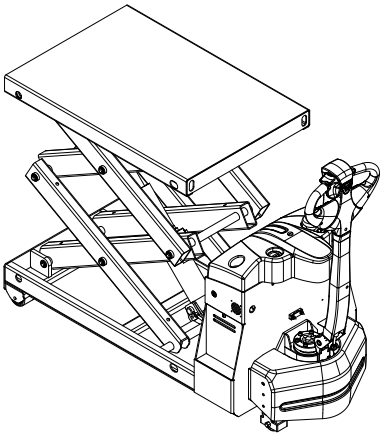
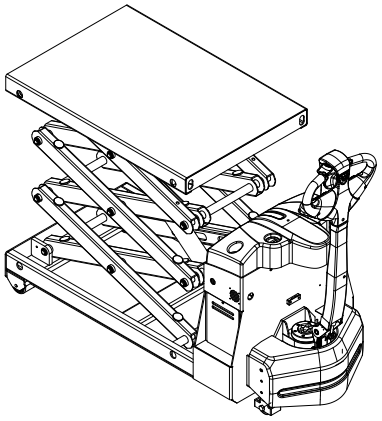
# XB Series

**ELECTRIC LIFTING PLATFORM VEHICLE 1510XB/2005XB/ 1020XB**

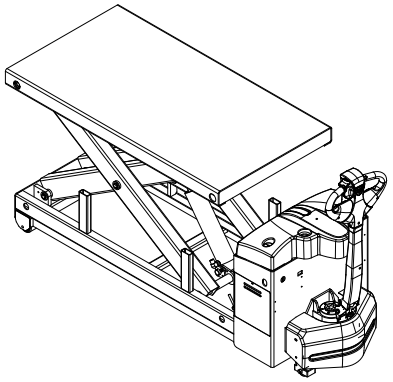
# OPERATION AND MAINTENANCE MANUAL



**1510XB**



**2005XB**



**1020XB**

**Original instruction**

# FOREWORD

Thank you very much for purchasing the XB series electric lifting platform vehicle of Hangcha Group .

XB series electric lifting platform vehicle is a newly developed product for warehouse logistic, it owns characteristics as advanced performance,Shear fork mechanism with stable structure, comfort operation, safety and security, low maintenance cost, and is an ideal tool for handling goods in warehouse, supermarket and workshop.

Before use the vehicle, relative persons must read and understand the manual, get to know how to safely operate and maintain the vehicle.

Part one of this manual is about the brief introduction and correct operation of the electric lifting platform vehicle, which will tell you how to operate safely and maintain preventively; part two will tell you the structure, working principle and maintenance of the electric lifting platform vehicle. To ensure safety and exert the vehicle's potential, all the personnel that in charge of operation maintenance and management must read this manual thoroughly.

As the improvements of products of our company, there may be some differences between this operation manual with your electric lifting platform vehicle.

If you have any questions please keep touches with HANGCHA GROUP CO., LTD. sales department or let the agents know.

# Contents

# Part Ⅰ：Operation and Maintenance

# 1 Notice for use

## 1.1 General

The vehicle in this manual is only for lifting and transporting loads.

This vehicle is not designed for heavy-duty.

It must be used, operated and maintained according to the information in this manual. Any other uses are outside the design envelope and can lead to injury to persons or damage to equipment and property.

## 1.2 Use as required

- Light to medium duty, indoor vehicle operations without ramps.
- Pick and place goods.
- Transport goods with trays.
- Do not carry people.
- Do not over load.
- Do not push or pull loads.
- Do not work together on the same goods by multiple pallet vehicle.

## 1.3 Approved application conditions

- Used in specified area as factory, tourist attraction and recreation place.
- Operation only on secure, level surfaces with sufficient capacity.
- Operation only on routes that are visible and approved by the proprietor.
- Use in specified rated load.
- Average environment temperature under continuous operating condition +25℃.
- The highest environment temperature in the short term (≤1h) +40℃.
- The lowest environment temperature under normal indoor conditions when operation +5℃.
- The lowest environment temperature under normal outdoor conditions when operation -20℃.
- Altitude: ≤2000m.
- Max. uphill grade when driving is 6%..
- When going uphill with loads, keep the loads in front; when going downhill, keep people in front. It is prohibited to travel crosswise or obliquely.

Please read others safety rules in this manual, it is important to your personal safety, working staff and goods safety.

**WARNING**

- **It's prohibited to use the vehicle in the area of the explosion.**
- **Special equipment and authorisation are required if the vehicle is to be used in extreme conditions (e.g. cold stores).**

Conditions for refrigerated vehicle operation:

According to different grades of cold storage vehicles, operate in cold storage according to standard sustainable working hours. At present, the recommended working hours of our vehicles are as follows:

The continuous working time in cold storage higher than - 18 ℃ shall not exceed 2 hours.

The continuous working time of - 15 ℃ / 15 min in cold storage shall not exceed.

## 1.4 Precautions for use of cold storage vehicles

-Use special oil products for cold storage and maintain and replace them regularly.

-All cold storage vehicle should not be shut down and parked in the cold storage, otherwise the hydraulic system and electrical system will be damaged.

-Before entering the cold storage, all cold storage vehicle must do hydraulic and walking actions until the temperature of each component rises.

-If there is condensate on the surface of the vehicle after leaving the warehouse, it must be dried or wait for the condensate to dry completely before entering the cold storage again.

-Shorten the maintenance cycle of lubrication points and prevent the early wear of lubrication points.

-After discharging, the battery should not be idle for a long time. It should be charged in time and keep a high proportion of electrolyte to prevent the battery electrolyte from freezing.

-Different models cooperate with operation to improve the efficiency of various models in the cold storage.

-When the vehicle breaks down in the cold storage, it must be removed from the cold storage as soon as possible and repaired in the buffer zone or maintenance area.Attachment installation or modification to the vehicle

## 1.5 Obligations and responsibilities of equipment users

In the operating instructions, "equipment user" refers to any natural or legal person who directly uses or appoints others to use the all electric lifting platform vehicle. In special cases such as leasing and leasing, the "equipment user" represents the party who undertakes the specified operation obligations according to the contract terms between the owner and the user of the equipment.

The user of the equipment must ensure that the all electric lifting platform vehicle is only used for the specified purpose, and eliminate the danger that may endanger the user's life and health or that of a third party. In addition, the user of the equipment must strictly abide by the accident prevention regulations, other safety technical regulations, and the operation, maintenance and repair rules of the equipment. The user of the equipment must ensure that all operators carefully read and fully understand the contents of the operation instructions.

If this operating instruction is not followed, the quality assurance of our company will be invalid automatically. Without the permission of the company, if the customer and / or the third party carries out non-standard operation on the equipment without the permission of the company, the company will not be responsible for the losses arising therefrom.

## 1.6 Install accessories or modify the vehicle

Without authorization by the manufacturer, it is not allowed to modify the vehicle privately.

The mounting or installation of any attachments which will interfere with, or supplement, the functions of the vehicle is permitted only after written approval by the manufacturer has been obtained. If necessary, the approval of local authorities has to be obtained.

Without the prior written approval of the original manufacturer, its authorized representative or its successor, any change to the vehicle that may influence its performance, such as rated capacity, stability or security, is not allowed. Changes include brake, steering, vision or dismountable attachment. When the manufacturer or its successor approve to changes of the vehicle, it also needs to make corresponding modification to vehicle nameplate, decals, logo and brochures.

In the event the vehicle 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 vehicle manufacturer and the user shall:

a) Arrange for the modification or alteration to be designed, tested and implemented by an engineer(s) expert in industrial vehicles 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 vehicle stating the manner in which the vehicle has been modified or altered together with the date of the modification or alteration, and the name and address of the organization that made the modification or alteration.

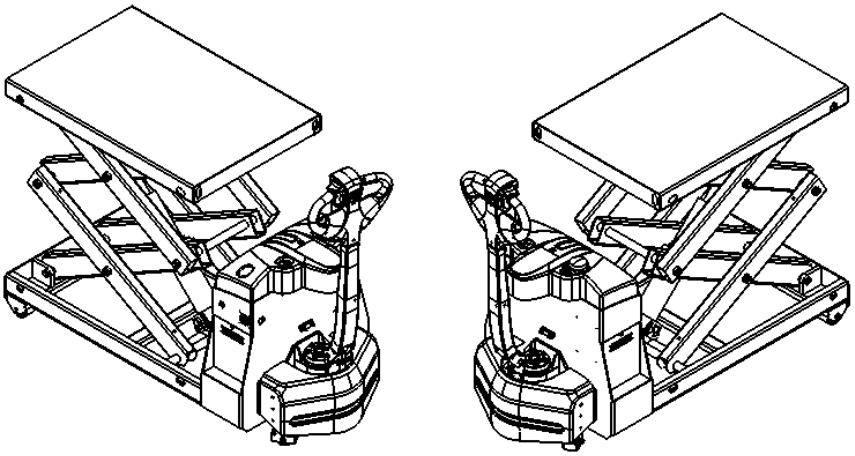
# 2 The electric lifting platform vehicle introduction

## 2.1 General

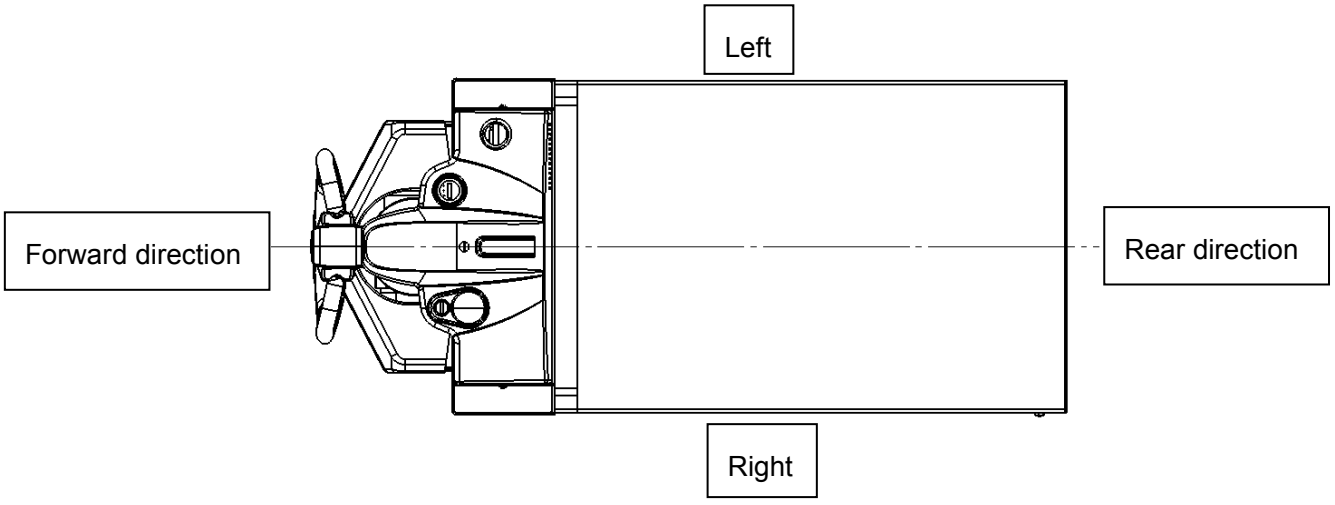
XB series mini range electric pallet vehicle described in this manual should work under low working strength and its continuous working time should not surpass one hour.

Users can get relevant information as rated load from the product model.

| Model | Meaning |
|---|---|
| 15 | Lifting height x 0.1M |
| 10 | Rated load × 100kg |
| XB | Product serial number |



The following determinations have been made for travel direction specification.



## 2.2 Functional description

**Frame**

– Beautiful and compact outline, concise and fluent line.

– Adopted steel stamping and injection moulding process is sturdy and durable.

**Driving system**

– Drive unit adopts wheel type, with compact and simple structure.

– Permanent-magnetic drive motor owns excellent performance.

– High performance electromagnetic brake.

**Hydraulic system**

– Integrated hydraulic power pack with compact structure and higher efficiency.

– There are only two hydraulic lines to reduce the risk of oil leakage.

**Electric system**

– 24V lead-acid battery,

– The latest CURTIS permanent magnetic control system, control performance, efficient and stable.

**Comfort**

— Simple and beautiful tiller to make the operator feel comfortable, all the iperation can be completed by one hand.

— Adopt maintenance-free lead-acid battery, which is very convenient to use.

— The compact body and semicircular design provide an ideal operation in limited space, and the ability of walking upright greatly increases the convenience in the container.

— Side battery change is standard feature.

**Reliability**

— 5-pivot design provide longer working life.

— The lifting system adopts shear fork mechanism, which is stable and reliable.

— Top quality hydraulic power unit applied to provide low noise, low vibration, smooth lifting and landing reliable operation.

— Punch formed forks to provide more strength and tip guide to provide higher efficient operation.

— Using non-contact proximity switch, improves safety and reliability.

**Safety**

— Three braking system of regenerative braking, reverse current braking, parking brake, insures the safe operation.

— Anti-slope on gradient can keep the safety.

— The emergency button on the tiller head can effectively avoid the harm to the driver.

— The standard equipped electronic lifting limitation protect the pump motor from damaging dramatically and more energy saving.

**Maintenance**

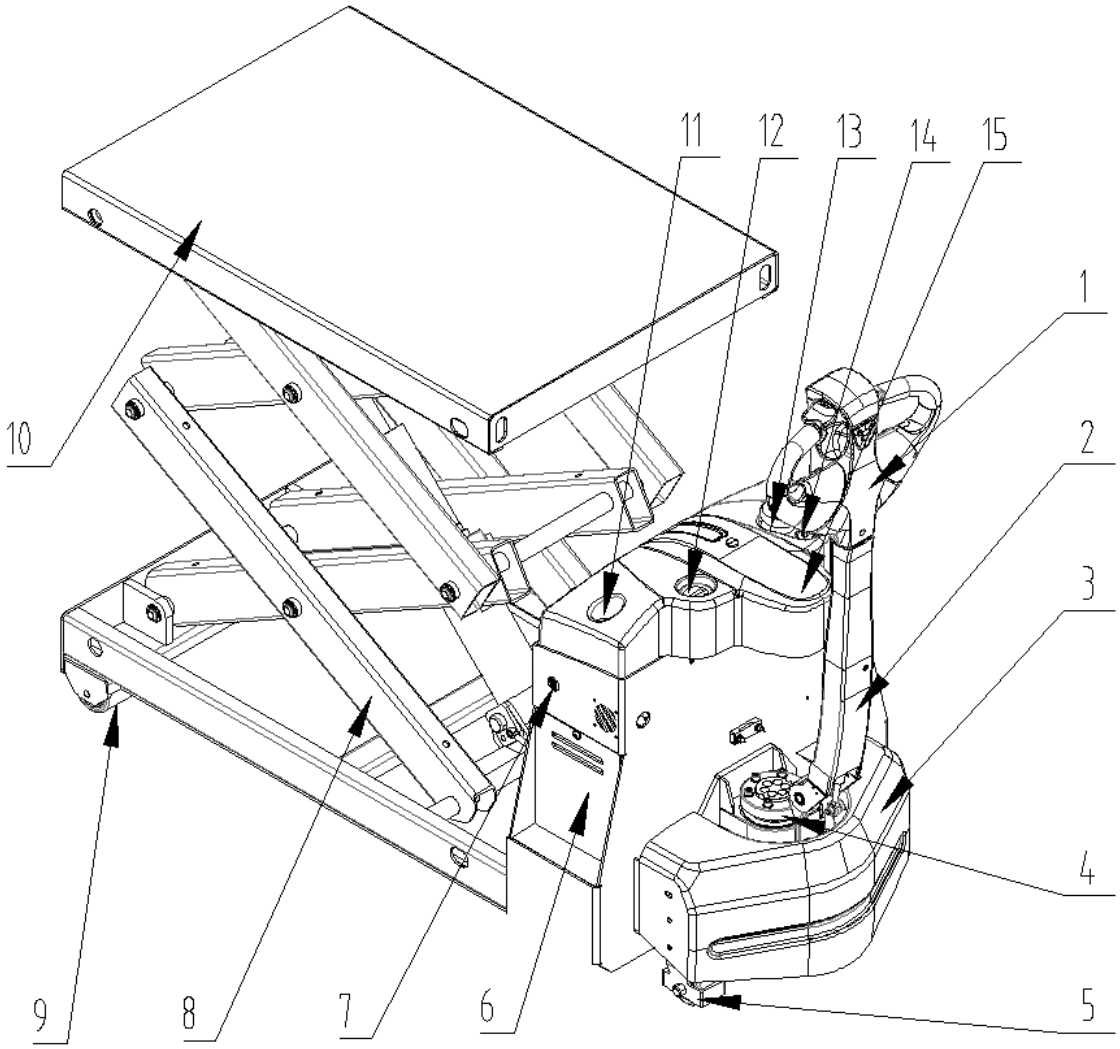
— Integrated battery indicator, hour meter and self-diagnostic instrument.

— Full opened hood, easy accessibility of all components, is easy for service.

— All shafts installed lubricated shaft sleeve and oil cup, provide convenient maintenance and long service life.

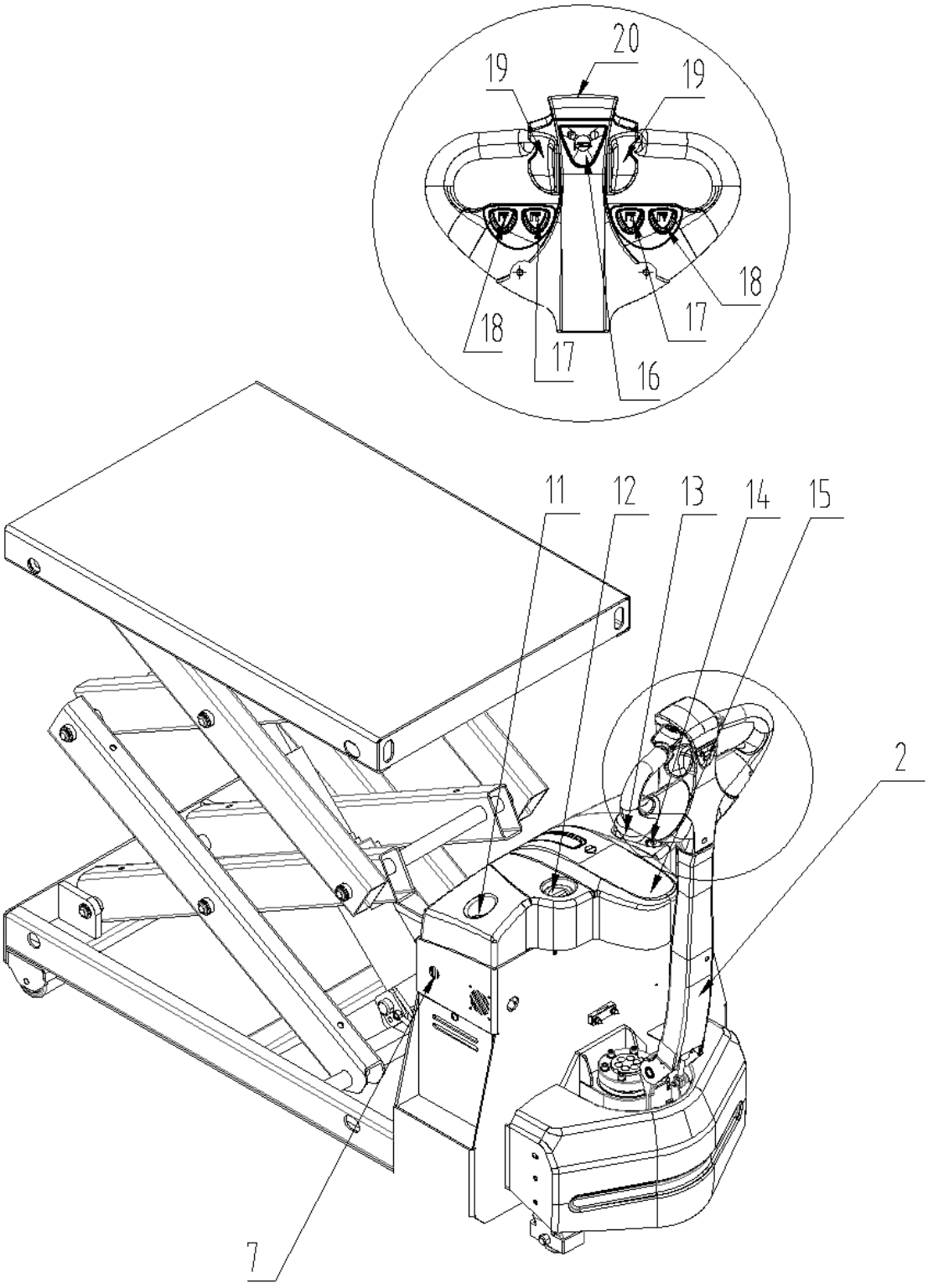
— All pins of shear fork mechanism adopt self-lubricating bushing, which is maintenance free and has long service life.

## 2.3 Main part introduction




| Item | Description | Item | Description |
|---|---|---|---|
| 1 | Control handle | 9 | Load wheel |
| 2 | Control lever | 10 | platform |
| 3 | Wheel housing | 11 | Battery charging plug (internal charger) |
| 4 | Driving wheel | 12 | Display instrument |
| 5 | Auxiliary wheel | 13 | Emergency switch |
| 6 | Side door (built-in battery, hydraulic power pack) | 14 | Switch lock (with key) |
| 7 | Charging indicator (with charger) | 15 | Hood |
| 8 | Scissors | | |

## 2.4 Display and control



| Item | Designation | Function |
|---|---|---|
| 2 | Control lever | Control the steering and brake of the vehicle. |
| 7 | Charging indicator (with charger) | Display the operation status of the built-in charger.<br>Red light flashing: charging<br>The green light is always on: the charging is finished or waiting for the battery to be put on<br>Yellow light flashing: charger failure. |
| 11 | Battery charging plug (internal charger) | Plug the plug into the power socket to charge the battery |
| 12 | Display instrument | Display battery power status and total working time of electric lifting platform vehicle |
| 13 | Emergency stop switch | Interrupt the circuit and stop all electric functions.<br>Vehicle forced braking. |
| 14 | Switch lock (with key) | Turn on and off the control current.<br>When the driver leaves the electric lift platform vehicle, pulling out the switch lock key can ensure that the electric lifting platform vehicle will not start accidentally. |
| 16 | horn | When pressed, it will sound to alert the model. |
| 17 | “Lift” button | Lifting platform |
| 18 | “Lower” button | Lower the platform |
| 19 | Travel switch | Control travelling direction and speed. |
| 20 | Collision safety switch | vehicle moves away from operator.<br>Protect the operator from extrusion damage under emergent circumstances. |

### 2.4.1 Display instrument

Display the Battery charge level indicator and the vehicle total work hour indicator

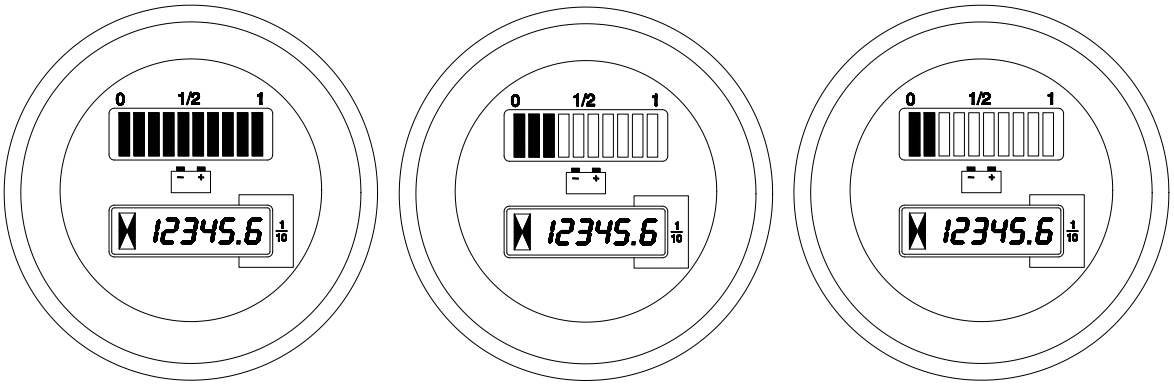
**Battery charge level indicator**

The multi-color ten-segment LED light bar is used to display the battery power status (5 green, 3 yellow, and 2 red LED light bars in sequence). When the battery discharges up to 70%, the red LED flashes, giving a “battery reserve” warning; when the battery power When the discharge reaches 80%, the two red LEDs flash alternately to give the “out of charge” warning; when the battery discharges up to 80%, the normally closed relay is disconnected and the controller is

locked to ensure that the battery is not Overdischarge. The battery's discharge status is displayed through the instrument's 10-cell LED bar. A grid of LED bars corresponds to 10% of the battery capacity. As the capacity of the battery decreases, the 10-cell LED lights up from right to left.

10 LED display bars display battery discharging status. One LED means 10% battery power. As the battery power reduces, 10 LED will light up one by one from right to left.

Fully charged Need charge Low charging status




**WARNING**

- **When the charge level reaches 30% the third LED starts to flash.**
- **When the charge reaches 20% the first two LED'S start to flash simultaneously and the fork lift system is immediately inhibited.**

**Hour meter**

This meter indicates the actual usage time of the vehicle, thus enabling the correct maintenance to be performed according to the set schedule.

In the middle of the quadrant there is an alphanumerical display which shows the work hours.

## 2.5 Standard technical data

The following technical data are all standard data. Our company reserves the right of alteration and extension.

| | | | |
|---|---|---|---|
| Characteristics | Model | | 1510XB |
| | Operator type | | Pedestrian |
| | Load capacity | kg | 1000 |
| | Wheelbase | mm | 1280 |
| Weight | Service weight with battery | kg | 340 |
| Wheels & Tyres | Tyres type | | PU |
| | Tyre size, front | mm | Φ210×70 |
| | Tyre size, rear | mm | Φ80×64 |
| | Tyre size, Universal wheel | mm | Φ70×40 |
| | Number of wheels | | 1+2+2 |
| | Wheelbase:Universal wheel | mm | 404 |
| | Wheelbase:Load wheel | mm | 586 |
| Dimensions | Maximum lifting height | mm | 1500 |
| | Minimum platform height | mm | 425 |
| | Overall length | mm | 1510 |
| | Overall width | mm | 688 |
| | Platform size | mm | 680×1000 |
| | Middle ground clearance | mm | 65 |
| | Minimum turning radius | mm | 1450 |
| Performance | Travel speed, unladen | km/h | 2.8 |
| | Lift speed, full load | mm/s | 75 |
| | Max Gradeability, full load | % | 6 |
| Motor & Battery | Drive motor power | kW | 0.65 |
| | Lift motor power | kW | 2.2 |
| | Battery voltage, rated capacity | V/Ah | 2×12/70 |
| | Battery weight | kg | 50 |
| | Controller mode | | Curtis DC |

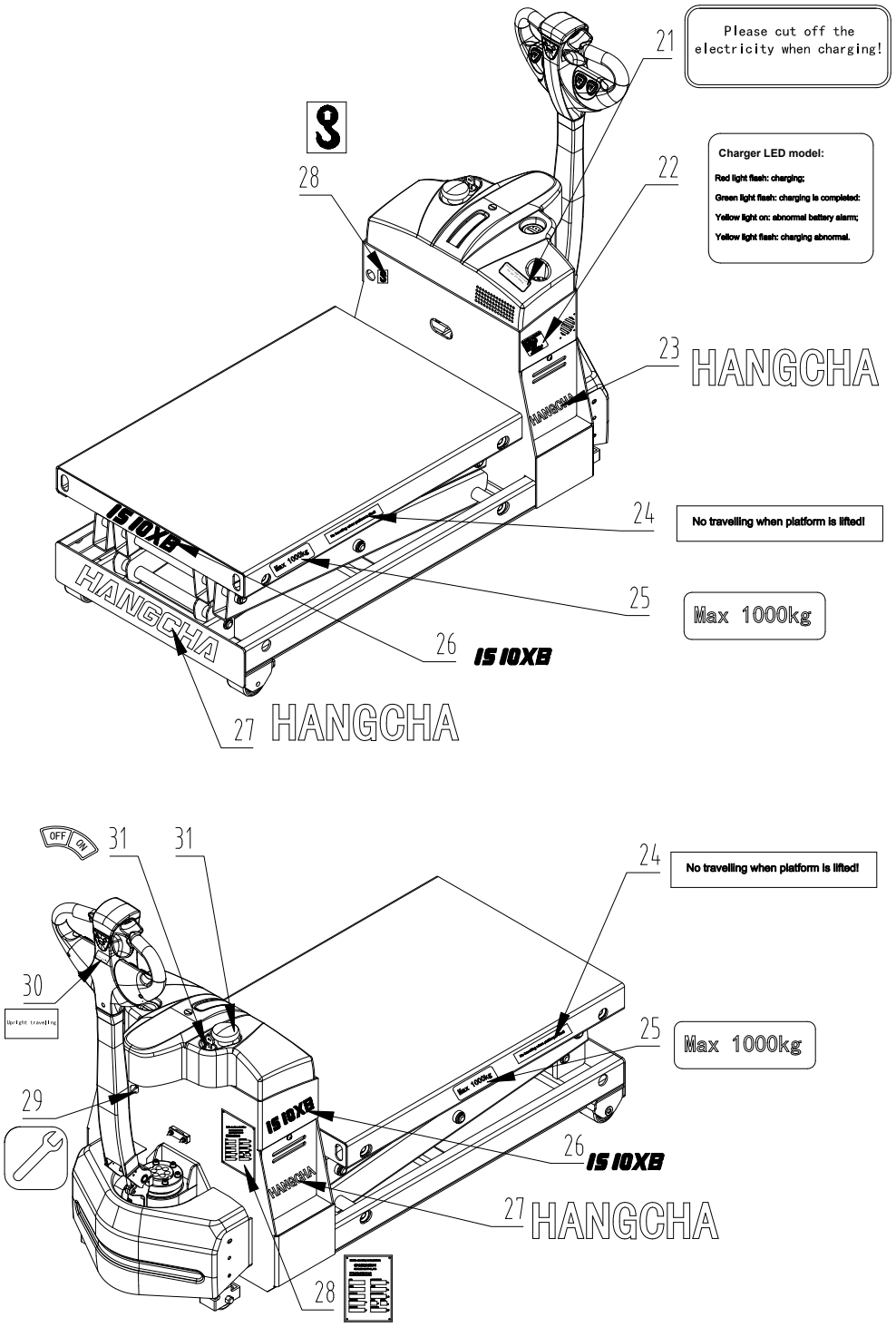
| | | | |
|---|---|---|---|
| Characteristics | Model | | 2005XB |
| | Operator type | | Pedestrian |
| | Load capacity | kg | 500 |
| | Wheelbase | mm | 1280 |
| Weight | Service weight with battery | kg | 340 |
| Wheels & Tyres | Tyres type | | PU |
| | Tyre size, front | mm | Φ210×70 |
| | Tyre size, rear | mm | Φ80×64 |
| | Tyre size, Universal wheel | mm | Φ70×40 |
| | Number of wheels | | 1+2+2 |
| | Wheelbase:Universal wheel | mm | 404 |
| | Wheelbase:Load wheel | mm | 586 |
| Dimensions | Maximum lifting height | mm | 2000 |
| | Minimum platform height | mm | 460 |
| | Overall length | mm | 1510 |
| | Overall width | mm | 688 |
| | Platform size | mm | 680×1000 |
| | Middle ground clearance | mm | 65 |
| | Minimum turning radius | mm | 1450 |
| Performance | Travel speed, unladen | km/h | 2.8 |
| | Lift speed, full load | mm/s | 96 |
| | Max Gradeability, full load | % | 6 |
| Motor & Battery | Drive motor power | kW | 0.65 |
| | Lift motor power | kW | 2.2 |
| | Battery voltage, rated capacity | V/Ah | 2×12/70 |
| | Battery weight | kg | 50 |
| | Controller mode | | Curtis DC |

| | | | |
|---|---|---|---|
| Characteristics | Model | | 1020XB |
| | Operator type | | Pedestrian |
| | Load capacity | kg | 2000 |
| | Wheelbase | mm | 1838 |
| Weight | Service weight with battery | kg | 490 |
| Wheels & Tyres | Tyres type | | PU |
| | Tyre size, front | mm | Φ210×70 |
| | Tyre size, rear | mm | Φ85×70 |
| | Tyre size, Universal wheel | mm | Φ70×40 |
| | Number of wheels | | 1+2+2 |
| | Wheelbase:Universal wheel | mm | 396 |
| | Wheelbase:Load wheel | mm | 568 |
| Dimensions | Maximum lifting height | mm | 1000 |
| | Minimum platform height | mm | 460 |
| | Overall length | mm | 2070 |
| | Overall width | mm | 800 |
| | Platform size | mm | 800×1500 |
| | Middle ground clearance | mm | 70 |
| | Minimum turning radius | mm | 2040 |
| Performance | Travel speed, unladen | km/h | 2.8 |
| | Lift speed, full load | mm/s | 40 |
| | Max Gradeability, full load | % | 6 |
| Motor & Battery | Drive motor power | kW | 0.65 |
| | Lift motor power | kW | 2.2 |
| | Battery voltage, rated capacity | V/Ah | 4×6/100 |
| | Battery weight | kg | 70 |
| | Controller mode | | Curtis DC |

## 2.6 Product plates and warning labels location

Plates and labels, such as nameplate, load curve plate, warning labels must be legible, if identification is unclear, and must be replaced.

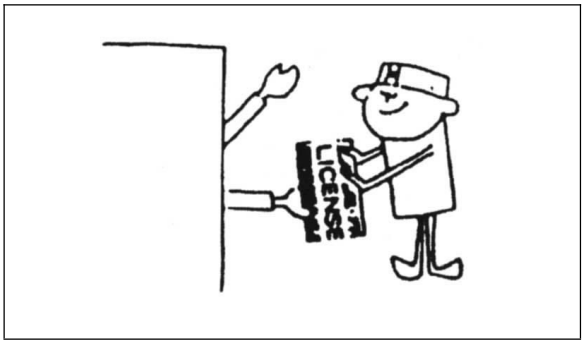
The figure below shows the approximate location of the various identity resides. Before operating the vehicle, please understand the meaning of the various identities.



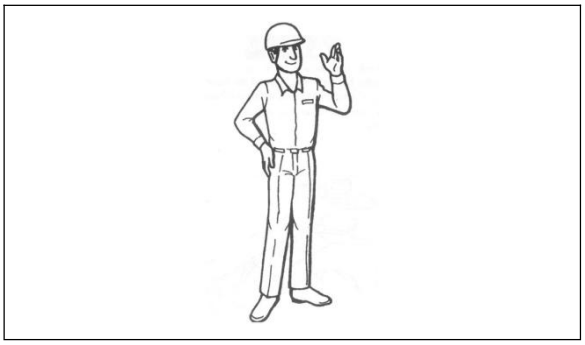
| Item | Description |
|---|---|
| 21 | Power off when charging! |
| 22 | Charge indicator label. |
| 23 | Manufacturer logo |
| 24 | Lifting state, no walking! |
| 25 | Tonnage label: rated lifting weight. |
| 26 | Model label |
| 27 | Manufacturer logo |
| 28 | Lifting label: fixed point for handling equipment with crane |
| 29 | Product name plate: the rated lifting capacity shown on the name plate is the maximum weight of goods that can be loaded and unloaded by the full electric lifting platform vehicle under the equipment conditions shown on the nameplate. Any change to the fully electric lifting platform vehicle or its equipment will change the rated lifting capacity. |
| 30 | Fault indication label |
| 31 | Walking upright label |
| 32 | Key switch label: "off" means off and "on" means on |
| 33 | Emergency stop label: in case of emergency, press this button to cut off the main power supply of the vehicle |

# 3 Safety Instructions

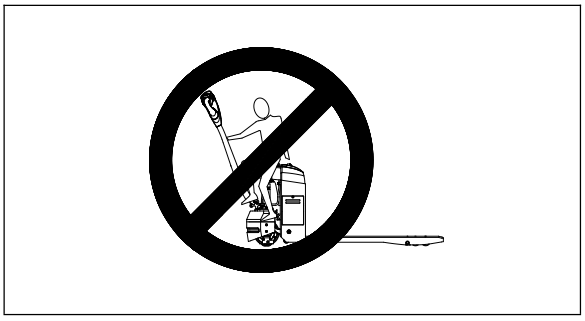
**1)** Only trained and authorized operator shall be permitted to operate the vehicle.




**2)** Operator must wear helmet, working shoes and uniform



**3)** Never carry people.



**4)** It is not allowed to reconfigure the vehicle without manufacturer's permission.

**5)** Do not work in flammable and combustible environment.

**6)** Check the oil, fluid leakage, deformation, flexibility in certain time. If neglected, service life of forklift will be shorted and in serious condition there will be accident.

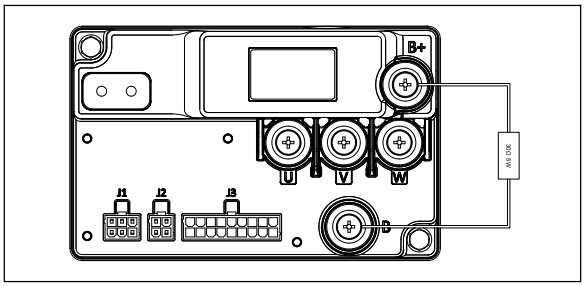
– Make sure change the "safety parts" during the schedule maintenance.

– Wipe off the oil, grease or water on the soleplate, foot pedal and control lever.

– No smoking or any spark, smoke near the battery when checking.

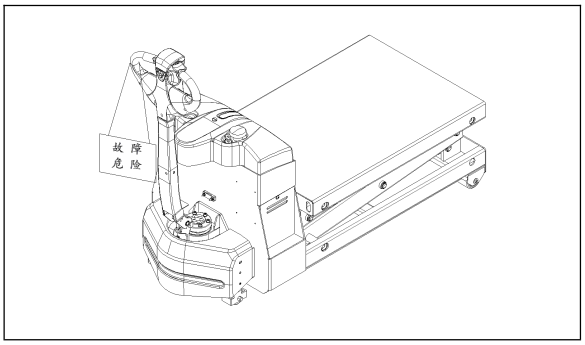
– Be careful of scald when checking motor and controller.

**7)** The controller equips with energy accumulator, do not touch between B+ and B- to avoid electric injury. If you need check or clean the controller, connect load(like contactor coil or horn or bulb or resistance) between controller B+ and B- to discharge the controller capacity.




**8)** Whenever you find the forklift abnormal, stop the vehicle, put on the DANGEROUS or FAULT sign to the vehicle, remove the key, and report to the managing person. Only after eliminating the fault can you use the vehicle.

– If there occurs to fault, battery electrolyte, hydraulic oil leakage when lifting loads, going up and down the slope, please organize staff to repair.



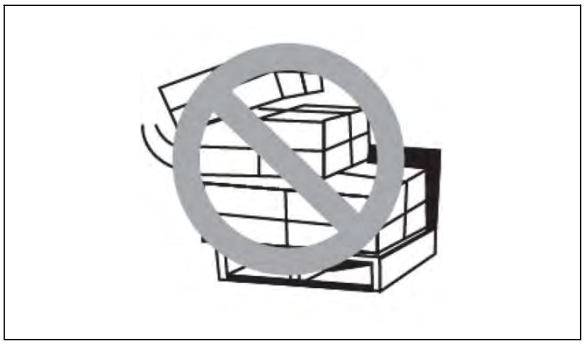

**9)** Explosive gas will be generated inside the battery, and any flame is forbidden to approach the battery. Do not let the tool close to the two poles of the battery to avoid spark or short circuit


**10)** The work ground of forklift shall be solid and smooth concrete surface or similar ones. Pre-check the ground condition of working site. Tidy the working site, clean obstacle, sweep macadam, muddy sand and wipe off greasy dirt.

**11)** Do not overload.

**12)** Before start, press the horn and make sure no people around.

**13)** Goods are not allowed to deviate the fork center, when goods is deviating the fork center, turn or pass uneven road, you are easily to fall. Meanwhile, possibility of turnover will increase.



**14)** Avoid sudden drive, stop or turn.

**15)** Do not drive the vehicle when the forks in high position.

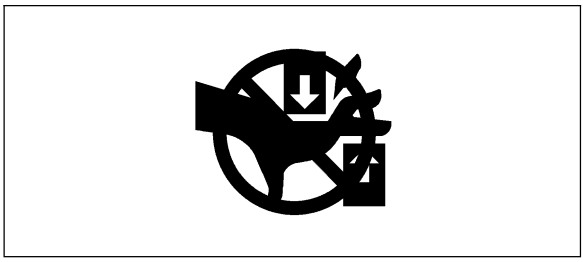
**16)** When handling bulky loads, which restrict your vision, please operate the machine in reverse or have a guide.

**17)** Cause the wheels of pallet vehicle is small, it is not allowed to run on the street, and only for driving in specified stacking place.

**18)** It's forbidden to put the head, hand, foot or body under the forks. Never stand on the fork.

**19)** It's forbidden to put the head, hand, foot or body into the space between the chassis and lifting component, once clipped, it is dangerous to your life. It's forbidden to put the head, hand, foot or

body into the space between fork and link mechanism.

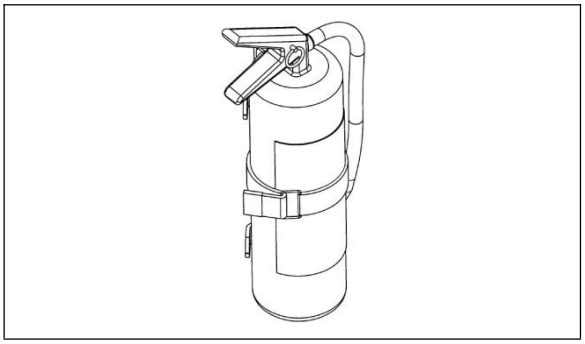


**20)** Make the loads in front when climbing the slope. It's prohibited to turn on the slope, or there's danger of tipping over. Avoid working on the slope.

**21)** **After power off, brake works and the vehicle can not be towed(dragged).**

**22)** Please obey the requirement in this manual and the vehicle label when operation. Check label, identification plate, replace damaged or fallen ones.

**23)** Fire extinguisher shall be equipped at the work site. Users can choose vehicle equipped with fire extinguisher. Driver and manger should be familiar with the fire extinguisher position and application method.



**24)** Do wash the inner of the vehicle, do not place the vehicle outdoors and exposed to the rain.

**25)** Before dismantle or repair the vehicle, take down the battery plug firstly.

# 4 Lifting, fixing and transportation of vehicles

The electric lifting platform vehicle is designed for short-distance lifting,lowering and transporting load units, not suitable for long-distance travel. If needed, the forklift vehicle must be transported by using lifting device or platform to place on vehicle or trailer.

## 4.1 Lifting by crane

**WARNING**

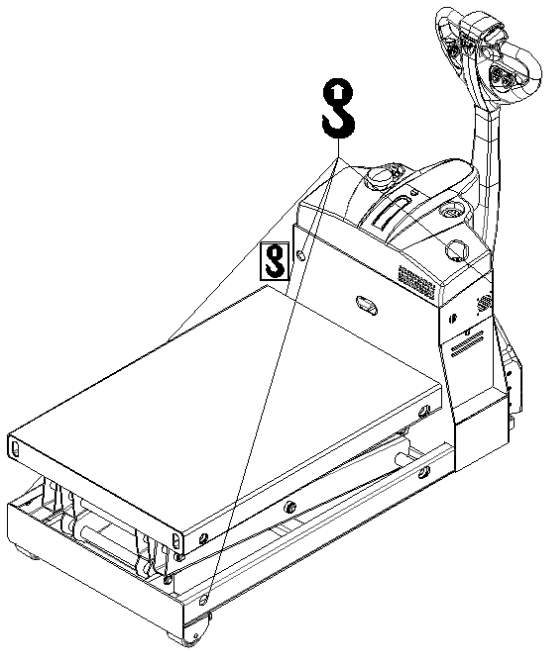
- **Only use lifting gear with sufficient capacity (for vehicle weight see vehicle nameplate ).**
- **Do not stay under the vehicle when hoisting the vehicle.**
- **It is forbidden to lift the full electric lifting platform vehicle in the lifting state of the platform**
- **When hoisting or laying down, it should be stable and slow to avoid collision or accident.**

Procedure:

– Park the vehicle securely.

– Secure the lifting slings to the strap point, and prevent them from slipping. Crane slings should be fastened in such a way that they do not come into contact with any attachments when lifting.

– Load the vehicle and park it securely at its destination.



## 4.2 Securing the vehicle during transport

Correctly fix the forklift vehicle to avoid move when using vehicle or trailer.

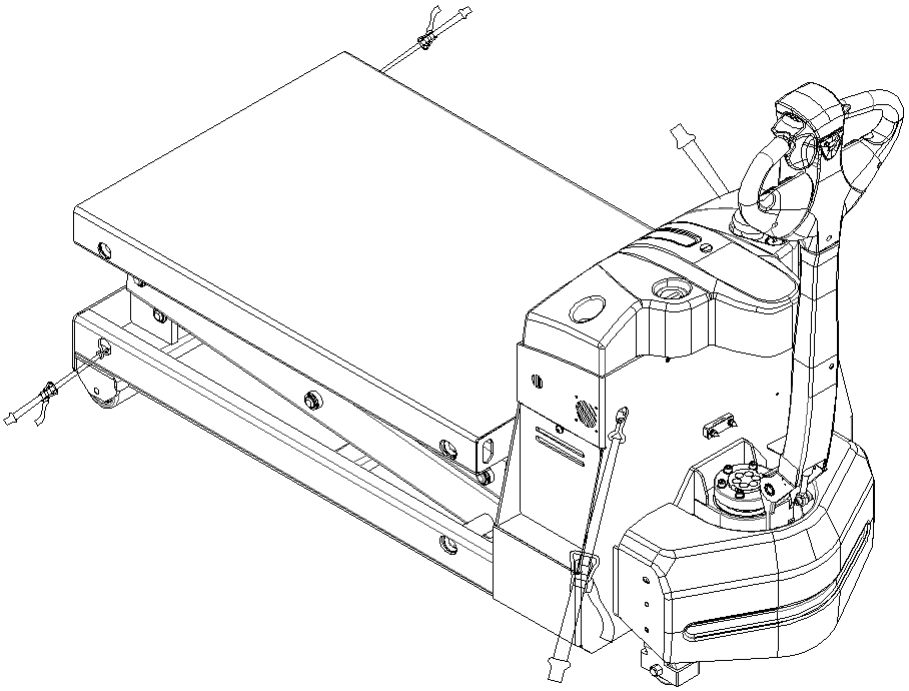
Procedure:

– Park the vehicle securely.

– Sling the tensioning belt around the vehicle and attach it to the fastening rings of the transporting vehicle.

– Use wedges to prevent the vehicle from moving.

– Tighten the tensioning belt with the tensioner.

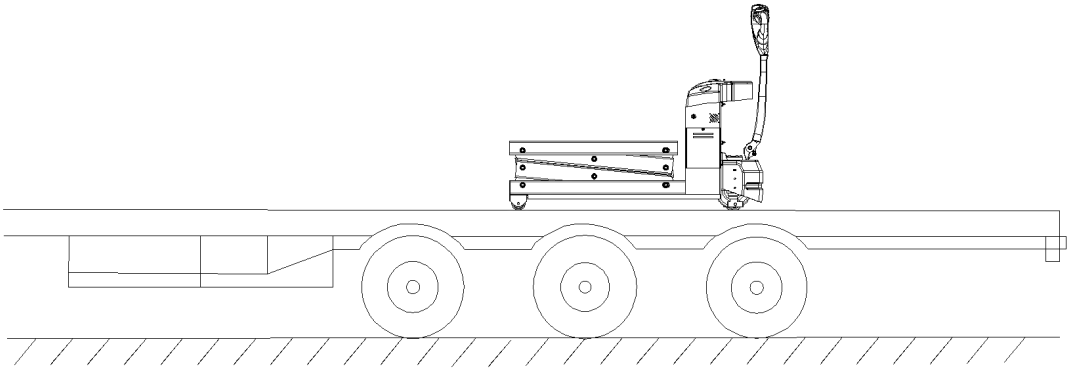


**WARNING**

- **The vehicle or trailer must have fastening rings.**
- **Use wedges to prevent the vehicle.**
- **Only use tension belt or fastening belt of good nominal strength.**

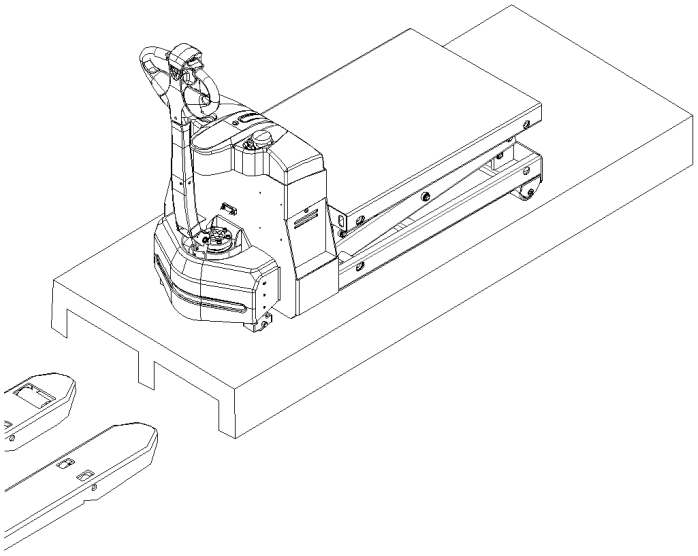
## 4.3 Transport

The pallet vehicle is designed for short-distance material handling only and is inappropriate for long-distance transportation. If needed, the vehicle must be transported by using lifting device or platform to place it on vehicle or trailer. Before operation, fix the pallet vehicle firmly on the transport vehicle with belt, and block the wheel to avoid relative motion during transportation.



**How to remove a broken vehicle**

It's not allowed to tow the forklift vehicle on the ground directly when the vehicle is broken down or damaged since the brake of the vehicle is closed under normal circumstances. Appropriate vehicles should be used to remove the broken vehicles.



**WARNING**

- **Do not tow the broken vehicles on the ground directly, or else the braking system would be damaged.**

# 5 Battery

The all electric lifting platform car is equipped with two 12V / 70ah (1020xb is 4 6V / 50 ah) maintenance free gel batteries. When the temperature of the battery reaches 25 ℃ ~ 30 ℃, the service life of the battery is the longest. The lower temperature reduces the available capacity of the battery, while the higher temperature shortens the service life of the battery.

The weight of single battery is about 25kg (17.4kg for 1020xb).The weight error is generally within ± 3%.

## 5.1 Safe operation rules for battery use

- Before charging, check whether there is damage on the cable connection and plug.
- The space for charging of all electric lifting platform vehicle shall be fully ventilated.
- Do not smoke or use open fire around when charging the battery.
- Inflammables and working equipment that may produce sparks are not allowed to be placed at least 2 meters around the full electric lifting platform vehicle that needs to be charged.
- Fire fighting equipment shall be prepared in charging place.
- Do not place metal objects on the battery.
- If the battery has been used for more than 4 years, it needs to be replaced. Do not mix old and new batteries.
- Try not to use it under overload, high humidity or steep slope.
- When external charging, do not reverse the polarity of the battery, otherwise the battery may be scrapped.
- After the battery is scrapped, please return it to the recycling station for unified treatment. Do not discard it at will.

## 5.2 Battery maintenance

The normal use of the battery does not need water maintenance.

- Regularly check the battery for damage and leakage, and clean the battery surface.
- The connection of each part of the battery should be checked regularly to avoid sparks or short circuit between positive and negative electrodes.
- The battery should always be upright and not upside down. At the same time, it should be shockproof and pressure proof. It should be installed firmly to avoid violent vibration, collision and friction of the battery.
- The maximum starting current of the vehicle shall not exceed 1.25 times of the rated capacity of the battery. For example, the maximum current of 50ah battery does not exceed 62.5a. The use of excessive working current should be avoided, otherwise the vehicle range and battery life will be shortened.
- Charger matching: battery charging parameters matching or not has a great impact on the performance and life of the battery, so users should choose the charger with the same charging parameters and high quality as the original charger when replacing the charger.
- It is necessary to prevent over discharge, overcharge or under charging during the use of battery, otherwise the battery will be damaged. If possible, the battery should be charged in time, and it is forbidden to continue driving after the instrument shows that the power is insufficient; the normal discharge depth is 50%, generally not more than 80%.
- When the vehicle is not in use, the battery must be charged and stored. When not in use, it is recommended to charge the battery once a week.
- The battery capacity is based on the ambient temperature of 25 ℃. It is normal that the continuous mileage will be shortened with the decrease of temperature. When the temperature drops by 1 ℃, the battery capacity will decrease by 1%. Try to avoid using it in the environment below - 10 ℃.
- The ambient temperature shall be controlled between -5 ℃ and +40 ℃ during charging, and the ventilation shall be kept in good condition. In winter, the battery shall be charged at room temperature to ensure sufficient power supply of the battery.
- After a period of charging and discharging cycles, the capacity of the battery will gradually decrease, resulting in a gradual reduction of the mileage, which is a normal loss.

## 5.3 Battery charging

The running process of the vehicle is the discharge process of the battery, and the over discharge of the battery is strictly prohibited. After the vehicle is running, the battery should be charged in time.

warning

- The vehicle has its own on-board charger. The charging power supply of the on-board charger must adopt single-phase power frequency AC power supply. It is forbidden to use DC, AC two-phase / three-phase and other non-single-phase AC power supply.
- Power off when charging!

### 5.3.1 Power interface

Input: 100vac ~ 240VAC

Output:24V/10A

### 5.3.2 Battery charging procedure

– Park all electric lifting platform vehicle safely according to regulations.

– Pull the battery (15) out of the battery cover (11).

– Insert the battery charging plug (11) into a suitable power socket.

– Charge the battery. When the charging indicator (7) is on continuously, the charging is completed.

Red light flashing: charging.

The green light is always on: charging is completed.

Yellow light always on: abnormal battery alarm.

Yellow light flashing: charger abnormal.

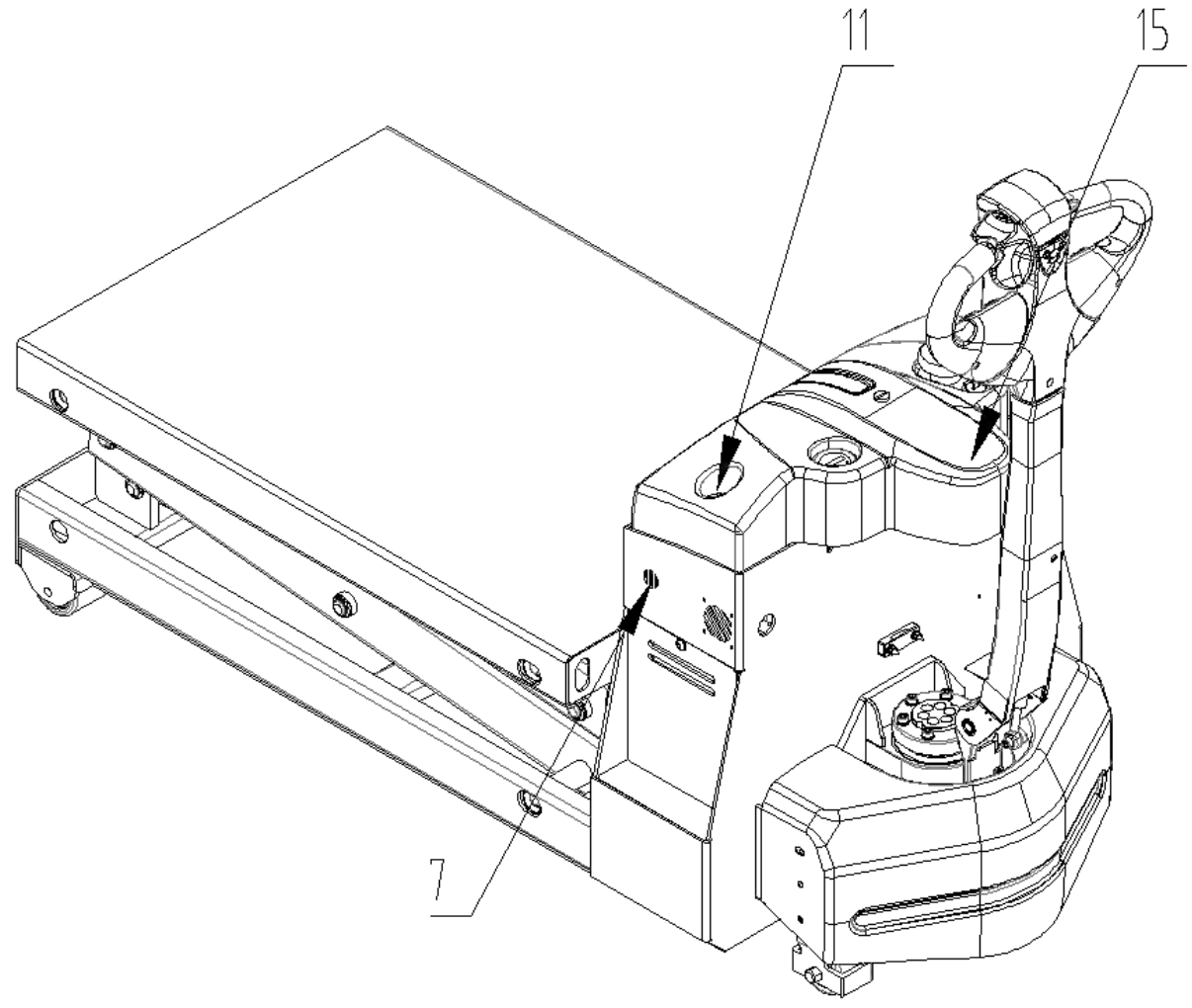
– Unplug the charging plug (11) from the power socket and fix it on the hood (15).

⚠ Be careful

- **Please charge when the battery power is lower than 3 grid, otherwise the battery will be damaged and no warranty will be given!**
- **When charging, the walking function of all electric lifting platform vehicle is prohibited.**
- **Try not to interrupt the charging process until the battery is fully charged.**

### 5.3.3 Supplementary charging

The construction of the charger allows the charging of partially charged batteries to continue in use.



## 5.4 Replace the battery

Operation steps:

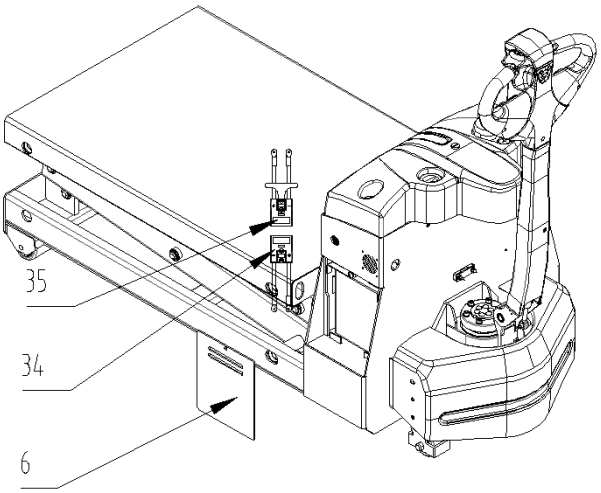
– Park all electric lifting platform vehicle safely according to regulations.

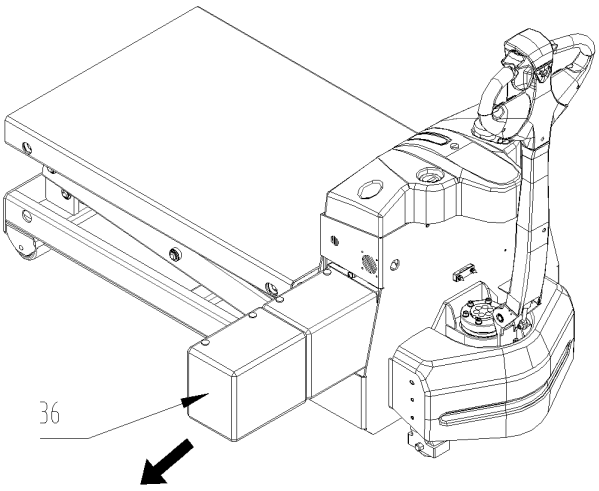
– Screw out the screw and remove the side door (6).

– Pull the battery charging plug (34) out of the body power socket (35).

– Pull the battery pack (36) out of the vehicle body.

Install the battery in the reverse order. Pay attention to the correct assembly position and wiring of the battery.



⚠ warning

- **The battery is very heavy and extra care should be taken to avoid injury.**
- **The disposal of waste batteries must comply with local environmental regulations.**
- **When replacing the battery, make sure that the specification, size and weight of the battery are consistent with that of the original battery.**

# 6 Running in of new electric lifting platform vehicle

We recommended operating the vehicle under light load conditions for the first stage of operation to get the most from it. Especially the requirements given below should be observed while the vehicle is in a stage of 100 hours of operation：

- Avoid the new battery over discharging in early period.
- Perform specified preventive maintenance services completely.
- Avoid sudden stop, start or turn.
- Limited load is 70%～80% of the rated load.
- Often check and fasten the fasteners of each joint part.
- After the break-in ends, replace hydraulic oil.

# 7 Operation

## 7.1 Check before operation

In order for the safety vehicle operation and keep the vehicle in good condition, before starting the vehicle, you must check it carefully.

**1) Oil leak and liquid leak check**

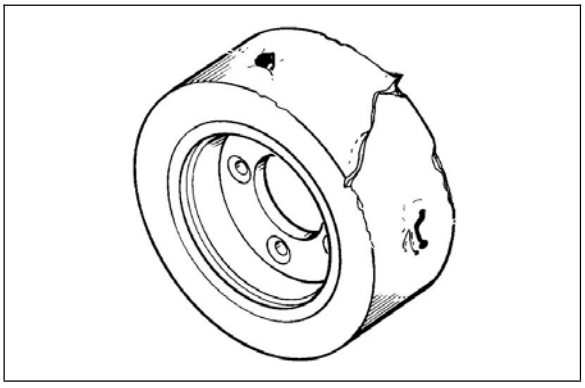
Park the vehicle and check oil leakage.

**2) Platform inspection**

Check the Platform and see whether bended or crazed.

**3) Front/rear wheel check**

Check the wheel and see whether there is any craze, damage, or abnormal wear. Check the wheel fasteners for looseness. Inspect whether there is rope on the wheel.

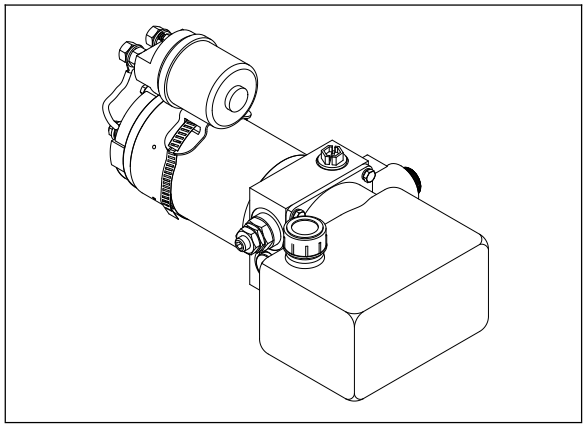


**4) Inspection of shear fork mechanism and platform**

Check whether there are cracks between the shear fork mechanism and the platform, whether there is interference in action, and whether the corresponding moving points are seriously worn.

**5) Hydraulic oil check**

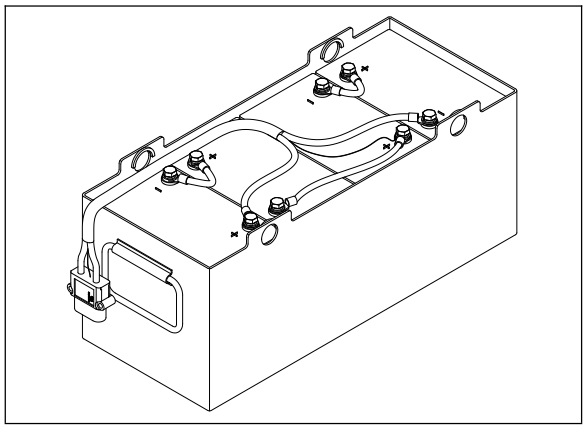
Open the hood, check if the oil level within the scales. Add oil when insufficient.



**6) Battery check**

Check the battery cover board. See whether the battery fixed reliably.

Check the terminal for loose or damage. Otherwise adjust or replace.



**7) Instrument display check**

Refer to instrument part.

**8) Lifting and lowering button**

Press the lifting button and check the fork lifting condition. Press the lowering button, check the fork lowering condition. Check if the lifting system has abnormal sound.

**9) Forward and reverse running**

**condition**

Tilt the handle to some degree, gradually press the accelerator button to the outside of the body with thumb, and inspect the forward running condition; gradually press the accelerator button to the inside of the body with thumb, and inspect the reverse running condition.

**10) Brake system**

When the vehicle run forward or backward, push the handle to vertical position or press to level position to check the brake condition.

**11) Steering system**

Left or right turn the handle to make the vehicle run around 3 turns, and then check if the steering system is normal.

**12) Horn**

Press the horn button to check sound.

**13) Appearance**

Check the vehicle appearance for clean, rust or paint spalling.

**14) Others**

Check whether there is any abnormal noise, whether wiring is regular or fastener loosens etc.

## 7.2 Start up

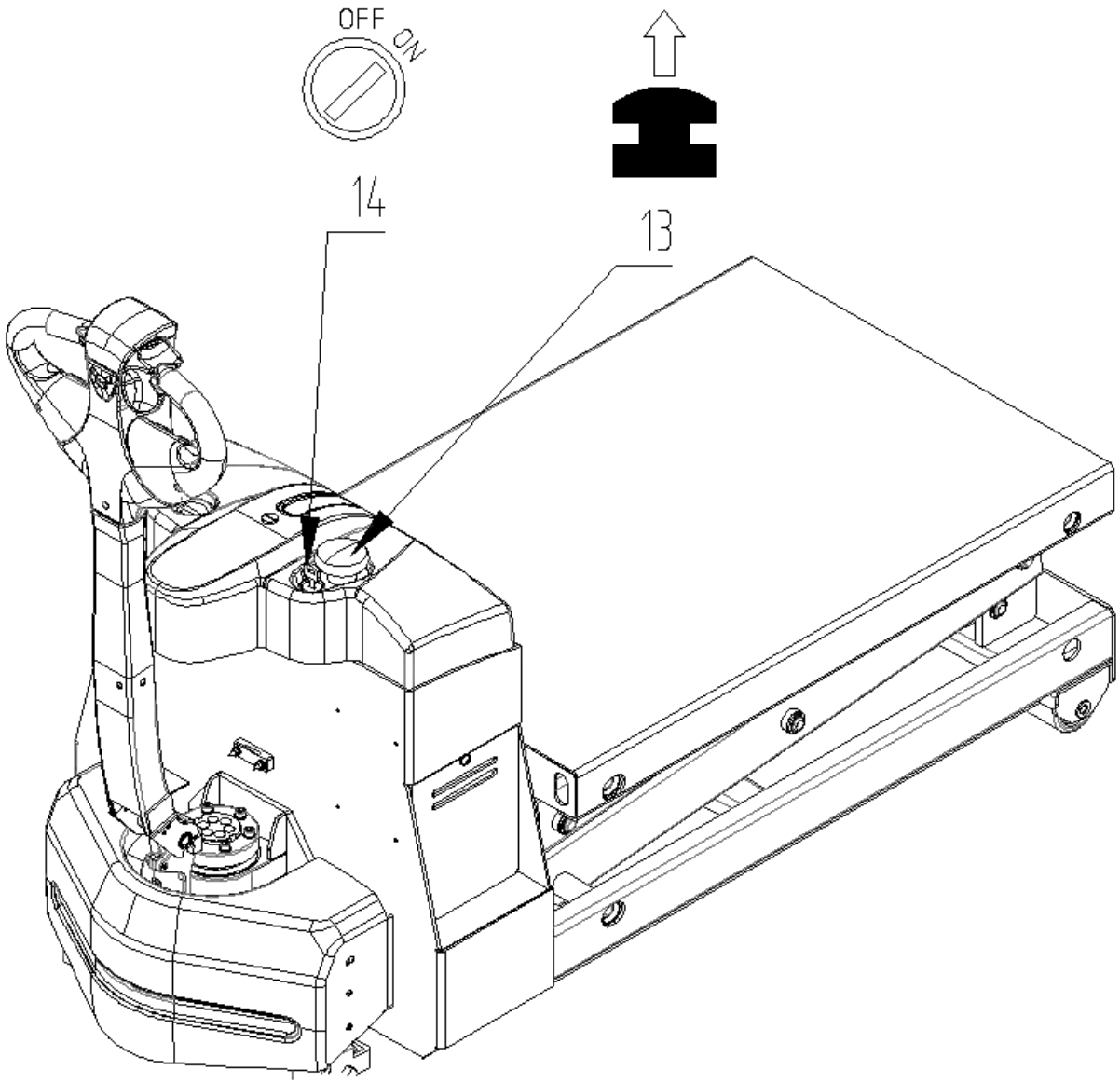
Procedure:

– Carry out check before operation and make sure each function and state is normal.

– Pull up the emergency stop switch (13).

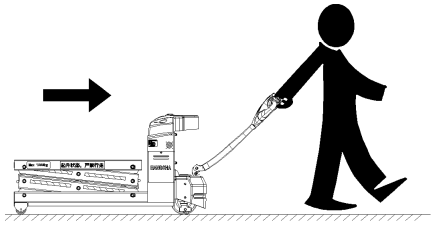
– Plug the key into key switch (14), turn to “ON” position in clockwise. The instrument displays battery capacity.

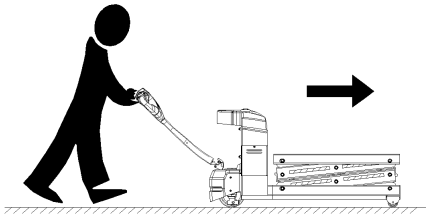
vehicle goes into running state.



## 7.3 Travelling

Driver should walk in front of the vehicle and keep at the side front of the vehicle when travelling. One hand holds the handle, and operates travel switch with thumb. Always watch moving direction and guide the vehicle. Or hold the handle with both hands and push the vehicle go forward.



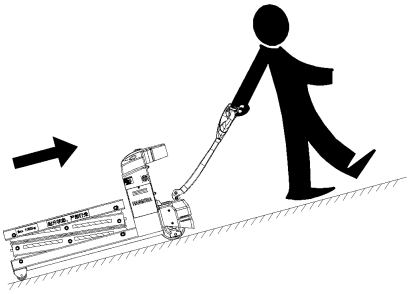


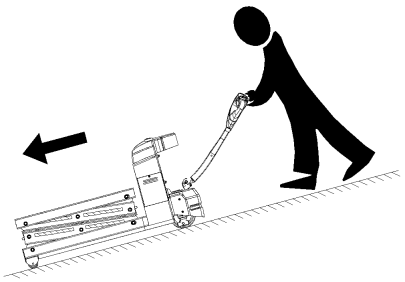
**CAUTION**

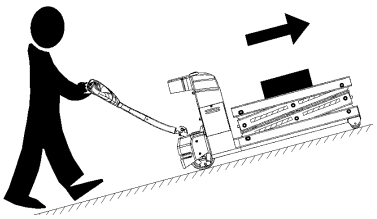
- **Operator must wear protective boots.**
- **When enter narrow area as lift, first get fork go.**
- **Keep road clean and wipe greasy dirt, water or other dirty easily causes slipping.**

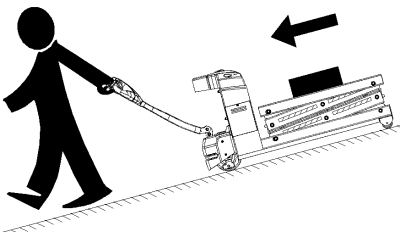
**Travelling on the slope：**

When going uphill and downhill without load, keep the fork to downhill direction; when going uphill and downhill with load, keep the fork to uphill direction.









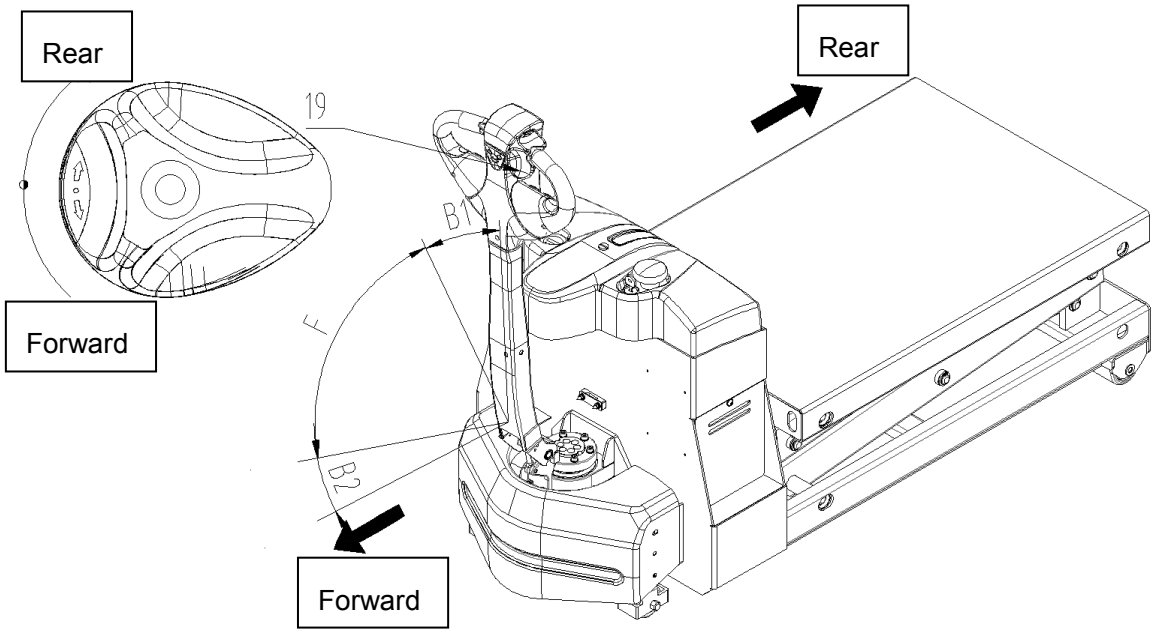
**WARNING**

- **No turn, inclines when going uphill and downhill.**
- **Never park on the slope.**

- **Slow down when going downhill and ready for braking.**
- **Travel according to regulated route.**
- **The road should keep clean, no slipping.**

### Slow down

Slowly loosen the thumb, the direction speed control button will return automatically and the vehicle slows down.




## 7.4 Braking

When the thumb off the direction speed control button, pull the handle to braking range (B1 or B2) position or vertical position, the vehicle brakes.

⚠ **CAUTION**

- **When release the control handle, the handle swivel into the braking range slowly or nor enter braking range, do check the reason and eliminate the fault. Replace gas spring if necessary.**

## 7.5 Steering

Hold the left and right handle of control handle with both hands, and decline to some degree, move the handle to left or right to release vehicle steering.

– When turn to left, the vehicle turns left.

– When turn to right, the vehicle turns right.

## 7.6 Stopping

– Release the direction-speed knob. Decrease the speed.

– Return the control handle to vertical position.

– Drop the fork to the lowest position.

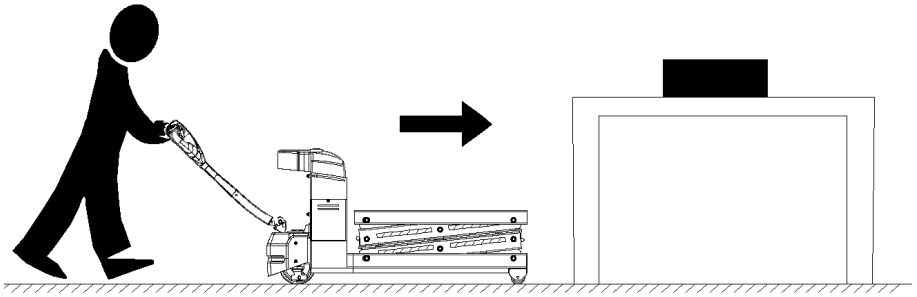
– Turn off the switch to “OFF” position, press down the emergency disconnect switch, pull out the battery plug, and take off the key.

– Fold up

## 7.7 Loading

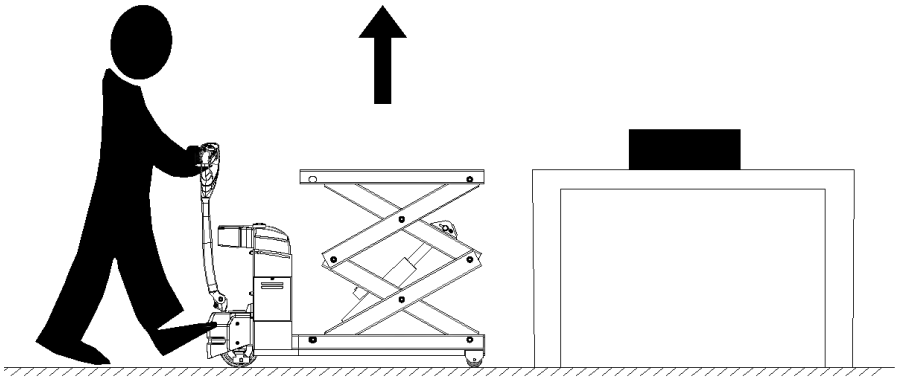
Procedure:

– Drive the vehicle carefully up to the loads.



– Return the control handle to the vertical position and press the lifting button to make the platform and the cargo at the same height.

– Transport the goods to the platform and place them in the center of the platform as much as possible.

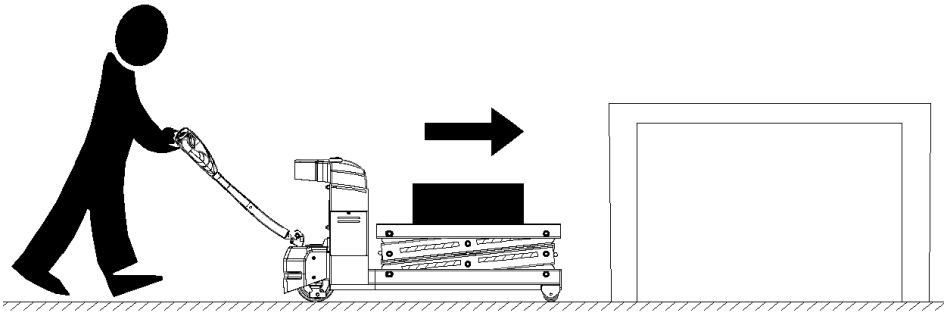


– Lower the platform to the lowest position.

## 7.8 Unloading

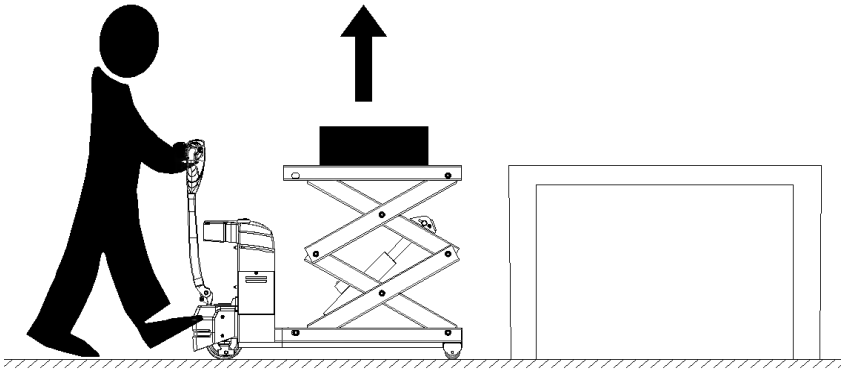
Procedure:

– Approach the deposit area



– Lift the platform to the required height of goods.

– Move the goods to the required position.



– Lower the platform to the lowest position.

## 7.9 Park the vehicle securely

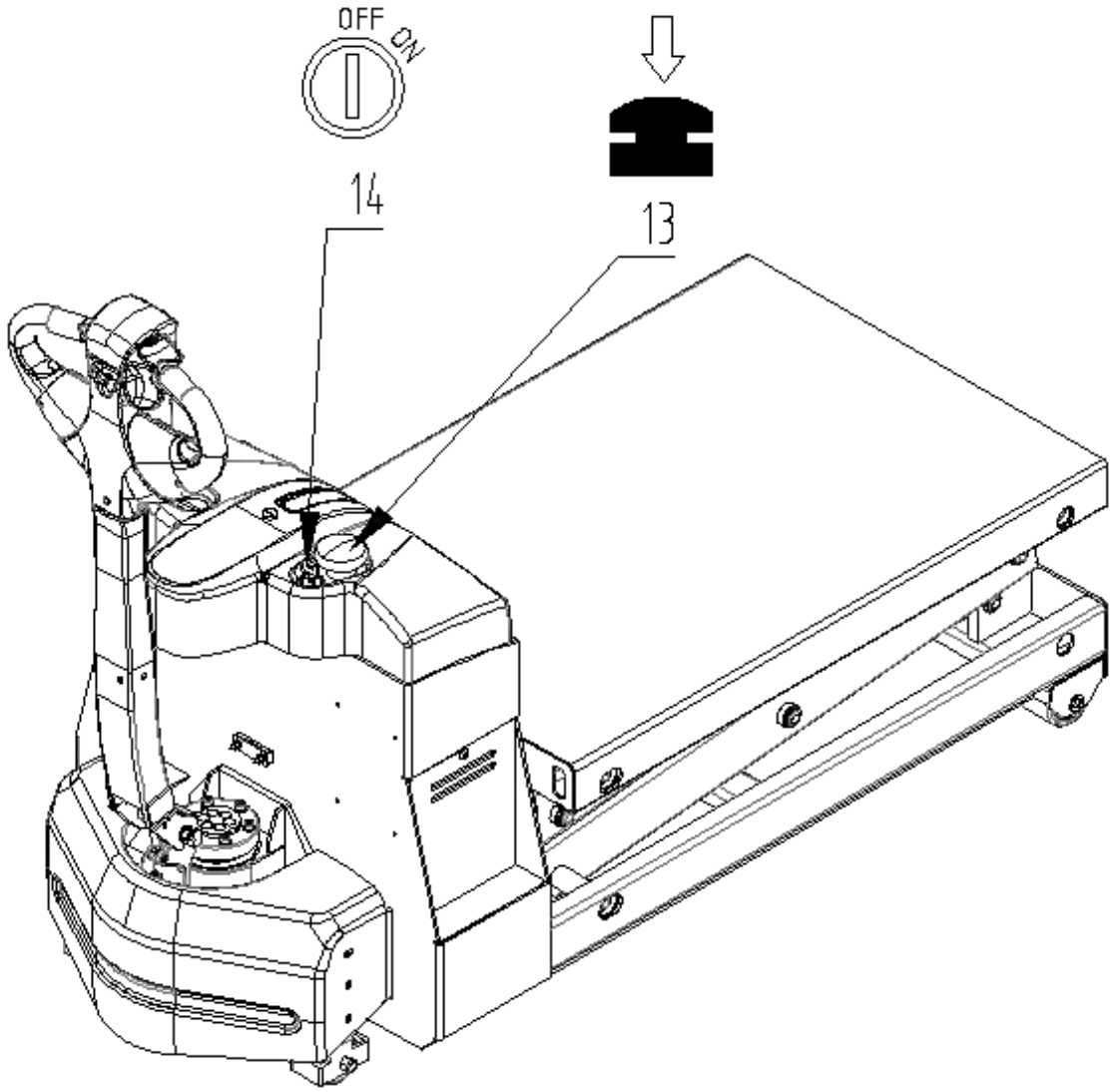
Procedure:

– Drive the vehicle to safe area or appointed area.

– Fully lower the forks.

– Turn off the key switch (14), and remove the key.

– Press the emergency stop switch (13).



# 8 Deposit the vehicle for long time

## 8.1 Deposit for long time

- Fully check the vehicle, especially check the wheel damage.
- Check fluid oil for leakage.
- Apply lubrication grease.
- Check the joint face of cylinder piston rod for looseness, and if scratch on the piston rod surface. Apply anti-rust oil to piston rod or easily rusty axle.
- Cover the whole vehicle.
- At least once a month to fully charge

## 8.2 Start running after deposit for a long time

- Remove rust preventive oil on exposed parts.
- Clean impurity and water of the hydraulic oil tank.
- Recharge battery, fit on vehicle and connect.
- Carefully check before start. Inspect starting, travelling, slowing down, steering, braking and parking etc. function.

# 9 Maintenance

## 9.1 Maintenance general

– The forklift vehicle needs inspection and maintenance periodically, to make it in good working condition.

– Inspection and maintenance are usually ignored, you'd better find out the problems early and solve it in time.

– Use authentic parts of Hangcha Group.

– Don't use different oil when changing or adding oil. Don't rave about oil and electrolyte used at will, and carry on handling according to the local environmental protection laws and regulations.

– Draw up complete maintenance plan.

– After you make maintenance, you'd better make a record.

– Forbid to repair the forklift vehicle if you haven't been trained.

**CAUTION**

- **No fire.**
- **You should shut off key switch and pull off the plug before service.（except some trouble shooting）.**
- **Clean the electric part with compress air, and do not with water.**
- **Do not stretch your hands, feet or any part of body into the gap between the mast and instrument.**
- **When the working environment is severe, maintain in advance.**

## 9.2 Periodic maintenance schedule

The service intervals stated are based on single shift operation under normal operating conditions. They must be reduced accordingly if the vehicle is to be used in conditions of extreme dust, temperature fluctuations or multiple shifts.

The following servicing checklist indicates the operations to be performed and the respective intervals to be observed. Maintenance intervals are defined as:

D = Every 8 service hours, at least daily

W = Every 40 service hours, at least weekly

M = Every 250 service hours, or at least every 1.5 months

T = Every 500 service hours, or at least trimonthly

S = Every 1000 service hours, or at least semiannually

Y = Every 2000 service hours, or at least annually

● = Standard maintenance interval

| **Battery** | | **D** | **W** | **M** | **T** | **S** | **Y** |
|---|---|---|---|---|---|---|---|
| 1 | Check the battery and battery components. | ● | | | | | |
| 2 | Check the battery capacity. | ● | | | | | |
| 3 | Check the battery fixed situation. | ● | | | | | |
| 4 | Check battery cable connections are secure. | ● | | | | | |
| 5 | Clean the battery surface. | ● | | | | | |

| **Chassis and super structure** | | **D** | **W** | **M** | **T** | **S** | **Y** |
|---|---|---|---|---|---|---|---|
| 1 | Check covers. | ● | | | | | |
| 2 | Check chassis and screw connections for damage. | ● | | | | | |
| 3 | Check labels are legible and complete. | ● | | | | | |

| **Travel** | | **D** | **W** | **M** | **T** | **S** | **Y** |
|---|---|---|---|---|---|---|---|
| 1 | Check the gear unit for noise and leakage. | ● | | | | | |
| 2 | Check wheel suspension and attachment. | ● | | | | | |
| 3 | Change wheels for wear and damage. | | | | | ● | |

| **Brakes** | | **D** | **W** | **M** | **T** | **S** | **Y** |
|---|---|---|---|---|---|---|---|
| 1 | Test brakes. | ● | | | | | |
| 2 | Check magnetic brake air gap. | | | | | ● | |

| Steering | | D | W | M | T | S | Y |
|---|---|---|---|---|---|---|---|
| 1 | Test electric steering and its components. | ● | | | | | |
| 2 | Check tiller recuperating function. | ● | | | | | |
| 3 | Bearing lubrication | | | | | ● | |

| Electrical system | | D | W | M | T | S | Y |
|---|---|---|---|---|---|---|---|
| 1 | Test warning and safety devices in accordance with operating instructions | ● | | | | | |
| 2 | Test the displays and controls. | ● | | | | | |
| 3 | Check the function of micro switch and sensor. | ● | | | | | |
| 4 | Test cable and motor attachments. | | | ● | | | |
| 5 | Check contactors and/ or relays. | | | ● | | | |
| 6 | Check fuse ratings. | | | ● | | | |
| 7 | Check electric wiring for damage. Make sure wire connections are secure. | | | ● | | | |
| 8 | Check the carbon brushes, replace if necessary. | | | | | ● | |

| Hydraulic system | | D | W | M | T | S | Y |
|---|---|---|---|---|---|---|---|
| 1 | Test hydraulic system. | ● | | | | | |
| 2 | Check that hydraulic ports, hose and pipe lines are secure, check for leaks and damage. | ● | | | | | |
| 3 | Check cylinders and piston rods for damage and leaks, and make sure they are secure. | | ● | | | | |
| 4 | Check hydraulic oil level and top up if necessary. | | | ● | | | |
| 5 | Test relief valve and adjust if necessary. | | | | | ● | |
| 6 | Lubricate the vehicle according to the lubrication schedule. | | | | | | ● |
| 7 | Replace the hydraulic oil after 2000 service hours/ biannually. | | | | | | ● |

| Lifting assy | | D | W | M | T | S | Y |
|---|---|---|---|---|---|---|---|
| 1 | Check link mechanism for tension, damage or rust | ● | | | | | |
| 2 | Check if there is abrasion between shaft and bearing of front and rear fork. | | | ● | | | |
| 3 | Check if there is deformation or fracture on the upper and down connecting rod. | | | ● | | | |
| 4 | Check if there is crack or fracture on front fork or rear fork. | ● | | | | | |
| 5 | Check for looseness of each joint. | | | ● | | | |
| 6 | Add lubricating grease to the pin roll. | | | ● | | | |

## 9.3 Remove or installing the hood

**Remove the hood**

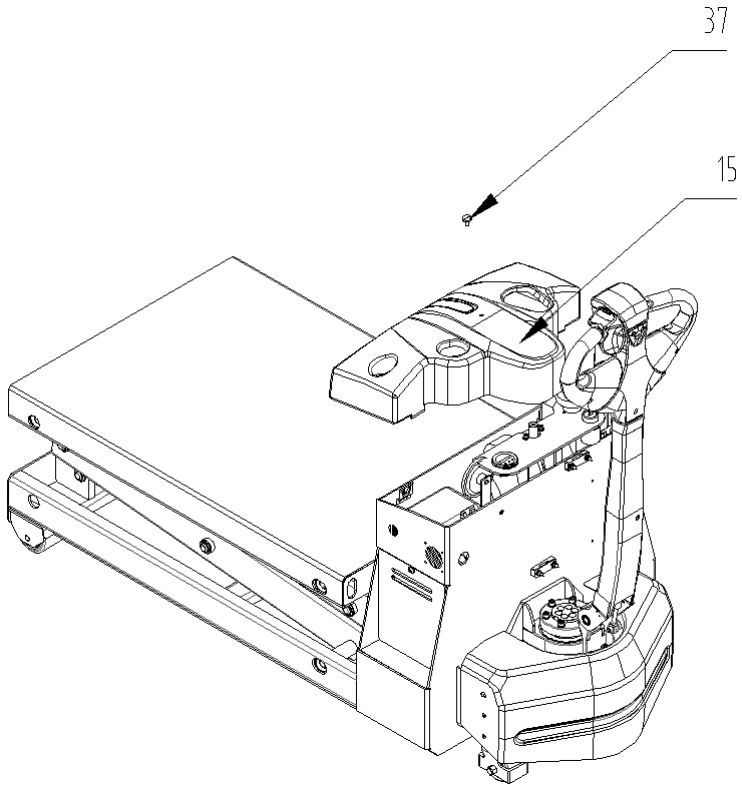
Procedure:

– Park the vehicle securely.

– Unscrew the hood screws (37).

– Lift the hood (15).

The hood is removed. Installation and removal process is reversed.




**WARNING**

- **Remove or installing a hood, carefully clip hand !**

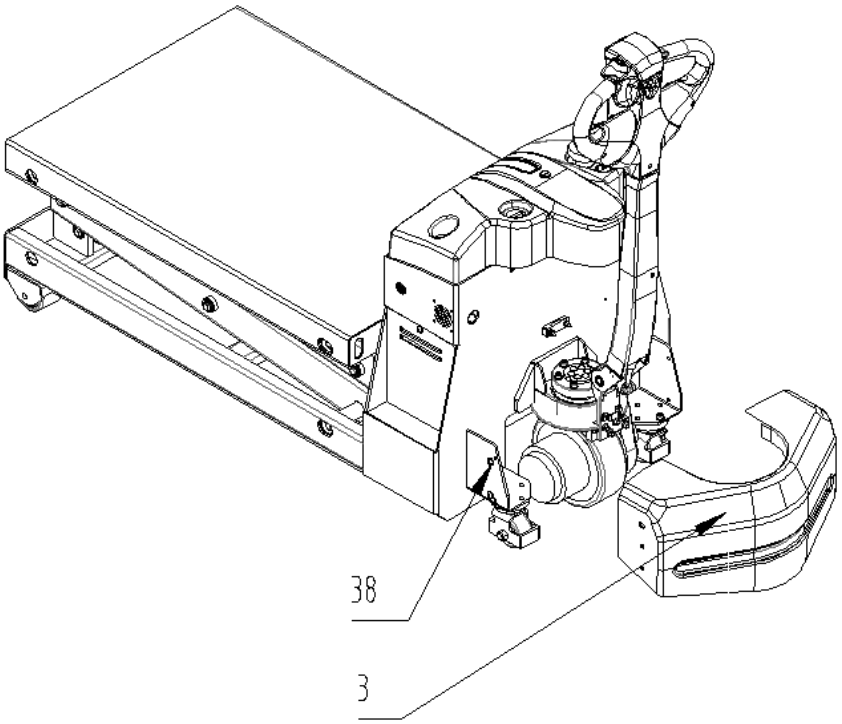
## 9.4 Remove or installing the drive wheel cover

**Remove the drive wheel cover**

Procedure:

– Unscrew the drive wheel cover (3) of the four screws (38), remove the drive wheel cover.

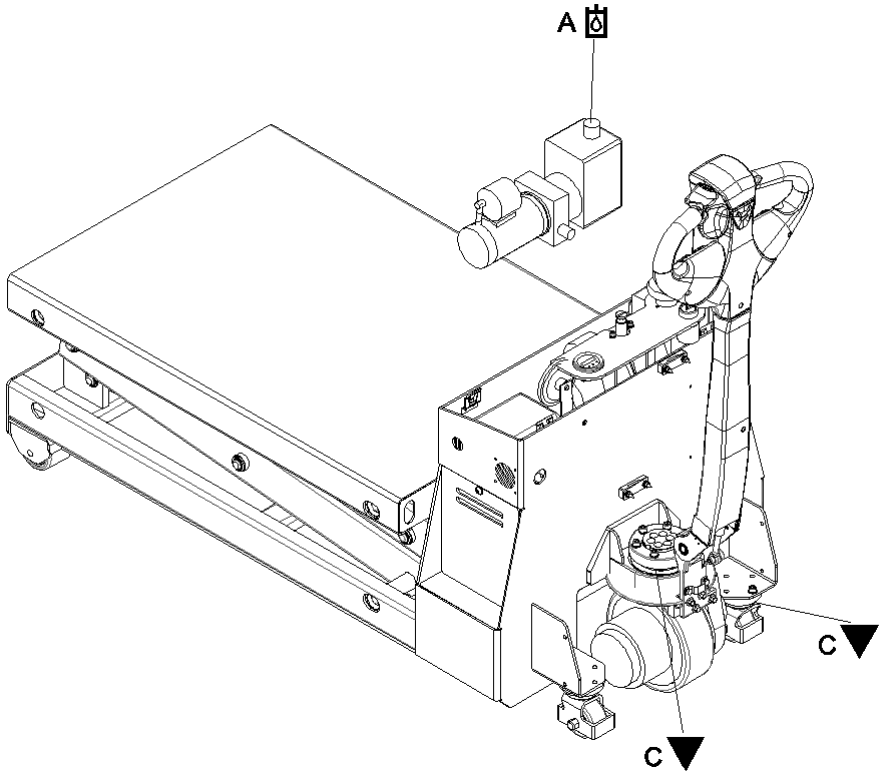
The drive wheel cover is removed. Installation and removal process is reversed.




**WARNING**

- **Remove or installing the drive wheel cover, carefully clip hand!**

## 9.5 vehicle used oil and lubrication




Filler plug for hydraulic oil

▼ Gliding surfaces

| Code | Designation | Mark, code | Remark |
|---|---|---|---|
| A | Hydraulic oil | Normally：L-HM32<br>High and cold environment：L-HV32 | Hydraulic system |
| C | Grease | Automobile general 3 # lithium base lubricant | Nozzle and lubrication |

⚠ **CAUTION**

- **Into the fuel tank of hydraulic oil must be filtered, and the injection volume of the hydraulic oil tank does not exceed the maximum scale.**

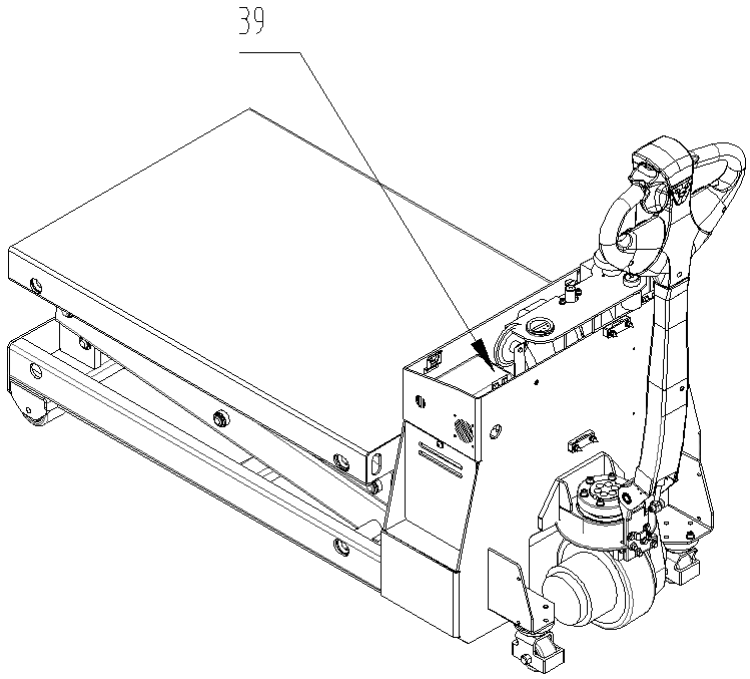
## 9.6 Check the fuses

Procedure:

— Maintenance work to complete preparations before the operation.

— Remove the hood.

— Check the fuse (39) values are correct, if necessary, replace.




| No. | Designation | Control circuit | Specification |
|---|---|---|---|
| 39 | Fuse | Pump motor | 150A |

## 9.7 Replace wheels

Procedure:

– Dismantle the drive unit from the vehicle.

– Remove the 12 socket hexagon screws which is used to fix the driving wheels with a S=5mm hex wrench.

**CAUTION**

- **Use equal strength to unscrew the bolts. Do not overexert which might do damage on the thread.**
- **Loosen the bolts in a symmetrical way when unscrewing the bolts and remove the bolts respectively.**

– Strike the edge of the driving wheels with a rubber hammer and remove the old driving wheels from the drive unit.

**CAUTION**

- **Strike the edge of the driving wheels evenly and symmetrically.**
- **Do not scratch the outer surface of inner ring gearbox and the inner surface of the driving wheels.**

– Install new driving wheels. Apply lubricating oil to the outer surface of inner ring gearbox and the inner surface of the driving wheels in favor of fast installment.

# Part Ⅱ：Structure, Principle and Maintenance

## 1 Drive Unit

### 1.1 Data sheet

| | | | |
|---|---|---|---|
| Speed ratio of reduction gear box | | | 24.6857 |
| Max. wheel torque | | N•m | 250 |
| Max. wheel load | | kg | 1000 |
| Drive motor | Rated voltage | V | 24 |
| | Rated power | kW | 0.8 |
| | Rated current | A | 21 |
| | Rated speed | r/min | 3300 |
| | Working system | | S2=45min |
| | Insulation grade | | F |
| | Protection grade | | IP44 |
| | Using the environment temperature | ℃ | -10～+40 |
| Brake | Rated voltage | V | 24 |
| | Rated power | W | 25 |
| | Rated braking torque | N•m | 8 |
| | Rated Air Gap | mm | 0.15～0.30 |
| | Pre-tension torque of the mounting screw | Nm | 5.5 |

## 1.2 Assemble and use notice

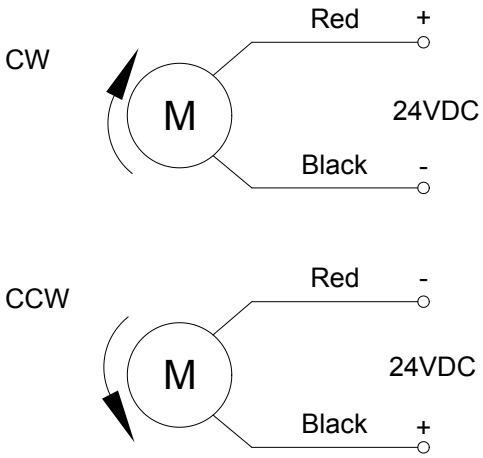
- When assemble, scrub the oil seal on the product. Avoid product damage, no disassemble at will.
- Avoid each fitting surface and exposed gear impact, thus influence installation.
- Normal working oil temperature is ≤70℃.
- Drive wheel is maintenance free drive device, if need grease, dismantle the drive unit, and add from the top.
- Added amount of grease (SHELL ALVANIA R3) is 2/5-2/3 space of the inner chamber.

## 1.3 Fault and troubleshooting

| Fault | Probable cause | Corrective action |
|---|---|---|
| Abnormal gear noise when travelling | Over large gear clearance | Adjust |
| | Lack grease | Replenish |
| | Over large gear wear | Replace |
| Abnormal noise when turning | Rotary rolling bearing damage | Replace |
| | Insufficient rotary rolling bearing grease | Add grease |
| Brake ineffective or invalid | Inching switch loosen or damage | Fasten or replace |
| | Over large brake clearance | Adjust |
| | Brake disc over wear | Replace |
| | Brake loosen | Fasten |
| | Circuit damage | Repair |
| Large vehicle vibration | Damper assembly damage | Replace |

## 1.4 Drive Motor


Wiring Diagram of Motor




**Motor use notice**

- Keep clean and dry around the motor, and do no place other objects on or in the motor.
- Do not use with overload.
- Never coexist with strong magnetic object.
- Input voltage grade should be correct.
- If there is abnormal odour in the motor, park to check.
- Wire between motor and controller should be as short as possible.
- During motor travelling, if there happen electric leakage, speed drops suddenly, severely vibrate, too hot with smoke, or electric contact sparking smoke, turn off the power immediately for check.
- Often check if the motor over heats.
- Often check motor wiring contact screw for looseness, sparking smoke or insulation aging.

**Use and maintenance**

Stator parts and brush neutral position has been adjusted before sold, so users should not dismantle or adjust at will.

- Check if motor rotates flexibly or abrades.
- Check if motor outlet(or terminal) connection is correct or reliable.
- Brush should slide easily in the brush box.
- Check if commutator segments are clean, if necessary, clean the minor groove of commutator segments and carbon powder on the commutator surface with soft clean white

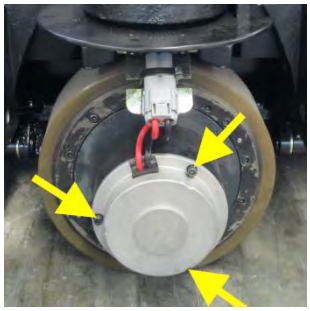
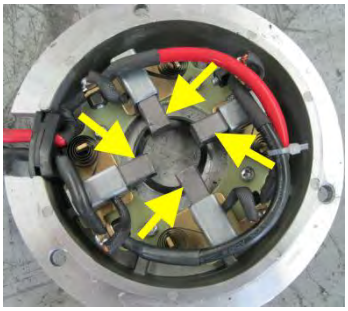
cloth, when there is grease on the surface, immerse the cloth in alcohol to wipe(park).

- Check if all fasteners are tight.
- Brush carrier should be fastening and no loose. If turn or remove the brush carrier needed, only mark can loosen the end cap bolt. Aim at marker line to tighten screw when brush carrier reset to keep the brush in neutral position.
- Check the coil insulation resistance regularly, when close to working temperature, it should not be lower than defined data, otherwise dry.
- Open the shutter regularly and check if the inner parts deformation or reversing part is normal.
- Often clean sand and other adhesion on the motor in order not to affect its heat dissipation.
- Check the motor at least once half year according to the following way：
  a. Check the outer part and clean dust on the motor;
  b. Clean and replace bearing, listen if there is abnormal noise during running;
  c. Check brush abrasion and replace if necessary.

## Replacement of the Brushes

Brushes must be replaced when they are seriously worn or damaged. All brushes should be replaced at the same time with a same specification.The newly replaced brushes needs to be connected with the commutator closely and the contact area should be assured for 75%.

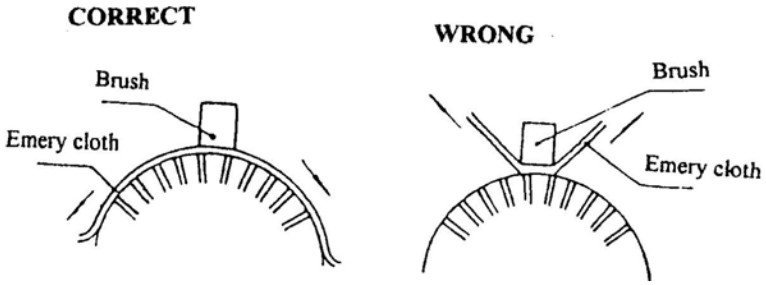
- Remove the connecting plug of the motor.
- Screw out the three fixed bolts on the motor hood.
- Take down the motor hood and replace the new brushes.

**Brush abrasion：**

- When replace brush, use 00 crocus cloth to polish, pull abrasive cloth to left or right when polishing.

– After polishing crocus cloth and cleaning commutator, motor should work under limited speed to ensure safety until the brush working surface polishes.

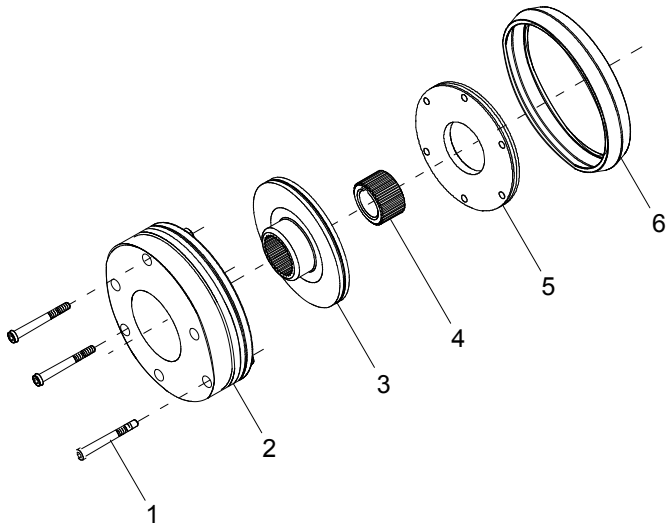


**Fault diagnosis**

| Fault | Probable cause |
|---|---|
| All copper sheet blacken | Pressure of the brush is not right |
| Commutator segments blacken in group according to certain sequence | ·Short circuit of commutator segments<br>·Short circuit of armature coils<br>·The welding of commutator segments and armature coils is not good or short circuit. |
| Commutator segments blacken, but without sequence | ·Center line shift of the commutator<br>·Rough, un-round of the commutator surface |
| Wear, color change and fracture of brush | ·Motor vibrate<br>·Gap between brush and brush box is too large<br>·The distance between brush box and commutator working surface is too long<br>·The mica between commutator segments extrudes.<br>·Brush material is not good.<br>·Trade mark of brush is not right |
| Large spark | ·Overloaded of motor<br>·Commutator is not clear<br>·Commutator is not smooth or round<br>·Mica plate or part commutator segment extrude<br>·Brush does not grind well<br>·Brush pressure is not large enough<br>·Incorrect brush trade mark<br>·Brush locked in the brush box<br>·Brush carrier loosen or vibrate<br>·Incorrect pole polarity and sequence |
| Brush and brush wire overheat | ·Large brush spark<br>·Electrical brush and flexible conductor have bad contact<br>·Small flexible conductor area |
| Noise in the brush | Uneven commutator surface |

## 1.5 Electromagnetic brake

The spring-loaded electromagnetic brake is applied in the vehicle which is a single disk brake with double friction surfaces. By use of the pressure spring, powerful braking torque would be generated when power off. The brake could be released by the electromagnetic effect.

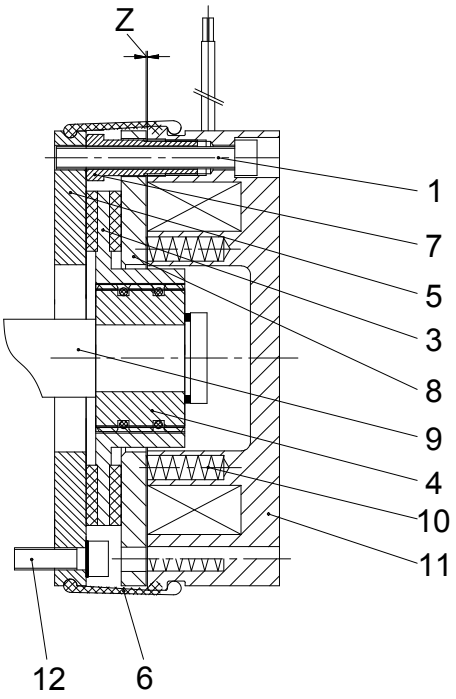



| | |
|---|---|
| 1.Mounting Bolt of the Brake | 2.Stator Module |
| 3.Brake Pad | 4.Shaft Sleeve |
| 5.Friction Disk | 6.Dustproof Cover |

Fig. 2-3 Electromagnetic brake parts

### 1.5.1 Electromagnetic brake working principle

Motor shaft (9) is connected with shaft sleeve (4) by passing through the flat key. And shaft sleeve (4) is connected with brake pad (3) by passing through the splines. When the stator (11) is block out, the force produced by the pressure spring (10) would act on the armature (8) which makes rotated the brake pad (3) driven by the motor shaft connected closely between the armature (8) and cover plate (5). As a result the braking torque is created. There will be a air gap Z between the armature and the stator at that moment. When the brake needs to be relaxed, the stator is applied with direct current and the magnetic field would attract the armature (8) to move towards the stator. The movement of armature compresses the pressure spring (10) which cause the loosening of the brake pad (3) by that time and the brake is released.




1.Mounting Bolt of the Brake

3. Brake Pad

4. Shaft Sleeve

5. Friction Disk

6. Dustproof Cover

7. Hollow Screw

8. Armature

9. Motor Shaft

10.Pressure Spring

11.Stator

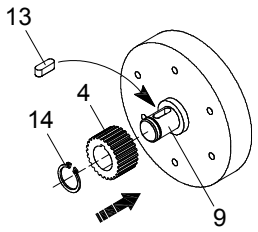
12.Mounting Bolt of Friction Disk

Z. Air Gap

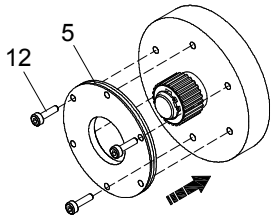
Fig.2-4 Electromagnetic Brake Structure

### 1.5.2 Electromagnetic brake installation

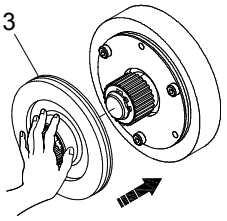
– Put the flat key (13) into the key groove of the motor shaft (9). Press the shaft sleeve (4) to the motor shaft (9) and fasten it with the inner spring.




– Install the friction disk (5) to the end face of the motor by using three mounting bolts of the friction bolts (12).

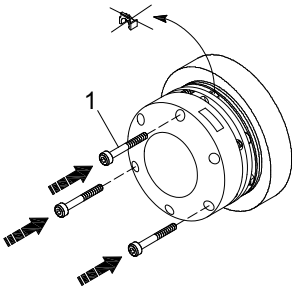



– Cover the shaft sleeve with the friction disk (3).

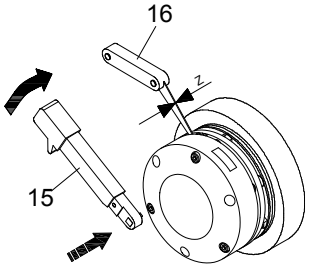



– Install the stator module (2) to the friction disk (5) with three mounting bolts of the brake (1).

**Note: Remove the three rubber mats of the stator module which is for stable transportation.**

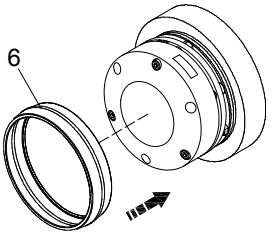



– Screw down the three mounting bolts (1) with a torque wrench (15) and check the air gap (Z) of the brake with a feeler gauge (16).



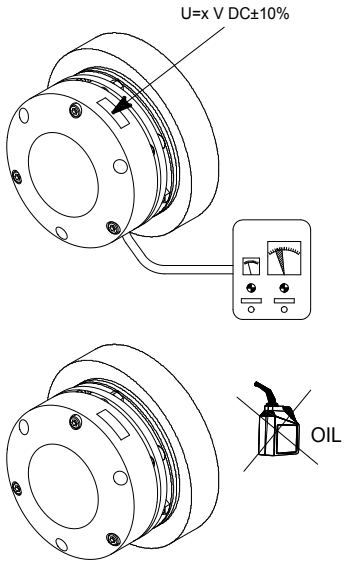

– Put on the dustproof cover(6).

– Connect the brake wiring.



**WARNING**

- **No broken wire sheath, or else the circuit might be damaged.**
- **Do not process the locating surface or the holes of the production without authorization, or else the magnet loop would be influenced.**
- **Do not over press when fitting the motor shaft. Make sure no damage on the friction surface and wipe off the burr of the mounting holes and surfaces. Put the shaft sleeve on the motor shaft and fasten the axial clamp spring.**
- **Measure the direct voltage of the connecting brake and compare the value to the rated voltage on the nameplate. Deviation should not be more than 10%.**
- **Make sure it is free from oil and dirt when installing and using the brake.**




### 1.5.3 Maintenance

- If work in high temperature environment for long time, please prevent rust, it may influence use if there is rust on the suction surface.
- Do not touch the friction surface with hand, no oil stain, otherwise it cannot reach the maximum torque.
- General use environment temperature is -10℃～+40℃.
- Please check periodically, and the check item : if the switch motion is normal; if there is noise; if there is abnormal heating; if any impurity, oil stain mixed into friction part or rotating part; if clearance of friction part is proper, exciting voltage normal.

### 1.5.4 Adjust the Air Gap of the Brake

Rated air gap Z grows with the friction. In order to there is sufficient braking torque, the air gap must be set before it reaches to the maximum value. The air gap can be adjusted by several times. When the thickness of brake pad becomes the minimum value(see the specification table below), the brake pad must be replaced.

Once the air gap reaches the top value, the brake might not be released and the brake pad would be burn out. It will also cause the decrease of braking force and the retention and the noise increase and even big accidents. It is prominent to do the periodical inspection and adjust the air gap. Disconnect the power. Through adjusting 3 hollow bolts (8) and the mounting bolts of stator (9), set the air gap between stator (1) and armature (2) to the rated Z by a feeler gauge.Ensure air gap at all directions are same.

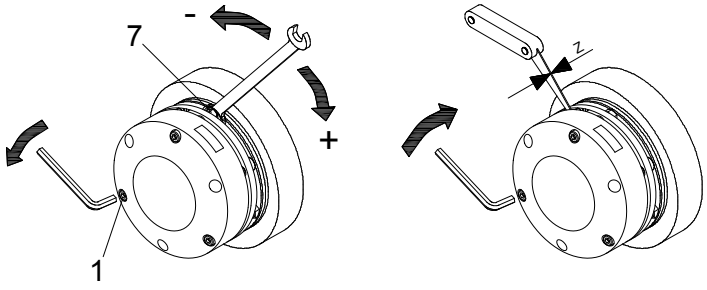
Specification Table

| Rated Current (V) | Rated Power (W) | Rated Torque (N.m) | Rated Air Gap (mm) | Minimum Thickness of Rotor (mm) | Pre-tension Torque of the Mounting Bolt (N.m) |
|---|---|---|---|---|---|
| 24 | 25 | 8 | 0.15～0.30 | 6.4 | 5.5 |

On the condition of power disconnected, through adjusting 3 mounting bolts of brake (1) and the hollow bolts (7), set the air gap between stator (11) and armature (8) to the rated Z by a feeler gauge. Ensure air gap at all directions are same.

Set the air gap in the following sequence:

- Unscrew the mounting bolts of brake (1) with a hex wrench.
- Adjust the hollow bolts (7) with a spanner.
- Screw up the three mounting bolts of brake (1).
- Check if the air gap Z is within the standard range with a feeler gauge.
- Adjust the mounting bolts and hollow bolts respectively according to the following figures. Set the air gap and screw up the mounting bolts of brake.



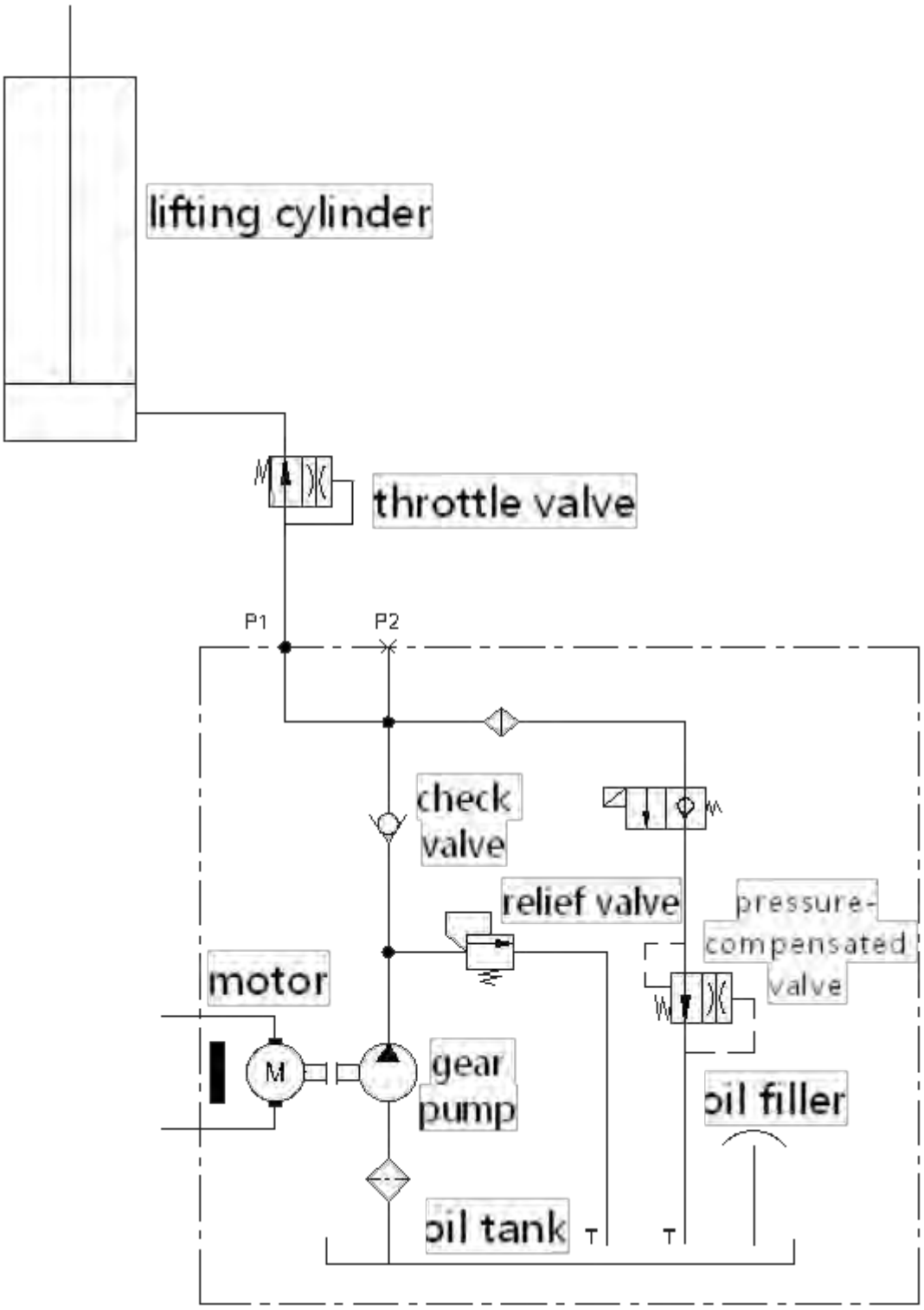
Under the general operating conditions, the first set of the air gap is usually after 1500 to 2000 hours service of the brake and it is suggested to adjust the air gap every 6 months. If it comes to a poor working condition, such as frequent use of brake and repeated emergency stops，the air gap should be set when the brake the shorten the adjustment interval for the first time.

### 1.5.5 Common fault and troubleshooting

| Fault | Probable cause | Corrective action |
|---|---|---|
| Brake does not work | Power is obstructed | Connect |
| | Too low exciting voltage | Check voltage and adjust. |
| | Improper air gap | Adjust air gap |
| | Stator coil breaks | Replace stator |
| | Oil dirt mixed in | Clean oil dirt |
| Long brake time | Switch installed to AC circuit | Install the switch to the DC circuit after rectifying |
| | Improper air gap | Adjust air gap |
| | Oil dirt mixed in | Clean oil dirt |
| Slipping | Unstable operation in previous use | Breaking-in for a while |
| | Oil dirt mixed in | Clean oil dirt |
| | Large load | Reduce load or replace large specification |
| | Large load change | Adjust load peak or large the specification |
| High temperature | Too high exciting voltage | Check voltage and adjust. |
| | Clutch or motor interfere to the brake | Check control circuit, eliminate interference |
| | High environment temperature | Set ventilation |
| | High operating frequency | Adjust to proper frequency |
| | Over large load | Reduce load |
| Large noise | Product service environment needs silence | Silence design |
| | Impurity mixed in. | Clear away the impurity |
| | Bad mounting | Replace mounting surface or shaft |
| | Large rotational inertia or dynamic unbalance value | Reduce rotational inertia or dynamic unbalance value. |

# 2 Hydraulic system

## 2.1 Hydraulic system working principle



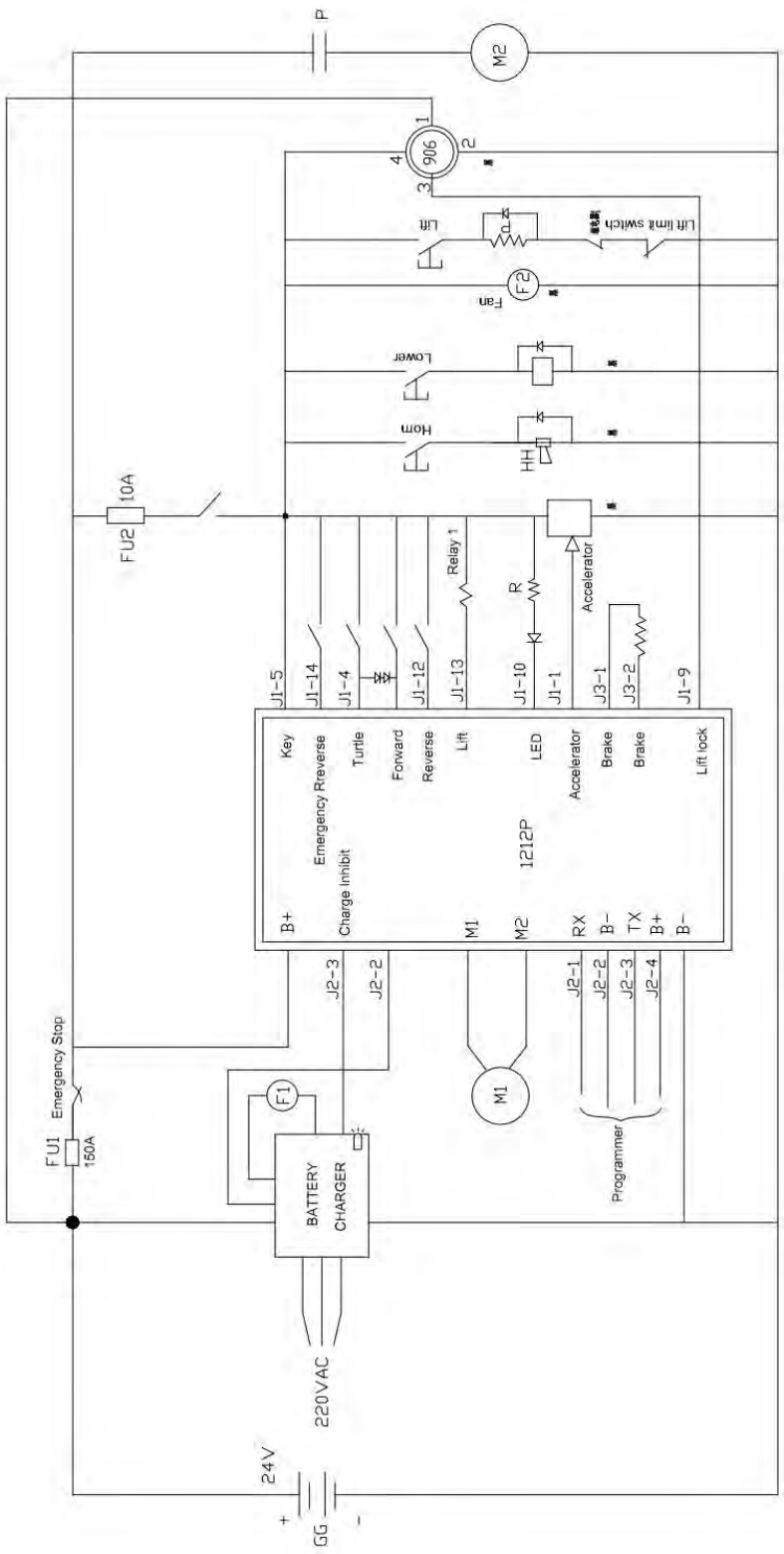
## 2.2 Hydraulic system fault diagnosis and correction

| Fault | | Probable cause | Corrective action |
|---|---|---|---|
| No oil pumps from the pump | | Low oil level | Fill to the specified oil level |
| | | Blocking of strainer | Clean oil pipe and oil tank. If hydraulic oil is dirty, please change it. |
| Low oil pressure of oil pump output | | Bearing worn; retainer, O-ring damage | Change the bad spare parts. |
| | | Adjustment failure of safety valve | Rise pressure with pressure gage |
| | | Air in the oil pump | Fill hydraulic oil to the oil tank, use the pump after bubble vanishing |
| Noise of oil pump | | Cavitation arising from the strainer blocking | Adjust or replace soft tube and clean the strainer |
| | | Cavity caused by the high viscosity of hydraulic oil | Replace new hydraulic oil, whose viscosity suits pump running speed. Work only when the oil temperature is normal |
| | | Bubble in the hydraulic oil | Check the reason for the bubble and then take measures |
| Forks can't lift | Gear pump works | Oil way block or damage | Repair or replace |
| | Gear pump no work | Lifting inching switch loosen or damage | Re-fix or replace |
| | | Motor or circuit fault | Repair |
| Forks do not drop down | | Solenoid valve block or damage | Repair or replace |
| Pressure of safety valve is unstable or can't be adjusted | | Pressure adjusting screw loosen | Re-adjust and lock. |
| | | Pressure adjusting spring deformation or damage. | Replace |
| | | Safety valve spool wear or sticking | Replace or clean to reassemble. |
| | | Pump failure | Repair pump |

# 3 Electric system

The electrical system of this vehicle is two wire system, and all circuits are not grounded. The working voltage of the whole vehicle circuit is DC 24 v.

## 3.1 Electrical schematic diagram



## 3.2 Drive motor controller

### 3.2.1 Maintenance

Controller has no user repair parts. Do not try to open, repair or alter the controller. Otherwise it may damage the controller and also invalid the guarantee.

It's suggested to keep the controller clean and dry, periodically check and get rid of diagnose historical files.

**Cleaning**

Periodically clean the outside controller is good for preventing corrosion or other controller fault from dirty, dust and chemical, which is part of the environment and always exist in battery power supply system.

Be careful when operating the vehicle power supplied by battery. Including but not limit to the following: correct training, wear goggles, do not wear loose clothing and jewelry.

Carry out maintenance according to the following cleaning procedure. Never clean the controller with high pressure washer.

- Remove battery to disconnect power.
- Connect load(like contactor coil or horn) between controller B+ and B- to discharge controller capacity.
- Clean dirt or corrosive on the power and signal binding post. Wipe the controller with wet cloth, dry the controller before connecting the battery. Controller can't suffer the water impact with pressure.
- Make sure the wiring is correct and fastened.

**Warning**

- **Strictly prohibit water in the product.**
- **Strictly prohibit operating with electricity.**
- **Strictly prohibit reverse polarity.**
- **Strictly prohibit motor short circuit.**

### 3.2.2 Diagnostics and Troubleshooting

When faults happen, try to restart by resetting the key switch after confirmed that faults are not caused by faulty wiring connection or mechanical failure. If the faults are still on, shut down the key, check for incorrect connection or corruption of the pin 35 connecter, reconnect after repaired and cleared, and then restart again.

The controller provides diagnostics information to assist technicians in troubleshooting drive system problems. The diagnostics information can be obtained in two ways: by reading the appropriate display on the programmer or by observing the fault codes issued by the status LED.

**Led Diagnostics**

During normal operation, with no faults present, the status LED is steadily on. If the controller detects a fault, the status LED flashes a fault identification code continuously until the fault is corrected. Refer to the troubleshooting chart for suggestions about possible causes of the various faults. Faults are listed alphabetically.

Note: The status LED can only indicate one fault at a time. If multiple faults are detected, the highest priority fault code flashes until it is cleared.

**Programmer Diagnostics**

The programming devices present complete diagnostic information in plain language. Faults are displayed in the Faults/Diagnostics menu, and the status of the controller inputs/outputs is displayed in the Monitor menu.

Additionally, the fault history file in the Faults/Diagnostics menu provides a list of the faults that have occurred since the file was last cleared. Checking (and clearing) the fault history file is recommended each time the vehicle is brought in for maintenance.

Refer to the troubleshooting chart for suggestions about possible causes of the various faults. Faults are listed alphabetically.

**Fault Handling**

When a fault is detected, the controller operates in a manner that is safe in the presence of that fault. Depending on the severity of the fault, the response can range from reduction of current to complete shutdown of drive. The status LED uses a 2-digit code. For example, code “1,4”—undervoltage—appears as:

| | | |
|---|---|---|
| ¤ ¤¤¤¤ | ¤ ¤¤¤¤ | ¤ ¤¤¤¤ |
| （1,4） | （1,4） | （1,4） |

## Troubleshooting Chart

### 1.5t

| Led Codes | Fault indicator status | Fault | Possible Cause |
|---|---|---|---|
| Off<br>On | ■<br>□ | no power or defective controller<br>controller powered up; No faults | |
| 1,1 | ¤ ¤ | Thermal Fault | 1）Temperature >8℃C or < -10℃.<br>2）Battery contact bad..<br>3）Work under extreme severe environment.<br>4）Electromagnetic brake does not release normally. |
| 1,2 | ¤ ¤¤ | Throttle Fault | 1）Throttle input wire open or shorted.<br>2）Throttle potentiometer fault.<br>3）Throttle potentiometer fault. |
| 1,3 | ¤ ¤¤¤ | Speed Pot Fault | 1）Speed limit potentiometer wiring open or short.<br>2）Speed limit potentiometer open. |
| 1,4 | ¤ ¤¤¤¤ | Undervoltage Fault | 1）Battery voltage <17 volts.<br>2）Battery or controller bad contact. |
| 1,5 | ¤ ¤¤¤¤¤ | Overvoltage Fault | 1）Battery voltage >31 volts.<br>2）Still connect the charger when vehicle running.<br>3）Battery bad contact. |
| 2,1 | ¤¤ ¤ | Main Off Fault | 1）Main contactor coil wrongly turn on. |
| 2,2 | ¤¤ ¤¤ | (no used) | |
| 2,3 | ¤¤ ¤¤¤ | Main Fault (①) | 1）Main contactor adhere or open.<br>2）Main contactor coil drive wrong. |
| 2,4 | ¤¤ ¤¤¤¤ | Main On Fault | 1）Main contactor coil wrongly turn off. |
| 2,5 | ¤¤ ¤¤¤¤¤ | (no used) | |
| 3,1 | ¤¤¤ ¤ | Wiring Fault (①) | 1）Incorrect throttle operation.<br>2）Throttle port or its mechanical part has fault. |
| 3,2 | ¤¤¤ ¤¤ | Brake On Fault | 1）Electromagnetic brake coil open..<br>2）Electromagnetic brake drive short.. |
| 3,3 | ¤¤¤ ¤¤¤ | Precharge Fault (①) | 1）Controller fault.<br>2）Low battery voltage. |
| 3,4 | ¤¤¤ ¤¤¤¤ | Brake Off Fault | 1）Electromagnetic brake coil short.<br>2）Electromagnetic brake drive open. |
| 3,5 | ¤¤¤ ¤¤¤¤¤ | HPD fault | 1） Throttle, key switch, push or prohibit input, some actions in wrong operation order.<br>2）Wrongly adjust accelerator. |
| 4,1 | ¤¤¤¤ ¤ | Current Sense Fault (①) | 1）Motor or motor wiring short.<br>2）Controller fault. |
| 4,2 | ¤¤¤¤ ¤¤ | Hardware Failsafe (①) | 1）Motor voltage can’t match throttle input.<br>2）Motor or motor wiring short.<br>3）Controller fault. |
| 4,3 | ¤¤¤¤ ¤¤¤ | Eeprom Checksum Fault (②) | 1）EEPROM fault or failure. |
| 4,4 | ¤¤¤¤ ¤¤¤¤ | (no used) | |
| 4,5 | ¤¤¤¤ ¤¤¤¤¤ | Battery Disconnect Fault (①) | 1）Battery does not connect.<br>2）Battery contact bad. |
| ①= Must cycle keyswitch to clear.<br>②= Must use programmer to clear, as follows: select Program menu, alter data value of any parameter, cycle key switch. | | | |

## 2.0t

| Fault | Fault Code | Effect(s) | Recovery | Description |
|---|---|---|---|---|
| SEVERE UNDERVOLTAGE | 1,2 | Reduce current limit | Condition clears | Capacitor bank voltage dropped below the Severe Undervoltage limit |
| UNDERVOLTAGE CUTBACK | 1,2 | Reduce the drive current limit | Condition clears | Capacitor bank voltage dropped below the Undervoltage limit with the FET bridge enabled |
| SEVERE OVERVOLTAGE | 1,3 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears | Capacitor bank voltage exceeded the Severe Overvoltage limit |
| OVERVOLTAGE CUTBACK | 1,3 | Reduced regen current limit | Condition clears | Capacitor bank voltage exceeded the Overvoltage limit with the FET bridge enabled. |
| CONTROLLER OVERTEMP CUTBACK | 1,4 | Reduce the drive current limit and regen current limit | Condition clears | Heatsink temperature over +75C |
| CONTROLLER SEVERE UNDERTEMP | 1,4 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears and cycle KSI | Heatsink temperature below -40C |
| CONTROLLER SEVERE OVERTEMP | 1,4 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears and cycle KSI | Heatsink temperature over +85C |
| MOTOR TEMP SENSOR | 1,5 | Max Speed reduced and motor temperature cutback disabled | Condition clears and cycle KSI | Motor thermistor input is at the voltage rail(0 or 10V) |
| MOTOR TEMP HOT CUTBACK | 1,5 | Reduce drive current | Condition clears | Motor temperature is at or above the Temperature Hot parameter setting |
| THROTTLE | 2,1 | Disable PWM output | Condition clears and cycle KSI | Throttle input is out of range |
| HPD SEQUENCING | 2,1 | Disable PWM output | Reapply inputs in correct sequence. | HPD(High Pedal Disable) or sequencing fault caused by incorrect sequence of KSI, interlock, direction and throttle inputs |
| MAIN CONTACTOR WELDED | 2,2 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears and cycle KSI | Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge |
| MAIN CONTACTOR DID NOT CLOSE | 2,2 | Disable main contactor, EMBrake, pump contactor and PWM output | Cycle KSI | With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. |
| MAIN DRIVER FAULT | 2,2 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears and cycle KSI | Main Contactor driver is either open or shorted |
| PRECHARGE FAILED | 2,2 | Main contactor cannot be closed and disable all PWM outputs | Condition clears and cycle KSI | Controller failed to precharge |
| ENCODER | 2,3 | Disable EMBrake and PWM output | Condition clears and cycle KSI | Motor encoder phase failure detected |
| STALL DETECTED | 2,3 | Disable main EMBrake and PWM output | Condition clears and cycle KSI | No motor encoder movement detected |

| | | | | |
|---|---|---|---|---|
| MOTOR OPEN | 2,4 | Disable main contactor, EMBrake and PWM output | Condition clears and cycle KSI | Motor phase U,V or W detected open |
| EMBRAKE DRIVER FAULT | 2,5 | Disable EMBrake and throttle | Condition clears and cycle KSI | Electromagnetic brake driver is either open or shorted. |
| EM BRAKE FAILED TO SET | 3,1 | Disable EMBrake and throttle | Condition clears and cycle KSI | After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, vehicle movement has been sensed. |
| EMER REV TIMEOUT | 3,1 | Disable EMBrake and PWM output | Turn the emergency reverse input off | Emergency Reverse was activated and ran until the EMR Timeout timer expired. |
| EMER REV HPD | 3,2 | Disable EMBrake and PWM output | Reapply inputs in correct sequence. | At the conclusion of emergency Reverse, the fault was set because various inputs were not returned to nutral. |
| EMR SRO | 3,2 | Disable EMBrake and PWM output | Condition clears | The EMR switches are turned on before KSI |
| PUMP DRIVER FAULT | 3,3 | Disable Horn driver | Condition clears and cycle KSI | Pump driver is either open or shorted |
| PUMP SRO | 3,4 | Disable pump driver output | Condition clears | The lift switch is turned on before KSI |
| VALVE DRIVER FAULT | 3,5 | Disable Horn driver | Condition clears and cycle KSI | Valve driver is either open or shorted |
| VALVE SRO | 3,6 | Disable valve driver output | Condition clears | The lower valve input switches are turned on before KSI |

| | | | | |
|---|---|---|---|---|
| FIVE V SUPPLY FAILURE | 4,1 | None | Condition clears | The voltage of internal +5V supply is upper or lower than the threshold voltage<br>The Torrance is -/+10% |
| FIFTEEN V SUPPLY FAILURE | 4,1 | None | Condition clears | The voltage of internal +15V supply is upper or lower than the threshold voltage<br>The Torrance is -/+10% |
| EXTERNAL SUPPLY OUT OF RANGE | 4,1 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears and cycle KSI | The voltage of external +5V or +14V is either greater than the upper voltage threshold or lower than the lower voltage threshold.<br>The Torrance is -/+10% |
| CAN BUS LOADING | 4,2 | | | |
| PDO TIMEOUT | 4,2 | | | |
| PDO MAPPING ERROR | 4,2 | | | |
| HW FAILSAVE | 4,3 | Disable motor, main contactor, EMBrake, Throttle and drivers. | Cycle KSI | The hardware is defeated |
| SW FAULT | 4,4 | Disable motor, main contactor, EMBrake, Throttle and drivers. | Cycle KSI | The CRC code of the application is not right |
| PARAMETER MISMATCH | 8,1 | Disable main contactor, EMBrake, pump contactor and PWM output | Condition clears and cycle KSI | When the EMR Input Type is set to type 2, the switch 2 input should be set as disable. Otherwise, the Parameter Mismatch fault is reported. |
| PARAMETER CHANGE | 8,1 | Disable main contactor, EMBrake, pump contactor and PWM output | Cycle KSI | Adjustment of a parameter that requires cycling of KSI |
| NV FAILURE | 8,3 | Disable motor, main contactor, EMBrake, Throttle and drivers. | Cycle KSI | Controller operating system tried to write to EEPROM memory and |

| | | | | |
|---|---|---|---|---|
| | | | | failed. |
| SUPERVISION | 8,4 | Disable main contactor, EMBrake, pump contactor and PWM output | Cycle KSI | Mismatched redundant readings; damaged Supervisor |

# Attachment 1：Table for bolt's tightening torque

If not specified, select the tightening torque from the below table：

**Unit：N·m**

| Bolt's diameter | Grade | | | |
|---|---|---|---|---|
| | **4.6** | **5.6** | **6.6** | **8.8** |
| 6 | 4～5 | 5～7 | 6～8 | 9～12 |
| 8 | 10～12 | 12～15 | 14～18 | 22～29 |
| 10 | 20～25 | 25～31 | 29～39 | 44～58 |
| 12 | 35～44 | 44～54 | 49～64 | 76～107 |
| 14 | 54～69 | 69～88 | 83～98 | 121～162 |
| 16 | 88～108 | 108～137 | 127～157 | 189～252 |
| 18 | 118～147 | 147～186 | 176～216 | 260～347 |
| 20 | 167～206 | 206～265 | 245～314 | 369～492 |
| 22 | 225～284 | 284～343 | 343～431 | 502～669 |
| 24 | 294～370 | 370～441 | 441～539 | 638～850 |
| 27 | 441～519 | 539～686 | 637～784 | 933～1244 |

**Note**：·Use entirely 8.8 grade bolt in the important joint position.

·Bolt's grade can be found in the head of the bolt, if it can't be found, the grade is 8.8.

# Attachment 2：Related Safety Instruction and Standard (For CE)

The model with CE certification which accords to the following directive and standard:

**Machinery Directive 2006/42/EC (the European Council of the Laws of the Member States concerning Machinery),**

**EMC Directive 2014/30/EU (on the harmonization of the laws of the Member States relating to electromagnetic compatibility),**

**EN ISO 12100:2010**
**EN ISO 3691-1:2015+AC2016,**
**EN 16307-1:2013+A1:2015**
**EN 1175-1:1998+A1:2010,**
**EN 12053:2001+A1:2008,**
**EN 12895:2015+A1:2019**
etc. coordinative standards.

- Main safety requirements accord with Machinery Directive 2006/42/EC, EN ISO 12100:2010, EN ISO 3691-1:2015+AC2016, EN 1175-1:1998+A1:2010, EN 16307-1:2013+A1:2015.
- Noise is measured according to EN 12053:2001+A1:2008.
- Test results of noise emission:

| Model | Noise pressure level in the operator's position dB(A) |
|---|---|
| 2005XB | 64 |
| 1510XB | 64 |
| 1020XB | 65 |

- **Electromagnetism compatibility is measured according to EN 12895:2015+A1:2019, and meet with 2014/30/EU Directive.**
- **Static test coefficient for lifting system is 1.33**

杭叉集团股份有限公司

**HANGCHA GROUP CO.,LTD.**

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# Attachment 3: EXAMPLE OF EC DECLARATION OF CONFORMITY

CE Original Declaration

| | |
|---|---|
| **MANUFACTURER:** | |
| Name: | HANGCHA GROUP CO., LTD. |
| Address: | 666 Xiangfu Road, Lin'an District, Hangzhou City, Zhejiang Province 311305, P.R. China |
| | |
| **TECHNICAL DOCUMENT WAS COMPILED BY:** | |
| Name: | Andy Yang |
| Address: | Die das technische Datenblatt erstellt hat Mariechen-Graulich-Straße 12a, 65439 Flörsheim am main Germany Tel: 0049-61453769188 |
| **HEREBY DECLARES THAT THE PRODUCT DESCRIBED BELLOW:** | |
| Name: | Electrical Lifting Platform Truck |
| Model: | |
| Serial No.: | |
| | |
| **COMPLIES WITH THE PROVISIONS OF THE FOLLOWING EUROPEAN DIRECTIVES:** | |
| 2006/42/EC | Machinery Directive |
| 2014/30/EU | EMC Directive |
| | |
| **COMPLIES WITH THE PROVISIONS OF THE FOLLOWING HARMONIZED STANDARDS:** | |
| EN ISO 12100:2010 | |
| EN ISO 3691-1:2015+AC:2016 | |
| EN 1175-1:1998+A1:2010 | |
| EN 16307-1:2013+A1:2015 | |
| EN 12053:2001+A1:2008 | |
| EN 12895:2015+A1:2019 | |
| Signature and stamp (签字并盖章):<br>Name: 徐征宇 Xu Zhengyu<br>Position: Legal Representative<br>According to Annex II 1.A of the Directive 2006/42/EC | |

# Maintenance Record

| Date | Repair, maintenance content | Serviceman |
|---|---|---|
| | | |
| | | |
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| | | |

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