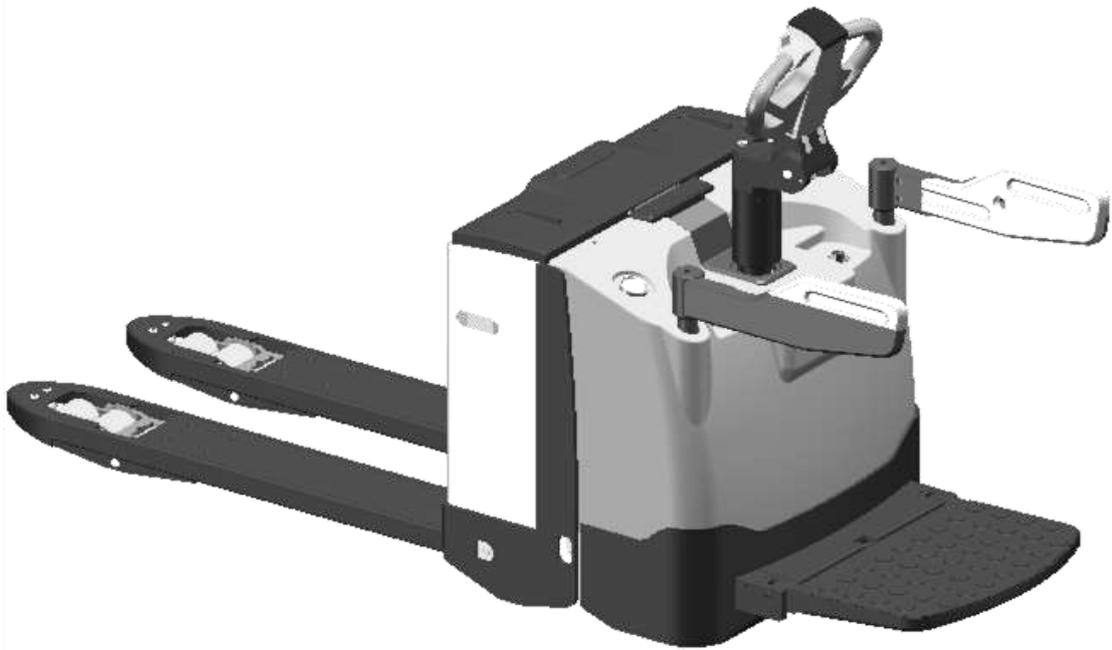


# Instruction Manual XP/XPA/XPK Electric Pallet Truck/Electric Roll Pallet Truck



**This Book Contains Important Information Regarding: SAFETY, ASSEMBLY, OPERATION, MAINTENANCE and WARRANTY POLICY. Please Read And Keep This Book For Future Reference**

# Thank You For Choosing A Electric Pallet Truck

Welcome to use our electric pallet truck. Our truck is made of high quality steel and was designed to give a durable, reliable and easy to use product.

The following pages contain instructions for using and maintaining the truck properly as well as recommendations and directions for operating the truck efficiently and safely. We recommend that you read this manual.



**WARNING!**

Read these instructions carefully, be familiar with the controls and the proper use of the truck. Please keep the instructions safe for later use

Our pallet trucks are subject to ongoing development. We reserve the right to alter the design, equipment and technical features of the truck. No guarantee of particular features of the truck should therefore be inferred from the present operating instructions.

## Customer Service / Summary Information

- Contact your local dealer for any problems encountered with your pallet truck or spare parts needs.
- Use only genuine spare parts to repair your pallet truck, thus keeping its technical features intact.
- Refer to the spare parts catalog, available from your local dealer, for ordering spare parts.
- We recommend that you copy from the product label and / or plates the information in the table below so that you can provide it to the dealer when necessary.

Product model	
Serial No	
Delivery date	
Manufacturing Date	

**Following markings refer to safety and important instruction.**



Indicates comply with the safety instruction to avoid casualties.



Indicates comply with the operation instruction to avoid material losses.



Indicates the explanation.



Indicates the explanation for cold storage.

- Indicates standard truck..
- Indicates optional.

# Memu

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# A Technical instruction

## 1.1 General information

Our XP pallet truck is a compact vehicle with five-wheel construction and minimum turning radius and can also control the steering by handle. It is especially appropriate for work of medium and high intensity in various industries. It is material handling equipment with high efficiency.

Normal temperature vehicle can used in the working site whose temperature is 5°C ~40°C .Cold storage vehicle can used in the working site whose temperature are 0°C~ -10°C, -10°C~ -30°C and -30°C~-60°C.

## 1.2 Term of use

- The truck is only allowed to operate by trained person. Please read the instruction manual carefully and know well the rules and standards before operating.
- The rated loading capacity is marked on metal plate. Please do not overload.
- The truck is only available for goods moving, for other using is not allowed.

## 1.3 Available operating conditions

- Temperature of working site for normal temperature vehicle shall be 5°C~40°C.
- Temperature of working site for cold storage vehicle shall be 0°C~ -10°C, -10°C~ -30°C and -30°C~-60°C.
- Trucks shall be worked on ground which is strong enough, flat, dry and with good-vision.
- The max grade ability is 8% when fully loaded.



### Restriction

- Please do not use the truck when its surrounding is full of dust and powder which may cause explosion.
- Please do not use the truck when its surrounding is with high salinity (especially ocean climate), or electric components will be corrupted.
- Please do not use the truck in bad working surrounding like extreme weather condition and high-intensity magnetic field.
- Please do not use the truck in the cold storage environment without special measurements.

## 1.4 Attachment installation

- When additional attachments is needed, if attachments will affect or add truck's function, please inform and get the permission of manufacturer before installation.

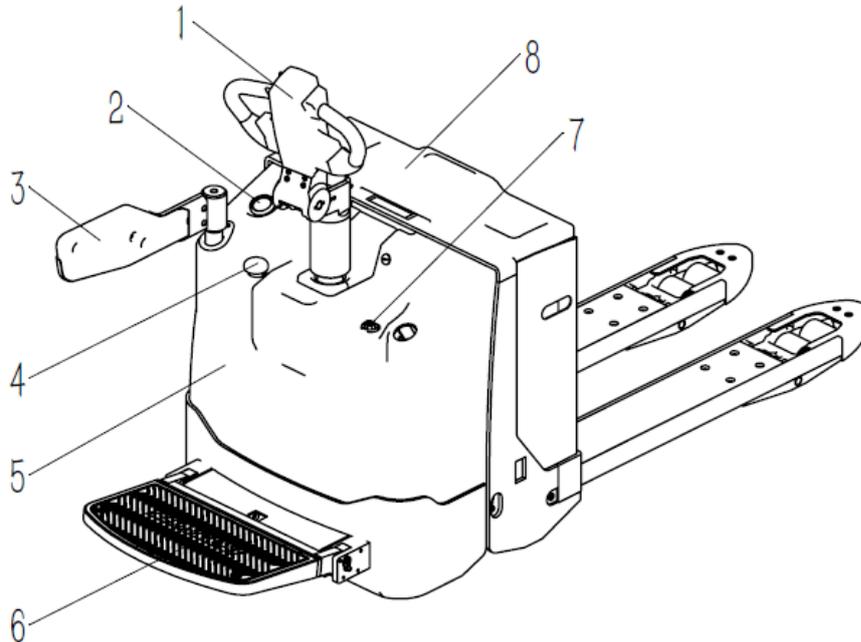
## 1.5 After sales service



As for after sales service for the trucks, please contact manufacturer or local distributor for appropriate equipment, spare parts and service from professional specialists.

## B Truck Introduction

### 2.1 Truck Overall view



No.	Part name	Remarks
1	Steering handle	
2	Battery status indicator and hour counter (PG instrument)	●
-	Battery status indicator and hour counter (Curtis 803 instrument)	○
-	Battery status indicator and hour counter (Curtis 840 instrument)	○
3	Handle bar	○
4	Emergency stop switch	
5	Rear cover	
6	Operator's platform	○
7	Key switch	
8	Battery compartment cover	

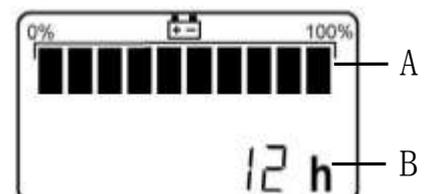
### 2.2 Parts introduction

#### 2.2.1 PG instrument(●)

The instrument is subdivided into two zones as follows:

**Zone A:** Indicates the battery charge level

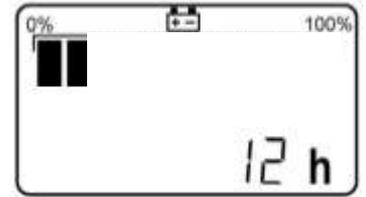
When battery is full charged, LED 10 remains lit up. As the battery discharges, the LEDs light up one at a time from right to left, starting



from LED 10, which indicates the completely charged battery status.



When the battery is 70% discharged, LED 3 blink, indicating that the battery is on reserve and must be charged. Bring the truck to the charging area and charge the battery. When the battery is 80% discharged, LEDs 1 and 2 blink alternately. Stop using the truck and charge the battery at once (As the right picture shows).



**Zone B: Timer**

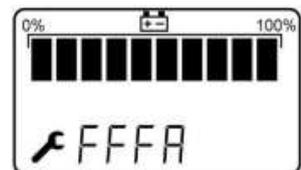
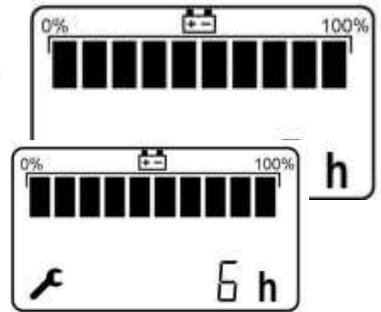
- Truck actual operation time will be showed in hour(displayed when truck starts )



- A “spanner” mark will show at the bottom-left to remind you to do maintenance when the maintenance interval missed(time of maintenance interval can be adjusted).

As the right picture shows: Overworking 6hrs more than maintenance interval, needs maintenance.

When there is any problem, the “spanner” mark and 4 digits fault code will show in the LED together, besides the faulty indicator light will be on, as the right picture shows.



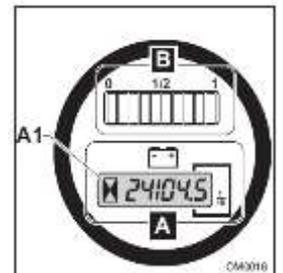
More fault code details, please look chapter 6.3.15.1 as reference.

**2.2.2 Curtis 803 instrument (○)**

The instrument is subdivided into two zones as follows:

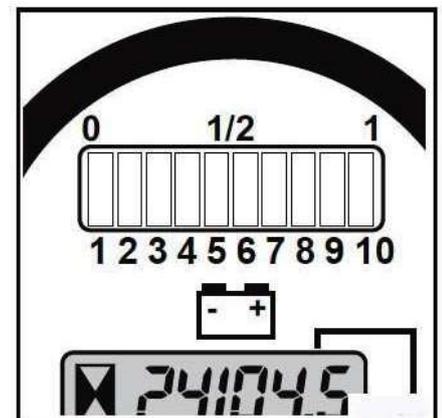
**Zone A:**

- Indicates the actual truck operation time, expressed in hours.
- When the counter is working, clock “A1” blinks, five numbers plus one decimal digit are displayed. The hours are counted progressively. The hours are counted progressively and start from zero.



**Zone B**

- Indicates the battery charge level; it's subdivided into ten sectors with respective colored LEDs.
- When the battery is 100% charged, LED 10 remains lit up.
- As the battery discharges, the LEDs light up one at a time from right to left, starting from LED 10, which indicates the completely charged battery status.
- When the battery is 70% discharged, LED 2 blink, indicating that the battery is on reserve and must be charged. Bring the truck to the charging area and charge the battery.
- When the battery is 80% discharged, LEDs 1 and 2 blink alternately. Lifting is blocked at this discharge threshold.



### 2.2.3 Curtis 840 instrument (o)

It has the function of displaying actual operation time, the battery charge level and fault code.

- Truck actual operation time will be showed in hour(displayed when truck starts )



476.9

The indicator shows the operation time is 476.9 hours.

- The battery charge level will be showed in the meter (displayed when the truck is moving or steering)



BDI 33%

The indicator shows the battery charge level is 33%



When the battery charge level is 20%, both yellow light and red light blink, which means the battery need to be charged. Bring the truck to the charging area and charge the battery.

When the batter charge level is lower than 15%, the travel speed of the truck will be lowered and the lifting is blocked. The battery need to be charged at once.

- Steering angle of driving wheel display.



Steering angle is 30° to the right.



Steering angle is 25° to the left.

- Travel speed display.



The current travel speed is 0.4km/h.

- Fault code display. (Red light blink)



The current fault code is 4,7 for driving.



The current fault code is 3,1 for driving; 4,1 for steering.  
3,1 4,1



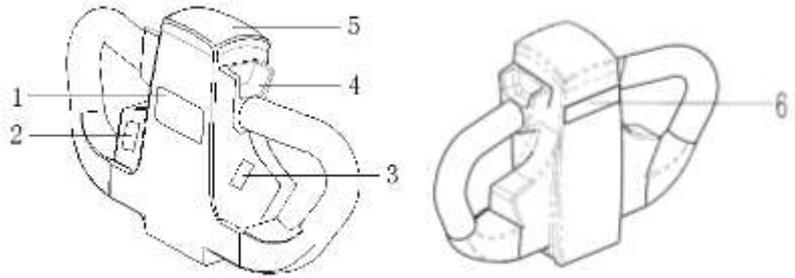
Fault code for driving and steering please look chapter 5.3.16.1&5.3.16.2 for reference.

**Notes:** when steering controller damaged, main contactor will be cut down at once, driving controller will appear fault code 3.1 in the meantime. When the problem on steering controller was ruled out, then the fault in driving controller will be disappear.

### 2.2.4 Steering handle

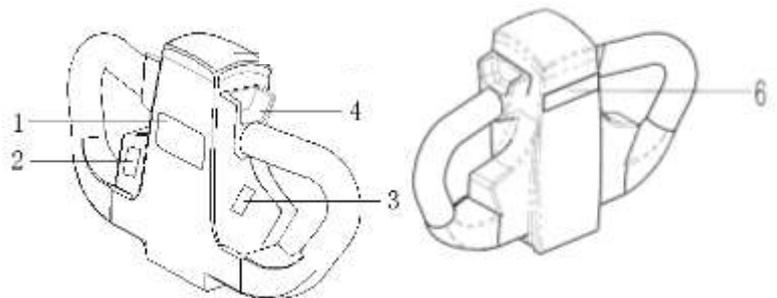
#### Steering handle- Normal temperature vehicle (as the right pic show)

- 1- Acoustic signal button
- 2- Lifting push button
- 3- Lowering push button
- 4- Traction control butterfly.
- 5- Crush prevention safety button
- 6- Set creep speed slow function button(○)



#### Steering handle –Cold storage vehicle (as the right pic show)

- 1- Acoustic signal button
- 2- Lifting push button
- 3- Lowering push button
- 4- Traction control butterfly.
- 5- Crush prevention safety button
- 6- Set creep speed slow function button



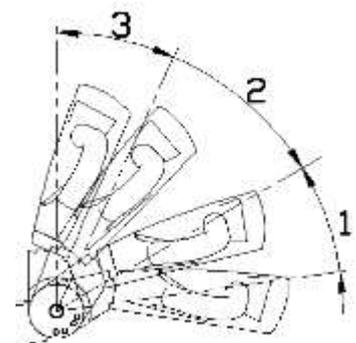
#### Handle Position

“1” ----braking position

When handle in this position range, braking system will work, power will be cut off.

“2”--- working position

When handle in this position range, braking system will not work, power will be get through.



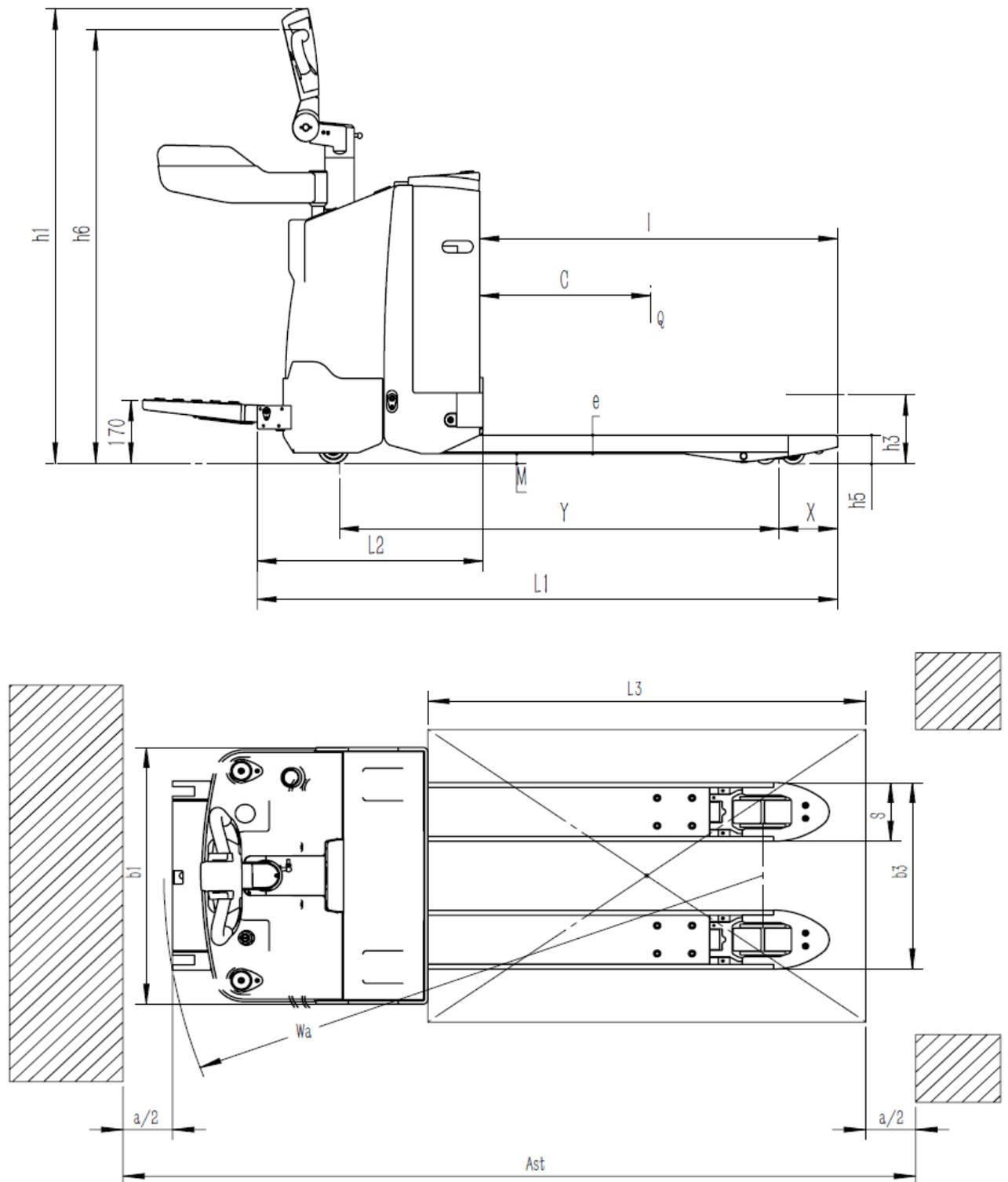
“3”--- braking position

When handle in this position range, braking system will work, power will be cut off.



When handle locate at “2”, “3” and press the Set creep speed slow function button 6, then truck can go forward and backward slowly.

### 2.3 Technical Specification



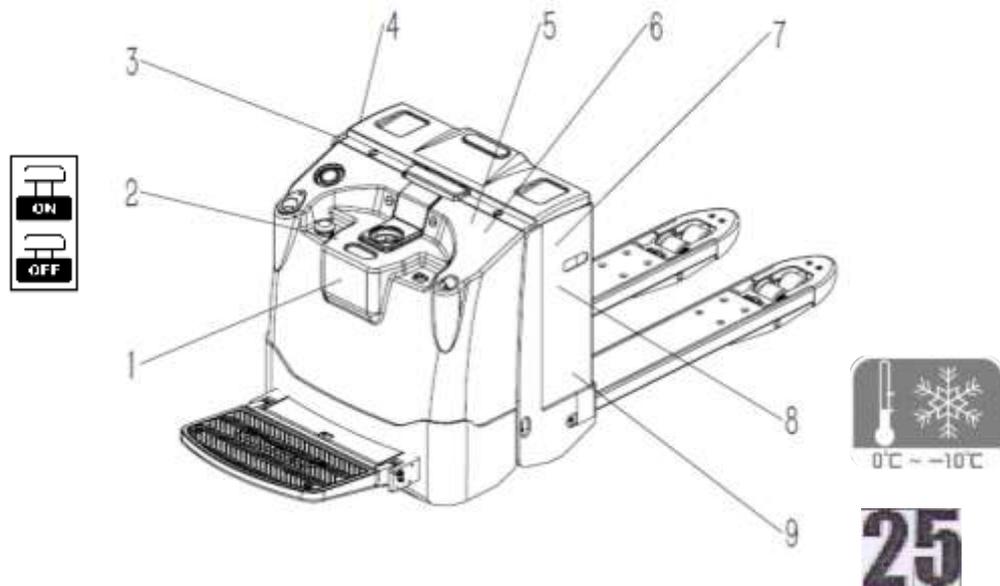
	1	Product Model		XPA20/ XPAE20	XPA25/ XPAE25	XPA30/ XPAE30
	2	Power supply		Electric		
	3	Operating type		Standing		
	4	Load capacity	Q kg	2000	2500	3000
	5	Load center	C mm	600		
	6	Load distance, Center of drive axle to fork back	X mm	191.5		
	7	Wheelbase	Y mm	1450		
Weight	1	Weight(without battery)	kg	430		
	2	Axle loading , loaded(front/rear)	kg	1166/2017		
	3	Axle loading , unloading(front/rear)	kg	550/139		
Wheel	1	Tyres		Polyurethane		
	2	Driving wheel size	mm	Φ 230×75		
	3	Loading wheel size	mm	Φ 80×70		
	4	Balancing wheel size	mm	Φ 100×40		
	5	Wheels number (x=drive wheel) Front/Rear		1x-2/4		
	6	Tread, drive end	mm	390/500		
	7	Tread, load end	mm	1326		
Dimension	1	Lower mast height	h1 mm	1326		
	2	Lifting height	h3 mm	205		
	3	Fork height, lowered	h5 mm	85		
	4	Height of tiller in drive position(max/min)	h6 mm	1246/985		
	5	Overall length	L1 mm	1908		
	6	Length to face of forks	L2 mm	758		
	7	Overall width	b1 mm	780		
	8	Fork dimensions	s/e/l mm	180/56/1150		
	9	Fork width	b3 mm	570/680		
	10	Minimum ground clearance	M mm	30		
	11	Aisle width for pallets 800x1200 (fork along side 1200)	Ast mm	2470		
	12	Turning radius	Wa mm	1741		
m	1	Travel speed loaded/unloaded	km/h			

	2	Lift speed loaded/unloaded	mm/s	40/50		
	3	Lowering speed loaded/unloaded	mm/s	50/40		
	4	Max grade ability loaded/unloaded	%	5/10		
	5	Service brake		Electromagnetic brake/EPS		
	Motor	1	Driving motor rating	kw	1.5	1.5
2		Lift motor rating	kw	2.2		
3		Battery voltage/nominal capacity	V/Ah	24V/180	24V/210	24V/240
4		Battery weight	kg			
Others	1	Type of drive control		MOSFET Control		
	2	Noise level at operator's ear	dB(A)	<70		

## 2.4 Name plate & labels

Product Name	Model				
Product Range	Loading Capacity				kg
Serial No.	Load Center				mm
PROD Year	Truck Weight With Battery				kg
Lifting Height	mm	Truck Weight Without Battery			kg
Battery Voltage/Capacity	V/Ah	Battery Weight Min.	Max.	kg	
Made in China					





No.	Name	No.	Name
1		6	Attention label
2	Emergency stop switch label	7	
3	CE logo	8	Cold storage label
4	Name plate	9	Tonnage label
5	Attention of cold storage truck use label		



If there are label 5 and label 6 on the truck, it shows that the truck is cold storage truck.

There are 3 cold storage labels as follows:



Indicates the cold storage truck can be used can used in the working site  
Temperature is 0°C~ -10°C.



Indicates the cold storage truck can be used can used in the working site  
temperature is -10°C~ -30°C.



Indicates the cold storage truck can be used can used in the working site  
temperature is -30°C~ -60°C.

## Name Plate

Product Name	Model		
Product Range	Loading Capacity	kg	
Serial No.	Load Center	mm	
PROD Year	Truck Weight With Battery	kg	
Lifting Height	mm	Truck Weight Without Battery	kg
Battery Voltage/Capacity	V/Ah	Battery Weight Min.	Max. kg
Made in China			
Suzhou Pioneer Material Handling Equipment & Technology Co., Ltd Tel: 0086-512-66511292      www.zowellforklifts.com			



Any question for trucks and inquiry for spare parts, please supply serial number.

## C Battery Charging, Replacement & Maintenance

### 3.1 Safety operation regulations for lead-acid battery

Daily maintenance and correct use of battery will increase its performance and life. Good maintenance will bring you high work efficiency and enormous economic benefits.

**Maintenance operator:** Charging, maintenance and replacement of batteries must be performed by qualified technicians only. The operation must be strictly in accordance with the regulations of operation manual.

**Fire precaution:** Do not smoke or use open fire around batteries. Keep charging area is well ventilated.

**Battery maintenance:** Keep battery cell covers dry and clean. The terminals and cable terminal lug must be tight and clean, and paint a little special grease. If the battery electrode is without insulation treatment, an antiskid insulation pad should be covered above the electrode.

**Risk of Electrolyte:** Electrolyte is a kind of poisonous, corrosive diluted sulfur acid. Please wear protective clothes, goggles and gloves when working around batteries. If the electrolyte splashes in eyes or on skin, please wash by clean water at once. Consult with the doctor if necessary.

**Disposal of worn out battery:** Batteries must only be disposed in accordance with local environmental protection regulations and related disposal laws.

### 3.2 Battery charging

The 1<sup>st</sup> charging for new battery before using is called initial charging, all charging during using in future is called normal charging.

Users can choose intelligent charging or AC current charging. It should be charged by AC current for initial charging.

### 3.2.1 Initial charging(This chapter is for battery without electrolyte)

#### 3.2.1.1 Electrolyte configuration

- Electrolyte of battery should be configured by sulfuric acid or deionized water which is apply to standard GB4554. The density of electrolyte should be



1.28~1.29g/cm<sup>3</sup>(25°C)

Electrolyte density will change with temperature, it can be calculated by the following formula.

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

D<sub>25</sub>--- Electrolyte density at 25 °C.

D<sub>t</sub>---Real electrolyte density(g/cm<sup>3</sup>) at t °C.

0.0007--- Temperature conversion factor

t--- Temperature when measuring electrolyte density.

- The containers for electrolyte configuration should be ceramic jars which is acid-resisting, heat-resisting, nonferrous or other acid-resisting containers. When configuring electrolyte, firstly pour measured water into clean containers, secondly slowly pour measured concentrated sulfuric acid into water, then mix them by an acid-resisting stick completely.

Cautions! Water can not be poured into concentrated sulfuric acid directly or physical injury and accident will be happened because of splashing.

#### 3.2.1.2 Pouring electrolyte

- Open filler cap, pour configured electrolyte which has been cooled below 35°C into battery slowly, electrolyte will be absorbed by pole plate, please refill it immediately until to required level.

- Clean surface around filler plug and then close filler plug.

#### 3.2.1.3 Steps of initial charging

- Connect battery wire harness with battery connector wire harness and open battery filler plug cap.
- Connect charger connector with battery connector.
- Turn on charger.
- Turn off charger after charging
- Disconnect the battery connector from charger connector, close filler plug cap and clean its surface around.
- Connect battery connector and tractor connector, then tractor can be used.



Please begin initial charging no later than 12 hours since electrolyte poured into battery.

Charger should apply to battery's voltage and capacity. Battery's positive pole should connect with charger's positive pole, battery's negative pole should connect with battery's negative pole, otherwise battery will be damaged.

For initial charging, please with 10% current of cell capacity for 1<sup>st</sup> stage charging.

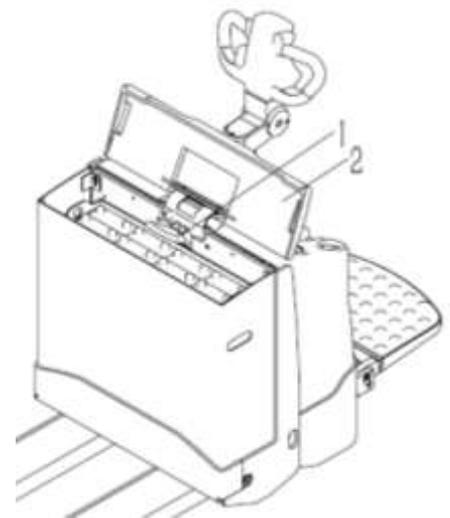
When cell voltage up to 2.4V, change to 5% current for 2<sup>nd</sup> stage charging. During charging, when electrolyte's temperature close to 45°C, please reduce the current or cool it by artificial method to avoid quality problem due to high temperature.

### 3.2.2 Normal charging

Procedure for normal charging by AC current is similar to initial charging. 1<sup>st</sup> stage current is 12% of battery capacity and 2<sup>nd</sup> stage should be reduced by half. Please do not with current more than 12% of battery capacity for charging. Charging capacity for first 5times charging should be 1.5times as last discharging capacity.

When making normal charging by intelligent charging, equalizing charging should be activated according to intelligent charger's manual for the first 5 times charging of new battery.

- Move the truck to charging area.
- Cut off the power supply.
- Open battery cover(2) and filler plug cap
- Disconnect battery connector(1)
- Connect the charger connector to battery connector (1).
- Turn on the charger.
- Turn off the charger when charging finished.
- Disconnect the battery connector (1) from charger connector. Close the filler plug cap and clean its around.
- Connect battery connector with truck's power supply, truck can be used again.



Features when battery is in fully charged,

a. Battery voltage and electrolyte density will remain stable within 2-3 hours continuously.

b. Electrolyte in battery will generate clear bubbles likes water boiling.



Charger must match the charging voltage and charging capacity of the battery.

Battery's positive pole should connect with charger's positive pole and battery's negative pole should connect with electrical equipment's negative pole, or the poles will be damaged.

Charging area shall be ventilated and away from the fire.

During charging, due to electrolysis and evaporation of water of electrolyte, distilled water should be refilled in time to keep electrolyte's normal level and density. After charging, adjust the electrolyte's density to  $1.28 \pm 0.005 \text{g/cm}^3$  by distilled water or sulphuric acid and keep electrolyte's normal level.

When charging, temperature of electrolyte can not be more than 55°C, if it is close to

55°C, please try to lower the temperature or reduce charging current. If temperature cannot be lowered, stop charging at once. Continue to charge again when temperature is lowered.

### 3.2.3 Equalizing charging

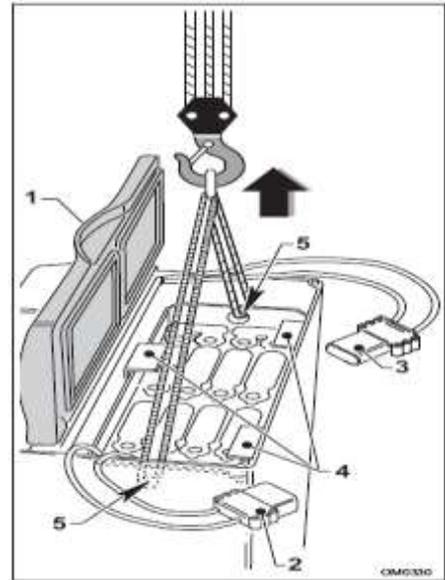
When using battery cell, its capacity and life will be shorted due to insufficient charging, not charging in time after discharging or other reasons, then active material cannot be refreshed in time and become vulcanization. As for battery in group,

because of the differences between battery cells, battery parameters will be more and more uneven after long-term using which will reduce the performance of the whole battery group. Equalizing charging can avoid battery's vitriolization and improve the equilibrium of battery group. If without equalizing charging in time, battery's performance and life will be affected.



Please do equalizing charging if matching any one of following cases.

- Discharging voltage is often reduced below final voltage.
- Discharging current value is often too big.
- Charging has not been done in time after discharging.
- Electrolyte mixed with harmless impurities.
- Not charging fully for three times continuously or not being used for a long time.
- After taking out pole group for checking or getting rid of precipitate
- Each two months for battery charged by adopt constant current and half a month by intelligent charger.



### Procedure for equalizing charging

**Constant current charging:** Charging the battery in normal and keep it still for one hour after charging. Then continue to charge by the current of 2nd stage till having big bubbles, stop charging for one hour. Repeat the operation several times, till the voltage and density not change. Stop for a while and charging again till to having big bubbles, then stop charging.

**Intelligent charging:** Start equalizing charging according to charger's manual.

### 3.3 Checking the proportion of electrolyte

- Open the filler plug cap of single battery cell
- Checking the electrolyte proportion of every cell's by aerometer carefully.
- Close the filler plug cap and clean its around after checking.

### 3.4 Battery replacement(XP20/XP25/XP30)

#### Take out battery

- Move the truck to flat ground
- Cut off power supply
- Open battery cover(1)
- Disconnect battery connector(2), (3), take out block(4)
- Fix hoist hook at hole(5), remove the battery and put it at a safe place.

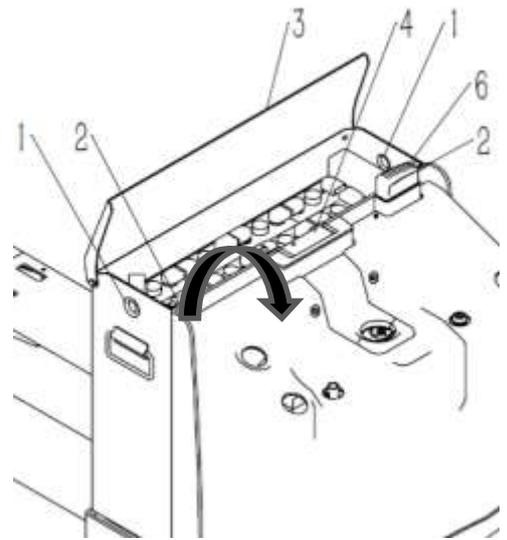
#### Install battery

- Install the battery into compartment as the above way
- Connect battery connector(2), (3).
- Close battery cover(1)

### 3.5 Battery replacement(XPA25)

#### Take out battery

- Move the truck to flat ground
- Cut off power supply
- Disconnect battery connector(5)
- Open battery cover(3)
- Follow the direction of beside image, rotate the battery anti stripping block(4) 90°C.
- Remove two hand wheel(2) at truck's both side
- Fix hoist hook at hole(1), remove the battery and put it at a safe place.



#### Install battery

- Open battery cover(3)
- Install the battery into compartment as the above way
- Rotate the battery anti stripping block(4) 90°Cas the opposite direction of beside image
- Assemble and screw two hand wheel(2) at truck's both side
- Connect battery connector(5)
- Close battery cover(3)



Please wear safety shoes when replacing battery.

Please do not damage any parts during battery replacement.

Battery's weight and dimension have great impact on tractor's stability and capacity, please refer to truck's name plate.

Pay attention to the fixed position where battery in tractor compartment when replacing and installing battery.

When replacing the battery, please do not put your hand among tractor body, battery and battery cover in order to avoid any injury.

### 3.6 Battery maintenance

- Charge the battery at once after each discharging. Do not overcharging, or battery's life will be shortened.
- Each discharging should not be more than 80% (The electrolyte density is 1.14g/cm<sup>3</sup>)
- Clean the electrolyte when it overflows to avoid short circuit fault or leakage of battery.
- Check the battery compartment to make sure no water in it. If there is water, clean it immediately.
- Keep the battery surface clean and dry.
- Please disconnect the battery connector and tractor if battery has been installed and used but the tractor is stopped working over a week.
- Check the battery voltage, electrolyte density and temperature at least once a week.
- Keep maintenance for terminal and connector should regularly by a small amount of special grease. Eliminate the possibility of any loose of connector and the poor

contact.



Battery should be charged in time after using. Charging not in time, charging not fully, without using for a long time or over-discharging will finally cause the poor performance of the battery and shorten the battery life.

It is recommended to check electrolyte level (after charging), battery voltage, and electrolyte density at least once a week to keep normal electrolyte level.

In normal use, if electrolyte level is lowered, only distilled water is allowed to fill into battery. Normally, it is forbidden to fill dilute sulfuric unless when electrolyte spilling out, then same density's dilute sulfuric acid can be filled.



During normal using, the temperature of electrolyte shall not be more than 55°C, otherwise, battery life will be greatly shorten and the rubber seal ring will be quickly worn out .

In order to have a full knowledge of battery group's status, make a inspection in every half of a month. The inspection including: tightness of connections, electrolyte level and density, voltage equilibration, especially charging by intelligent charger, such inspection is often ignored, so that some problematic batteries can not be noticed in time, then performance of the whole battery group will be affected.

### 3.7 Battery out of service

Battery will be out of service due to a lot of causes, besides battery quality and transportation, using and maintaining improperly are also main cause. When failure happens, please do analysis and take effective measures immediately.

Feature, cause and solution for battery out of service are as follows,

Appearance	Main features	Failure causes	Solution
Sulfuration of pole plate	<ol style="list-style-type: none"> <li>1. When discharging normally, capacity drops</li> <li>2. Proportion drops and below normal value</li> <li>3. When discharging, voltage drops rapidly</li> <li>4. When charging, bubble appears early and temperature rises up quickly</li> <li>5. Crystal PbSO<sub>4</sub> is thick and big</li> </ol>	<ol style="list-style-type: none"> <li>1. Initial charging not fully charged</li> <li>2. Stay in discharging condition too long time</li> <li>3. Not fully charged often</li> <li>4. Electrolyte proportion high</li> <li>5. Level low, top of pole plate exposed to air</li> <li>6. Electrolyte not pure</li> <li>7. Short circuit inside</li> </ol>	<ol style="list-style-type: none"> <li>1. Overcharging</li> <li>2. Repeat charging</li> <li>3. Water therapy</li> <li>4. equalizing charging in time</li> </ol>
Active substance drops too much	<ol style="list-style-type: none"> <li>1. There is sediment in electrolyte, brown substance will rise when charging.</li> <li>2. Battery capacity decreased.</li> </ol>	<ol style="list-style-type: none"> <li>1. Brown substance is caused by big charging current.</li> <li>2. White substance is caused by over discharging.</li> <li>3. Impurity substance inside battery</li> <li>4. Drops in group, low pole</li> </ol>	<ol style="list-style-type: none"> <li>1. Put plastic shell with battery, replace pole plate, clear substance.</li> <li>2. Charging with small current, adjust electrolyte density and level later.</li> </ol>

		plate quality 5. Drops like pasty, high proportion or temperature for long time	
Short circuit inside	<ol style="list-style-type: none"> <li>1.Low voltage when charging</li> <li>2.Less bubble at the end term of charging, or bubble appears too late.</li> <li>3.Temperature increases rapidly when charging, electrolyte proportion and level increases slowly, serious self discharging</li> <li>4.Less discharging battery, voltage drops quickly</li> </ol>	<ol style="list-style-type: none"> <li>1.Conductive material drops</li> <li>2.Pole plate winding, division plate damaged.</li> <li>3.Too much substance</li> </ol>	<ol style="list-style-type: none"> <li>1.Take out the conductive material</li> <li>2.Replace pole plate</li> <li>3.Replace division plate</li> <li>4.Replace new electrolyte</li> </ol>
Opposite pole	<ol style="list-style-type: none"> <li>1. Battery capacity drops</li> <li>2. Voltage drops obviously</li> </ol>	<ol style="list-style-type: none"> <li>1.Assembly problem</li> <li>2.Over discharging</li> <li>3.Pole plate sulfated due to charging not fully</li> </ol>	<ol style="list-style-type: none"> <li>1.Replace battery</li> <li>2.Charge battery cell with opposite pole problem separately.</li> </ol>
Electrolyte problem	<ol style="list-style-type: none"> <li>1.Proportion, capacity and voltage low</li> <li>2.Proportion high</li> <li>3.Electrolyte not pure, there is impurity substance inside</li> </ol>	<ol style="list-style-type: none"> <li>1.Too much water or pole plate sulfation</li> <li>2.Fill electrolyte by mistake</li> <li>3. Impurity substance from distilled water and electrolyte more than standard.</li> </ol>	<ol style="list-style-type: none"> <li>1.Adjust density or clear sulfation</li> <li>2.Take out some electrolyte and adjust its density.</li> <li>3.Replace electrolyte.</li> </ol>

### 3.8 Storage

- Battery should be stored in clean, dry and ventilated warehouse with temperature 5~40°C.
- Keep battery away from direct sunlight, solarization and rain. At least 2-meters far away from heat source.
- Never invert or lie down battery. Never throw, tumble or press the battery.
- Metal, impurity should be avoided dropping into the battery.
- Without electrolyte. If there is special requirement, the battery should be fully charged, electrolyte's level and density should be well adjusted.
- During storage, please charge the battery normally once a month according to normal battery charging.

## D Operation Instruction

### 4.1 Safety rules

- Driving permission

Truck can be only operated by qualified specialist, please follow the rules in this operation manual strictly during operation.

**- Driving area**

Please do not stock the goods to block the travel passage and emergency exit.

Please do not overload the goods more than the area loading capacity of the ground.

**- Attentions during driving**

Operator must control the driving speed according to the real working situation and keep a certain distance from the front truck to do braking in case.

**- The sight of operator during driving**

Please keep slow speed when making curve turning, quick driving speed is not allowed(accidental situation not included).

**- Driving on slope**

The slop must keep clean, dry, and meet requirements of trucks' technical performance. Curve turning on slope is not allowed. Please keep slow when downgrade and prepare to brake the truck at any time.

**- Equipment damage and failure**

If damage and failure of equipment and attachment is found, please report it to supervisor immediately. Truck without full function feature (tyre worn out or brake failure) could not be used without well repair.

**4.2 Operation rules for cold storage**

- 0~-10°C “Fresh cold storage truck”: do not work in cold storage whose temperature is higher than -10°C more than an hour.

- -10~-30°C “Cold storage truck”: do not work more than 15min/hr in -10~-30°C storage. Can work in -10°C storage without time limit.

- -30~-60°C “Frozen cold storage truck”: do not work more than 15min/hr in -50~-60°C storage. Can work in -10°C storage without time limit. Do not work more than 3hrs in -10~-30°C storage, truck should work 30min outside or have a 30min rest.



Operation for “Cold storage truck” with different level, please follow the above rules carefully.

Movement for hydraulic and driving system should be carried out until temperature of parts increased before “Cold storage truck” entering cold storage.

If there is condensated water on “Cold storage truck” surface after getting out of cold storage, truck can not work inside again until no condensated water exists by waiting or drying.

**4.3 Inspection before daily operation**

- Check function of driving forward/backward, lifting/lowering

- Check brake

- Check horn

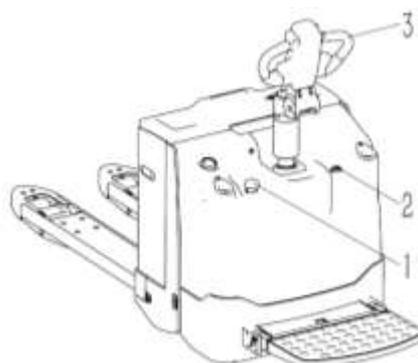
- Check battery capacity

- Check thickness of wheel nut



Please refer to contents in latter chapters for to check the above function.

**4.4 How to use the truck(starting operation orders)**

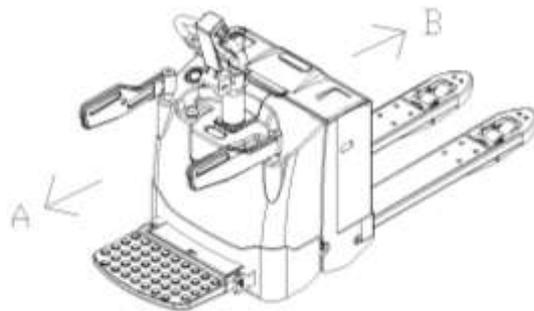


how

- Open handle bar(if possible)
- Unfold platform and stand on it
- Pull emergency switch(1)
- Rotate key switch(2) in right direction
- Press tiller(3) down to area 2
- Ready

## 4.5 Driving

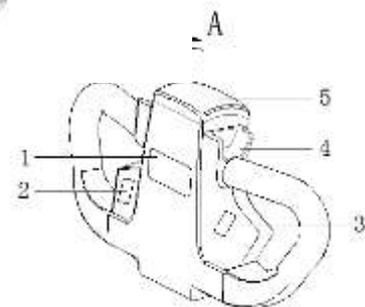
### 4.5.1 Direction



- B driving forward
- A driving backward

### 4.5.2 Driving forward

Rotate direction knob (4) in direction A, the rotate angle bigger, the speed for driving backward higher.

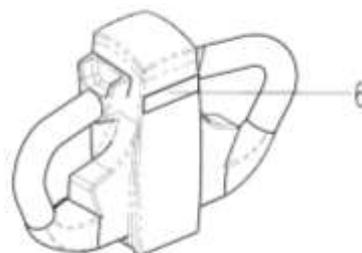
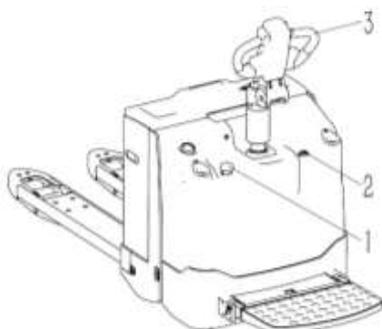


### 4.5.3 Driving backward

- Rotate direction knob (4) in direction B, the rotate angle bigger, the speed for driving forward higher.



When tiller at position “2”, “3”, press slow creep speed button (6) at same time, truck will drive forward or backward with a very low speed.



#### 4.5.4 Steering

Turn left

- Rotate the tiller in clockwise direction, truck will turn left.

Turn right

- Rotate the tiller in anticlockwise direction, truck will turn right.

#### 4.5.5 Direction change

- Release direction knob (4), and rotate direction knob (4) in opposite direction, truck's driving direction will be changed.



Please reduce driving speed before bypassing any obstacle.

#### 4.5.6 Horn

- Press horn button (1), horn will begin to work.

#### 4.5.7 Brake

- Make the tiller (1) in area 1 and 3, brake system will begin to work.
- Release direction knob (4), direction button will go back to its original position automatically, brake system will begin to work.



Please press emergency switch to brake in emergency case.



Truck for normal condition, in emergency case, when truck is going backward, press belly button (5) (Cold storage truck does have such button), truck will reduce driving speed until stop, and then truck will go a short distance in opposite direction with slow speed till stop.

### 4.6 Lifting/lowering

#### 4.6.1 Lifting

- Press lifting button (2), front body of truck body will lift

#### 4.6.2 Lowering

- Press lowering button (3), front body of truck will lower

### 4.7 Loading

- Start to use truck, drive the truck to load
- Adjust front body's lifting height accordingly and make load onto both forks.
- Press lifting button (2) to lift front body accordingly.

### 4.8 Moving load

- Rotate direction knob (4) in direction A or B to make truck drive and load accordingly.



When driving with load on slope, please keep the load facing to upside of the slope.

Please do not drive the truck on slope which is over its grade ability (please refer to technical specification)

## 4.9 Unloading

- Drive the truck to unloading area smoothly
- Adjust the lifting height of truck's front body to unload the load from forks.
- Drive the truck away.



When unloading, please do not park the truck in busy traffic area.

## 4.10 Parking

- Drive the truck to parking area.
- Press lowering button (3) to lower front body to min. lifting height.
- Rotate key switch (2) in left direction and take it out.
- Press emergency switch (1).



If truck will not be used for a long time, please disconnect battery connector.



It is not allowed to park the cold storage truck in cold storage, or hydraulic and electric system will be damaged.

# E HOISTING, TRANSPORTATION AND PRESERVATION

## 5.1 HOISTING

Using enough bearing capacity lifting tools to hoist the truck and protect the connecting part as right image.



The weight of truck including battery are marked on metal plate.

When the truck is under hoisting, please do not stand beside or stay close to the truck.

## 5.2 TRANSPORTATION

- During transportation, please make sure the whole truck is fixed well and also with protection for extreme weather condition.

## 5.3 PRESERVATION

If the truck will not be used for a long time, please do operations as below,

- Clean the truck.
- Grease the lubricating oil on non-oil coated mechanical parts.
- Clean the battery and grease the special oil on electrodes screw bolt.
- Pull out the connectors of battery. The battery should be charged every month.
- Lower the forks at lowest position.
- Make cushions for the truck to avoid the wheels' deformation.

# F MAINTANENCE

**General Information**

Completely standardized maintenance is one of the forklift operator to ensure reliable performance of the most important preconditions. Neglect regular maintenance can lead to truck failure and malfunction, and the staff and a potential threat to the safe operation.



"Refrigerator car" is a special handling equipment, proper use and maintenance professional can improve the effective utilization of cold storage type forklift, good rates and service life

- Only in accordance with this specification, guidance or tips, regular maintenance and inspection of the truck, the truck in order to maintain normal operation.
- Maintenance work may only be carried out by professionals.
- After the overhaul must perform a functional check of the truck and each test run.
- When servicing, use our spare parts, the only way to ensure that your truck to maintain the original level of technology.
- Without the manufacturer's consent, does not allow the truck modification or reconfiguration.
- In the maintenance process, the existing regulations shall be processed in accordance with existing environmental protection regulations or waste of aging components and a liquid medium for processing.
- If Forklift work (such as heat, cold, dusty, etc.) in extreme environments, you should shorten the inspection and maintenance intervals.



In all the maintenance process, the truck must be placed on the ground, pad wheels and ensure that the truck does not move.

When the truck maintenance, maintenance personnel should wear safety shoes.

**Jacking up the truck**

In order to carry out maintenance work, often you need to jack up the truck.

- With sufficient bearing capacity jack.
- The jack is placed under the front portion of the vehicle body from the top to the front of the truck, the truck made of wooden mats to live.
- The jack is placed below the rear of the vehicle body from the top to the rear of the truck, the truck made of wooden mats to live.



Once jacking up the truck, the truck must live with the mat wood.

**Inspection and Maintenance Schedule**

Inspection and Maintenance Inspection and maintenance intervals specified in the list only for normal operating conditions. Maintenance Schedule. If the operating conditions of intensity higher than the general level, such as dust, temperature fluctuations, or to perform shift work system, it must be appropriate to shorten the maintenance cycle.



**On the "cold car", the need to shorten the maintenance cycle, to prevent early wear and tear of the components.**

Content	Daily	First 50 hours	If need	Half year	Every year	Every two year
Daily operation before inspection	•					
Daily inspection of friction sheet		•				

Daily inspection of screws intensity		•				
Daily inspection of wheels		•				
Daily inspection of tightness of hydraulic system		•				
Daily inspection of electrolyte liquid level and proportion		•				
Daily inspection of the intensity of cable and connectors		•				
Daily inspection of intensity of mechanical components		•				
Inspection of lubrication point		•				
Inspection of forklift operation function		•				
Clean truck			•			
Inspection of fuse			•			
Check brake linings state			•			
Daily inspection of screws intensity			•			
Daily inspection of wheels			•			
Daily inspection of electrolyte liquid level and proportion			•			
Daily inspection of the intensity of cable and connectors			•			
Check motor insulation resistance and tightness			•			
Check the effect of various types of switches			•			
Forklift operator function tests			•			
Daily inspection of tightness of hydraulic system				•		
Daily inspection of wheels				•		
Daily inspection of screws intensity				•		
Daily inspection of the intensity of cable and connectors				•		
Clean and inspect the contactor contacts are burning				•		
Check brake linings state				•		
Check hydraulic oil level				•		
Check hydraulic oil level				•		

Check each lubrication point				•		
Forklift operator function tests				•		
Daily inspection of intensity of mechanical components					•	
Forklift operator function tests					•	
Replace hydraulic oil						•
Replace hydraulic oil						•
Forklift operator function tests						•



On the table "Initial 50 hours" refers to the new forklift initial friction and closing times.

### Cleaning truck

- Cut off the power.
- Disconnect the battery connector.
- Using compressed air (use a compressor with a water trap) to clean up the truck, while removing the cleaning agent adhering dirt available.



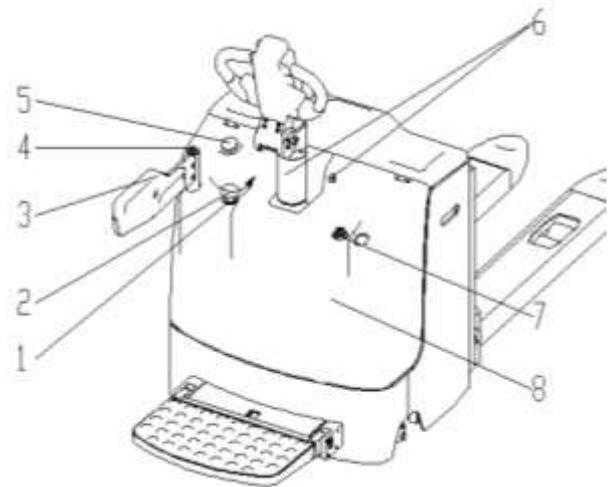
If using water or high pressure cleaning equipment truck must be taken to cover all electrical components carefully, otherwise electrical components will be the influence of moisture and cause malfunctions.

If preventive measures, but there are still water to seep into the motor, it must make the truck run by electrical self-heating and drying moisture.

Removable cover

### Remove the back cover

- Cut off the power.
- Unscrew the emergency stop switch cap (2) , And remove the rubber ring (1) .
- Remove the screws (4) , And remove the left and right armrest (3) .
- Unscrew the thumbscrews (6) , Remove the back cover (8) .



### Replace the back cover

Remove the back cover in accordance with the inverse step the back cover (8) .

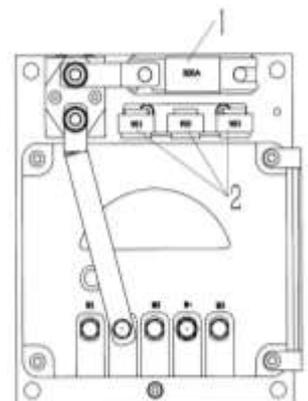


During operation be careful not to damage the vehicle wiring harness, power table (5) 、 Key switch (7) .

### Replace the fuse (XP20/XP25/XP30)

#### PG C3 controller (●)

- Cut off power.
- Remove the back cover
- Check whether the fuse (1) and fuse (2) matches the parameter



specifications and specified below

1 -200A

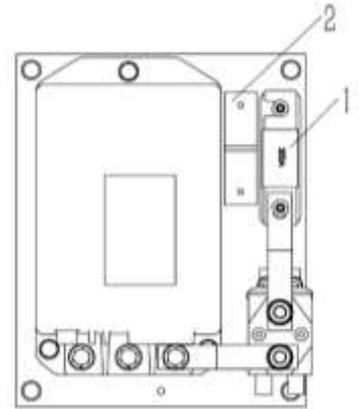
2 -10A

### Curtis 1243 Controller(○)

- Cut off power
- Remove the back cover
- Check whether the fuse (1) and fuse (2) matches the parameter specifications and specified below

1 -200A

2 -10A

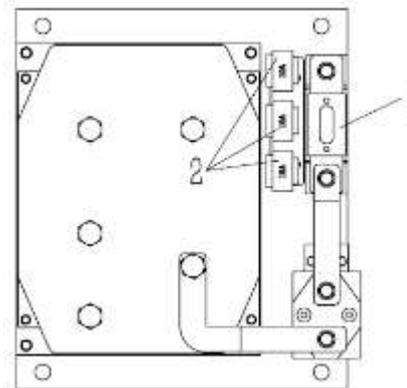


### Curtis 1232/1232E Controller(○)

- Cut off power
- Remove the back cover
- Check whether the fuse (1) and fuse (2) matches the parameter specifications and specified below

1 -150A

2 -10A



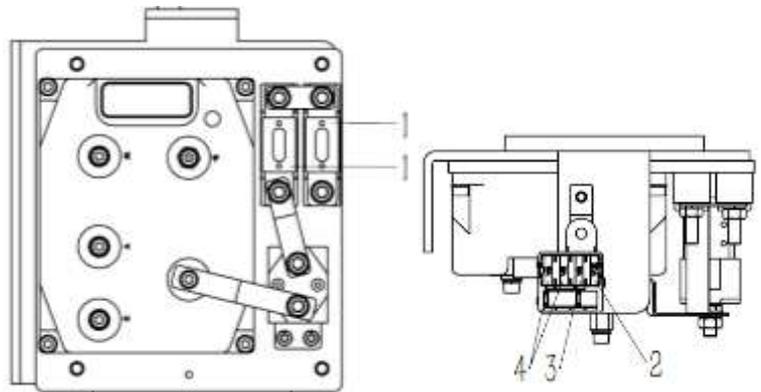
Replace the fuse (**XPA25**)

### Normal temperature-EPs

- Cut off power
- Remove the back cover
- Check whether the fuse (1) to (5) matches the parameter specifications and specified below

1 -200A    2 -30A

3 -10A    4 -10A (reserved)



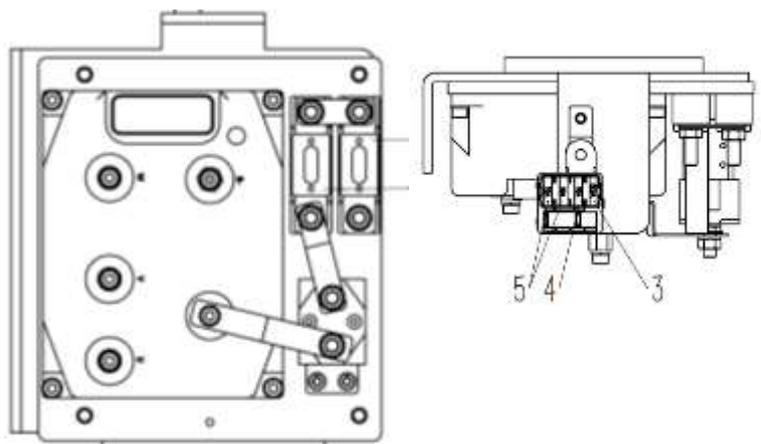
### Cold storage truck - EPs

- Cut off power
- Remove the back cover
- Check whether the fuse (1) to (5) matches the parameter specifications and specified below

1 -200A    2 -150A

3 -30A    4 -10A

5 -10A (reserved)

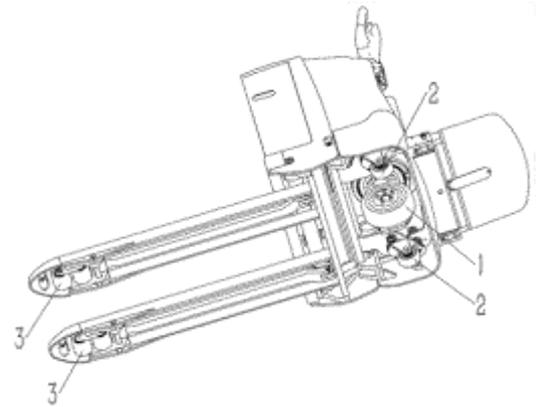


### Daily inspection of screws intensity

- Jacking up the truck until the wheels off the ground, and made of wooden pad to live.
- Check the drive wheel (1) for tightness. Torque 104N.M.
- Check the drive wheel (2) for tightness. Torque 104N.M.
- Check the drive wheel (3) for tightness. Torque 104N.M.

### Check the tightness of mechanical components

- Check the various nuts and bolts for tightness.
- Check the entire body in good condition, if there are cracks in the welded parts.
- Replace any defective parts.
- If necessary, add paint.



### Daily inspection of wheels

- Jacking up the truck until the wheels off the ground, and made of wooden pad to live.
- Check whether all the wheels rotate freely, remove any obstructing the rotation of the wheels and any foreign matter.
- Replace worn and damaged tires.

### Clean and inspect the contactor contacts are burning

- Disconnect the battery connector.
- Use compressed air to clean contactor, and check the status of the contact.
- If there is any significant wear contacts or have burnt stains must be replaced.

### Daily inspection of the intensity of cable and connectors

- Cut off power
- Remove the back cover.
- Check the insulation condition of cables and connectors, and whether there are scorch marks tightness.
- Check the battery and - if the terminal oxidation. (Residue appears white like salt-like).
- Check the battery status of plug contacts, connectors and check for damage.
- Check harness fasteners are tightened.



Oxidation rust connections and damaged cables can cause a voltage drop, which leads to truck failure.

### Daily inspection of tightness of hydraulic system

- Start truck
- Press the UP button (2), the front of the vehicle body (4) to rise to the top, and let stand for 10 minutes.
- Check the hose fittings between the pump station and the cylinder seal.
- Check the cylinder seal.
- Check hose installation and there is no reasonable wear and tear.

- If the oil spill, according to the need to replace the corresponding parts.

**Lubrication each hinge point**

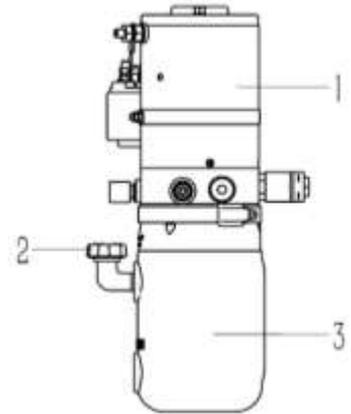
- Inspect and lubricate each hinge point



Specific grease specifications, see 6.3.13.

**Replace hydraulic oil**

- Cut off power
- Remove the back cover.
- Remove the hose, the pump assembly from the body removed.
- The fuel tank removed from the pump station.
- Remove the oil filler cap (2) and drain the hydraulic oil.
- Cleaning tank (3) and an oil filter.



**Refill**

- The fuel tank (3) mounted on the pump station (1).
- The pump assembly mounted to the vehicle body, and connect the hose.
- Unscrew the filler cap (2), add the hydraulic oil from the oil filler, then screw on the filler cap (2).
- Lifting operating system several times, air evacuation system.
- Lower the front of the vehicle body, check the hydraulic oil level.
- If necessary, unscrew the filler cap (2), add the hydraulic oil from the oil filler.
- The surrounding clean.
- Replace the back cover.



Hydraulic oil specifications, see 6.3.13.

**Recommended working medium**

SN	NAME	SPECIFICATIONS	REMARK
1	Gear Oil	GL-5 85W-90	
		GL-4 75W-90	Low-temperature environments
2	Hydraulic oil	HM32#	Low-temperature environments
		HM46#	
		HV32#	Freezer use
3	grease	3# Lithium Grease	

"



Cold car "should be used for cold storage and regular maintenance work oil replacement.

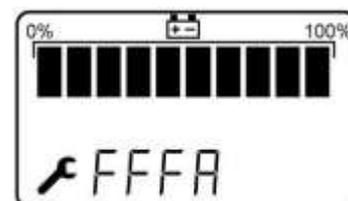
## Maintenance work medium

- Working medium can only be stored in a container in.
  - Working medium is flammable, can not contact with hot parts and open flames.
  - Injecting a liquid medium had a clean container.
  - Avoid liquid medium spill or leak. A spill or leak, clean with a suitable adsorption sucker thing.
-  - Used or discarded liquid medium will also be treated according to regulations. Non-standard health and life and the surrounding environment will operate constitutes a danger to the operator.

### Fault code (mechanical steering)

#### 6.3.15.1 PG C3 controller (●)

4 Fault code flashes frequency and PG charge gauge on the controller (PG C3) on the LED indicator to help maintain vehicle fault diagnose appears, as shown at right.



COD E	Flash Frequency	Cause and Troubleshooting Information
0001	8	Memory check error
0203	8	The underlying memory error correction
020c	8	The underlying memory mismatch
0204	8	Edit the underlying memory error
0210	8	The underlying memory write error
020d	8	Motor underlying memory data error
0704	8	Internal 12V supply exception, confirm the potential of the control line and connected to the controller correctly? Controller replacement test can be performed to verify that the controller is not a factor? Or external factors cause?
0707	8	Internal 5V supply exception, confirm its potential control circuit connected to the controller correctly? Controller replacement test can be performed to verify that the controller is not a factor? Or external factors cause?
0710	8	Internal 5V supply is greater than the upper limit
0711	8	Internal 5V supply is less than the upper limit
0720	8	Switch input voltage is too high
0721	8	Switch input voltage is too low
0810	7	Referring to the high-end Accelerator, please check the relevant parameter settings and associated wiring if the contrast?
0b00	8	Memory write error
0b08	8	Memory address is out of range
0E21	7	Accelerator slip-ended input circuit, please check the parameter settings and associated wiring whether contrast?
0E22	7	Accelerator output potential anomalies, replace the variable resistance type accelerator re-test?
0E25	7	The simulation input signal 1/2 is greater than the value of its high threshold setting (only applicable in the Throttle Type is the type 2 or 5)
0E26	7	The simulation input signal 1/2 less than the low threshold value provided by him

		(is applicable only in the Throttle Type 2 or Type 5)
0E28	7	The simulation input signal 1/2 beyond the normal range, please check the parameter settings and associated wiring if the contrast? (Is applicable only in the Throttle Type 0/1/3/4 Type)
0E2E	7	Analog input resistance 1/2 is too high, please check the parameter settings and associated wiring whether contrast? (Is applicable only in the Throttle Type 0/1/3/4 Type)
0E2F	7	Analog input resistance 1/2 is too low, please check the parameter settings and associated wiring whether contrast? (Applicable only in the type Throttle Type 1/3)
0E35	7	Analog input 1 reference and high short circuit, please check the parameter settings and the associated wiring if phase contrast? (Only applies to ISO test provided in the three-wire Yes 5K $\Omega$ , and Throttle Type is the type 1/3)
0E36	7	Analog input 1 and the low reference terminal short circuit, please check the parameter settings and the associated wiring whether contrast? (Only for ISO test when located in Yes, and in the Throttle Type is the type 1/3)
1201	7	Accelerator dual-channel signal alignment error
1310	3	Motor phase current too high, check the motor wiring and insulation state? And confirm whether the data match the motor and Motor Nameplate and Commissioning related settings with the use of contrast? Speed encoder pulse number set correctly?
1330	3	Speed encoder signal lost contact, please check the wiring has been disconnected? Are encoder specifications contrast with the controller?
1360	3	Motor phase current too high, check the motor wiring and insulation state? And confirm whether the data match the motor and Motor Nameplate and Commissioning related settings with the use of contrast? Speed encoder pulse number set correctly?
1500	9	Electrical short-circuit brake circuit
1502	9	Disconnect the electric brake circuit
1504	8	abnormal electrical output
1600	10	Voltage is too high
1601		Internal converter voltage is too high
1701	4	Main contactor disconnect the main contact circuit
1703	8	Main contactor output abnormal
1705	4	Main contactor main contact circuit short circuit
170c	4	Main contactor coil short
170d	4	Main contactor coil is disconnected
1800	8	Check the internal watchdog error feedback
1801	8	Internal watchdog exception
1b21		Current feedback exception, it is recommended to confirm the change controller can troubleshoot this situation? Please return the controller abnormal manner proposed by PG inspection
1d02	7	Underlying restructuring program error
1d04	7	Direction switch input conflict
1E08	6	speed operation 1
1E09	6	speed operation 2

1E0 A	6	speed operation 3
2b04	3	Motor-side voltage is too high; check the motor and motor match the wiring and confirm whether the data Motor Nameplate and Commissioning and settings associated with the use of contrast speed encoder pulse number set correctly?
2c00	1	Supplied to the controller measure battery voltage is lower than the moment 15V; recommended to check whether the battery performance is poor or a new battery test??
2c01	8	Supplied to the controller measure battery voltage is too low moment; Recommended to check whether the battery is in a low level? Then test again fully charged
2c02	1	Electricity reached Low Voltage Cut-Out set point
2c04	10	Higher than the voltage supplied to the controller 33V
2d01	2	Please encoder state Attorney General, or modify parameters Encoder Signal Swap is set; the controller detecting traveling speed encoder signal lost contact
2d01	2	Please encoder state Attorney General, or modify parameters Encoder Signal Swap is set; the controller detecting traveling speed encoder signal lost contact
2E00	8	Internal multitasking Timeout
2F01	7	The controller detecting boot there Accelerator / direction switch / interlock switch signal input, please use the programmer ADC view to view the status of these signals, or check the relevant line connection
2F10	7	The controller detecting boot there Accelerator / direction switch / interlock switch signal input, please use the programmer ADC view to view the status of these signals, or check the relevant line connection
3100	1	Supplied to the controller measure battery voltage is lower than the moment 14V; recommended to check whether the battery performance is poor or a new battery test??
3105	10	Supplied to the controller measure battery voltage instantaneously exceeds 35.5V, the battery voltage or the side of the moment more than 40V; please check the battery status, and associated wiring
3106	10	Supplied to the controller measure battery voltage instantaneously exceeds 40V; please check the battery status, and associated wiring
3110	9	Contacts short-circuit power supply attenuator
3111	9	Power supply contactor error attenuator
3120	2	Power supply contactor error attenuator
3121	2	Disconnect the power supply decay detection error
3215	8	ADC view of data storage errors
3607	8	No expectations, the failure index is invalid
3611	8	Internal watchdog actuator failure
3800	8	Data sampling error
3A00		Invalid settings programmed original file and the underlying controller software version does not match the recommended settings of the original file is read out from the controller, such as one by one to modify the desired setting
3A06	7	Invalid setting, it is recommended accelerator type to 0/2/4/5, or use analog input 1 (applicable only in the Throttle Type is the type 1/3)
3A08	8	Invalid motor nameplate technical parameters; suggests the correct motor data

		to parameters set Nameplate
3b01	2	Disconnecting the motor circuit, check the status of the motor and associated line connections
3d02	3	The motor circuit and the positive battery short circuit, check the status of the motor and associated line connections
3d03	3	Motor circuit and the battery negative short-circuit, check the status of the motor and associated line connections
4200	8	Boot multitasking has not completed initialization
4401		Controller logic or operating system encounters abnormal disturbing, please check the battery, the motor state and its wiring, or the controller replacement test
4700		Communication lost contact
7802	3	Motor thermistor Motor Thermistor Foldback value reaches the set value, then the effective current controller will be suppressed until linearly Motor Temperature Cut-Off set point; recommendation to allow the motor to cool before operation
7804	3	The controller noticed Current Foldback Time limit for achieving; recommends confirmation settings match the value of the application
7805	8	Internal motor output phase voltage is too high, replace the controller
780A		Walking into the drive motor over-temperature limit in
780b	3	Travel motor temperature is too high
7801	3	Motor thermistor value reaches Motor Temperature Cut-Off set value, then the effective current controller will be suppressed to match the value of the Absolute Minimum Current; recommendation to allow the motor to cool before operation
7820	3	Controller internal temperature exceeds 92 °C the controller into overtemperature limiting state. The active current controller will be suppressed until linearly Controller Temperature Cut-Off; Recommendation for the controller to cool before operation
7902	3	Controller internal temperature exceeds 100 °C about bringing the controller overtemperature limiting state, then the effective current controller will be suppressed to match the value of Absolute Minimum Current; and recommendations for the controller to cool before operation
7903	8	The controller detecting emergency reverse (belly) input signal error; please check the relevant settings or wiring
7904	7	The controller detecting boot emergency reverse (belly) switch has been activated; please check the relevant settings or wiring
7905	7	The controller detecting emergency reverse (belly) input signal is not a reasonable range; check settings or wiring
7906	7	The controller detecting emergency reverse (belly) Local input signal and CAN input signal conflict; please check the settings or wiring
7907	7	Belly Button High Threshold setting is less than Belly button Low Threshold; reset settings
7908	3	The controller detecting motor thermistor loop disconnect
7910	7	The controller detecting emergency reverse (belly) CAN input signal lost contact;

		check the state or the thermistor connection
7911		Lost contact interlock switch signal
7912		Forward switching signal lost contact
7913		Reverse indicator signal lost contact
7914	7	Rising input error counter
7915	7	Falling input error counter
7916		Speed 1 input data lost contact
7917		Speed 2 input data lost contact
7918		Speed 3 input data lost contact
7919		Mode 2 input data lost contact
791A		Alleys rotary switch signal lost contact
791b		Switching signal lost contact traction
791c		Accelerator switch input signal lost contact
791d	7	CAN communication lost contact with the accelerator signal, please check the parameter settings and associated wiring whether contrast?
791E		The simulation input 2 input data lost contact
791F		Lifting Signal lost contact
7920	7	The controller detecting foot brake input signal lost contact; please check the settings and wiring
7944	5	The controller detecting rise / fall CAN input signal is not within the normal range; check the status of accelerator and setup, and wiring
794d	7	CAN accelerator signal communication error, please check the parameter settings and associated wiring whether contrast?
794E	7	Simulation Input 2 Input data out of range
7c00		Internal temperature sensing component failures
7d00	8	Inside the motor-side drive failure
7d11		Horn loop short circuit
7d14		Horn loop disconnect
7d15	8	Horn output side of the error
7d20	5	Valve 1 circuit short circuit
7d21	5	Valve 1 loop disconnect
7d22	8	Valve 1 Error output side
8819	9	Electrical short-circuit loop indication
8829	9	Electric brake circuit disconnect indication
8860	9	Short circuit loop reverse directions
8870	9	Reverse loop disconnect indication
8900		Automatic matching static phase motor current is outside the range of reasonable
8901		Automatic matching static phase motor current is greater than 2 times the rated current (Rated Motor Current)
8902		Automatic Matching no-load test motor current 2 times rated current (Rated Motor Current)
8920		Automatic matching static phase voltage out of range
8921		Automatic matching static phase voltage out of range
8922		Automatic Matching no-load test voltage is out of range
8930		Automatic speed matching static phase encoder signal is not 0

8931		Automatic speed matching static phase encoder signal is not 0
8942		The actual motor speed is greater than 1.5 times the rated speed (Rated Motor Speed)
8952		Automatic Matching no-load test Timeout
89F0		Controller terminates automatically matching step
89F1		Programmer terminates automatically matching step
8990		Automatic match fails, R1 value out of range
8991		Automatic match fails, L1 value out of range
8994		Automatic match fails, R1U value out of range
8995		Automatic match fails, R1V value out of range
8996		Automatic match fails, R1W value out of range
89A0		Automatic match fails, R2 value is out of range
89A1		Automatic match fails, L2 value out of range
89A6		Automatic match fails, the rotor time constant is made invalid feedback
89b0		Automatic match fails, Rm value out of range
89b1		Automatic match fails, Lm value out of range
9100	5	The controller detecting rising contactor coil is disconnected; check the wiring and contacts status
9102	5	The controller detecting rising contactor coil short circuit; check the wiring and contacts status
9103	8	Abnormal increase in pump output
9106		Increased pump current overload; recommends measuring motor current oil bar, and look set value Hydraulic / Overload Current Overload Time and whether the application of phase contrast
9108	3	Increased pump current is too high
9109	3	Ultra-high-rise pumps instantaneous current
910A	3	Rising oil pump drive into the over-temperature limit in
910b	3	Excessive temperature rise in the oil pump drive
910c	8	Abnormal rise in oil pump drive interlock
910d	3	Rising oil pump drive voltage is too high
9110	5	Decrease proportional valve controller detecting circuit breaks; check proportioning valve and connection status
9112	8	Increased proportional valve output error
9114	5	The controller detecting decrease proportional valve current exceeds 2.75A; check proportioning valve and connection status
9120	5	Lowering valve controller detecting circuit breaks; check wiring and lowering valve status
9121	5	Lowering valve controller detecting circuit short circuit; check the wiring and lowering valve status
9122	8	Lowering valve on the output side abnormal
9128	5	Hold Valve loop disconnect
9129	5	Hold Valve circuit Short circuit
912A	8	Hold Valve output side of the error
9130	5	Rising pump motor circuit disconnect
9131	5	Pump motor current reversal abnormal rise
9200	3	Bridge current (controller at the positive electrode) is too high, check the battery

		status and associated wiring
9300		Key Service Overdue Time service accumulated power door locks when the number reaches the default value, Key Service Speed Limit speed limit operation
9301		Active Service Overdue Time to start the service when the cumulative number reaches the default value, Active Service Speed Limit speed limit operation
9500	5	Rising input signal error
9501	5	Rising input signal is out of range
9502	5	Rising input simulation quantity signal is out of range
9503	5	Simulation quantity signal rise too high
9504	5	Low rise simulation signals
9505	5	Rising input signal amplitude is too high
9506	5	Rising input signal amplitude is too low
9507	5	Rise simulation quantity signal off
9509		Rising input signal high-end reference error
9510	8	The controller detecting foot brake input error; please check the settings and wiring
9511	7	Detecting foot brake controller input exceeds reasonable limits; please check the settings and wiring
9512	7	Detecting foot brake controller analog input exceeds reasonable limits; please check the settings and wiring
9513	7	Detecting foot brake controller analog input is too high; please check the settings and wiring
9514	7	Detecting foot brake controller analog input is too low; please check the settings and wiring
950A		Rising input signal with reference to the low-end error
9515	7	The controller detecting foot brake input resistance is too high; please check the settings and wiring
9516	7	The controller detecting foot brake input resistance is too low; please check the settings and wiring
9517	7	The controller detecting foot brake input resistance is too low; please check the settings and wiring
9519	7	The controller detecting foot brake input end error; please check the settings and wiring
951A	7	The controller detecting the low end of the foot brake input error; please check the settings and wiring

### 6.3.15.2 Curtis 1243 Controller(○)

LED indicator controller (Curtis 1243) on the display code to help diagnose vehicle maintenance failure occur.

#### LED display mode

Display Mode	Information
Blinking	Controller failure

	View a programming fault
	Control instructions to view the corresponding LED lights flashing fault code
No blinking	Check key switch input signal, the controller fault
	Controller failure

LED display code (2,4) represents the LED flashes twice, pauses for a few seconds and then flash four times.



LED 显示代码	Programmer display	cause of issue		solution
0.1	NOKNOWNFAULTS	N/A		N/A
1.1	Current sensor fault	1	Vehicle operator error caused a high current spike	Turn the key switch again. If the problem persists, replace the controller.
		2	The current sensor out of range	
		3	Controller failure	
1.2	Hardware security failure	1	Large environmental interference	Turn the key switch again. If the problem persists, replace the controller.
		2	Self-test or watchdog error	
		3	Controller failure	
1.3	M- to short-circuit between the B-	1	M- internal or external short circuit between the B-	Check wiring; re-open the key switch If the problem persists, replace the controller
		2	Electrical wiring is incorrect	
		3	Controller failure	
1.4	Start the vehicle operation order (SRO) Error	1	Interlock switches, direction, key switch operation sequence error	View operating sequence; look accelerator adjusted correctly; View programming parameters are correct.
		2	Interlock switch direction or open circuit.	
		3	Operating sequence delay is set too short	
		4	Start the vehicle operation order (SRO) or wrong type of accelerator wrong choice	
		5	Transmission adjustment error	
2.1	Accelerator slip-ended input is too high	1	Accelerator input is open or shorted to B +	Correction Accelerator slip-ended input, so that the erroneous input go high normal input range.
		2	Accelerator fault	
		3	Choose the wrong type accelerator	
2.2	Emergency line, or reverse detection line open	1	Emergency line, or reverse detection line open	Re-examine the emergency reverse switch cable or restart

				interlock switch
2.3	When starting the vehicle foot pedal input signal is greater than 20%. The controller disables the output protection function (HPD) fault	1	Interlock switches, accelerators, key switch operation sequence error.	Check the operating sequence is correct; Check accelerator adjusted correctly; view programming parameters are correct
		2	Accelerator fault	
		3	Operating sequence delay is set too short	
		4	Choose the wrong type accelerator	
	SRVCTOTAL	1	Total maintenance timer times out	Using the programmer reset
	SRVCTRAC	1	Traction Maintenance timer times out	Using the programmer reset
	TOTALDISABLED	1	The total time to stop the timer	Using the programmer reset
	TRACDISABLED	1	Traction prohibit timer times out	Using the programmer reset
2.4	Accelerator slip-ended input is too low	1	Accelerator open or short circuit to B-	Correction Accelerator slip-ended input, so that the erroneous input go low normal input range
		2	Accelerator fault	
		3	Choose the wrong type accelerator	
3.1	Main contactor coil or exciter coil short	1	Main contactor coil short	That exposure test coil excitation coil, re-open the key switch
		2	Excitation coil to short-circuit between the B or B-	
		3	Excitation resistance is too low	
3.2	Main contactor contact adhesion	1	Main contactor contact adhesion	Test contactor and wiring; re-open the key switch
		2	Main contactor coil driver circuit	
3.3	Field winding open circuit	1	Open field winding connection points	Check wiring; re-open the key switch
		2	Field winding open circuit	
3.4	No contactors	1	Main contactor coil open	Check wiring; re-open the key switch
		2	Main contactor is not installed	
		3	Wires connected to the main contactor open	
4.1	Low battery	1	The battery voltage is less than the minimum operating voltage of the controller	The battery voltage is higher than the minimum operating voltage of the controller
		2	Battery terminal corrosion	
		3	Loose battery terminals or controller	
		4	The controller is broken	
4.2	Battery voltage is	1	As the battery voltage is higher than	The battery voltage is

	too high		the maximum operating voltage of the controller	lower than the operating voltage controller upper cut-off
		2	Still connected to the charger vehicle operation	
4.3	Current temperature drops	1	Temperature >85°C or <-25°C	The temperature returns to normal
		2	Vehicle overload	
		3	Controller Installation Error	
4.4	The start mode	1	Mode selection switch and short to B +	Restart Mode 1
	Select 1 switch is closed	2	Mode switch is "tied" in Mode 4 or Mode 2	
	Super hot motor, disable the output	1	Excitation resistance value is higher than the motor overheating set point resistance	It is lower than the resistance value of the motor excitation set point to prevent overheating
	Motor heating limit output	1	Motor excitation resistance value is higher than the set point heat resistance	It is lower than the resistance value of the motor excitation heating set point resistance

### Curtis 1232/1232E Controller(○)

Fault code LED indicator controller (Curtis 1232/1232 E) on the display to help diagnose vehicle maintenance failure occur.

#### LED display mode

error code	Fault content		Issue	solution
	<b>Display Mode</b>	1	External motor U, V or W short circuit connection	<b>Information</b>
LED light does not shine 12 Controller Overcurrent		2	Controller no power; or the vehicle battery is depleted; or other Motor parameters does not match	
Yellow LED flashes			Controller is working properly	
Yellow and red LED lights constant		3	Controller failure	
13 Current Sensor Fault Red LED ON		1	The controller is in program load status	
		2	Motor V, U, W circuit on the body, leading to leakage Watchdog failure or software Controller failure	Restart key switch is not installed. Restart key switch and restart. If necessary, reinstall the software.
14 Precharge Failed		1	Capacitor positive terminal of Controller error. Fault display code consists of two digits. Red light	Reset by VCI or re-enter the
Red and yellow LED lights flash alternately			flashes the number of times that the code is the first or the second digit figures; the number of flashes yellow represents the corresponding specific figures.	

			an external load, so that the capacitor is not charging properly	interlock switch
15	Controller Severe Undertemp	1	The controller working environment is too harsh	Appreciation temperature -40 °C above, restart interlock switch or key switch
16	Controller Severe Overtemp	1	The controller working environment is too harsh	Lowering the temperature below 95 °C. Restart interlock switch or key switch
		2	Overloaded vehicles	
		3	Controller Installation Error	
17	Severe Undervoltage	1	Battery parameter setting error	The capacitor voltage rises
		2	Non-controller system power consumption	
		3	Battery impedance is too large	
		4	Battery Disconnect	
		5	Fuse broken or not connected to the main contactor	
18	Severe Overvoltage	1	Battery parameter setting error	Reduce the voltage and then restart key switch
		2	Battery impedance is too high	
		3	Regenerative braking when the battery is disconnected	
22	Controller Overtemp Cutback The controller temperature is too high resulting in performance reduction	1	The controller working environment is too harsh	Reduce the temperature
		2	Overloaded vehicles	
		3	The controller is not installed correctly	
23	Undervoltage Cutback	1	Low battery	Enhance the capacitor voltage
		2	Battery parameter setting error	
		3	Non-controller system depleted	
		4	Battery impedance is too large	
		5	Battery Disconnect	
		6	Disconnect the fuse or the main contactor open	
24	Overvoltage Cutback	1	Regenerative braking regenerative braking current causes the battery voltage rises	Reduce the capacitor voltage rises

		2	Battery parameter setting error	
		3	Battery impedance is too large	
		4	Regenerative braking when the battery is disconnected	
25	+5V Supply Failure	1	External load impedance is too low	Adjust the output voltage to the normal range
26	drive 6 output overcurrent	1	External load impedance is too large	Adjust the load, and then use the VLC settings "stedigout" to restart the drive
27	drive 7 output overcurrent	1	External load impedance is too low	Adjust the load, and then use the VLC settings "stedigout" to restart the drive
28	Motor overheating cause performance reduction	1	Motor temperature is at or above the programmed temperature warning, resulting in reduced output current	Motor temperature return to normal range
		2	Motor temperature parameter is set incorrectly	
		3	If the motor is not using a temperature sensor, the programming parameters "Temp compensation" and "Temp cutback" must be set to "OFF"	
29	Motor overheating cause performance reduction	1	Motor temperature sensor connection is incorrect	Adjust the motor temperature sensor input voltage values in the normal range
		2	If the motor is no temperature sensor, parametric programming using "Motor Temp Sensor Enable" must be set to "OFF"	
31	drive1 coil is open or shorted output connections Main contactor coil open / short	1	Connection open or shorted loads	Correct open / short error, restart output
		2	Connecting pins defaced	
		3	Incorrect wiring	
32	Drive 2 coil is open or shorted output connections Electromagnetic brake coil open / short	1	Connection open or shorted loads	Correct open / short error, restart output
		2	Connecting pins defaced	
		3	Incorrect wiring	

33	Driver 3 output connection coil open / short	1	Connection open or shorted loads	Correct open / short error, restart output
		2	Connecting pins defaced	
		3	Incorrect wiring	
34	Driver 4 output connection coil open / short	1	Connection open or shorted loads	Correct open / short error, restart output
		2	Connecting pins defaced	
		3	Incorrect wiring	
35	Ratio drive open / short	1	Connection open or shorted loads	Correct open / short error, restart output
		2	Connecting pins defaced	
		3	Incorrect wiring	
36	Encoder failure	1	Motor encoder failure	Restart key switch
		2	Incorrect wiring	
37	Motor open	1	Motor phase	Detection phase, restart key switch
		2	Incorrect wiring	
38	Main contactor adhesion	1	Main contactor contact welding	Restart key switch
		2	U or V-phase motor disconnected or phase	
		3	There is a connection B + terminal of the capacitor-charging circuit	
39	Main contactor is not closed	1	Main contactor is not closed	Check contactors, restart key switch
		2	Main contactor oxidation, melting or unstable connection	
		3	Capacitor is charged external devices	
		4	The fuse is broken	
41	High output Accelerator	1	Accelerator potentiometer output voltage is too high	Reduce the output voltage of the accelerator potentiometer
42	Low output accelerator	1	Accelerator potentiometer output voltage is too low	Increased accelerator potentiometer output voltage
43	Potentiometer 2 output is too high	1	Potentiometer 2 output is too high	Reduce potential output voltage
44	Potentiometer 2 output is very low	1	Potentiometer 2 output is very low	Increase the output voltage of the potentiometer
45	Potentiometer low-side current is too high	1	Low impedance potentiometer	Reduce low-side current, restart key switch

46	EEPROM	1	The EEPROM memory write failure, This may be due to the VCR write EEPROM storage, Or CANBUS, Adjusted or programmed parameters programmed into the controller parameter error caused	Download the correct software (SO), set the correct control parameters, and then restart key switch
47	High pedal protection / operation sequence fails	1	Keyless start, interlock, direction, and accelerator input sequence settings	Enter the correct order
		2	Wiring, switch key interlock, direction, or accelerator input fault	
47	Emergency Reverse High pedal protection	1	Emergency reverse operation to end, but the accelerator forward and reverse input and interlocks are still not reset	In the correct order to re-enter
49	Parameter change failure / error	1	To ensure the safety of vehicles, some changes to certain parameters must be restarted after the entry into force of the switch key	Restart key switch
68	VCL run-time error	1	VCL code running timeout	Edit VCL application software bug fixes, new software checks to make sure it matches the correct parameters. Restart key switch
69	External power supply output is out of range	1	External load at 5V and 12V power supply current is too large or too line	External current adjustment
		2	In the "Check the menu (Checking Menu)" parameter error.	
71	Operating system failure	1	Internal controller failure	Restart key switch
72	PDO timeout	1	CAN PDO information reception time exceeds the time limit	Restart key switch, Or receive information CAN NMT
73	Motor stall Motor was blocked	1	Motor benedict turn	Restart key switch. Motor encoder or detecting a valid
		2	Motor encoder failure	

		3	Incorrect wiring	signal in DOS mode, and set the parameter to Throttle Command = 0, Motor RPM = 0
		4	Motor encoder input power failure	
87	Motor fails to match	1	Control codes appear in the motor 0 = normal matching process 1 = controller receives the encoder signal, but is not defined pulse volume, manually set the pulse volume 2 = Motor temperature sensor failure 3 = Motor temperature reaction failure 4 = Motor overheating reactor failure 5 = low temperature reaction motor failure 6 = low voltage failure Reaction 7 = high pressure reactor failure 8 = Controller can not check the encoder signal, channel signal disappears 9 = Motor parameter setting exceeds range	Correcting errors and restart the key switch
89	Motor type error	1	Motor type (Motor Type) parameter value is out of range	Reset and restart key switch
91	VLC / OS does not match	1	Controller C ++ program does not match the DOS program	Update and correct VCL OS program
92	Electromagnetic brake invalidation	1	After the electromagnetic brake command is set vehicle is still moving	Check accelerator is normal
		2	Electromagnetic braking force is too small	
93	Encoder restricted operation state	1	Since the motor stall or encoder failure so restricted operating state is activated	Restart key switch, if it is because the motor Benedict turn lead to, make sure that the encoder operates in normal operation, Throttle Command = 0 Motor RPM = 0
		2	Wrong Wiring	
		3	Vehicle stall	

94	Reverse emergency response timeout	1	Since the EMR Timer timer expires, a timeout caused the emergency reverse is activated	Check the state of emergency reversing switch
		2	Emergency reverse switch has been in the On position	
98	Controller error signal	1	Controller model does not recognize	Select the correct controller, download the correct controller software
		2	Hardware and software do not match each other	
		3	Damage to the controller	

### Fault code (electronic power steering)

#### Curtis 1232/1232 E controller (drive controller)



Fault code Refer to Section 6.3.15.3

#### Curtis 1220 Controller (steering controller)

Fault code LED indicator controller (Curtis 1220) on the display to help diagnose vehicle maintenance failure occur.

#### LED indicator display modes

Display Mode	information
LED light is not on	Controller KSY power is not on, or the battery is exhausted, or there are other serious fault
LED lights flashing regularly	Controller is working properly
LED lights flashing rapid or irregular	Controller failure, LED display code example, (1,3): ☼☼☼☼ LED lights indicate the first chain lightning once, pause a few seconds after the chain lightning three times.

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error code	Fault description	Possible failure factors	Solution
1.2	Controller Overcurrent	<ol style="list-style-type: none"> <li>1. Controller "B +" line is dead</li> <li>2. Improper limiting parameter settings</li> <li>3. Controller failure</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the wiring</li> <li>2. Check the parameters of which was corrected</li> <li>3. Replace the controller</li> </ol>
1.3	Current Sensor Fault	<ol style="list-style-type: none"> <li>1. The vehicle operator error caused a high current spike</li> <li>2. The current sensor out of range</li> </ol>	Turn the key switch again. If the problem persists, replace the controller

		3. Controller failure	
1.4	Percharge Failed	1. The positive terminal of the capacitor external load, so that the capacitor is not charging properly	Cut off all power and try again. If the problem persists, replace the controller
1.5	Contoller Severe Undertemp	1. The controller working environment is too harsh	The temperature rose to -40 °C above, restart key switch
1.6	Controller Severe Overtemp	1. The controller working environment is too harsh 2. The steering current is too large 3. Install no heat controller	1. Reduce the temperature below 95 °C, restart key switch 2. Check the steering motor rotation is smooth, with or without catching phenomenon 3. The controller increases the heat (thermal grease coating, thermal aluminum)
1.7	Severe Undervoltage	1. Battery parameter setting error 2. Battery voltage is less than the minimum operating voltage of the controller 3. Loose or corroded terminals	1. Check the battery parameters, which is correct 2. Check the battery voltage 3. Check terminals
1.8	Severe Overvoltage	1. Battery parameter setting error 2. As the battery voltage is higher than the maximum operating voltage of the controller 3. The car charger is still connected both runtime	1. Check the battery parameters, which is correct 2. The battery voltage is lower than the operating voltage controller upper cut-off 3. Disconnect the charger
2.1			
2.2	Controller Overtemp Cutback	1. The controller working environment is too harsh 2. The steering current is too large 3. Install no heat controller	1. Reduce the temperature below 95 °C, restart key switch 2. Check the steering motor rotation is smooth, with or without catching phenomenon 3. The controller increases the heat (thermal grease coating, thermal aluminum)
2.3	Motor line polarity errors	1. The controller and motor wiring polarity errors 2. The position encoder AB phase wiring error	Check the wiring to be adjusted

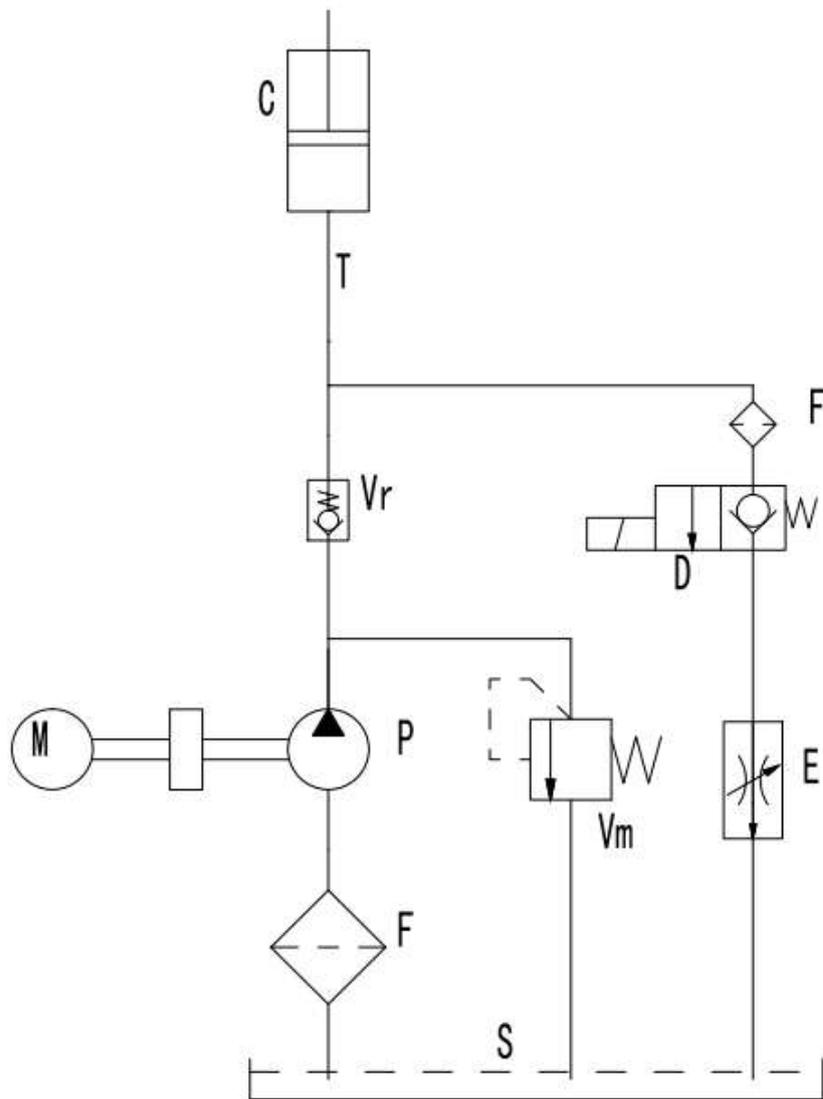
2.4	The steering wheel out of the permissible range	1. The steering motor encoder is damaged, no signal output 2. The steering motor encoder uses the error	Replace the encoder
3.1	Internal drive controller fault relay		Replace the encoder
3.2	Controller internal relay contact adhesion		Replace the encoder
3.3	The controller does not pull the internal relay		Replace the encoder
3.4	Hardware failure		Replace the encoder
3.5	Output port fault		
3.6	Steering motor stall	1. The steering motor encoder AB phase wiring error 2. The steering motor encoder supply voltage is too low 3. Use the wrong steering motor encoder 4. The steering motor seizure does not turn	1. Adjust the position encoder AB phase wiring 2. Check the position of the encoder power supply voltage is less than 5V port 1E7,1E10 3. Replace the correct position encoder 4. Check the steering motor rotation is smooth, with or without catching phenomenon
3.7	Steering motor open		Check wiring
3.8	Steering motor line short		Check wiring
4.1	(J1-6) Input signal out of range	1. improper parameter setting 2. turn potentiometer assembly signal overrun	1. Check the Left, Center, Right signal parameter settings, can not exceed the set deadband 2. Adjust potentiometer handle in the middle position (Center), the signal is 2.5V
4.2	1. (J1-13) Input signal out of range 2. (J1-6) and (J1-13) Input signal does not match	1. improper parameter setting 2. turn potentiometer assembly signal overrun	
4.3	(J1-11) Input signal out of range	1. improper parameter setting 2. The feedback potentiometer assembly signal overrun	1. Check the Left, Center, Right signal parameter settings, can not exceed the set deadband 2. Adjust the potentiometer, the drive wheel in the middle position (Center), the signal is 2.5V
4.5	Parameter change fault		Check parameters, correct it

4.6	EEPROM fault	1. EEPROM memory write has failed. Programmer parameter adjustment, the parameters programmed into the controller error	Setting the correct control parameters, and then restart key switch
4.7	Steering motor encoder fault	1. The steering motor encoder damage	Replace the encoder
5.3	The median is not found	1. Zero proximity switch wiring errors or damaged 2. Zero proximity switch sensing distance is too large	1. Check the wiring to see if the switch is damaged 2. Adjust the proximity switch sensing distance
6.2	Communication error	On power-up and walking controller fails to communicate	Check the walking controller and the steering controller T24 12-pin wiring is connected
6.3	No Communication	1. Communication Port (E1-8) open 2. Programming and walking controller is connected	1. Check the walk controller T28 and steering controller 8-pin wiring is connected 2. Unplug the programmer
7.1	Software failure		Replacement controller by Curtis personnel software update
7.3	Failure to follow		
7.5	Parameter conflicts		Check parameters, correct it

#### 6.4 Equipment scrap and waste approach

The truck eventually scrap, waste treatment carried out must be used according to national laws and regulations in force. Special attention should be about dealing with waste batteries, electronics, electrical equipment requirements.

#### Accessory 1 Hydraulic schematics



**M:** motor pump station

**D:** solenoid valve

**S:** Tank

**Vm:** relief valve

**F:** Filter

**E:** Throttle

**P:** Pump

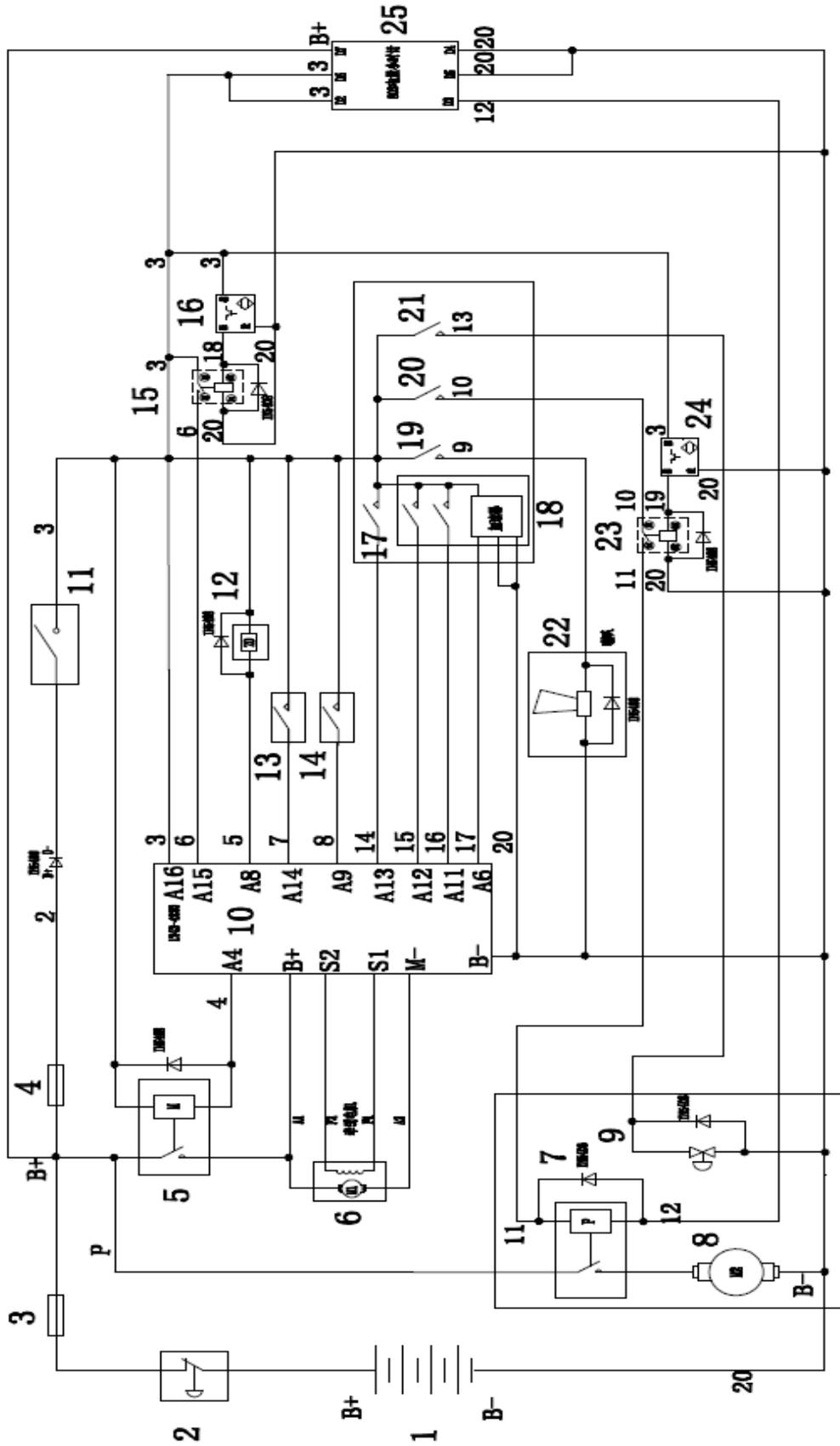
**Vr:** a one-way valve

**C:** Cylinder

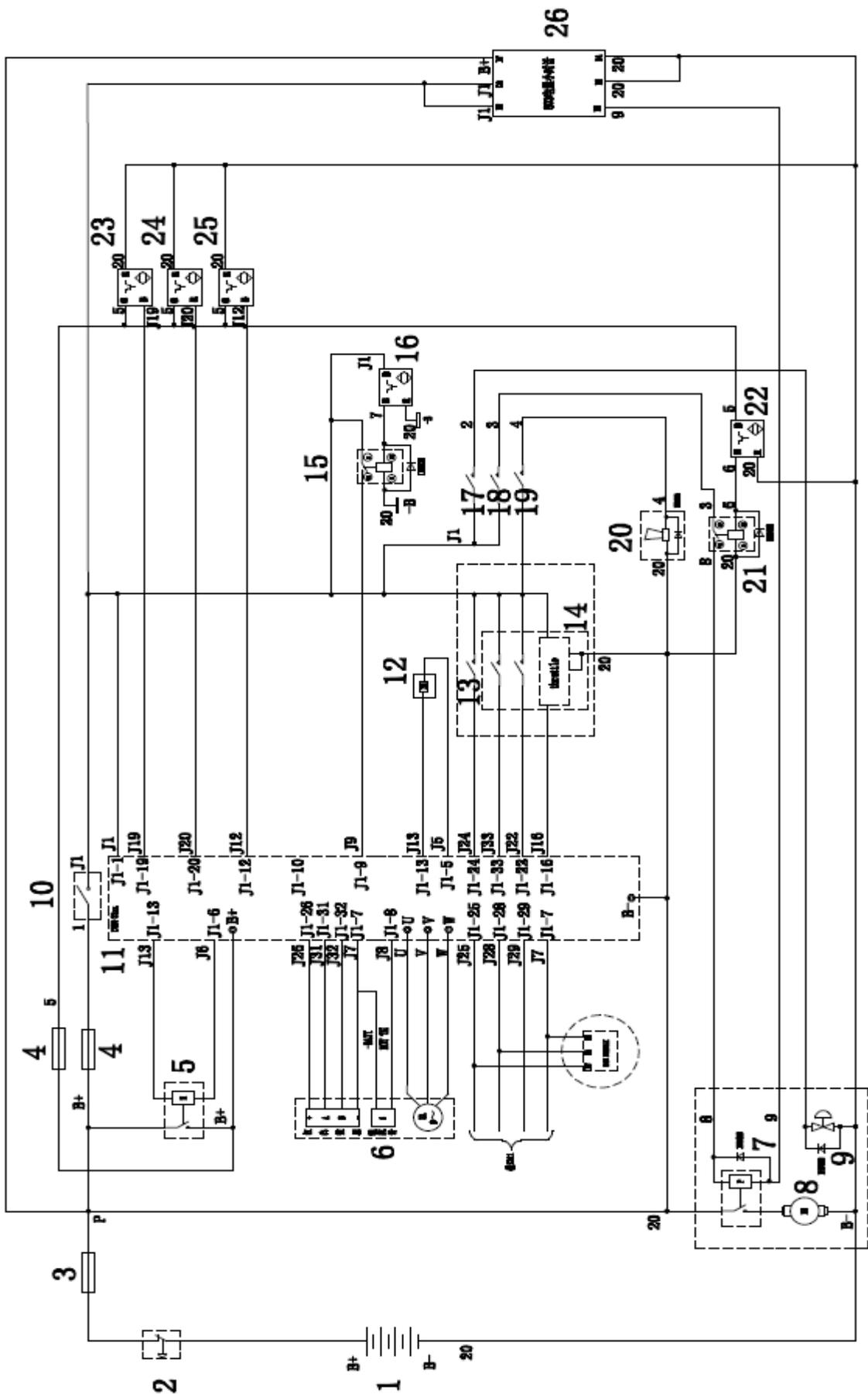


<b>SN</b>	<b>Name</b>	<b>Remark</b>
1	Battery	
2	Emergency Stop Button	
3	200A Plug Fuse	
4	10A Blade Fuse	
5	Main Contactor	
6	Driving Motor	
7	Pump Contactor	
8	Pump Motor	
9	Electromagnetic Valve	
10	Key Switch	
11	PG C3 Controller	
12	Electromagnetic brake	
13	Pedal speed proximity switch	○
14	Rise limit proximity switch	○
15	Interlock Switch	
16	Turtle speed switch	○
17	Emergency reversing switch	
18	accelerator	
19	Horn switch	
20	Down switch	
21	Lifting switch	
22	PG Hour Meter	
23	Horn	

Accessory 3 Electrical schematics (XP20 / XP25 / XP30- mechanical steering) - Curtis 1243(○)

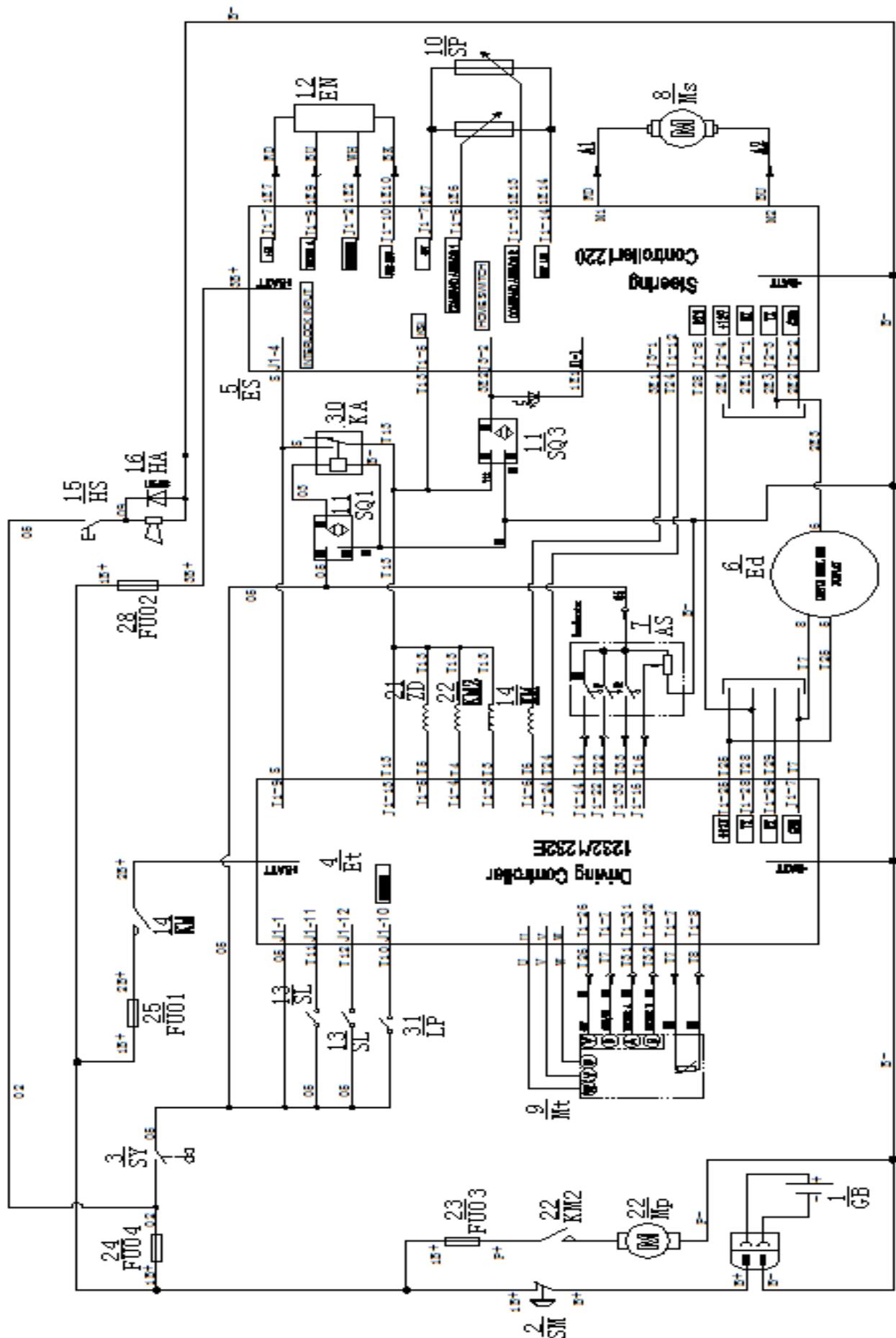


<b>SN</b>	<b>Name</b>	<b>Remark</b>
1	Battery	
2	Emergency Stop Button	
3	200A Plug Fuse	
4	10A Blade Fuse	
5	Main Contactor	
6	Driving Motor	
7	Pump Contactor	
8	Pump Motor	
9	Electromagnetic Valve	
10	Curtis 1243 Controller	
11	Key Switch	
12	Electromagnetic Brake	
13	Switch Mode 1	○
14	Switch Mode 2	○
15	Relay	
16	Interlock Switch	
17	Emergency reversing switch	
18	accelerator	
19	Horn Button	
20	Rise Switch	
21	Down switch	
22	Horn	
23	Replay	
24	Proximity Switch	○
25	803 Hour Meter	



SN	Name	Remark
1	Battery	
2	Emergency Stop Button	
3	150A Plug Fuse	
4	10A Blade Fuse	
5	Main Contactor	
6	Driving Motor	
7	Pump Contactor	
8	Pump Motor	
9	Electromagnetic Valve	
10	Key switch	
11	Curtis 1232/1232E controller	
12	Electromagnetic Brake	
13	Emergency reversing switch	
14	Accelerator	
15	Relay	
16	Proximity Switch	
17	Down switch	
18	Lifting switch	
19	Horn switch	
20	Horn	
21	Relay	
22	Proximity Switch	
23	Left armrest switch	○
24	Right armrest switch	○
25	Pedal limit switch	○
26	803 hour meter	

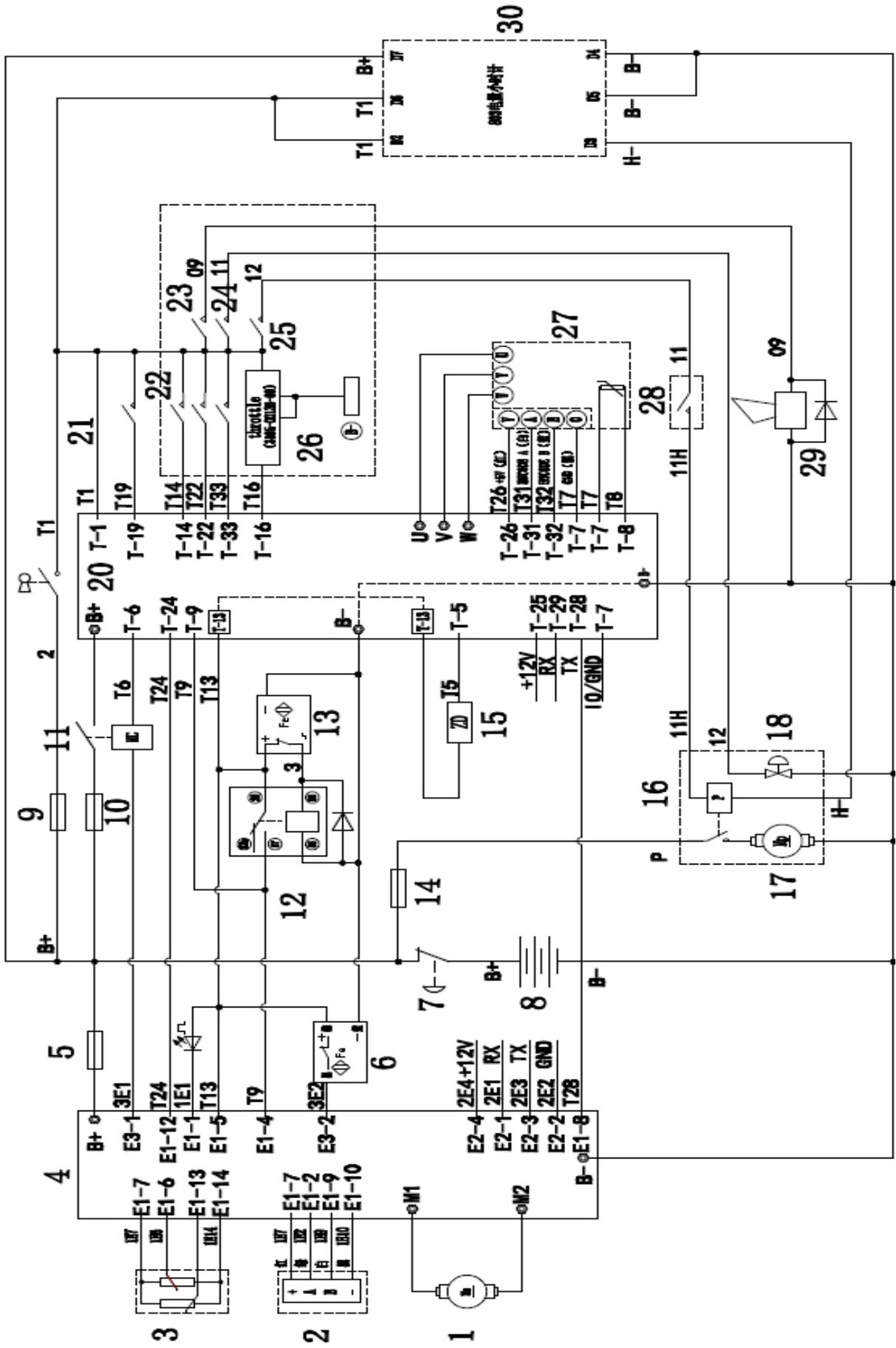
Accessory 5 electrical schematics (XPA25 room temperature car - Electronic Power Steering)- Curtis 1232/1232E+1220



<b>SN</b>	<b>Code</b>	<b>Name</b>	<b>Remark</b>
1	GB	Battery	
2	SM	Emergency Stop Button	
3	SY	Key Switch	
4	ET	Curtis 1232/1232E Controller	
5	ES	Curtis 1220C Controller	
6	ED	840 Hour Meter	
7	AS	Accelerator	
8	MS	Steering motor	
9	MT	Driving Motor	
10	SP	Turn potentiometer	
11	SQ1	Proximity Switch	
12	EN	Position encoder	
13	SL/SS	Lifting / lowering button	
14	KM	Main Contactor	
15	HS	Horn switch	
16	HA	Horn	
21	ZD	Electromagnetic Brake	
22	KM2	Pump Assembly	
23	FU03	150A Plug Fuse	
24	FU04	10A Blade Fuse	
25	FU01	150A Plug Fuse	
28	FU02	30A Blade Fuse	
30	KA	Interlock relay	
31	LP	Limit switch	

**Accessory 6 electrical schematics (XPA25 cold car - Electronic Power Steering)- Curtis 1232/1232E+1220**

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<b>SN</b>	<b>Name</b>	<b>Remark</b>
1	Steering motor	
2	Encoder	
3	Turn potentiometer	
4	Curtis 1220 Controller	
5	30A Blade Fuse	
6	Proximity Switch	
7	Emergency stop switch	
8	Battery	
9	10A Blade Fuse	
10	150A Plug Fuse	
11	Main Contactor	
12	Relay	
13	Proximity Switch	
14	200A Plug Fuse	
15	Electromagnetic Brake	
16	Pump Contactor	
17	Pump Motor	
18	Electromagnetic Brake	
19	Key Switch	
20	Curtis 1232/1232E Controller	
21	Turtle speed switch	○
22	Emergency reversing switch	
23	Horn switch	
24	Lifting switch	
25	Down switch	
26	Accelerator	
27	Driving Motor	
28	Limit switch	○
29	Horn	
30	803 Hour Meter	