble	repair or change
3	Forklift cannot stop in travelling	tip of contactor damaged, tip does not release when touching it	power off in emergence, change the contactor tip
4	shutdown of brake	①EM brake loose or damaged	fasten the screw or repair EM brake
		②EM brake plate worn out	change the brake plate
5	steering failure	① Steering gear damaged.	repair or change
		② steering motor damaged	repair or change
		② Oil pump motor damaged	repair or change
		③ Steering pipeline leaks.	repair or change
6	steering wheel is heavy to steer, with noise, motor is overloaded	①gear and bearing is blocked	clean or replace the bearing
		②there is clearance in bearing installation	adjust the clearance
		③front wheel bearing damaged	replace the bearing
7	Forks cannot lift	①overloaded	reduce the load
		②pressure of overflow valve is too low	adjust higher
		③abnormal inside leakage in lifting cylinder	replace the seal
		④hydraulic oil is not enough	add appropriate amount of filtered hydraulic oil
		⑤voltage of the battery is not enough	charging
		⑥ manual multivalve damaged	repair or change
		⑦Oil pump motor damaged	repair or change
		⑧ Oil pump damaged	repair or change
		⑨voltage of the battery is severely not enough	Charging
		⑩electric lock not open or damaged	repair or change
8	The fork cannot lower after lifted.	①inner mast overloaded or deform	repair or change
		②outside mast overloaded or deform	repair or change
		③mast rolling wheel blocked	repair or adjust
		④mast guiding rod bended	repair or adjust
		⑤speed adjust valve blocked	adjust
		⑥ Solenoid valve is out of control	eliminate faults
		⑦chain loose	repair or tighten chain
9	voltage decreased (after charging)	①individual battery damaged	repair or change
		②battery liquid level low(the Li-ion battery does not have this option)	add electrolyte
		③there is impurity in electrolyte(the Li-ion battery does not have this option)	replace electrolyte

14. List of accessories, spare parts and wearing parts

No.	Name	Position for use	Specification	Quantity	Remark
1	electric key	switch on electric lock	JK404C	2	
2	plug, socket	match the charger	REMA SR 175	1set	
3	fuse	Electrical parts	10A	2	
5	fuse	Electrical parts	300A	1	
7	Seal ring	Side cylinder	UHS40	1	
8	Dust ring	Side cylinder	DHS40	2	
10	O- seal ring	Side cylinder	47.5X2.65	2	
11	Combined ring	Oil tube	D22	2	
12	Combined ring	Oil tube	D20	2	
13	Combined ring	Oil tube	D14	2	
14	Combined ring	Oil tube	D12	2	

Delivery company:

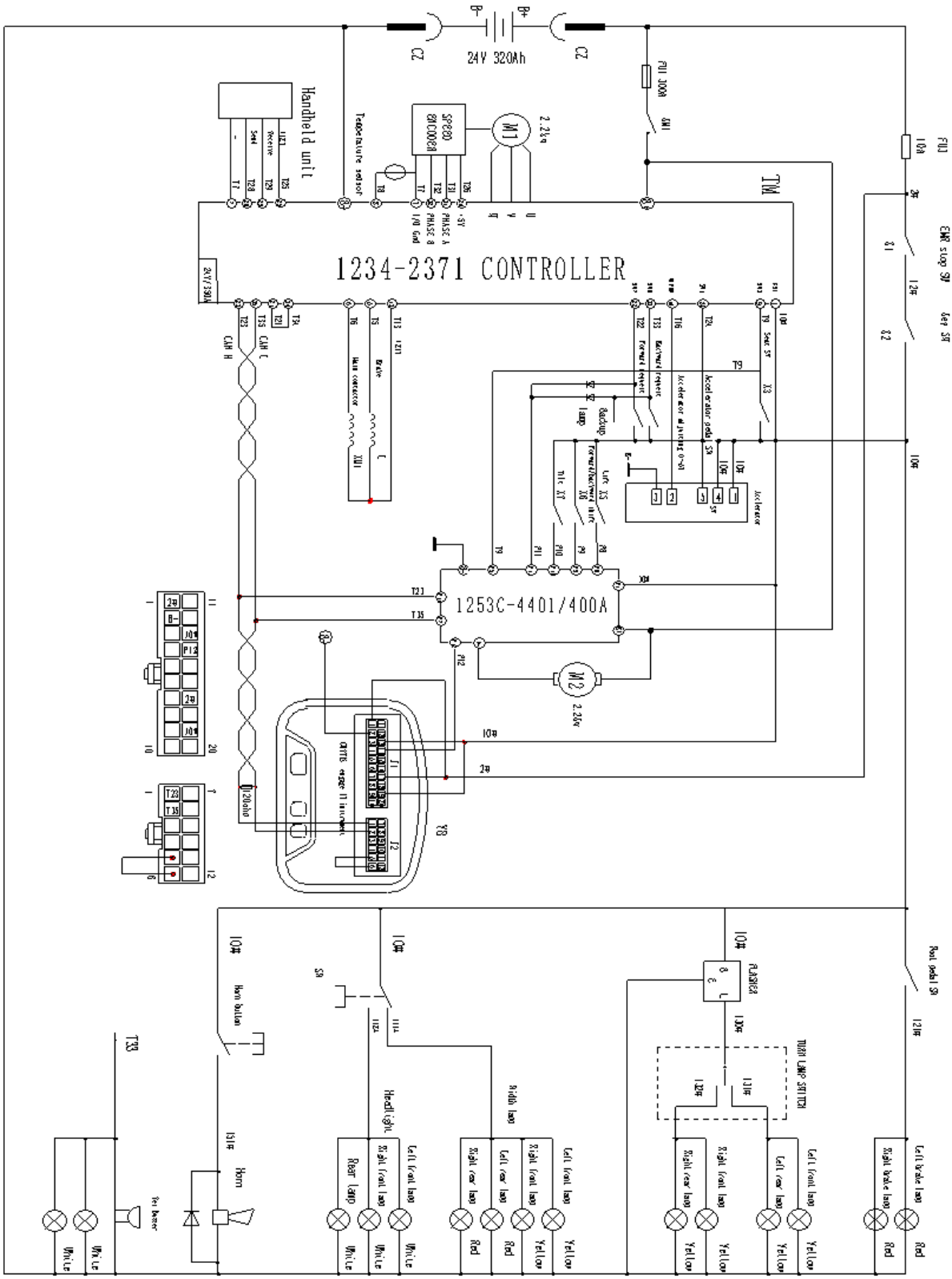
15. Structure diagrams, schematics of main components



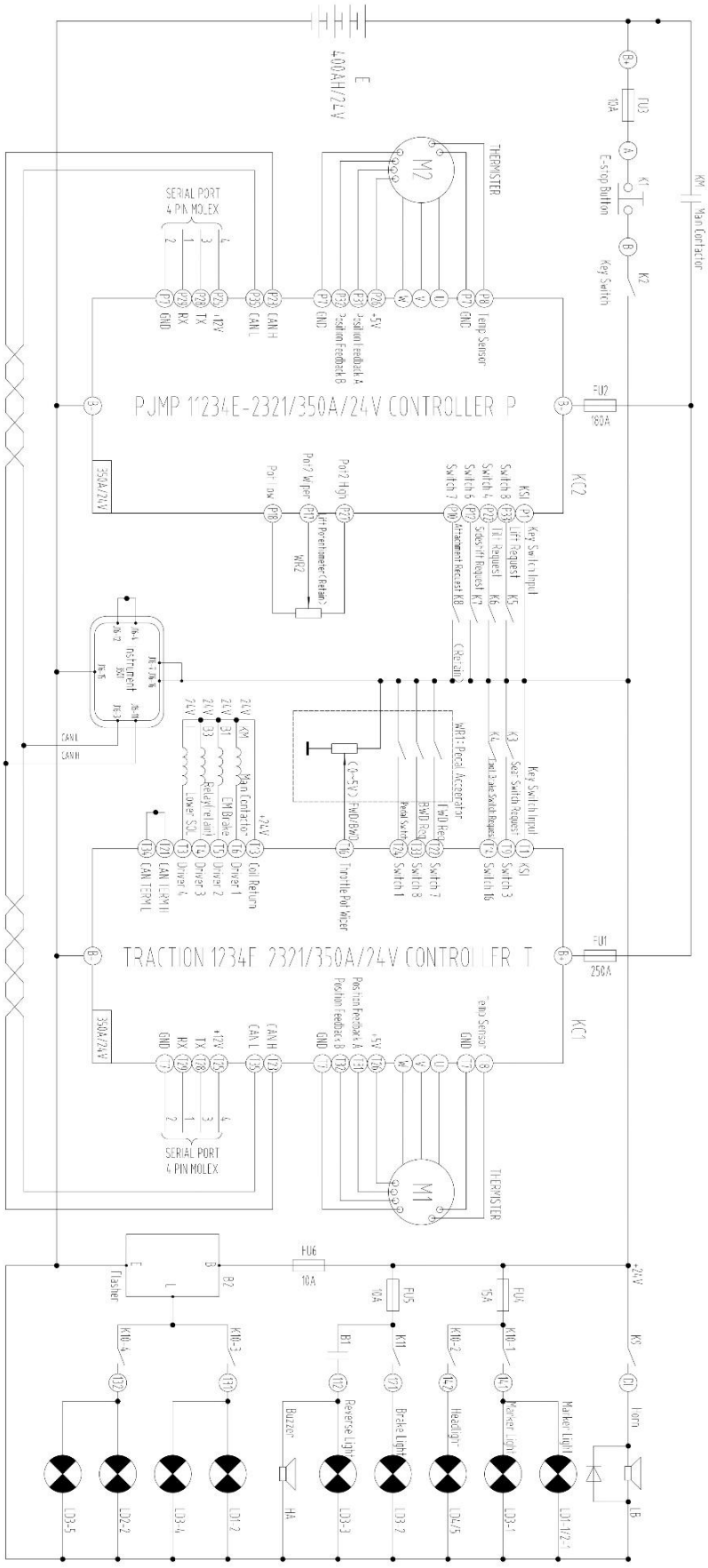
Hydraulic principle diagram

16. Electric system

16.1 CURTIS Electric system diagram



CURTIS 1234E+1253C Schematic Diagram



CURTIS 1234E+1234ESchematic Diagram

16.2 CURTIS controller error code

- Curtis 1234E/1236E controller error code and troubleshooting

  There are red and yellow LED indicators on the controller housing. Different flashings represent different failures. Seeing below

Lights Flashing	Description
Both off	Controller is dead, for battery is out of power or a cable fault occurs
Yellow light flashes	Controller works fine
Both on	Controller is updating
Both flash	Controller fault

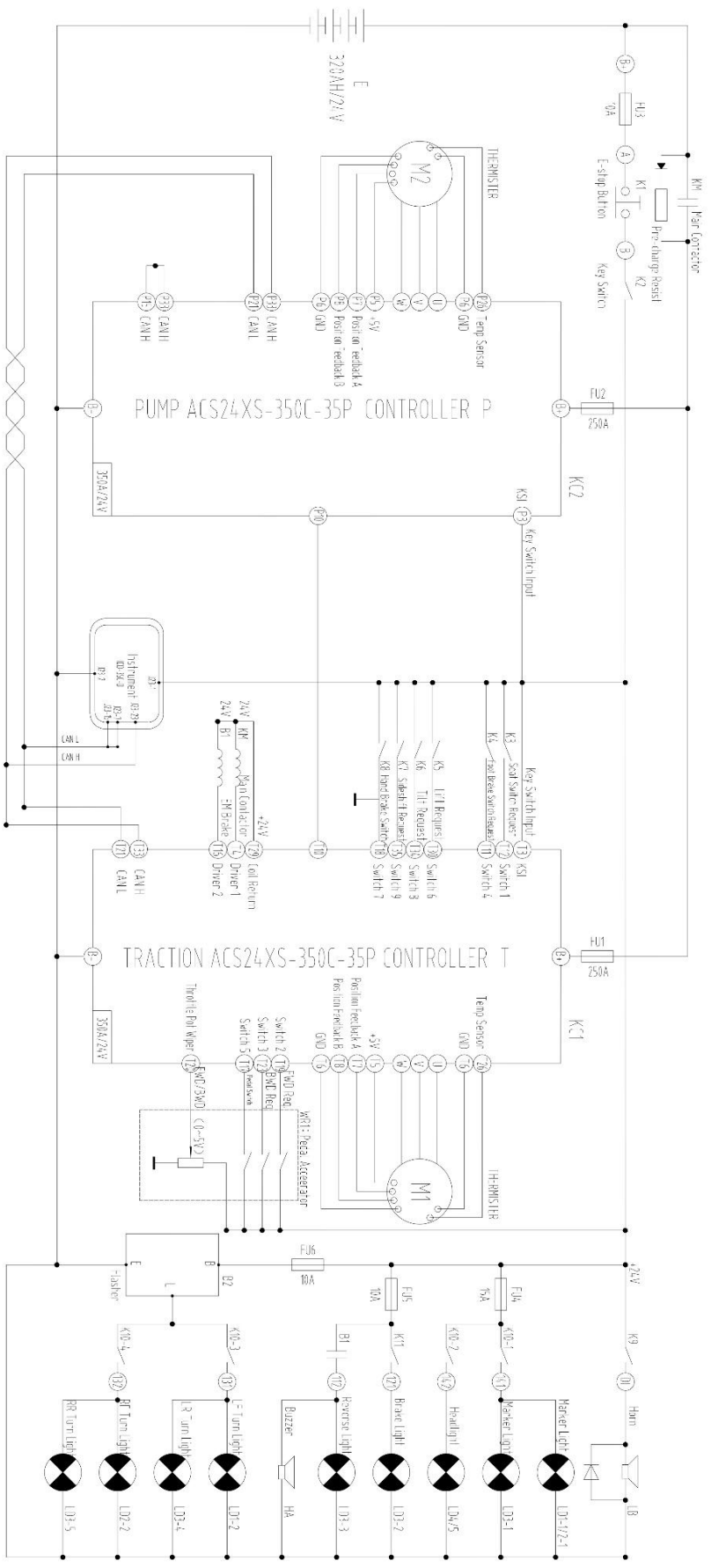
Code	Fault display	Possible cause
1,2	Controller Overcurrent (main contactor, electromagnetic brake, motor not work)	1. Motor connecting wire U, V or W short circuited 2. False setting of motor parameter 3. Controller fault
1,3	Current Sensor Fault (main contactor, electromagnetic brake, motor not work)	1. U, V, W short circuited relative to truck body (motor stator short circuited) 2. 2. Controller fault
1,4	Precharge Failed (main contactor, electromagnetic brake, motor not work)	1. External load which is connected to capacitor bank (B+ terminal) stops capacitor from charging. 2. Check capacitor voltage under the monitor menu.
1,5	Controller Severe Undertemp (main contactor, motor, electromagnetic brake, speed governor not work; full brake input)	1. Controller works in extreme environment (below -40℃). 2. Check controller temperature under the monitor menu.
1,6	Controller Severe Overtemp (main contactor, motor, electromagnetic brake, speed governor not work; full brake input)	1. Controller works in extreme environment (above 95℃) 2. Truck overloaded. 3. Improper mounting of controller. 4. Check controller temperature under the monitor menu.
1,7	Severe Undervoltage (driving torque decreases)	1. False parameter setting of battery voltage. 2. Battery has run out of power. 3. Battery internal resistance too high. 4. Battery not connected when driving. 5. Check capacitor voltage under the monitor menu. 6. B+ fuse burnt or main contactor not closed.
1,8	Severe Overvoltage (main contactor, motor, electromagnetic brake, speed governor not work; full brake input)	1. False parameter setting of battery voltage. 2. Battery resistance too high when regenerative brake current is produced. 3. Battery not connected during regenerative braking. 4. Check capacitor voltage under the monitor menu.
2,1	Controller Undertemp Cutback (driving and braking torque decrease) (controller will not start when VCL language fails)	1. Controller undertemp cutback function takes into effect. 2. Controller is working in extreme conditions. 3. Check controller temperature under monitor menu.
2,2	Controller Overtemp Cutback (driving and braking torque decrease)	1. Controller overtemp cutback function takes into effect. 2. Controller is working in extreme conditions. 3. Truck overloaded. 4. Improper mounting of controller. 5. Check controller temperature under monitor menu.
2,3	Undervoltage Cutback (driving torque decreases)	1. During normal running, battery needs charging, controller undervoltage cutback function takes into effect. 2. False parameter setting of battery voltage. 3. Battery has run out of power. 4. Battery internal resistance too high. 5. Battery wire disconnected during driving. 6. Check capacitor voltage under encoder monitor menu. 7. B+ fuse burnt or main contactor not closed.

2,4	Overvoltage Cutback (driving torque decreases)	1. Running normally. During regenerative braking, regenerative braking current makes battery voltage too high and the fault is displayed; controller overvoltage limit takes into effect. 2. False parameter setting of battery voltage. 3. Battery resistance too high when regenerative braking current is produced. 4. Battery connecting wire open circuited during regenerative braking. 5. Check capacitor voltage under encoder monitor menu.
2,5	+5V Supply Failure (controller will not start when VCL language fails)	1. Too low resistance of external load which is connected to +5V supply (pin 26). 2. Check the 5V and Ext supply current under encoder monitor menu.
2,6	Digital Out 6 Overcurren (digital output driving end 6 not work)	1. Too low resistance of external load which is connected to digital output driving end 6 (pin 19).
2,7	Digital Out 7 Overcurrent (digital output driving end 7 not work)	1. Too low resistance of external load which is connected with digital output driving end 7 (pin20).
2,8	Motor Temp Hot Cutback (driving torque decreases)	1. Motor temperature exceeds parameter setting, therefore the demanded current is cutback. 2. Parameter of motor temp control has not been correctly adjusted. 3. Check motor temp and Analog2 input under encoder monitor menu. 4. If thermistor is not applied, temperature compensation and temperature cutting-off should be set as OFF.
2,9	Motor Temp Sensor Fault (operation limitation <max. speed decrease> and motor overtemp cutback functions become ineffective)	1. Improper connection of motor temp sensor. 2. If thermistor is not applied, temperature compensation and temperature cutting-off should be set as OFF. 3. Motor temperature exceeds max. temp setting.
3,1	Coil1 Driver Open/Short (driving 1 no output)	1. Connected load open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
	Main Open/Short (driver 1, motor and electromagnetic brake not work)	1. Coil of main contactor open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
3,2	Coil2 Driver Open/Short (driver 2 no output)	1. Connected load open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
	EM Brake Open/Short (driver 2 and speed governor not work, full braking)	1. Connected load open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
3,3	Coil 3 Driver Open/Short (driver 3 no output)	1. Connected load open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
3,4	Coil 4 Driver Open/Short (driver 4 no output)	1. Connected load open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
3,5	PD Open/Short (proportional valve not work)	1. Connected load open or short circuited. 2. Connecting terminal polluted. 3. Wiring harness damaged or connecting wire false.
3,6	Encoder Fault (operation limitation function takes into effect)	1. Motor encoder faulted. 2. Wiring harness damaged or connecting wire false. 3. Check motor monitor menu: motor RPM
3.7	Motor Open (main contactor, motor and electromagnetic brake not work)	1. Motor wire U, V, W open circuited. 2. Cable damaged or false connecting wire.
3,8	Main Contactor Welded (main	1. Contacts of main contactor adhesion.

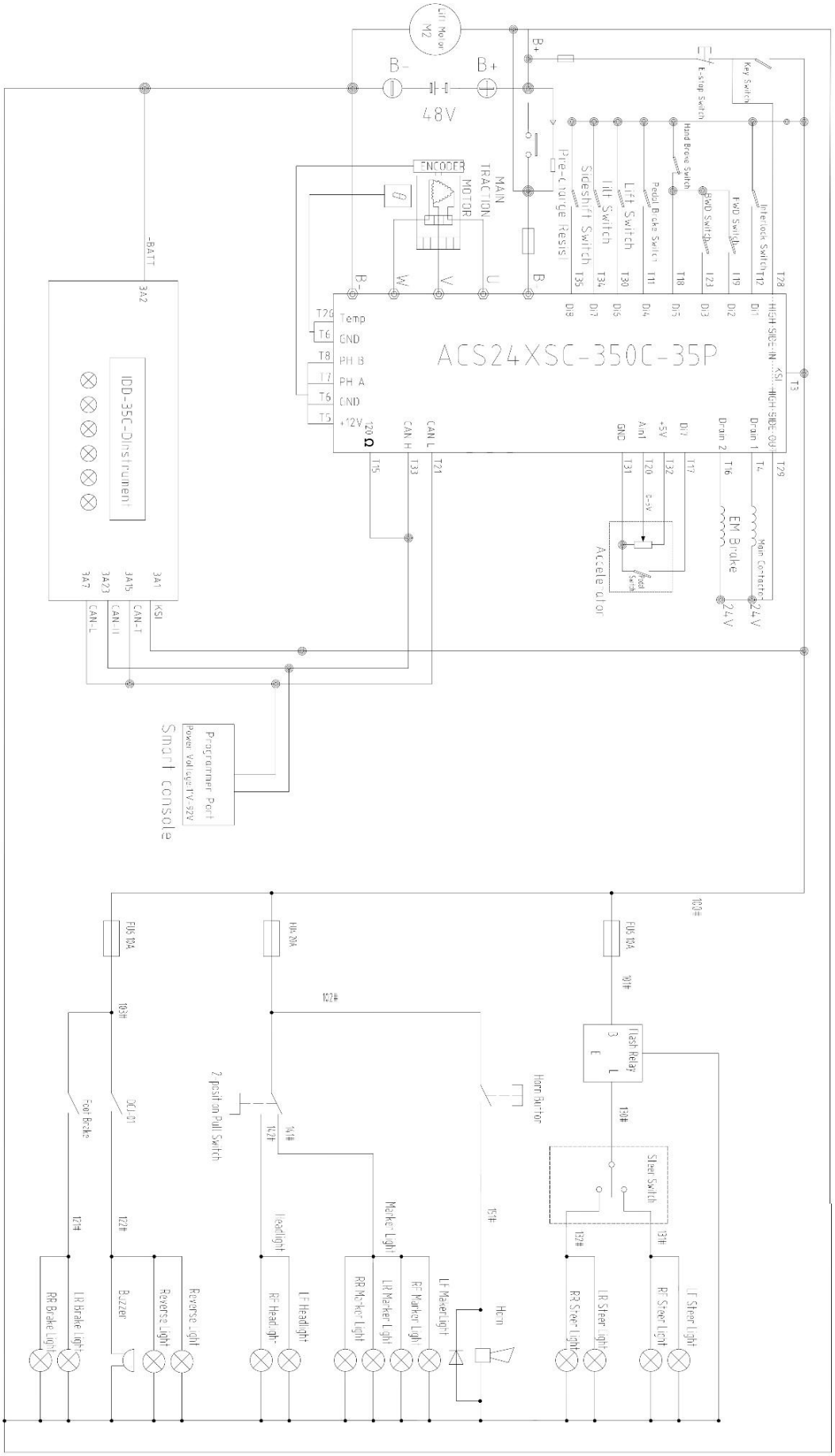
	contactor, motor and electromagnetic not work)	2. Bad contact or open circuit of phase U connecting wire of motor 3. An alternative voltage path (eg. an external precharge resistor) provides a current for capacitor bank (B+).
3,9	Main Contactor Did Not Close (main contactor, motor and electromagnetic not work)	1. Main contactor not closed. 2. Contacts of main contactor burnt or have bad contact 3. External load at capacitor bank (B+) stops capacitor bank from charging. 4. B+ fuse burnt
4,1	Throttle Wiper High (speed governor not work)	1. Throttle wiper voltage too high. 2. Check accelerator input on monitor menu.
4,2	Throttle Wiper Low (speed governor not work)	1. Throttle wiper voltage too low. 2. Check accelerator input on monitor menu.
4,3	Brake Wiper High (full brake input)	1. Brake wiper voltage too high. 2. Check braking potentiometer input on monitor menu.
4,4	Brake Wiper Low (full brake input)	1. Brake wiper voltage too low. 2. Check braking potentiometer input on monitor menu.
4,5	Pot Low Overcurrent (speed governor not work, full brake input)	1. Resistance of potentiometer connected to low end of potentiometer too low. 2. Check the potentiometer low end output on monitor menu.
4,6	EEPROM Failure (main contactor, motor, electromagnetic brake, speed governor, interlock, driver 1-4 and proportional valve not work, full brake input	1. EEPROM failure. 2. EEPROM writes through VCL, through CAN bus, through adjusting 1311 parameter or through uploading new software for controller, they are all possible causes.
4,7	HPD/Sequencing Fault (speed governor not work)	1. False input sequence of key switch, interlock, direction and accelerator. 2. Bad connection of key switch, interlock, direction and accelerator input, or switch fault. 3. Check input items of encoder monitor menu.
	Emer Rev HPD (speed governor and electromagnetic brake not work)	1. Emergency reverse operation is over, yet accelerator, forward/backward input and interlock switch have not returned to neutral.
4,9	Parameter Change Fault (main contactor, motor, electromagnetic brake not work)	1. This is a safety fault caused by a 1311 parameter setting change, which can be excluded by turning on electric door switch again. For example, if a user changes accelerator type, this fault will occur. Turning on electric door switch again and the truck can work again.
5,1-6,7	OEM Faults	1. These are OEM level faults which can only be seen through encoder of a higher level.
6,8	VCL Runtime Erro (main contactor, motor, electromagnetic brake, speed governor, interlock, driver 1-4 and proportional valve not work, full brake input)	1. VCL code running time false. 2. See 1311 controller monitor menu: VCL error module and VCL error.
6,9	External Supply Out of Range	1. An external load connected to 5V and 12 V produces an input current which is too big or too small. 2. External maximum and minimum input on fault check menu incorrect. 3. See 1311 input check menu: external input current.
7,1	OS General (main contactor, motor, electromagnetic brake, speed governor, interlock, driver 1-4 and proportional valve not work, full brake input)	1. Internal controller fault.
7,2	PDO Timeout	1. Receive time of CAN PDO exceeds PDO timeout interval.
7,3	Stall Detect	1. Motor stops running.

		2. Motor encoder fault. 3. Wiring harness damaged or connecting wire error. 4. Problematic power supply of encoder. 5. See 1311 motor monitor menu: motor RPM.
8,7	Motor Characterization Fault (main contactor, speed governor, electromagnetic brake and motor not work)	1. Incorrect descriptions of motor characteristics.
8,8	Encoder Characterization Fault (main contactor, speed governor, electromagnetic brake and motor not work)	1. Incorrect descriptions of encoder characteristics. 2. Pulse frequency of motor encoder is not a standard value（32,48,64,80ppr）.
8,9	Motor Type Fault (main contactor, speed governor, electromagnetic brake and motor not work)	1. Parameter of motor type out of range.
9,2	EM Brake Failed to Set	1. Truck continues to travel after a braking signal is given. 2. Electromagnetic brake cannot hold rotating motor.
9,3	Limited Operating Strategy（LOS） (enters limited operation mode)	1. For either encoder fault (code 36) or stop running check fault (code 73), it's that the limited operation mode is activated. 2. Motor encoder fault. 3. Wiring harness damaged or connecting wire error. 4. Speed loss of truck.
9,4	Emer Rev Timeout (speed governor and electromagnetic brake not work)	1. Emergency reverse is in an activated state yet emergency reverse has stopped working due to timeout. 2. Emergency reverse signal adhesion.

16.3 Inmotion Schematic Diagram



Inmotion ACS24XS+ACS24XS Schematic Diagram



Inmotion ACS24XSC semi AC Schematic Diagram

16.4 Inmotion controller fault codes

No.	Error code	Hexade -cimal	Description	Trouble shooting
1	**13**	**0x0D**	HPG CONTROLLER EEPROM KO	Reset key
2	**20**	**0x14**	Incorrect start Accelerator pedal switch active before key on	Release pedal switch
3	**21**	**0x15**	Incorrect start Forward switch or reverse switch active before key on	Turn off the direction switch
4	**22**	**0x16**	Forward switch and reverse switch active at the same time	Direction switch fault
5	**23**	**0x17**	Throttle analog value out of range	Throttle fault or analog need to be calibrated
6	**24**	**0x18**	Throttle analog fault	
7	**30**	**0x1E**	HPG controller battery voltage low	HPG controller battery voltage low need charge
8	**31**	**0x1F**	Traction controller CAN communication fault	Check CAN wire of controller and display
9	**32**	**0x20**	Battery voltage low	Need charge
10	**33**	**0x21**	DC motor voltage high	Reset key
11	**34**	**0x22**	CPU fault	Reset key
12	**36**	**0x24**	Incorrect start Tilt switch active before key on	Reset tilt switch
13	**37**	**0x25**	Incorrect start Side switch active before key on	Reset side switch
14	**38**	**0x26**	Incorrect start Attachment switch active before key on	Reset attachment switch
15	**39**	**0x27**	Incorrect start Lift switch active before key on	Reset lift switch
16	**40**	**0x28**	Lift analog value out of range	Lift analog fault or need to be calibrated
17	**43**	**0x2B**	Steer analog value out of range	Steer analog fault or need to be calibrated
18	**44**	**0x2C**	WARNING: Traction controller speed protection	Vehicle speed is too high alarm
19	**45**	**0x2D**	WARNING: Traction controller encoder fault	1.Traction controller encoder fault 2.Traction motor speed sensor connection wire is open
20	**49**	**0x31**	DC motor operating current is zero	HPG conrtoller sensor fault
21	**53**	**0x35**	HPG controller over current	HPG conrtoller over current
22	**62**	**0x3E**	HPG controller temperature high	HPG controller temperature high need cool
23	**66**	**0x42**	HPG Controller battery low	HPG controller battery low need charge
24	**74**	**0x4A**	HPG controller driver shorted	HPG controller driver shorted
25	**76**	**0x4C**	HPG controller coil shorted	HPG controller coil shorted
26	**78**	**0x4E**	HPG controller VACC not ok	HPG controller VACC not ok
27	**79**	**0x4F**	Incorrect start HPG controller incorrect start	HPG controller incorrect start
28	**81**	**0x51**	WARNING: Traction controller temperature is low	Traction controller temperature is low alarm
29	**82**	**0x52**	WARNING: Traction controller temperature is high	Traction controller temperature is high alarm
30	**83**	**0x53**	Traction controller temperature sensor fault	Traction controller temperature sensor fault
31	**84**	**0x54**	WARNING: Traction motor temperature is low	1.Traction motor temperature is low 2.raction motor temperature sensor is fault
32	**85**	**0x55**	WARNING: Traction motor temperature is high	1.Traction motor temperature is high 2.Traction motor temperature sensor is fault

33	**86**	**0x56**	Traction motor temperature sensor fault	1.Traction motor temperature sensor is fault 2.Traction motor temperature sensor connection wire is open
34	**87**	**0x57**	Traction motor encoder fault	1.Traction motor encoder fault 2.Traction motor speed sensor connection wire is open
35	**88**	**0x58**	WARNING: DC bus voltage of traction controller is high	1.DC bus voltage high 2.The ramp is too steep
36	**89**	**0x59**	WARNING: DC bus voltage of traction controller is low	Need to charge or check power wiring
37	**90**	**0x5A**	WARNING: The default value of the traction controller is updated	Reset key
38	**91**	**0x5B**	WARNING: Traction drive limit	Battery low vehicle speed limit
39	**97**	**0x61**	Open drain of traction output open or short	Check the wire of open drain of traction output open or short
40	**98**	**0x62**	WARNING: Traction controller over current or short	Check power wiring
41	**101**	**0x65**	Traction controller short	1.Check power wiring 2.Controller enable before contactor pull
42	**102**	**0x66**	Traction controller temperature is high cut back	Traction controller temperature is high need cool
43	**103**	**0x67**	Traction motor temperature is high cut back	1.Traction motor temperature is high need cool 2.Traction motor temperature sensor fault
44	**104**	**0x68**	Traction controller over current	1.Vehicle overload or Mechanical clamping 2.Traction motor speed sensor fault
45	**105**	**0x69**	Traction controller precharge failed	Replace the pre charge resistance
46	**110**	**0x6E**	DC bus voltage of traction controller is low cut back	Battery need charge
47	**111**	**0x6F**	DC bus voltage of traction controller is high cut back	DC bus voltage of traction controller is high cut back
48	**112**	**0x70**	DC bus voltage of traction controller is high cut back(Hardware monitoring)	DC bus voltage of traction controller is high cut back(Hardware monitoring)
49	**114**	**0x72**	Internal power supply error	Traction motor temperature sensor or speed sensor connection
50	**121**	**0x79**	WARNING: Pump controller temperature is low	Pump controller temperature is low alarm
51	**122**	**0x7A**	WARNING: Pump controller temperature is high	Pump controller temperature is high alarm
52	**123**	**0x7B**	Pump controller temperature sensor fault	Pump controller temperature sensor fault
53	**124**	**0x7C**	Pump motor temperature is low	1.Pump motor temperature is low 2.Pump motor temperature sensor fault
54	**125**	**0x7D**	WARNING: Pump motor temperature is high	1.Pump motor temperature is high 2.Pump motor temperature sensor fault
55	**126**	**0x7E**	Pump motor temperature sensor fault	1.Pump motor temperature sensor fault 2.Pump motor temperature sensor connection wire is open
56	**127**	**0x7F**	Pump controller encoder fault	1.Pump motor speed sensor fault 2.Pump motor speed sensor connection wire is open
57	**128**	**0x80**	WARNING: DC bus voltage of pump controller is high	DC bus voltage of pump controller is high
58	**129**	**0x81**	WARNING: DC bus voltage of pump controller is low	Check power wiring
59	**130**	**0x82**	WARNING:	Reset key

			The default value of the pump controller is updated	
60	**132**	**0x84**	WARNING: Pump drive limit	Battery voltage low need charge
61	**137**	**0x89**	Open drain of pump output open or short	Check the wire of open drain of pump output open or short
62	**138**	**0x8A**	WARNING: Pump controller over current or short	Check power wiring
63	**141**	**0x8D**	Pump controller short	
64	**142**	**0x8E**	Pump controller temperature is high cut back	
65	**143**	**0x8F**	Pump motor temperature is high cut back	Pump motor temperature is high alarm
66	**144**	**0x90**	Pump controller current calibration error	Reset key
67	**145**	**0x91**	Pump controller precharge failed	Replace the pre charge resistance
68	**150**	**0x96**	DC bus voltage of pump controller is low cut back	DC bus voltage of pump controller is low cut back
69	**151**	**0x97**	DC bus voltage of pump controller is high cut back	DC bus voltage of pump controller is high cut back
70	**152**	**0x98**	DC bus voltage of pump controller is high cut back(Hardware monitoring)	DC bus voltage of pump controller is high cut back(Hardware monitoring)
71	**153**	**0x99**	Pump controller CPU fault	Reset key
72	**154**	**0x9A**	Pump controller speed control fault	Pump controller speed control fault
73	**147**	**0x93**	BMS cell voltage too high	
74	**148**	**0x94**	BMS firstly fault	
75	**149**	**0x95**	BMS secondary fault	
76	**155**	**0x9B**	BMS CAN bus off	BMS CAN bus off
77	**156**	**0x9C**	Temperature protection	Temperature protection
78	**157**	**0x9D**	BMS over temperature protection	BMS over temperature protection need cool
79	**158**	**0x9E**	BMS single body over discharge	BMS single body over discharge need charge
80	**159**	**0x9F**	BMS over voltage protection	BMS over voltage protection
81	**161**	**0xA1**	Display can fault	Check display and controller can connection
82	**163**	**0XA3**	BMS over current	BMS over current
83	**164**	**0XA4**	Charge protection	Charge protection
84	**165**	**0XA5**	Seat switch off after a period of time, the direction of the request to reset	Reset direction switch
85	**168**	**0xA8**	BMS indicates Limit Current alarm	BMS indicates Limit Current alarm
86	**169**	**0xA9**	BMS indicates cutoff Current alarm	BMS indicates cutoff Current alarm
87	**170**	**0xAA**	BMS indicates brake Current alarm	BMS indicates brake Current alarm
88	**171**	**0xAB**	BMS CAN error	BMS CAN Error
89	**200**	**0xC8**	Proportional valve error	Proportional valve error
90	**241**	**0xF1**	HPG controller can bus ko	Check can wire open and can speed rate
91	**242**	**0xF2**	HPG controller battery over voltage	HPG controller battery over voltage
92	**243**	**0xF3**	HPG controller key shorted	HPG controller key shorted
93	**244**	**0xF4**	HPG controller watchdog error	Reset key switch
94	**246**	**0xF6**	HPG controller waiting for main contactor	Turn off the pump contactor parameter

16.5 Intelligent instrument

IDD-35C-D is a vehicle mounted color screen instrument based on CAN and wireless communication, which can display information such as vehicle speed, working time, battery power, Chinese and English display, password protection, fault code, etc. Meanwhile, it can realize industrial interconnection functions such as vehicle positioning, remote locking, remote help, etc. It can also modify and configure vehicle parameters according to users, provide online real-time communication, cloud data storage and background monitoring

services. IDD-35C-D has the advantages of instant communication, precise positioning and high degree of visualization. It is the best terminal for the future Internet of things and cloud services of electric forklift. It is widely used in all kinds of industrial electric vehicles, such as forklift, balance vehicle, tractor, sightseeing vehicle, AGV, etc. Shown as 3-11

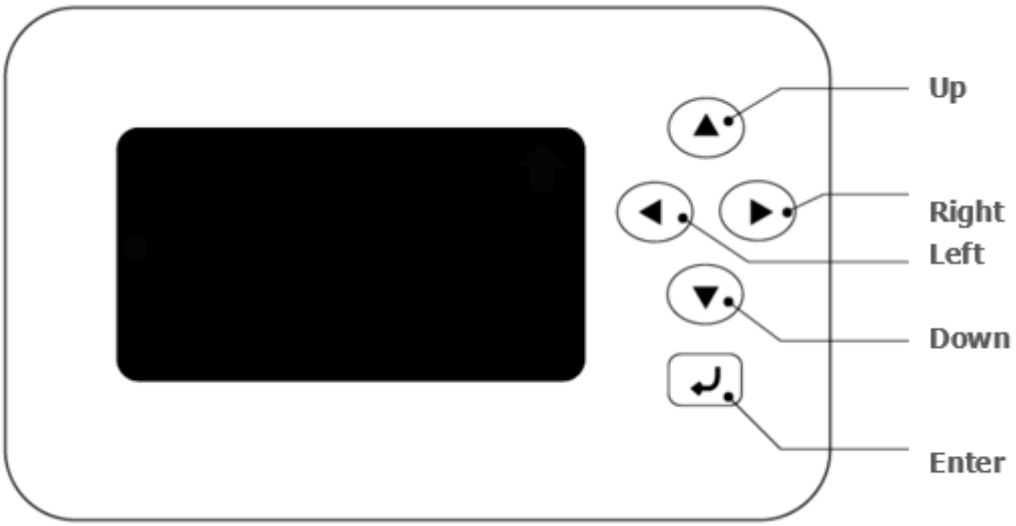
- Appearance and display instructions

1) Parameter name Description
   ① Hour meter
   Digital display of the accumulated working time of the current truck, with a maximum of 5 digits;
   ② Wheel angle indication
   The arrow represents the direction of the steering wheel;
   ③ Working mode indication
   Display the current working mode, including "S (low speed)", "P" and "E" three working modes
   ④ Travel speed display
   Displays the current truck speed in km/h or MPH
   ⑤ Battery level display:
   Display the current battery capacity;
   ⑥ Forward and backward indication
   " ↑ " indicates of traveling forward, while " ↓ " indicates of traveling backward. No indication for neutral.
2) Indication of the alarm lights
   1. Turtle shaped light is on when the truck is running in tortoise speed mode
   2. Fault light is on when the truck is in fault.
   3. Battery light is on when battery power is less than or equal to 20%
   4. When power level of lifting locking lamp is less than or equal to 10%, the lifting locking lamp will be on
   5. seat light when the driver leaves the seat: 0: on; 1: off
   6. Hand brake light is on when the driver operates the hand brake
3) Button description

S	Move the cursor up, or add 1 to the selected number; or switch to S mode (low speed mode) in the main interface;
P	Move the cursor left; or switch to P mode in the main interface.
E	Move the cursor right; or switch to E mode in the main interface.
	Move the cursor down, or minus 1 to the selected number; or switch to S mode (low speed mode) in the main interface;

	Cancel the current content or return to the previous menu;
OK	Confirm the current operation; or enter the menu mode in the main interface;

- 3501TB-5004 instrument voltage setting steps



1) Menu and password
   a) First, turn on the power supply and press and hold the OK key; After about 2S, the instrument will automatically enter the main menu.
   b) Use the Up/Down key to select "OEM settings" and enter.
   c) The instrument displays the password login page, select "input password" with the Up/Down key, and click the right key to activate the password input status.
   d) OEM password is 1235; after entering the correct password, the instrument will immediately enter the OEM parameter-setting page.
2) Parameter modification
   a) Use the Up/Down key to select "nominal voltage", and click the right key to activate the parameter setting status.
   b) Use the Up/Down key to select the desired parameter.
   c) This parameter has three options, namely "12/48/80V", "24/60V" and "36/72V"; Please select the corresponding parameter value according to the working voltage of the system.
   d) After parameter selection, click the move left button to exit the setting state;
3) Exit the menu

   Use the Up/Down key to select "exit", and enter to exit the current page. Repeat this operation until the instrument returns to the main interface.
4) Check current fault information
   a) Jog the confirm button to enter the fault information interface
   b) When the language of the instrument is set to "English", English fault information will be displayed; when the language of the instrument is set to "Chinese", Chinese fault information will be displayed.
   c) Jog the confirm button again, and the instrument will exit the fault information interface.
5) Operation settings
   a) Long press the confirm button to enter the instrument setting interface
   b) Select the operation menu > > language steps are as follows: use the Up/Down key to select the operation menu, and enter; Then use the Up/Down key to select the language, and click the right key to enter the parameter setting.
   c) The language setting steps are as follows: use the Up/Down key to select Chinese or English; Press the left key to confirm. Then use the down key to select exit, and enter to exit.
6) Adjust backlight brightness
   a) Long press the enter key to enter the instrument setting interface

b) Select the operation menu > > LCD screen setting > > LCD screen brightness adjustment steps are as follows: use the Up /Down key to select the operation menu and enter. Then use the Up/Down key to select the LCD setting, and enter; finally, use the Up/Down key to select the LCD brightness adjustment, and click the right key to enter the parameter setting

c) Set brightness

The steps are as follows: adjust the brightness value by moving Up/Down; Press the left key to confirm. Then use the down key to select exit, and exit.

d) Reset hour meter

Long press the confirm button to enter the instrument setting interface

Select the operation menu > > language steps are as follows: use the Up/Down key to select the operation menu, and enter; Then use the Up/Down key to select the language, and click the right key to enter the parameter setting.

e) The language setting steps are as follows: use the Up/Down key to select Chinese or English; Press the left key to confirm. Then use the down key to select exit, and click the OK key to exit.

7) OEM settings
   a) Long press the confirm button to enter the instrument setting interface
   b) Select M OEM Settings > > enter the M OEM password as follows: use the Up/Down key to select the OEM settings, and enter.
   c) The steps for entering the password are as follows: move the cursor with the right key to enter the password input state. Then use the Up/Down key to select the number at the first place of the password. Click enter to the next password until the four-digit password is entered. (Initial password: 1235) if the password is entered correctly, it will automatically enter the OEM setting page; If the password is entered incorrectly, the screen will prompt "wrong password".
8) Set battery rating
   a) Select battery rated voltage
   b) Use the Right key to activate the parameter setting status. Then use the Up/Down key to select the required battery rated voltage parameter. Finally, click the move left button to exit the editing status; Use the Up/Down key to select exit, and exit. This parameter has three options, namely "12/48/80V", "24/60V" and "36/72V"; Please select the corresponding parameter value according to the working voltage of the system

17. Packing list

Item	Name	Q'ty	Remarks
1	Complete truck	1 unit	
2	Forks	1 pair	
3	Technical document	1 pc	Table 1
4	Random tooling	1 pc	Table 2

Table 1. Technical document

Item	Name			Q'ty	Remarks
1	Content	1.1	Certificate of qualification	1	
		1.2	Random list	1	
		1.4	Use instructions	1	
		1.5	Parts catalogue	1	
2	Key			1	

Table 2. Tool kit attached to the truck

Item	Name	Q'ty(pc)	Remarks
1	Sleeve extension bar	1	
2	Wheel hub nut sleeve 22	1	
3	Wheel rim nut sleeve 17	1	
4	Hook spanner for the lift.tilt oil cylinder	1	
5	Double-ended spanner 8~10	1	
	Double-ended spanner 14~17	1	
	Double-ended spanner 17~19	1	
	Double-ended spanner 22~24	1	
	Solid spanner 13	1	
	Solid spanner 16	1	
	Solid spanner 18	1	

Consignor:

Recording card of maintenance and repairing:

Items	Maintenance time	Maintenance part	Material used	Maintenance personnel	Remarks

Customer advisement feedback:

Items	Time occurred	Trouble location	Fault cause	Trouble-shooting	Remarks