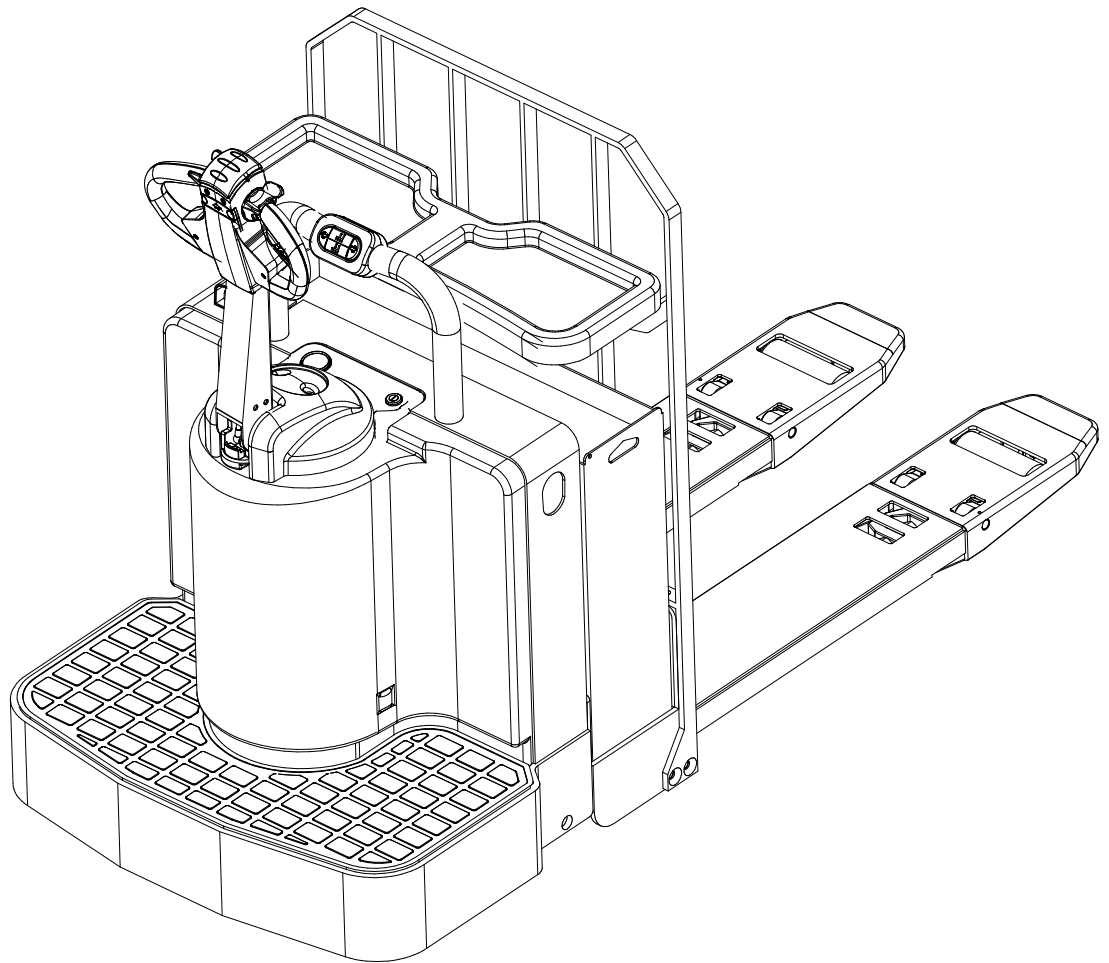


CBD40T Electric Pallet Truck

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



2022-03

Welcome to choose CBD40T electric pallet truck!
**Hope our electric trucks will 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.**

Brief introduction:

CBD40T series electric pallet truck is powered by storage battery, and is driven by motor. This kind of truck travels by means of gear drive. The fork is lifted by means of DC motor and hydraulic transmission, which motivate hydraulic cylinder up and down to lift fork and goods together. As this truck is electrically driven for traveling and lifting, it possesses many characteristics, such as labor-saving, high efficiency, stability in operation, simple and easy operation, safety and reliability, little noise, environmental friendly, etc. In addition, the driving mode for this kind of truck is stand driving and steering operation of handle steering. 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 1200m;
- b. Ambient temperature shall not be higher than +40°C and no lower than -25°C;
- c. When the ambient temperature reaches +40°C, 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.

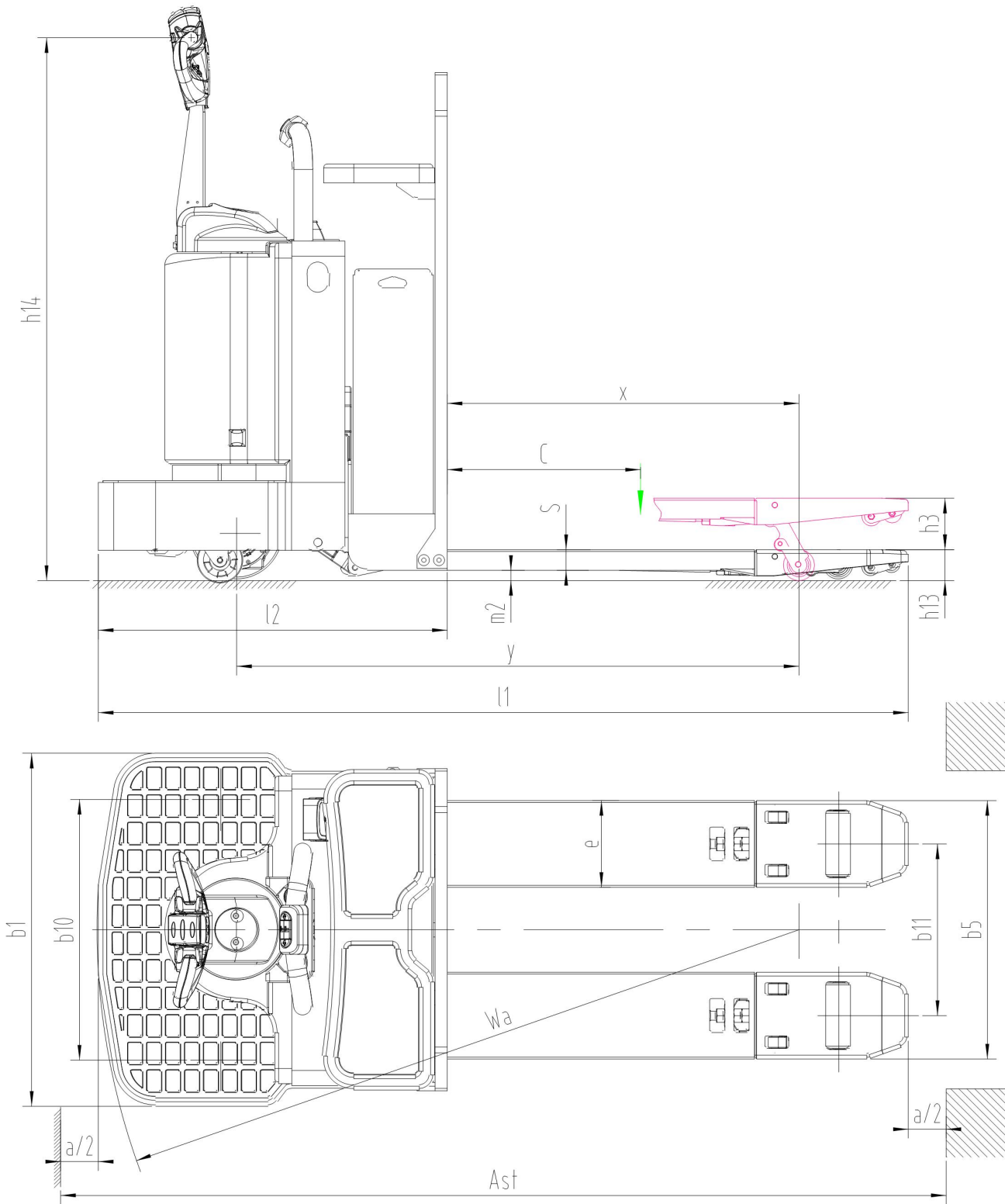
Please come into contact with our sales department in case of any problem.

Description of symbol: Regulations of the following symbols are of great importance to your safety and others as well

| | | |
|---|---------|--|
|  | 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. |

I .Technical parameters:

1. CBD40T Outline drawing:

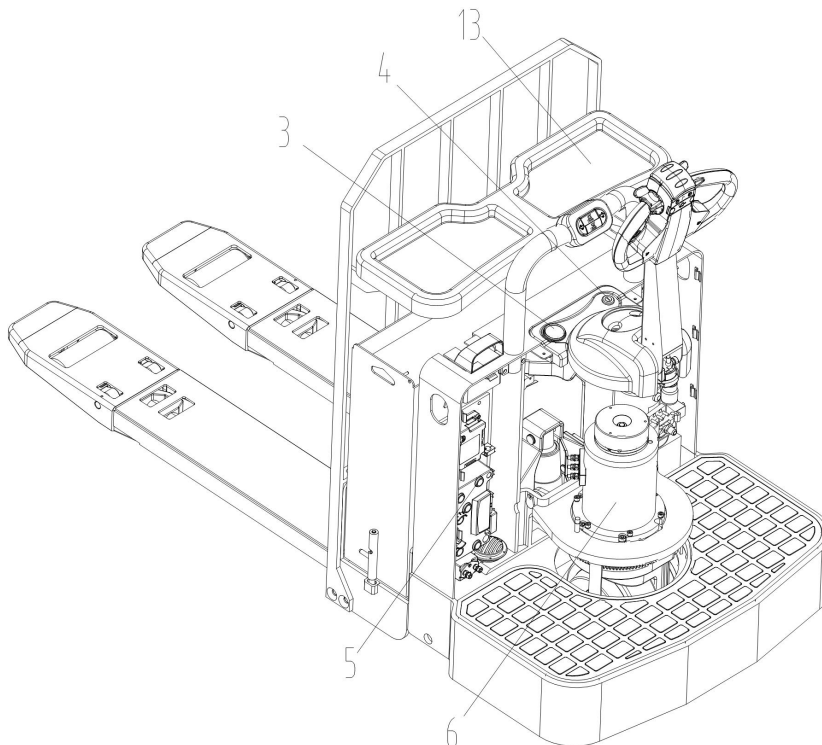
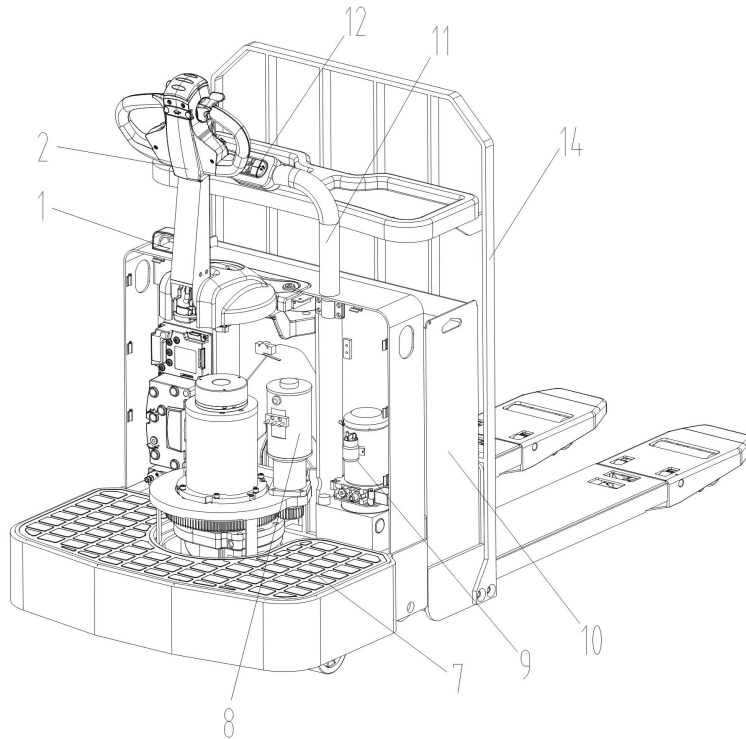


2. Main technical parameter

| | | | | |
|------------------|------|---|---------------|-----------------------|
| Characteristics | 1.1 | Manufacturer(abbreviated) | | |
| | 1.2 | Model | | CBD40T |
| | 1.3 | Driving model: Electric(storage battery), diesel, gasoline, fuel gas | | Electric |
| | 1.4 | Driving model (Manual, Walking, Stand driving, Seat driving ,Order picking) | | Stand driving |
| | 1.5 | Rated load | Q(kg) | 4000 |
| | 1.6 | Load center distance | c (mm) | 600 |
| | 1.8 | Front overhang | x (mm) | 933 |
| | 1.9 | Tread | γ (mm) | 2695 |
| Weight | 2.1 | Service weight(with battery) | kg | 1120 |
| | 2.2 | Axle load, front/rear, laden | kg | 2020/3100 |
| | 2.3 | Axle load, front/rear, unladen | kg | 850/270 |
| Wheel chassis | 3.1 | Wheels (rubber, high elasticity, pneumatic tyre, polyurethane wheel) | | PU |
| | 3.2 | Wheel dimension, front | | $\phi 250 \times 100$ |
| | 3.3 | Wheel dimension, rear | | $\phi 82 \times 173$ |
| | 3.4 | Additional wheel(dimension) | | $\phi 127 \times 57$ |
| | 3.5 | Wheel number, front/rear (x = driving wheel) | | 1X+2/2 |
| | 3.6 | Tread, front | b_{10} (mm) | 691 |
| | 3.7 | Tread, rear | b_{11} (mm) | 455 |
| Dimension | 4.4 | Lift height | h_3 (mm) | 135 |
| | 4.9 | Min. /Max. height of operation handle, in driving position | h_{14} (mm) | 1041/1374 |
| | 4.15 | Height, lowered | h_{13} (mm) | 82 |
| | 4.19 | Overall length | l_1 (mm) | 3245 |
| | 4.20 | Length to fork face | l_2 (mm) | 1045 |
| | 4.21 | Overall width of truck body | b_1 (mm) | 936 |
| | 4.22 | Fork dimension | S/e/l(mm) | 55x230x2200 |
| | 4.25 | Overall width of fork | b_5 (mm) | 685 |
| | 4.32 | Wheelbase ground distance | m_2 (mm) | 27 |
| | 4.33 | Aisle width, with pallet 1000x1200 crosswise | A_{s1} (mm) | 3865 |
| | 4.34 | Aisle width, with pallet 800x1200 lengthwise | A_{s2} (mm) | 3665 |
| | 4.35 | Turning radius | W_6 (mm) | 3065 |
| Performance Data | 5.1 | Traveling speed, laden/unladen | Km/h | 6/6.5 |
| | 5.2 | Lifting speed, laden/unladen | m/s | 0.03/0.04 |
| | 5.3 | Descending speed, laden/ unladen | m/s | 0.05/0.045 |
| | 5.7 | Gradeability, laden/unladen | % | 8/15 |
| | 5.10 | Traveling brake | | EM brake |
| Motor | 6.1 | Driving motor power | kW | 3 |
| | 6.2 | Lifting motor power | kW | 2.2 |
| | 6.3 | Battery voltage/rated capacity | V/Ah | 24/560 |
| | 6.4 | Battery weight | Kg | 559 |
| | 6.5 | Battery dimension (LXWXH) | mm | 780×335×620 |
| | 8.4 | Noise level at operator's ear, according to DIN12053 | dB(A) | 70 |

II .Structure description

1. Structure of the entire truck

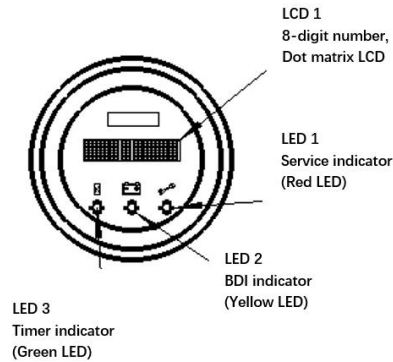


1. Power switch 2. Handle 3. Multi-functional instrument 4. Electric lock 5. Electric controlling master assy
6. Driving unit 7. Platform 8. Steering power assmebly 9. Hydraulic power assembly
10. Battery 11. Armrest 12. Armrest controlling box 13. Tool tray
14. Load backrest

2. Function introductions of instrument and operational control pieces:

(1) Instrument

Display various system parameters, such as charging, running time and maintenance status, motor controller or other serial communication source. Three LEDs: green indicates that the timer is displaying; amber indicates battery charging status display; red indicates that the fault has occurred

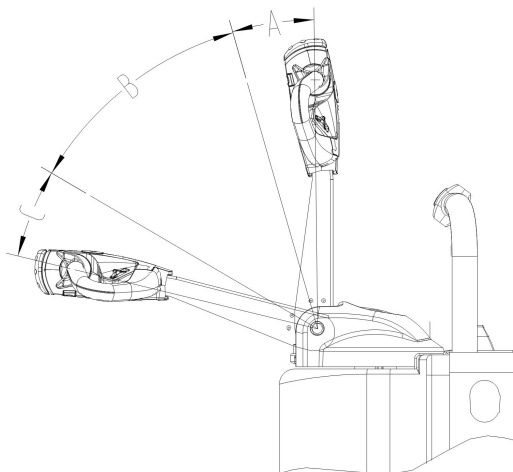


(2) Steering system

The steering system mainly composes of operation handle, steering device shaft, support bearings, potentiometer and steering power unit. The system is used to control travel direction of the truck.

(3) Braking

The traveling brake of this truck is regenerative braking, with parking brake of electromagnetic brake. When the accelerator is released during the traveling of the truck, the controller will carry out regenerative braking at first. This kind of brake can turn the dynamic energy to electric energy which can be recharged to battery. When the truck is stopped, the electromagnetic arrester will be out of power and braked again. This type of regenerative brake with electromagnetic brake not only prolongs the service time of storage battery but also reduces the wearing of the brake plate, which extends the service time of brake.



The position of operation handle is divided into 3 areas, i.e. area A, area B and area C which have different operational functions separately.

Area A: When the operation handle is in area A, the truck will be in a state of braking.

Then acceleration knob for traveling can not work but can only conduct lifting or lowering operation.

Area B: When the operation handle is in area B, the truck will be in a state of traveling. When the accelerator knob is turned to one direction, the truck will travel in this direction. When the accelerator knob is turned in

another direction, the truck will travel in another direction. When the accelerator knob is released during truck traveling, regenerative braking will take effect, making the truck slow down to stop.

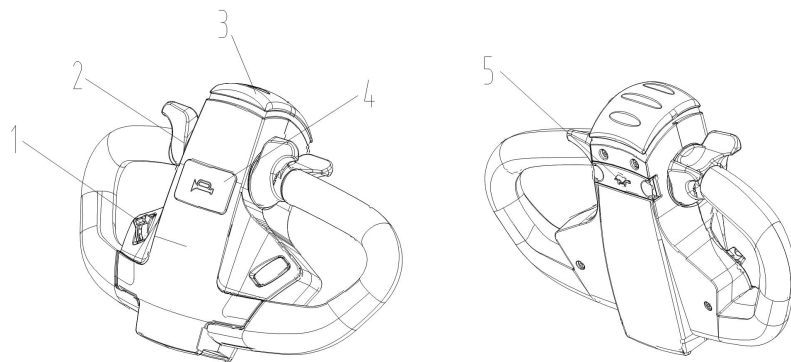
Area C: When the operation handle is in area C, the truck will be in a state of traveling. When the accelerator knob is turned to one direction, the truck will travel in this direction. When the accelerator knob is turned in another direction, the truck will travel in another direction. When the accelerator knob is released during truck traveling, the truck will be in a state of free sliding.



When the operation handle is placed in area B or area C, the truck can conduct traveling operation as well as lifting operation. However, traveling and lifting operation can not realized at the same time, with the traveling operation as the preferential function.

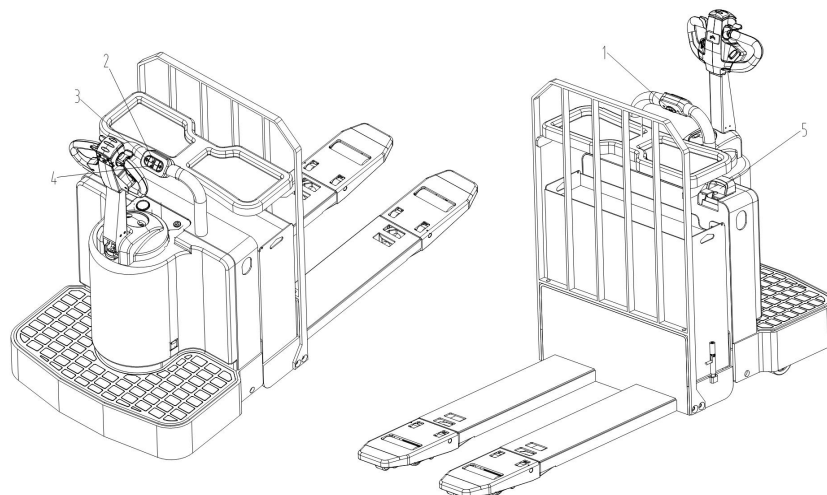
(4)Operation control:

- 1) Lifting and lowering operation: Press the lowering button of the forks, the forks will descend. While the lifting button is pressed, the fork will rise.



1. Lifting button 2. Accelerator knob 3. Emergency reverse button 4. Horn
5. Horn 6. Turtle slow button

- 2) Accelerator knob: It is used to control the travel direction and speed of the electric truck. Before operation of the truck, firstly turn the operation handle to area C shown as above. When the handle is placed in area A, the truck will be powered-off and braked. At this time, the truck can not drive. When the operation handle is placed in area C and the acceleration knob is turned in one direction, the truck will travel in that direction. Meanwhile the truck will be accelerated with the increasing of rotation amplitude of the knob. When the accelerator knob is turned in another direction, the truck will travel in another direction. Likewise, the truck will speed up with the increasing of rotation amplitude of the knob.



1. Horn 2. Lift 3. Turtle-shaped low speed 4. Power switch
- 3) Horn button: Horn of the truck will be turned on if you press the button.
- 4) Emergency reverse button: when the operation handle is placed in area B and the emergency reverse button is pressed, the truck will travel in an opposite direction away from the operator immediately. This is a safety switch which can avoid the operator from being squeezed under unexpected condition.
- 5) Turtle slow button: When this button is pressed, the truck will travel at an extremely slow speed. This button is applicable for operation on especially narrow field or on the condition that the truck needs to be accurately located. .
- 6) Electric lock: It is used to control switching-on and switching-off of main power supply of the truck. The truck driver or personnel who has been specially assigned shall keep Key of the electric lock. Be sure to cut off the main power supply when you leave the truck, and take the key of electric lock, for fear occurrence of accident due to operation carried out by others. .
- 7) Power switch: It is used to control emergency power-off of the truck. Pulling up the switch, then main power supply will be cut off, and inserting down represents switching-on. If your truck were out of control due to some reason, please immediately pull up the switch to cut off power supply for sake of any occurrence of accident. .



As for the operation button on operation handle and handrail control case, the same buttons have the same control function, which is convenient for easy operation.

III. 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 travel 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 forbidden 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.

1. Safety operation norms

(1) Training of driver



Notice

Even though each electric pallet 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.

Safety rules and regulations shall be observed during operation or maintenance of the truck.

(4) 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.

- 1) Good roadway condition shall be kept and the traffic should be smooth.
- 2) Sufficient light ray shall be ensured on working place.
- 3) 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.
- 4) 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.
- 5) Integrity of the truck shall be realized:



Warn

Don't remake 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.
- 6) 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.

- 7) 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.
- 8) Overloading operation of truck is forbidden:



Warn

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

- 9) Use suitable pallet:

The pallet shall be of suitable dimensions, neither too wide nor too large.
- 10) Electrical System Check:



Notice

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

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

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 backside. Due to this difference from common vehicles, the backside of truck swings comparatively fast when turning around. For this reason, to prevent collision with other objects nearby the backside of truck, do drive or turn slowly.

2) Strictly forbid harsh driving



Notice

Never start up, brake or turn abruptly.

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.



Warn

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

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.

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

4 Important 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:



Warn

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 battery operation.

IV. Drive and operation:

1. Prepare before operation:



Warn

Never use the faulty truck

- a) Before operation, check the truck to make sure: whether oil leakage of hydraulic pipe exists, whether all the supporting wheels work well, whether blocking phenomenon appears. Never use the faulty truck.
- b) Check the charge quantity of storage battery. Never use the truck with empty batteries. Otherwise, the lifetime of storage battery can be reduced greatly. More seriously, the storage batteries can be damaged.
- c) Check the braking of truck and the ascent, descent, running forward and backward.

2. Driving:

(1) Start-up:



Warn

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

Turn the switch of electric lock to ON position. When the operation handle is turned to area B or area C and accelerator knob is rotated slowly, the truck will start gradually. The greater the accelerator knob is turned, the faster the truck travels.

(2) Decelerate:

The driving motor of the truck is AC motor. The running speed of motor is controlled by speed regulation actuator all the time. So, if the accelerator knob is released slowly, the truck will slow down so as to decelerate. Then, the truck will be in a state of sliding. When the operation handle is turned to area B, regenerative braking take effect. And the truck will slow down until it stops.

(3) Turning:



Caution

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

The driver stands on the truck pedal in the right gesture and faces the forks. When the truck travels forward, if the operation handle is rotated counterclockwise, the truck will turn clockwise. If the operation handle is rotated clockwise, the truck will turn counterclockwise. When running backward, if the operation handle is rotated clockwise, the truck will turn clockwise. If the operation handle is rotated counterclockwise, the truck will turn counterclockwise.

(4) Braking:

Turn the operation handle to area B and release the accelerator knob, then braking of the truck can be realized. While the operation handle is turned to area A, the truck will be in a state of braking, and traveling function will be cut of.

(5) Transportation operation:



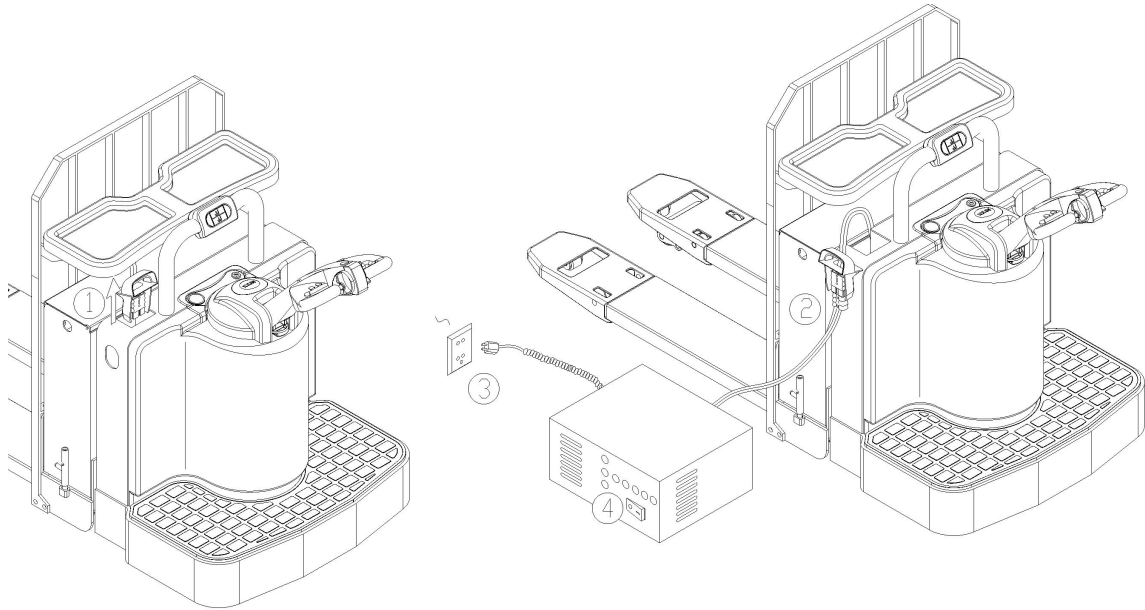
Notice

Before operating truck, do check the following items: Ensure no goods falling and damaged in the loading area.

Ensure no goods or objects impeditive for safety.

- 1) The following procedures shall be observed for goods transportation:
- 2) Decelerate when approaching the goods area;
- 3) Inspect safety condition around the stacking area;
- 4) Adjust position of the truck, placing it in front of place where goods locate;
- 5) Slowly start the truck, and insert fork arms to the bottom of goods as deeply as possible;
- 6) Press the lifting button, raising forks to a position with a distance of over 40mm between bottom of the pallet and ground;
- 7) Start the truck and carry the goods to destination. Press lowering button and put the goods on the ground, making the forks totally out of the bottom of the pallet. Then backward the truck slowly;

V.Usage, maintenance and charge of storage battery



Schematic diagram of charging method

When it is necessary to conduct charging, please refer to the following operation methods.

1. Pull down the power switch;
2. Connect the charging plug of storage battery to output connector of charger;
3. Then link the input connector of charger to AC power system;
4. Turn on the charger, and it starts to charge after several seconds.



Warn

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.

1 Initial charge

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.

1. 2 Open gas cap.

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°C) and a temperature of lower than 30°C into the batteries. The electrolyte level should be 15-25mm higher than the polar plate. 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°C . (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.

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°C) and density of the electrolytic solution can be converted as follows:

$$D_{25} = D_t + 0.0007(t - 25)$$

D_{25} : the density of the electrolytic solution at 25°C

D_t : the density of the electrolytic solution at 25°C .

t: temperature of the electrolytic solution when testing the density.

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. power source (charger) respectively and then turn on the power. Charge with the current of 40 A (the current of the first stage). After the charge voltage achieves 28.8V ($12 \times 2.4V = 28.8V$), switch to the 20A current of the second stage for continuative charge. When charging, the temperature of electrolyte shall never exceed 45°C. When the temperature raising up nearly to 45°C, reduce the current by half or stop charging temporarily. After the electrolyte temperature reduce below 35°C, continue charging. However the charge time need to be extended appropriately.

1. 6 Fully charged basis: When the voltage during the second stage charging reaches 31.2V ($12 \times 2.6V = 31.2V$), the variation of the voltage is no greater than 0.005 (V). The density of the electrolytic solution reaches 1.280 ± 0.005 (25°C), 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.

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 inconsistency, 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.

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.

2 Use and maintenance

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 $1.7V \times 12 = 20.4V$). 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.

2. 2 Common charge: The first stage current of common charge is 40A and that of the second stage is 20A. 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 10 hours.

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 charging and 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.

2. 4 Equalizing charge:

a. Charge with a 4A current.

b. When the charge voltage reaches 31.2V ($12 \times 2.6V = 31.2V$), 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 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.

3 .Keep and storage

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

4. Operation of electrolyte

(1) Density check

The suction type densimeter 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)

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 daily

(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.

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.

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: 24V
- b. The output current of charger: 40A

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.

VI. 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

1 Check point and check content

| | No. | Check point | Check content |
|-----------------|-----|------------------------------------|---|
| Braking system | 1 | Operation handle | When the operation handle is turned, with the handle switching between area A and B, there is a noise from the brake. |
| | 2 | Brake clearance | The clearance between brakes should be kept between 0.2mm and 0.8mm. |
| Steering system | 3 | Operation handle | Degree of tightness and rotary flexibility. |
| Lifting system | 4 | Oil pipe | Leakage or not. |
| | 5 | Hydraulic oil | Appropriate oil quantity. |
| | 6 | Lifting 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%. |
| Storage battery | 9 | Charge | Confirm the display state of the battery capacity. |
| | 10 | Electrolyte | The solution level and density of electrolyte. |
| | 11 | Connecting line | 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 | Damaged or not. If there is any crack. |
| | 15 | Function | Check that whether lifting, lowering, forward & backward movement and emergency reverse of the truck is normal, and if there is any abnormal noise. |

VII. Inspection after operation

After operation, the smudge on truck shall be wiped out. Besides, the following check shall be carried out:

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.

The situation about deformation, distortion, damage or breakage

Add lubricating oil and grease if necessary.

Replace faulty components.

VIII. 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.

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.

Our company shall recommend the lubricating oil and hydraulic oil in use.

(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) Precautions before repair and 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..

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 the professional personnel before the first use fill it into the storage battery. 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 5.1.

3 Daily inspection

Inspection of hydraulic oil level: lower the fork to the lowest position; look over the oil level from the oil window. The distance between oil level and the bottom of oil tank is about 70mm, and oil charge is 1.5L. Recommendatory trademark for the hydraulic oil should be chosen.

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

4 The inspection according to the need

Clean the truck

Inspect and screw down each fastener

Inspect the damage state of wheels

5 The inspection and maintenance after 50 hours (Weekly)

| | | |
|---------------------------|---|--|
| Braking system | 1 | When the operation handle is turned, with the steering handle switching between area A and B, 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 0.8mm. |
| Capacity of electrolyte | 4 | Inspect the liquid level of electrolyte, pure water can be used for supplement if the liquid level is too low. |
| Capability of electrolyte | 5 | The specific gravity should be 1.28g/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. |

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 | Operation handle | When the operation handle is turned, with the handle switching between area A and B, 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 | Connecting rod and wheel carrier | Function and check the cracks, bending, deformation and lubrication condition. |

| | | | |
|--|----|---|--|
| | 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 | 11 | Electrolyte | Liquid level, specific gravity and cleanness |
| | 12 | Plug | Function, whether it is damaged or not |
| | 13 | Key switch | Function |
| | 14 | Contactora | Contact performance and function |
| | 15 | Inching switch | Function |
| | 16 | Controller | Function |
| | 17 | Fuse | Whether it is perfect or not |
| | 18 | Wiring harness and connection terminals | Whether flexible and whether damaged or not. |

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.

| | |
|------------|---|
| Contactora | Burnish the coarse surface of contactora using sand paper |
| | Replace according to the status when the function is not well |
| Motor | Wearing status of carbon brush and selenium rectifier. |
| Brake | Clean the dirt and dust on friction plates of the brake, meanwhile check the wearing status of the friction plates. |

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.

| | |
|----------------|---|
| Contactora | 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. |
| Decelerate 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 |

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 When it is over loaded, we advise:

Hydraulic oil: LHPISOVG68, in accordance with standard DIN51524T.2, the average sustained temperature is above 60 degrees.

C. When it is lightly loaded with low temperature, we advise:

Hydraulic oil: HLPISOVG32, in accordance with standard DIN51524T.2, the average sustained temperature is below 60 degrees.

D. At the occasion with variable loading, we advise:

All the working conditions mentioned above can use the hydraulic oil LHPISOVG46 in accordance with standard DIN51524T.2 for replacement. The viscosity of this lubricant is very high (mostly used hydraulic oil).

If it is difficult to buy hydraulic oil, SAE20W/20 engine oil can be used to substitute HLP68 hydraulic oil.

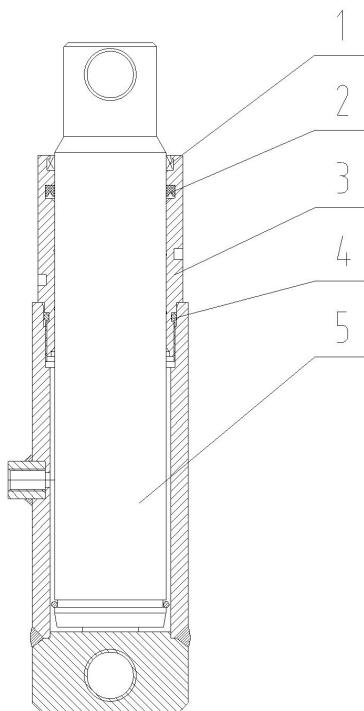
(2)Gear oil:

Hyperbola gear oil 85W-90(GL-5)

Lubricating grease: #3 Lithium grease

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 Structure of lifting cylinder and wearing parts:



1. Dustproof ring DHS60-68-5/6.5;
2. Seal ring UHS60-70-6;
3. Oil cylinder;
4. O-type seal ring 65X3.55;
5. Plunger

11 Maintenance period of consumables and partial parts:

| Items | Maintenance content | Maintenance period | Remarks |
|---------------------------------|---|--------------------|---------------------------------|
| Bearings of fork wheel | Replacement | 1200 hours | |
| Fork wheel | Replacement | 1200 hours | |
| Seals | Replacement | 1200 hours | Replace when finding out damage |
| Gearbox | 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 | |
| Oil pump motor | Check for carbon brushes and bearings | 1000 hours | |
| Contactors | Burnish the coarse surface of contactor using sand paper. | 1200 hours | Replace them if necessary |

IX. The store, transportation and loading of truck

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 if it is normal or not.

Lower the forks to the lowest position.

Support the side near 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.

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.

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.

X.Replacement of storage battery

The weight of battery pack is about 559kg, and the replacement procedure of storage battery is as follows:

- 1.Pull down the socket connector of storage battery from the truck;
- 2.Turn on the safety pin of battery pack;
- 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.



Note

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

XI.Common faults and trouble shooting

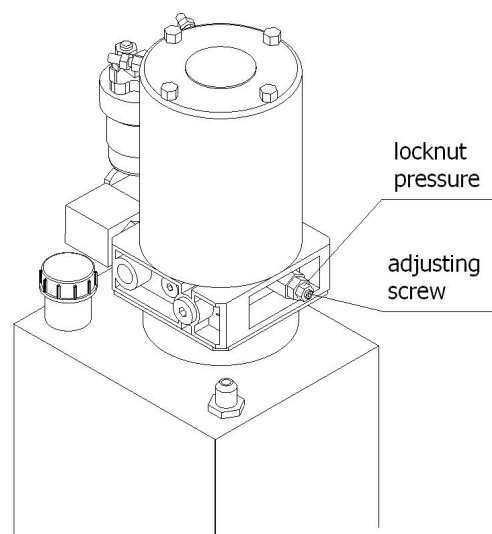
| Faults | Possible cause | Trouble shooting |
|---|--|--|
| Abnormal noise during lifting | The oil-absorptive filter is blocked | Clean or replace the oil-absorptive filter |
| | The oil-absorptive tube leaks and the oil are foaming. | Fasten the tie-in, check the oil level, or add some oil. |
| | Hydraulic pump or motor is damaged. | Contact maintenance personnel of our company |
| | Seal malfunction, and make the air enter oil pump. | Contact maintenance personnel of our company |
| | The viscosity of oil is not correct, oil level is too low. | Replace the oil or add some oil |
| Hydraulic system has no pressure or the pressure is too low | Malfunction in pump oil-absorptive, and noise exists. | Replace the oil or add some oil |
| | Oil pump is damaged | Replace the oil or add some oil |
| | There is malfunction in valve pack. | Contact maintenance personnel of our company |
| | The pipeline is broken or leaking. | Contact maintenance personnel of our company |
| | The viscosity of oil is not suitable; the leakage loss is too great. | Replace the pipeline or screw down the tie-in. |
| The oil pressure is not stable | The cause is the same as that of abnormal noise. | Refer to the treatment methods for abnormal noise. |
| | The lifting cylinder or seal ring is worn. | Replace the cylinder sleeve or seal ring |
| | The quantity of oil is not enough | Add oil |
| The truck cannot start | Storage battery is used up. | Inspect, charge, or replace the storage battery |

| | | |
|------------------------------|---|---|
| | The wire terminal is loosened. | Screw down the terminal screw |
| | The fuse is burn out. | Replace the fuse |
| | The accelerator is damaged. | Replace accelerator |
| The direction is ineffective | The steering device is blocked by the abnormal matter. | Clean up the foreign matter. |
| | The steering potentiometer is loosened or invalid. | Replace the potentiometer or screw down the mounting screws. |
| | The steering power unit is faulty or wire terminal is loosened. | Tighten the screws or consult the maintenance personnel of our company. |
| | Malfunction of steering controller | Consult the maintenance personnel of our company. |
| Brake cannot work | The friction plates of the electromagnetic brake are damaged. | Replace |
| | Inching switch is damaged or ineffective connection. | Tighten it or replace it |
| | Steering potentiometer is damaged or loosened. | Tighten or replace it after adjustment |
| | Malfunction of controller | Consult the maintenance personnel of our company. |
| Not release after braked | The electromagnetic brake is out of electricity. | Check the circuit. |
| | The clearance of the electromagnetic brake is too large. | Adjust the brake clearance to 0.2mm. |
| | | |

Adjustment methods of safety valve pressure

The pressure of safety valves has already been adjusted when the truck is ex-factory. Users shall not adjust the pressure at will. Otherwise it will bring danger to the truck's hydraulic system and safety. If the oil pressure is not in accordance with specified value, please ask the professional personnel to adjust according to the test methods stipulated in the JB/T3300 standards as well as the following methods:

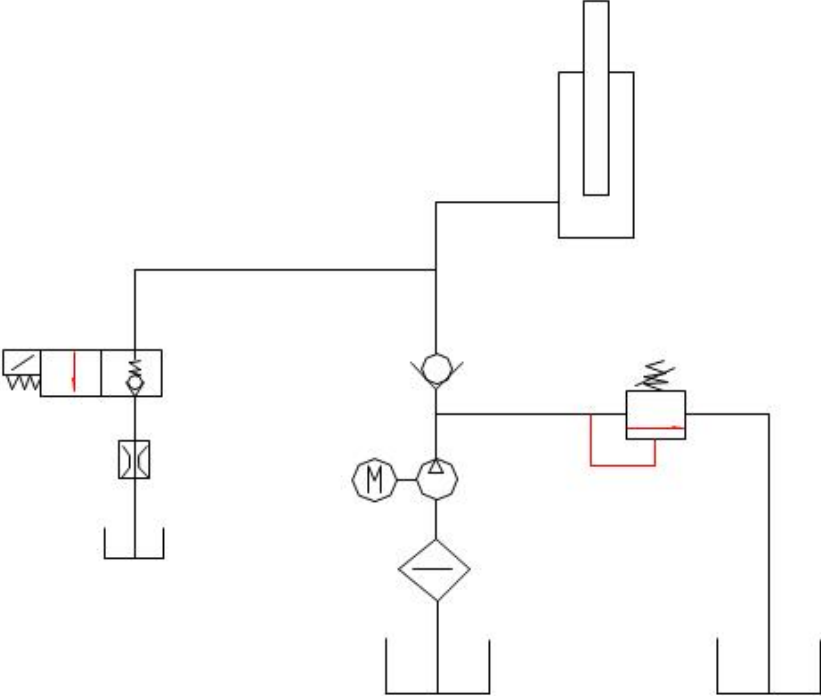
1. Prepare a heavy object whose weight is equal to the rated load of the vehicle;
2. Insert the vehicle fork into the heavy object so that the center of the heavy object is on the load center of the fork. Press the lifting button to observe whether the fork can rise and fall. If the fork is lifted, the pressure is sufficient, and if the fork cannot be lifted, the pressure is too low.
3. Find the position of the overflow valve of the hydraulic power unit, loosen the lock nut and adjust the pressure regulating screw. The clockwise pressure increases and the counterclockwise pressure decreases. Adjust the arrival fork until it can drive the load to lift.
4. Finally, increase the weight of the heavy object to



the rated load of 1.15 and test again. At this time, the fork shall not be allowed to lift, otherwise the pressure has been too large and the vehicle may be overloaded.

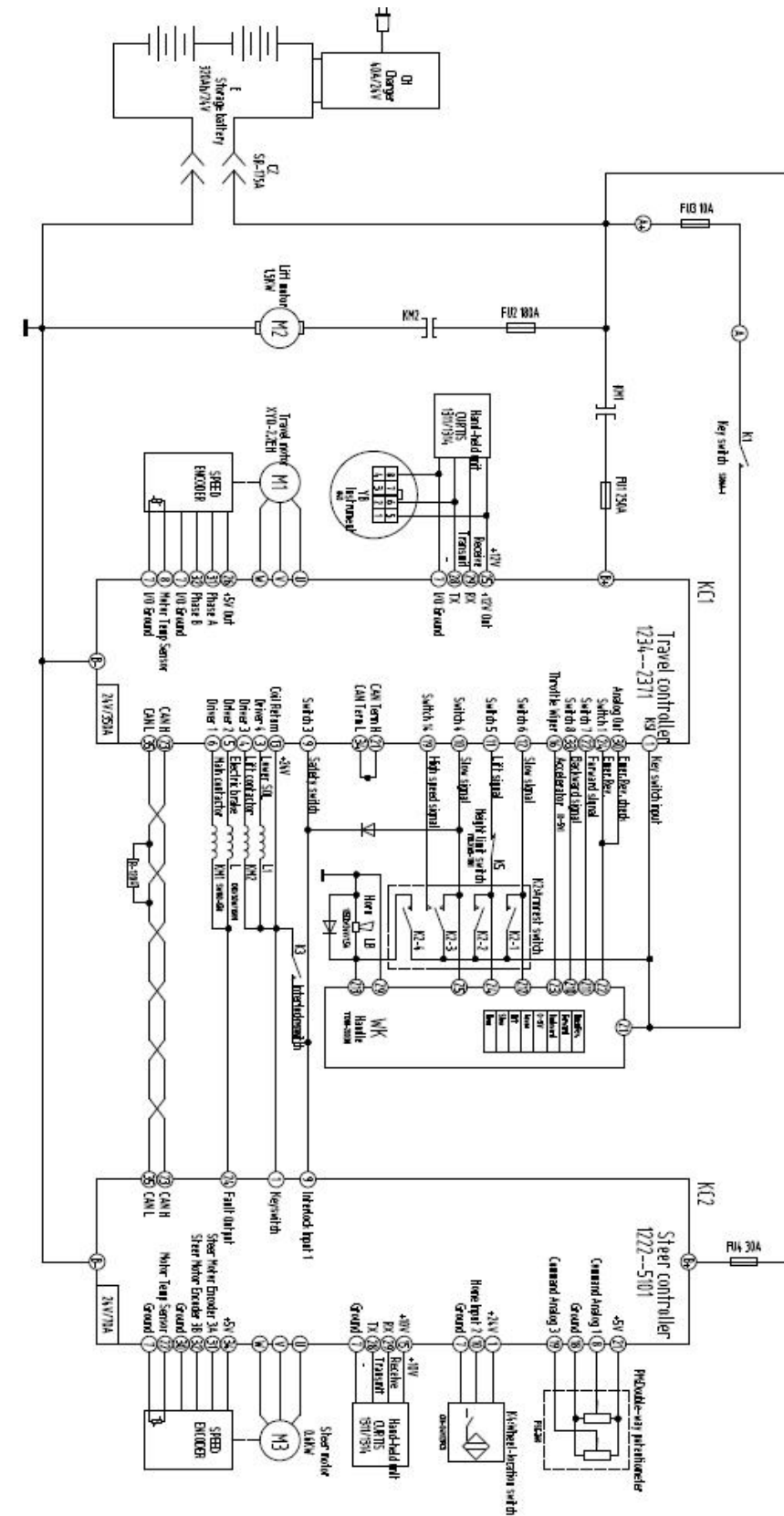
- 5. Re lock the nut after adjustment.

Hydraulic principle diagram



Hydraulic principle diagram

Electrical schematic diagram
Lead-acid battery+AC steering



1232/1234/1236/1238 Programmer fault diagnosis menu and status display LED fault diagnosis table

There are red and yellow LED lights on the controller housing. Different flashing situations represent different failure situations. 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 | Possible Causes |
|------|--|---|
| 1,2 | Controller Over current : main contactor, electromagnetic brake, motor quit | <ol style="list-style-type: none"> 1. Short circuit among motor connection U, V or W phase 2. Error in setting motor parameters 3. Controller failure |
| 1,3 | Current Sensor Fault: main contactor, electromagnetic brake, motor quit | <ol style="list-style-type: none"> 1. U, V, W Short Circuit in the car Body (Motor Stator Short Circuit) 2. Controller failure |
| 1,4 | Precharge Failed: main contactor, electromagnetic brake, motor quit | <ol style="list-style-type: none"> 1. The external load connected to the capacitor bank (B + terminal) prevents the capacitor from charging. 2. Check up the capacitance voltage under the Monitor Menu |
| 1,5 | Controller Severe Undertemp: main contactor, electromagnetic brake, motor and speed governor quit; Full Brake Input | <ol style="list-style-type: none"> 1. The controller works at a extreme low temperature (below - 40 C). 2. Check the controller temperature under the monitor menu. |
| 1,6 | Controller Severe Overtemp main contactor, electromagnetic brake, motor and speed governor quit; Full Brake Input | <ol style="list-style-type: none"> 1. The controller works at a extreme high temperature (higher than 95 C). 2. Overloaded 3. Improper installment of the monitor 4. Check the controller temperature under the monitor menu. |
| 1,7 | Severe Undervoltage: Driving torque descending | <ol style="list-style-type: none"> 1. Error on battery voltage parameter setting 2. Out of battery 3. Excessive internal resistance in the battery 4. Battery is not connected when driving. 5. Check Capacitance Voltage under the Monitor Menu. 6. B + fuse melts or main contactor not closed. |
| 1,8 | Severe Overvoltage: main contactor, electromagnetic brake, motor and speed governor quit; full brake input | <ol style="list-style-type: none"> 1. Error on battery voltage parameter setting 2. Battery resistance is too high when regenerative braking current is generated. 3. Batteries are not connected during regenerative braking. 4. Check capacitance voltage under the Monitor Menu |
| 2,1 | Controller Undertemp Cutback: reduction of driving and braking torque, | <ol style="list-style-type: none"> 1. The function of cutback under low temp. takes effect 2. The controller works in a extreme temp. 3. Check the controller temperature under the monitor menu. |

| | | |
|-----|---|---|
| | controller does not start when VCL language fails to execute | |
| 2,2 | Controller Overtemp Cutback: reduction of driving and braking torque, | <ol style="list-style-type: none"> 1. The function of cutback under high temp. takes effect 2. The controller works in a extreme temp. 3. overloaded 4. Improper installment of the monitor 5. Check the controller temperature under the monitor menu |
| 2,3 | Undervoltage Cutback: low Voltage Reduction (Reduced Driving Torque) | <ol style="list-style-type: none"> 1. Under normal operation, the battery needs to be charged, and the low-voltage limit function of the controller takes effect. 2. Error on battery voltage parameter setting 3. Run out of battery 4. The internal resistance of the battery is too high 5. Battery is not connected when driving. 6. Check capacitance voltage under the Monitor Menu 7. B + fuse melts or main contactor not closed. |
| 2,4 | Overvoltage Cutback over Voltage Reduction (Reduced Driving Torque) | <ol style="list-style-type: none"> 1. During regenerative braking, the regenerative braking current causes the battery voltage to be too high and shows the fault. The overvoltage limit parameter of the controller takes effect under normal operation 2. Error on battery voltage parameter setting 3. The battery resistance is too high when regenerative braking current is generated. 4. The battery connection is open When regenerative braking 5. Check capacitance voltage under the Monitor Menu |
| 2,5 | +5V Supply Failure: controller does not start when VCL language fails to execute | <ol style="list-style-type: none"> 1. The external load resistance connected to the + 5V supply terminal (pin26) is too low. 2. Check the current supplied by 5V and Ext under the Programmer Monitor menu. |
| 2,6 | Digital out 6 over current: digital output driver 6 does not run | The external load resistance connected to the digital output driver 6 (pin19) is too low. |
| 2,7 | Digital Out 7 over current: digital output driver 6 does not run | The external load resistance connected to the digital output driver 7 (pin19) is too low. |
| 2,8 | Motor Temp Hot Cutback: reduction of driving torque | <ol style="list-style-type: none"> 1. The temperature of the motor exceeds the parameter setting, so the requested current is reduced. 2. The motor temperature control parameters are not correctly adjusted. 3. Check the motor temperature and Analog 2 input under the programmer monitor menu. 4. Temperature compensation and temperature cut-off should be set to OFF without an electrically heated regulator. |
| 2,9 | Motor Temp Sensor Fault: limited operation (maximum speed reduction) and motor overheat reduction function failure | <ol style="list-style-type: none"> 1. Improper connection of motor temperature sensor. 2. Temperature compensation and temperature cut-off should be set to OFF without an electrically heated regulator. 3. The temperature of the motor exceeds the set maximum temperature. |

| | | |
|-----|---|---|
| 3,1 | Coil1 Driver Open/Short: No output from Coil1 Driver | <ol style="list-style-type: none"> 1. Connected load open or short circuit 2. Contaminated connection terminals. |
| | Main connector Open/Short: coil1 driver, electromagnetic brake quit | <ol style="list-style-type: none"> 1. Wire harness damage or wiring error 1. Main connector open or short circuit 2. Contaminated connection terminals. 3. Wire harness damage or wiring error |
| 3,2 | Coil2 Driver Open/Short: No output from Coil2 Driver | <ol style="list-style-type: none"> 1. Connected load open or short circuit 2. Contaminated connection terminals. 3. Wire harness damage or wiring error |
| | EM Brake Open/Short: electromagnetic brake coil open/short circuit (drive 2 and speed governor quit, full brake) | <ol style="list-style-type: none"> 3. Connected load open or short circuit 4. Contaminated connection terminals. 5. Wire harness damage or wiring error |
| 3,3 | Coil 3 Driver Open/Short: No output from Coil3 Driver | <ol style="list-style-type: none"> 1. Connected load open or short circuit 2. Contaminated connection terminals. 3. Wire harness damage or wiring error |
| 3,4 | Coil 4 Driver Open/Short: No output from Coil4 Driver | <ol style="list-style-type: none"> 1. Connected load open or short circuit 2. Contaminated connection terminals. 3. Wire harness damage or wiring error |
| 3,5 | PD Open/Short: PD quit | <ol style="list-style-type: none"> 1. Connected load open or short circuit 2. Contaminated connection terminals. 3. Wire harness damage or wiring error |
| 3,6 | Encoder Fault: the function of restricting the operation takes effect | <ol style="list-style-type: none"> 1. Encoder Fault 2. Wire harness damage or misconnection 3. Check motor monitoring menu: Motor RPM |
| 3.7 | Motor Open: main contactor, motor and electromagnetic brake quit) | <ol style="list-style-type: none"> 1. Motor U, V, W line open circuit. 2. Wire harness damage or misconnection |
| 3,8 | Main Contactor Welded: main contactor, motor and electromagnetic brake quit | <ol style="list-style-type: none"> 1. Contact cohesion of the main contactor. 2. U phase of the motor has a poor connection or an open circuit 3. An alternating voltage path (such as an external pre-charged resistor) provides a current for the capacitor bank (B+terminal). |
| 3,9 | Main Contactor Did Not Close: main contactor, motor and electromagnetic brake quit | <ol style="list-style-type: none"> 1. Main contact is open 2. Contact of the main contactor is burnt or has a poor connection 3. The external load of the capacitor bank (B + terminal) prevents the capacitor bank from charging. 4. B+ fuse blows out |
| 4,1 | Throttle Wiper High: Speed governor quit | <ol style="list-style-type: none"> 1. Voltage of the throttle wiper is too high. 2. Check input of the throttle wiper under the monitor menu. |
| 4,2 | Throttle Wiper Low: Speed governor quit | <ol style="list-style-type: none"> 1. Voltage of the throttle wiper is too low. 2. Check input of the throttle wiper under the monitor menu. |
| 4,3 | Brake Wiper High: full braking input | <ol style="list-style-type: none"> 1. Voltage of the brake wiper is too high. 2. Check input of the throttle wiper under the monitor menu. |
| 4,4 | Brake Wiper Low: | <ol style="list-style-type: none"> 1. Voltage of the brake wiper is too low. |

| | | |
|---------|--|--|
| | full braking input | 2. Check input of the throttle wiper under the monitor menu. |
| 4,5 | Pot Low Over current Speed governor quit, full braking input | 1. The combination of potentiometers connected to the low end of potentiometers is too low 2. Check the pot low under the monitor menu |
| 4,6 | EEPROM Failure main contactor, motor and electromagnetic brake, speed governor ,interlock,1-4of the driver and proportional valve all quit ,full braking input) | Fail to write into EEPROM memory EEPROM memory is written through VCL, CAN bus, by adjusting 1311 parameters or loading new software to the controller. These may be the causes of the failure. |
| 4,7 | HPD/Sequencing Fault: speed governor quit | 1. Error on the disordered input of key switch, interlock, direction and accelerator 2. Check monitor menu entry of the programmer |
| | Emer Rev HPD: Speed governor and electromagnetic brake quit | Emergency reverse operation terminated, but accelerator, forward and backward input, interlock switch did not return to neutral. |
| 4,9 | Parameter Change Fault: main contactor, motor and electromagnetic brake quit | This is a safety failure caused by a change in the setting of a parameter 1311, which can be eliminated by opening a new switch. It error will occur if the user changes the type of accelerator, and the truck can be operated only after the switch is reopened. |
| 5,1-6,7 | OEM Faults | require higher level programmers to solve |
| 6,8 | VCL Runtime Error main contactor, motor and electromagnetic brake, speed governor ,interlock,1-4of the driver and proportional valve all quit ,full braking input | 1. Error on run time of VCL code 2. Refer to 1311 controller monitoring menu: VCL Failure Mould and VCL Failure. This failure can be likened to an ID of the run-time VCL module and the specified error code in the OS system information file . |
| 6,9 | External Supply Out of Range | 1. The input current generated by any external load connected to 5V and 12V is too large or too small. 2. The external maximum and minimum input of the fault check menu parameters are not adjusted correctly. 3. Refer to 1311 input inspection menu: External Input Current |
| 7,1 | OS General main contactor, motor and electromagnetic brake, speed governor ,interlock,1-4of the driver and proportional valve all quit ,full braking input | 1. Failure of internal controller. |
| 7,2 | PDO Timeout CAN PDO accepts a timeout. | 1. The communication reception time of CAN PDO exceeds the PDO timeout period. |
| 7,3 | Stall Detect Control Running in Restricted Operating Mode | 1. the motor stops working 2. encoder of the motor meets a failure 3. Wire harness damage or wiring misconnection. 4. A problem occurs on the encoder power supply |

| | | |
|-----|---|---|
| | | 5. Refer to 1311 motor monitor menu: Motor RPM |
| 8,7 | Motor Characterization Fault: main contactor, motor and electromagnetic brake, speed governor quit | Misdescription of motor characteristics in motor description step. |
| 8,8 | Encoder Characterization Fault: main contactor, motor and electromagnetic brake, speed governor quit | 1. . The description of encoder characteristics is wrong in the encoder description step. 2. Pulse frequency of motor encoder is not a standard value(32,48,64,80ppr) |
| 8,9 | Motor Type Fault: main contactor, motor and electromagnetic brake, speed governor quit | The parameters of motor type is out of range |
| 9,2 | EM Brake Failed to Set Electromagnetic brake failure | 1. The truck still travels after getting the brake signal. 2. Electromagnetic brake cant embrace the motor in rotation. |
| 9,3 | Limited Operating Strategy(LOS): star restricted operation mode | 1. Both the encoder fault (code 36) and the stop detection fault (code 73) lead to the motivation of restricted operation mode 2. Motor encoder failure 3. Wire harness damage or wiring misconnection 4. Truck stalls |
| 9,4 | Emer Rev Timeout: motor and electromagnetic brake quit | 1. Emergency reverse order is activated, but it has stopped working because the emergency reverse order is out of time. 2. Emergency reverse signal adhesion |
| 9,8 | Illegal Model Number | 1.Moder_Number variable contains illegal valur 2.Software and hardward do not match 3.Controller defective |
| 9,9 | Parameter Mismatch | Dual Motor Enable parameter is set On and Control Mode Select parameter not set to 1(Speed Mode Express) or 2(Speed Mode) Motor Technology and Feedback Type parameters do not match |

1220-2201 programmer fault diagnosis table and status display LED fault diagnosis table

The fault information can be displayed through the hand-held programmer. If there is an external LED (J1-1), the LED will flash according to the fault information, corresponding to the fault code in the fault list.

| Fault table | | | | | |
|-------------|-----------------------------|--|---|----------|--------|
| Code | Fault | Possible cause | Trouble shooting | Steering | Travel |
| 12 | Controller Overcurrent | 1. Steering motor wiring short circuit 2.Controller failure | Restart KSI | Shut | Stop |
| 13 | Current Sense Fault | 1.Controller failure | Restart KSI | Shut | Stop |
| 14 | Precharge Fault | 1.Controller failure | Restart KSI | Shut | Stop |
| 15 | Controller Severe Undertemp | 1.Controller runs at a sever undertemp. | Wait until the temp. goes back over -35°C | Alarm | Null |

| | | | | | |
|----|----------------------------|---|---|---------------------------------|-----------|
| | | 2.Temp.sensor damaged | | | |
| 16 | Controller Severe Overtemp | 1.Overloading 2.Controller runs at a sever overtemp. 3.Improper controller position | Restart KSI | Alarm then Shut | Stop |
| 17 | Severe Undervoltage | 1.Connecting failure of the battery or the battery wiring 2. There are other large loads connected to the battery 3. The battery is dead or the model is inconsistent | Restart KSI | Shut | Stop |
| 18 | Severe Overvoltage | 1. In regen, the resistance of battery or battery cable is too high 2. Battery cable disconnected during regen | Restart KSI | Shut | Stop |
| 21 | Motor Temp Hot Cutback | 1.Overloading 2.Controller runs at a sever overtemp. | Wait under the motor temp. goes back to normal | Alarm and restrict the currency | Null |
| 22 | Controller Overtemp | 1.Overloading 2.Controller runs at a sever overtemp. 3.Improper controller position | Wait under the motor temp. goes back less then 85°C | Alarm | Slow down |
| 23 | Motor Polarity Fault | 1. The polarity of the motor is reversed 2. The polarity of the position feedback device is reversed | Restart KSI | Shut | Stop |
| 24 | 5V Output Failure | 1.5V output overload 2.Controller failure | Restart KSI | Remain then shut | Stop |
| 31 | Main Driver Fault | 1. Internal relay coil damaged 2. Internal relay drive open or short | Restart KSI | Alarm then Shut | Stop |
| 32 | Relay Welded | 1. Internal relay stuck 2.Controller failure | Restart KSI | Shut | Stop |
| 33 | Relay Did Not Close | 1. Internal relay receives pull in command but does not pull in 2. Internal relay chip oxidation | Restart KSI | Shut | Stop |
| 34 | Hardware Fault | 1. Hardware failure detected 2. Motor voltage out of range 3. IIC communication lost 4. Power tube short circuit | Restart KSI | Shut | Stop |
| 35 | Fault Output Failed | 1. Faulty output wiring incorrect 2.Controller failure | Restart KSI | Alarm then Shut | Stop |

| | | | | | |
|----|--------------------------------|--|-------------|------------------|------|
| 36 | Motor Stalled | <ol style="list-style-type: none"> 1. Motor stalling 2. The encoder of steering motor fails or the wiring is disconnected 3. The steering motor wiring is disconnected 4. Parameter does not match motor | Restart KSI | Shut | Stop |
| 37 | Motor Open | <ol style="list-style-type: none"> 1. Steering motor wiring open circuit 2. Motor wiring error 3. Controller failure | Restart KSI | Alarm then Shut | Stop |
| 38 | Motor Short | <ol style="list-style-type: none"> 1. Steering motor wiring short circuit | Restart KSI | Shut | Stop |
| 41 | Command Analog 1 Out Of Range | <ol style="list-style-type: none"> 1. Analog command input 1 (J1-6) out of range 2. Command low side (j1-14) out of range (for resistance type) 3. Incorrect parameter setting | Restart KSI | Remain then Shut | Stop |
| 42 | Command Analog 2 Out Of Range | <ol style="list-style-type: none"> 1. Analog command input 2 (j1-13) out of range 2. The cross check of analog quantity of j16 and j113 failed 3. Incorrect parameter setting | Restart KSI | Remain then Shut | Stop |
| 43 | Feedback Analog 1 Out Of Range | <ol style="list-style-type: none"> 1. Analog feedback input 1 (j1-11) out of range 2. Incorrect parameter setting | Restart KSI | Remain then Shut | Stop |
| 44 | Feedback Analog 2 Out Of Range | <ol style="list-style-type: none"> 1. Analog feedback input 2 (j1-3) out of range 2. J-11 and j13 analog quantity cross check failed 3. Incorrect parameter setting | Restart KSI | Remain then Shut | Stop |
| 45 | Parameter Change Fault | <ol style="list-style-type: none"> 1. Parameter value changes, need to restart 2. Restore the parameter to the default value | Restart KSI | Shut | Stop |
| 46 | EEPROM Failure | <ol style="list-style-type: none"> Memory parameter verification calculation error 2. Controller failure | Restart KSI | Remain then Shut | Stop |
| 47 | Encoder Fault | <ol style="list-style-type: none"> 1. Encoder data out of allowable range 2. Open circuit of phase a or phase B of orthogonal encoder | Restart KSI | Remain then Shut | Stop |

| | | | | | |
|----|-------------------------|--|-------------|---|------|
| | | 3. Phase B of polarity encoder is open | | | |
| 53 | Home Position Not Found | 1. Home switch failure 2. Wrong installation or wiring | Restart KSI | Shut | Stop |
| 62 | Communication Fault | 1. Lost communication with walking | Restart KSI | Shut | Stop |
| 63 | Communication Lost | 1. RX (j1-8) wiring failure 2. A hand-held programmer is in use on the walking controller | Restart KSI | Alarm and output the maximum angle signal | 減速 |
| 71 | Software Fault | 1. Software failure 2. Controller failure | Restart KSI | Shut | Stop |
| 73 | Following Error | 1. Wrong parameter setting 2. Failure of position feedback equipment 3. Steering motor failure | Restart KSI | Alarm then Shut | Stop |
| 75 | Parameter Conflict | 1. Parameter setting conflicts with other parameters | Restart KSI | Shut | Stop |

1222 programmer fault diagnosis menu and status display LED fault diagnosis table

Fault information of 1222 electric steering controller can be obtained by the following ways: 1. Using the hand-held programmer; 2. Observing the flashing of the LED light on the controller. The hand-held programmer will display all current and historical fault information, and display the name of the fault. Two LEDs (one red and one yellow) display all current fault information. When the red light flashes once, it means that the number of times the yellow light flashes below is the first number of the fault code. When the red light flashes twice, it means that the number of times the yellow light flashes below is the second number of the fault code.

For example, if the controller displays fault: analog quantity 3 is out of range (code 42), Command Analog 3 Out of Range will be displayed in the handheld programmer. The user can check the actual voltage value of analog quantity 3 through Command Input » Analog Input » Analog 3 under the monitoring menu. Through the LED light of the controller, the fault information is displayed as follows:



That is: the red light flashes once, and then the yellow light flashes four times. Then the red light flashes twice, and then the yellow light flashes twice, so the fault code is 42. Refer to the fault information list in this manual for relevant fault codes and causes.

In addition, two LED lights of the controller can display different status information of the controller

| LED light information display | |
|-------------------------------|---|
| Display | Description |
| Both OFF | The controller is not powered on, the battery is not powered, or other serious faults |
| The yellow light is flashing | normal operation |

| | |
|---|------------------------------------|
| Two lights are always on | Downloading program |
| The red and yellow lights flash alternately | Please refer to the list of faults |

Fault information and processing table, providing the following information to users:

- Fault code
- Fault displayed on Curtis programmer
- Possible causes of failure
- Fault causes and elimination
- Measures to be taken for steering
- Measures taken for travelling

For each fault, the fault list table gives the following measures

Alarm only - 1222 normal operation

Shutdown - turn off 1222 immediately and turn off the fault output of Pin24 at the same time

Alarm and then shut down - 1222 continues to run until the motor stops or exceeds the time set by the fault timeout parameter, and then shut down.

Hold and then shutdown - 1222 will ignore the operator's instructions, keep the existing position until the motor stops or exceeds the time set by the fault timeout parameter, and then close.

In case of a fault, if it is confirmed that it is not a wiring error or a mechanical fault of the vehicle, try to restart it through the vehicle key switch. If the fault still exists, please turn off the key switch, check whether the 35 pin connector is connected correctly or dirty, repair and clean it, then connect again, and then try again.

| Code | Sub-code | Fault | POSSIBLE CAUSE | CLEAR CONDITION | STEER FAULT ACTION | TRACTION FAULT ACTION |
|-------------|-----------------|-----------------------------|--|----------------------------------|---------------------------|------------------------------|
| 11 | 1 | Hardware Fault | Interior hardware fault | Cycle KSI. | Shutdown. | 1 = Stop |
| 12 | 1 | Controller Overcurrent 1 | 1. The steer motor wires shorted. 2. Controller defective. | Cycle KSI. | Shutdown. | 1 = Stop |
| 12 | 2 | Controller Overcurrent 2 | 1. Motor UVW short circuit 2. Motor parameter mistake 3. Controller fault | Cycle KSI. | Shutdown. | 1 = Stop |
| 13 | 1 | Current Sense Fault | 1. Controller defective. | Cycle KSI. | Shutdown. | 1 = Stop |
| 14 | 1 | Precharge Fault | 1. Controller defective. | Cycle KSI. | Shutdown. | 1 = Stop |
| 15 | 1 | Controller Severe Undertemp | 1. Controller is operating in extreme low temperature environment. 2. The temperature sensor is broken. | Heatsink temperature above-35°C. | Alarm only | 3 = No Action |
| 16 | 1 | Controller Severe | 1.Excessive load on vehicle. | Cycle KSI. | Alarm and | 1 = Stop |

| | | | | | | |
|----|---|-------------------------|--|--|----------------------------------|------------------|
| | | Overtemp | 2.Controller is operating in an extreme high temperature environment. 3. Improper mounting of controller.. | | Shutdown. | |
| 17 | 1 | Severe Undervoltage | 1. Battery or battery cables or battery connections defective. 2. Excessive non-controller hydraulic system drain on battery. 3. Battery discharged or improper battery. | Cycle KSI. | Shutdown. | 1 = Stop |
| 18 | 1 | Severe Overvoltage | 1. Battery or battery cable resistance too high for a given regen current. 2. Battery disconnected while regen braking. | Cycle KSI. | Shutdown. | 1 = Stop |
| 22 | 1 | Controller Overtemp | 1.Unreasonable fixing or cooling of controller 2.The vehicle is overloaded 3.The controller operates in harsh environment | The temperature is less than 85 °C | Alarm only | 2 = Reduce Speed |
| 25 | 1 | 5V Supply Failure | 1. Overload for the 5V supply | Cycle KSI | Alarm and shutdown | 1= Stop |
| 26 | 1 | 10V Supply Failure | External load impedance of 10V power supply is too small | Bring Steering Motor temperature backs to range. | Warning and Reduce Current Limit | 2 = Reduce Speed |
| 27 | 1 | Severe Motor Over Temp | 1.The motor operates in extreme environment 2.Wrong adjustment of motor temperature control parameters | Restart the key switch | Alarm and shutdown | 2 = Reduce Speed |
| 28 | 1 | Motor Temp Hot Cutback | 1.The motor operates in extreme environment 2.Wrong adjustment of motor temperature control parameters | The sensor temperature returns below the fault value | Alarm only | 1= Stop |
| 29 | 1 | Motor Temp Sensor Fault | 1.The sensor is not connected properly | The motor temperature | Alarm only | 1= Stop |

| | | | | | | |
|----|---|--------------------------|--|-----------------------------|------------------------|----------|
| | | | 2.If the motor temperature sensor is not used, turn off the sensor enable parameter | returns to the normal range | | |
| 31 | 1 | Contactors Open/Short | 1. Open circuit or short circuit of connected load 2. The connecting pin is stained 3. Wrong wiring | Cycle KSI. | Warning then Shutdown. | 1 = Stop |
| 35 | 1 | Fault Output Failure | 1. Incorrect Fault Output wiring. 2. Controller defective. | Cycle KSI. | Shutdown | 1 = Stop |
| 36 | 1 | Motor Stalled | 1. Stalled steer motor. 2. Steer motor encoder failure or wires open. 3. Steer motor wires open. 4. Related parameters do not match with steer motor. | Cycle KSI. | Shutdown. | 1 = Stop |
| 37 | 1 | Motor Open | 1. Steer motor wires open. 2. Faulty motor cable wiring. 3. Controller defective. | Cycle KSI. | Warning then Shutdown. | 1 = Stop |
| 38 | 1 | Contactors welded | 1.Steering contactor adhesion 2.There are other voltage sources (such as external pre charging resistor) that supply current to the capacitor | Cycle KSI. | Shutdown. | 1 = Stop |
| 39 | 1 | Contactors Did Not Close | 1.The steering contactor closes for a short time but then opens 2.Oxidation of steering contactor 3.The capacitor has an external load applied to prevent it from charging | Cycle KSI. | Shutdown. | 1 = Stop |
| 39 | 2 | Contactors Did Not Close | 1.Contactors not closed 2.Oxidation of steering contactor 3.The capacitor has an external load applied to | Cycle KSI. | Shutdown. | 1 = Stop |

| | | | | | | |
|----|---|---|---|------------|---------------------|----------|
| | | | prevent it from charging | | | |
| 41 | 1 | Command Analog1 Out of Range | 1. Command Analog Input 1 (J3-6) is out of range. 2. Incorrect parameter settings. | Cycle KSI. | Hold then Shutdown. | 1 = Stop |
| 42 | 1 | Command Analog3 Out of Range | 1. Command Analog Input3 (pin 19) is out of range. | Cycle KSI. | Hold and shutdown. | 1 = Stop |
| 43 | 1 | Position feedback device analog 5 input (16 pin) out of range | Restart the key switch | Cycle KSI. | Hold then Shutdown. | 1 = Stop |
| 44 | 1 | Feedback Analog6 Out of Range | Position feedback device analog 6 input (17 pin) out of range | Cycle KSI. | Hold then Shutdown. | 1 = Stop |
| 45 | 1 | CAN Not Operational | 1222 CAN NMT state has no operation within 80ms of interlock opening | Cycle KSI. | Alarm and shutdown | 1 = Stop |
| 46 | 1 | EEPROM CRC Fault | 1. New software is written in 2. Use "RESET" to clear the fault 3. Controller failure | Cycle KSI. | Shutdown | 1 = Stop |
| 47 | 1 | Sin/Cos command sensor | 1. Sin / Cos sensor fault 2. The parameters of Sin / Cos sensor are misadjusted | Cycle KSI. | Shutdown | 1 = Stop |
| 47 | 2 | Sawtooth Command Sensor | 1.Sawtooth wave sensor fault 2.Wrong parameter adjustment of sawtooth wave sensor | Cycle KSI. | Shutdown | 1 = Stop |
| 48 | 1 | Sawtooth Feedback Sensor | 1. Sin / Cos sensor fault 2. The parameters of Sin / Cos sensor are misadjusted | Cycle KSI | Interlock = OFF | 1 = Stop |
| 48 | 2 | Sawtooth Feedback Sensor | 1.Sawtooth wave sensor fault 2.Wrong parameter adjustment of sawtooth wave sensor | Cycle KSI | Alarm and shutdown | 1 = Stop |
| 49 | 1 | Parameter Change Fault | After the parameter value or software is changed, a power-off restart is needed. | Cycle KSI. | Shutdown. | 1 = Stop |

| | | | | | | |
|----|---|--------------------------------|--|------------|---------------------|----------------|
| | | | From the perspective of safety, the fault automatically forces the truck to power off and restart | | | |
| 51 | 1 | Interlock Switch Supervision | 1.Interlock switch uses cross configuration (normally open and normally closed). Check these two inputs. If switch 1 (9 pins) = switch 3 (11 pins), an error will be reported 2.Interlock switch fault | Cycle KSI. | Shutdown. | 1 = Stop |
| 52 | 1 | Home Switch Supervision | 1.If the wheel position is not close to the return position, redundant return switch input is detected. If it is inconsistent, this fault will be reported. 2.Return switch fault 3.In the case of 360 ° steering, the setting of parameter Homing CamAngle (DEG) is wrong | Cycle KSI. | Hold and shutdown | 1 = Stop |
| 53 | 1 | Home position not found | Return switch fault | Cycle KSI. | Hold and shutdown | Speed reduced. |
| 54 | 1 | Home reference Tolerance Fault | 1.Return switch fault 2.In case of 360 ° steering, the parameter Homing Cam angle (DEG) is not set to right | Cycle KSI. | Shutdown. | 1 = Stop |
| 55 | 1 | Steer Command Supervision | Command input device failure | Cycle KSI. | Alarm and shutdown. | 1 = Stop |
| 56 | 1 | Wheel Position Supervision | Position feedback device failure | Cycle KSI. | Shutdown. | 1 = Stop |
| 69 | 1 | 5V Current Out of Range | 5V external load current too large or too small | Cycle KSI. | Shutdown. | 1 = Stop |
| 71 | 1 | Software Fault 1 | Spare | | | |

| | | | | | | |
|----|---|----------------------------|--|------------|--------------------|----------|
| 71 | 2 | Software Fault 2 | 1.Software failure 2.Controller failure | Cycle KSI. | Shutdown | 1 = Stop |
| 71 | 3 | Software Fault 3 | Spare | | | |
| 71 | 4 | Software Fault 4 | 1.Software failure 2.Controller failure | Cycle KSI. | Alarm and shutdown | 1 = Stop |
| 71 | 5 | Software Fault 5 | 1.Software failure 2.Controller failure | Cycle KSI. | Alarm and shutdown | 1 = Stop |
| 72 | 1 | PDO1 Timeout | Communication between walking controller and 1222 is interrupted | Cycle KSI. | Alarm and shutdown | 1 = Stop |
| 73 | 2 | Following Error | 1.Position feedback device failure 2.Locked rotor of steering motor 3.Steering motor encoder failure | Cycle KSI. | Alarm and shutdown | 1 = Stop |
| 74 | 3 | Hardware Software Mismatch | 1.New software has been downloaded 2.The controller hardware does not support the new software | Cycle KSI. | Shutdown | 1 = Stop |
| 75 | 4 | Parameter Conflict | 1.Parameter settings conflict with each other 2.Parameter setting out of range | Cycle KSI. | Shutdown | 1 = Stop |