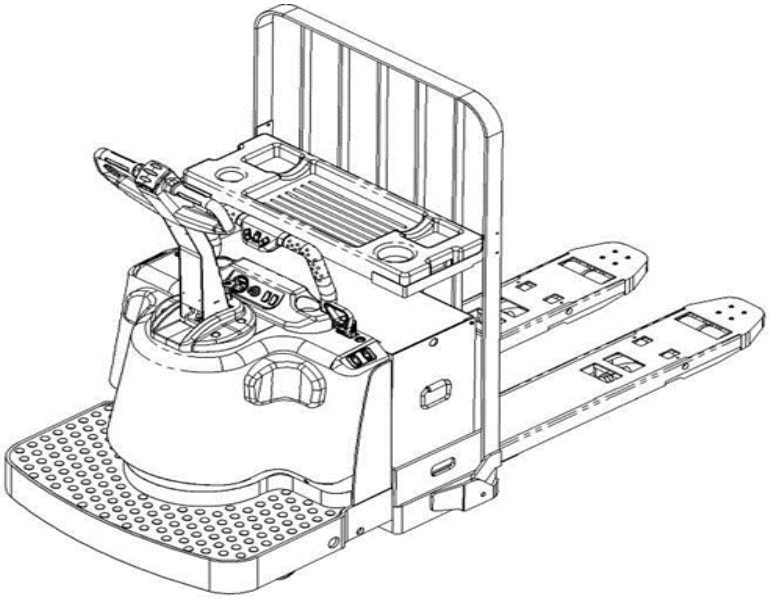
NOBLELIFT 诺力

NOBLELIFT

Service Manual

PT27-36R



PT27-36RM

1/2021

Content

Foreword

This specification briefly introduces the technical parameters of our pallet, the structure of the main components, working principle and operation, maintenance, maintenance and other requirements and contents. Please read this manual carefully before operation in order to ensure safe and effective material handling through proper driving and maintenance. At the same time, it can help operators to use battery vehicles reasonably, so that pallet play the maximum efficiency! It is hoped that operators and equipment managers will read carefully before operating battery vehicles! Please strictly abide by the regulations and matters needing attention in this specification, drive carefully, operate carefully and use carefully, so that your pallet can be in the best working condition for a long time and play its best role. When you rent or transfer a vehicle, please rent or transfer this manual with the car.

To highlight, the following icons are used in this manual:

---- Indicates a potentially dangerous state, if not avoided, may cause serious personal injury, serious damage to the pallet or fire, etc.

---- Indicates a potentially dangerous state, if not avoided, that may cause minor injury to the person, or local damage to the pallet, etc.

3. ---- General considerations and instructions when using

Most of this product is made of recyclable steel, and the waste produced in the process of use, maintenance, cleaning and disassembly must be recovered and disposed of without pollution according to local regulations. The recycling of such waste must be done by professionals in designated areas, such as hydraulic fluids, batteries and electronic equipment, which, if not handled properly, may be hazardous to the environment and human health.

Special statement:

1) this product is strictly prohibited from being used in potentially explosive dangerous environments.

2) the noise level of the normal use of this product is in accordance with the international standard EN 12053.

3) the normal vibration level of this product conforms to the international standard EN13059.

4) the environmental requirements for the normal use of this product are as follows: altitude is not more than 2000 meters, temperature range is-5 °C-40 °C, humidity is not more than 90%, wind speed is not more than 5 m / s.

If you need to use it in cold storage or special environment for a long time, please contact our technical staff if you need to install special accessories.

5) implement product recall service in the event of batch problem

Due to the requirement of continuous product improvement, manufacturers reserve the right to change their product design and specifications without prior notice. If you want to know the latest product parameters, please contact us. All parameters of this manual shall be subject to the date of publication of the specification.

1. GENERAL

1.1 INTRODUCTION – MAINTENANCE SAFETY PRECAUTIONS

Maintenance work may cause injuries. Always take care to perform work safe, at least observing the following. It is of utmost importance that maintenance personnel pay strict attention to these warnings and precautions to avoid possible injury to themselves, others or damage to the equipment. A maintenance program must be followed to ensure that the machine is safe to operate.
The specific precautions to be observed during maintenance are inserted at the appropriate point in the manual. These precautions are, for the most parts, those that apply when servicing hydraulic and larger truck component parts.

MODIFICATION OF THE TRUCK WITHOUT CERTIFICATION BY A RESPONSIBLE AUTHORITY THAT THE TRUCK IS AT LEAST AS SAFE AS ORIGINALLY MANUFACTURED, IS A SAFETY VIOLATION.

SINCE THE TRUCK MANUFACTURER HAS NO DIRECT CONTROL OVER THE FIELD INSPECTION AND MAINTENANCE, SAFETY IN THIS AREA RESPONSIBIUTY OF THE OWNER OR OPERATOR.

FAILURE TO COMPLY WITH SAFETY PRECAUTIONS, LISTED IN THIS SECTION MAY RESULT

When carrying out any operation or maintenance, have trained and experienced personnel to carry out the work.

When carrying out any operation or maintenance, carefully read operation and maintenance handbook.

Read all the precautions given on the decals which are fixed to the truck.

Be sure you fully understand the content of the operation. It is important to prepare necessary tools and parts for maintain the truck.

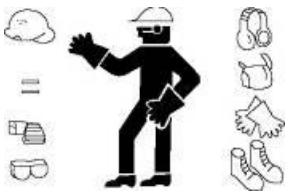
Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

It should be noted that the machines hydraulic systems operate atextremely high potentially dangerous pressures. Every effort should be made to relieve any system pressure prior to disconnecting or removing any portion of the system. Relieve system pressure by cycling the applicable control several times with the engine(motor) stopped and ignition on, to direct any line pressure back into the

reservoir. Pressure feed lines to system components can then be disconnected with minimal fluid loss.

Remove all rings, watches and jewelry when performing any maintenance.

Wear well-fitting helmet, safety shoes and working Clothes When drilling grinding or hammering always. Wear protective goggles. Always do up safety clothes properly so that they do. Not catch on protruding parts of machines. Do not wear oily clothes. When checking, always release battery plug. DO NOT WEAR LONG HAIR UNRESTRAINED, OR LOOSE-FITTING CLOTHING AND NECKTIES WHICH ARE APT TO BECOME CAUGHT ON OR ENTANGLED IN EQUIPMENT.



During maintenance do not allow any unauthorized person, to stand near the machine.

Flames should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil or electrolyte.

Immediately remove any oil or grease on the floor of the operator's compartment or on the handrail. It is very dangerous if someone slips while on the machine.

Always use pure oil or grease, and be sure to use clean containers.

Oil is a dangerous substance. Never handle oil, grease or oily clothes in places where there is any fire or flame. As preparation for use of fire extinguishers and other fire- fighting equipment.

Keep the battery away from fire hazards. The generated gases are explosive. Store all the oils in a specified place.

Keep the flammable things away from the machine. Do not smoke at the working place.

Battery should always be disconnected during replacement of electrical components.

Always use the grades of grease and oil recommended by NOBLELIFT choose the viscosity specified for the ambient temperature. Exhaust gas is dangerous provide ventilation when working in a closed space.

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Wear a gas mask if necessary.

When working on top of the machine, be careful not to lose your balance and fall.

Hand a caution sign in the operator's compartment (for example "Do not start" of "Maintenance in progress"). This will prevent anyone from starting or moving the machine by mistake.

When welding on the machine or working on the electrical system, ALWAYS turn the key switch OFF and remove the battery plug from the battery. Park the machine on firm, flat ground. Lower the fork to the min. height and stop the motor.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to

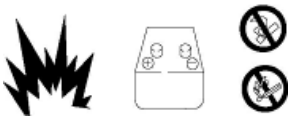
burn skin and eat holes in clothing. If you spill acid on your clothes or skin, immediately flush with large quantities or water.

When working on the battery, wear goggles or safety glasses. If splashed into the eyes, flush with water and get medical attention immediately.

Battery terminals touched by metal objects can cause short circuit and burn you. Keep tools away from the terminals.

Keep sparks, lighted matches, and open flame away from the top of battery. Battery (hydrogen) gas can explode.

When disassembling and assembling the battery, make sure that the battery terminals (+, –) are correctly connected.



If water gets into the electrical system, abnormal operation or failure can result. Do not use water or steam on sensors, connectors and instruments in the cab.

Do not handle electrical equipment while wearing wet gloves, or in wet places, as this can cause electric shock.

When working with other, choose a group leader and work according to his instructions. Do not perform any maintenance beyond the agreed work.

Unless you have special instructions to the contrary, maintenance should always be carried out with the motor stopped. If maintenance is carried out with the motor running, there must be two technicians present: One operating the stacker and the other one performing the maintenance. In such a case, never touch any moving part. Before making adjustment, lubricating or performing any other maintenance, shut off all power controls.

When removing parts containing O-ring Gaskets or seal clean the mounting surface and replace with new sealing parts.

Thoroughly clean the machine. In particular, be careful to clean the grease fittings and the area around the dipsticks. Be careful not to let any dirt or dust into the system.

Use only approved nonflammable cleaning solvents.

When changing the oil or fitter, check the drained oil and filter for any signs of excessive metal particles or other foreign materials.

Always use NOBLELIFT genuine parts for replacement. ENSURE REPLACEMENT PARTS OR COMPONENTS ARE IDENTICAL OR EQUIVALENT TO ORIGINAL PARTS OR COMPONENTS.

When checking an open gear case, there is a risk of dripping things in. Before removing the covers to inspect such cases, empty everything from your pockets. Be particularly careful to remove wrenches and nuts.

1.2 MEASUREMENT CONVERSIONS

Length

Unit	cm	m	km	in	ft	yd	mile
cm	1	0.01	0.00001	0.3937	0.03281	0.01094	0.000006
m	100	1	0.001	39.37	3.2808	1.0936	0.00062
km	100000	1000	1	39370.7	3280.8	1093.6	0.62137
in	2.54	0.0254	0.000025	1	0.08333	0.02777	0.000015
ft	30.48	0.3048	0.000304	12	1	0.3333	0.000189
yd	91.44	0.9144	0.000914	36	3	1	0.000568
mile	160930	1609.3	1.6093	63360	5280	1760	1

1mm=0.1cm, 1　m=0.001mm

Area

Unit	cm2	m2	km2	a	ft2	yd2	in2
cm2	1	0.0001	–	0.000001	0.001076	0.000012	0.155000
m2	10000	1	0.000001	0.01	10.764	1.1958	1550.000
km2	–	1000000	1	10000	1076400	1195800	–
a	0.01	100	0.0001	1	1076.4	119.58	–
ft2	–	0.092903	–	0.000929	1	0.1111	144.000
yd2	–	0.83613	–	0.008361	9	1	1296.00
in2	6.4516	0.000645	–	–	0.006943	0.000771	1

1ha=100a, 1mile2=259ha=2.59km2

Volume

Unit	cm3 = cc	m3	l	in3	ft3	yd3
cm3 = m l	1	0.000001	0.001	0.061024	0.000035	0.000001
m3	1000000	1	1000	61024	35.315	1.30796
l	1000	0.001	1	61.024	0.035315	0.001308
in3	16.387	0.000016	0.01638	1	0.000578	0.000021
ft3	28316.8	0.028317	28.317	1728	1	0.03704
yd3	764529.8	0.76453	764.53	46656	27	1

1gal(US)=3785.41 cm3=231 in3=0.83267gal(US)

Weight

Unit	g	kg	t	oz	lb
g	1	0.001	0.000001	0.03527	0.0022
kg	1000	10	0.001	35.273	2.20459
t	1000000	1000	1	35273	2204.59
oz	28.3495	0.02835	0.000028	1	0.0625
lb	453.592	0.45359	0.000454	16	1

1 tone (metric)= 1.1023 ton(US)=0.9842 ton(UK)

Pressure

Unit	kgf/cm2	bar	Pa=N/m2	kPa	lbf/in2	lbf/ft2
kgf/cm2	1	0.98067	98066.5	98.0665	14.2233	2048.16
bar	1.01972	1	100000	100	14.5037	2088.6
Pa=N/m2	0.00001	0.001	1	0.001	0.00015	0.02086
kPa	0.01020	0.01	1000	1	0.14504	20.886
lbf/in2	0.07032	0.0689	6894.76	6.89476	1	144
lbf/ft2	0.00047	0.00047	47.88028	0.04788	0.00694	1

kgf/cm2=735.56 Torr(mmHg)=0.96784atm

Standard tightening torque

The following charts give the standard tightening torques of bolts and nuts.

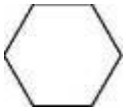
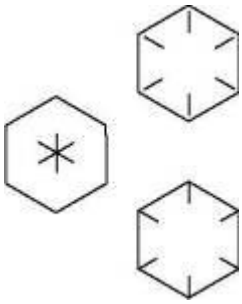
Exceptions are given in sections of “Disassembly and Assembly”

METER TABLE

Classification	4T, 5T	10T
Bolt type		 10.9
Bolt size	Torque kgf · m (lbf · ft)	Torque kgf · m (lbf · ft)
M4	0.2 ± 0.02	0.4 ± 0.04
M5	0.3 ± 0.03	0.8 ± 0.08
M6	0.5 ± 0.05	1.4 ± 0.14
M8	1.2 ± 0.12	3.3 ± 0.3
M10	2.3 ± 0.23	6.5 ± 0.7
M12	4.0 ± 0.4	11.3 ± 1.1
M14	6.4 ± 0.6	17.9 ± 1.8
M16	9.5 ± 0.9	26.7 ± 2.7
M18	13.5 ± 1.4	38.0 ± 3.8

M20	18.6 ± 1.9	52.2 ± 5.2
M22	24.7 ± 2.5	69.4 ± 6.9
M24	32.1 ± 3.2	90.2 ± 9.0
M30	62.6 ± 6.3	176.1 ± 17.6
M36	108.2 ± 10.8	304.3 ± 30.4
M42	171.8 ± 17.2	483.2 ± 48.3
M45	211.3 ± 21.1	594.3 ± 50.4

INCH TABLE

	4T, 5T	10T
Classification Bolt type		
Bolt size	Torque kgf · m (lbf · ft)	Torque kgf · m (lbf · ft)
1/4	0.6 ± 0.06	1.7 ± 0.2
5/16	1.2 ± 0.12	3.0 ± 0.3
3/8	2.0 ± 0.20	5.6 ± 0.5
7/16	3.2 ± 0.32	8.9 ± 0.9
1/2	4.7 ± 0.47	13.4 ± 1.3
9/16	6.8 ± 0.68	19.0 ± 1.9
5/8	9.3 ± 0.93	26.1 ± 2.6
3/4	16.0 ± 1.60	45.1 ± 4.5
7/8	25.5 ± 2.55	71.6 ± 7.2
1	38.0 ± 3.80	106.9 ± 10.7
1-1/8	54.1 ± 5.41	152.2 ± 15.2
1-1/4	74.2 ± 7.42	208.9 ± 20.9
1-3/4	98.8 ± 9.88	277.8 ± 27.8
1-1/2	128.2 ± 12.82	360.7 ± 36.1

The torque in above table shall not be applied to nylon or nonferrous bolts or washer. The same is valid for not

standardized ones.
H Newton meter : 1 Nm = 0.1kgfm

TIGHTENING TORQUE OF SPLIT FLANGE BOLTS
The following torque shall be applied to the split flange bolts.

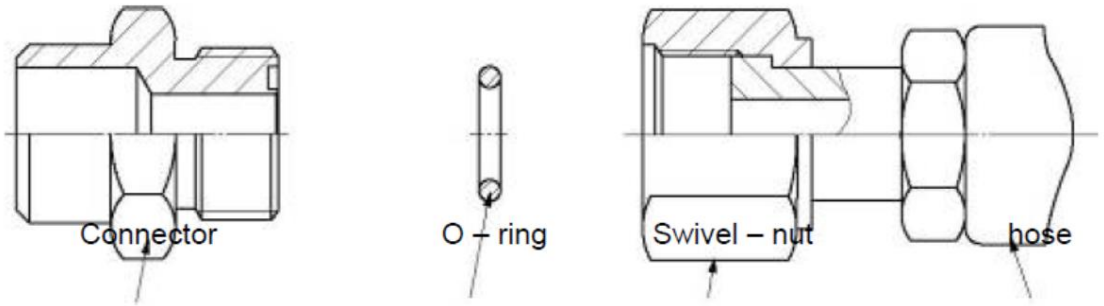
Diameter (mm)	Flat width (mm)	Torque	
		kgf·m	N·m
10	14	6.7 ± 0.7	66.7 ± 6.8
12	17	11.5 ± 1	112 ± 9.8
16	22	28.5 ± 3	279 ± 29

.

PF THREAD

Thread	Torque (kgf·m)
1/8	1.1 ± 0.1
1/4	2.6 ± 0.2
3/8	4.6 ± 0.3
1/2	8.5 ± 0.4
3/4	19 ± 1.0
1	33 ± 2.0

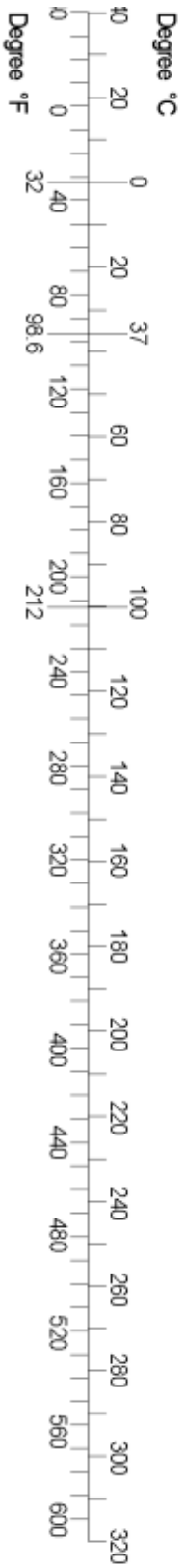
TORQUE FOR SWIVEL NUT WITH O-RING



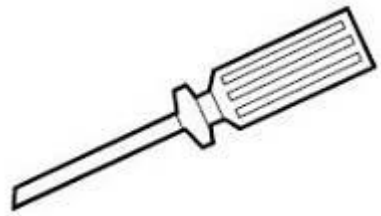
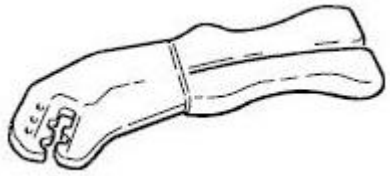
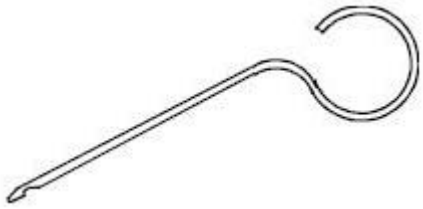
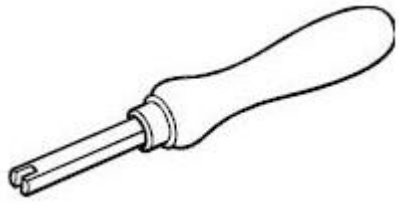
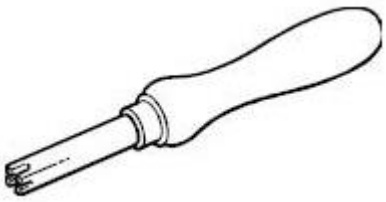
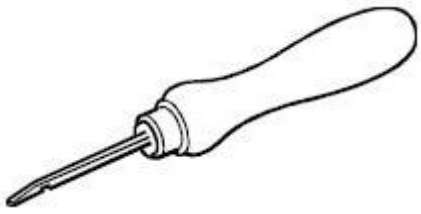
Tube O.D (inch)	Thread (in)	Torque (kgf·m)
1/2	UN　13/16 - 16	9.5 ± 0.95
3/4	UN 1 3/16 - 12	18 ± 1.8
1	UN 1 7/16 - 12	21 ± 2.1

SI Unit		Conv Factor		Non–SI Unit		Conv Factor		SI Unit
Torque								
Newton meter (N·m)	×	8.9	=	In·in	×	0.113	=	N·m
Newton meter (N·m)	×	0.74	=	lb·ft.	×	1.36	=	N·m
Newton meter (N·m)	×	0.102	=	kg·m	×	7.22	=	lb·ft.*
Pressure (Pa = N/m2)								
kiloPascal (kPa)	×	4.0	=	in. H2O	×	0.249	=	kPa
kiloPascal (kPa)	×	0.30	=	in. Hg	×	3.38	=	kPa
kiloPascal (kPa)	×	0.145	=	psi	×	6.89	=	kPa
(bar)	×	14.5	=	psi	×	0.069	=	bar*
(kg/cm2)	×	14.22	=	psi	×	0.070	=	kgf/cm2*
Newton/mm2	×	145.04	=	psi	×	0.069	=	bar*
MegaPascal (MPa) (Pa=N·m2)	×	145	=	psi	×	0.00689	=	MPa
Power r (W = J/s)								
kiloWatt (kW)	×	1.36	=	PS (cv)	×	0.736	=	kW
kiloWatt (kW)	×	1.34	=	HP	×	0.746	=	kW
kiloWatt (kW)	×	0.948	=	Btu/s	×	1.055	=	kW
Watt (W) (W=J/s)	×	0.74	=	ft·lb/s	×	1.36	=	W
Energy (J = N·m)								
kiloJoule (kJ)	×	0.948	=	Btu	×	1.055	=	kJ
Joule (J) (J=N·m)	×	0.239	=	calorie	×	4.19	=	J
Velocity and acceleration								
meter per sec2 (m/s2)	×	3.28	=	ft/s2	×	0.305	=	m/s2
meter per sec (m/s)	×	3.28	=	ft/s	×	0.305	=	m/s
kilometer per hour	×	0.62	=	mph	×	1.61	=	km/h
Horse Power/Torque								
BHP × 5252 R.P.M. = TQ (lb·ft)				TQ Z R.P.M. 5252 = B.H.P.				
Temperature								
°C = (°F–32) ÷ 1.8				°F= (°C Z 1.8) + 32				
Flow Rate								
liter/min (dm3/min)	×	0.264	=	US gal/minZ3.785			=	l/min

Note : (　　) Non–SI Unit

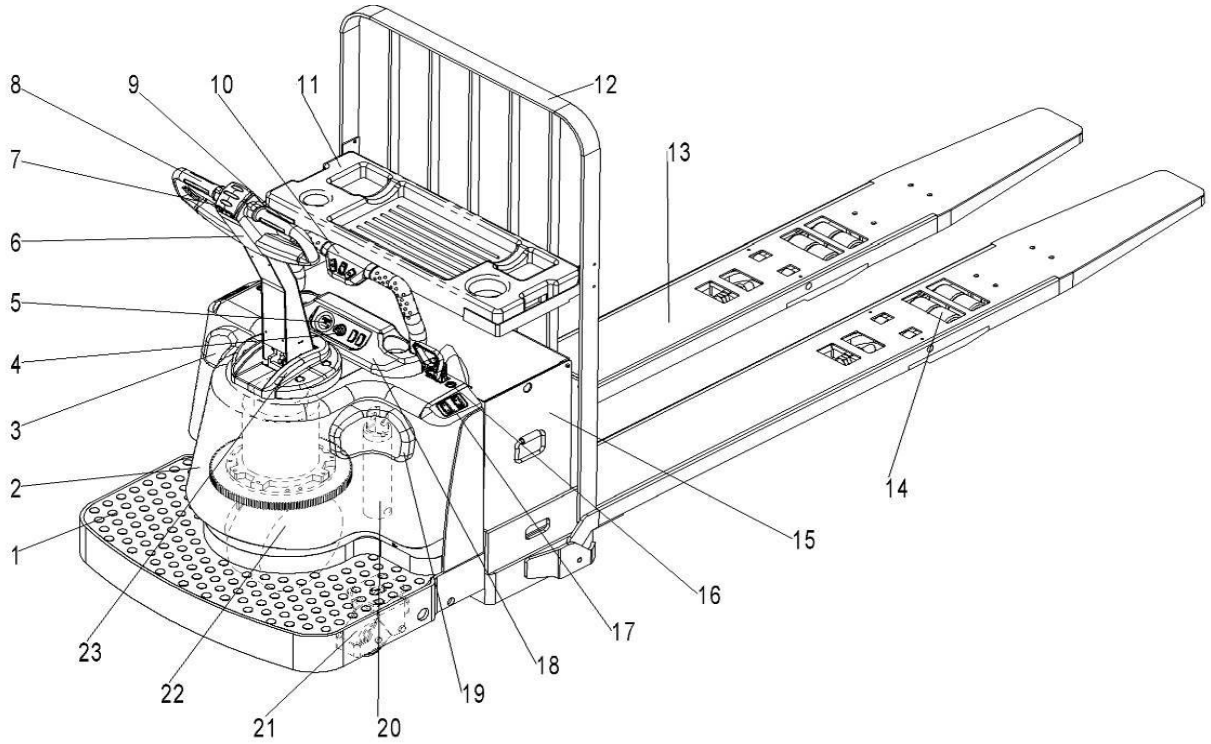


Replacement tool for electrical plug-in connection

No.	PIc	Application
1		Remove pin
2		Install pin
3		Loose lock
4		Two-hole lock
5		Four-hole lock
6		Remove pin

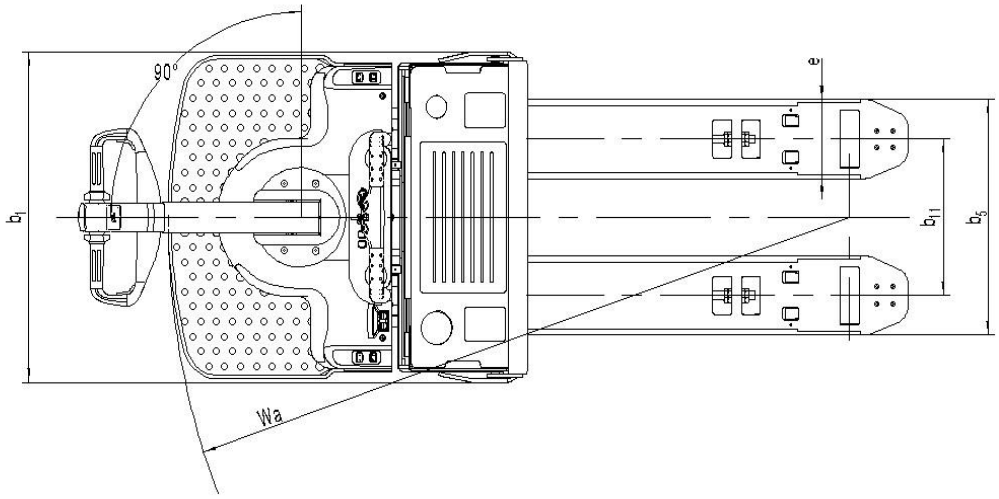
2. Sepcification

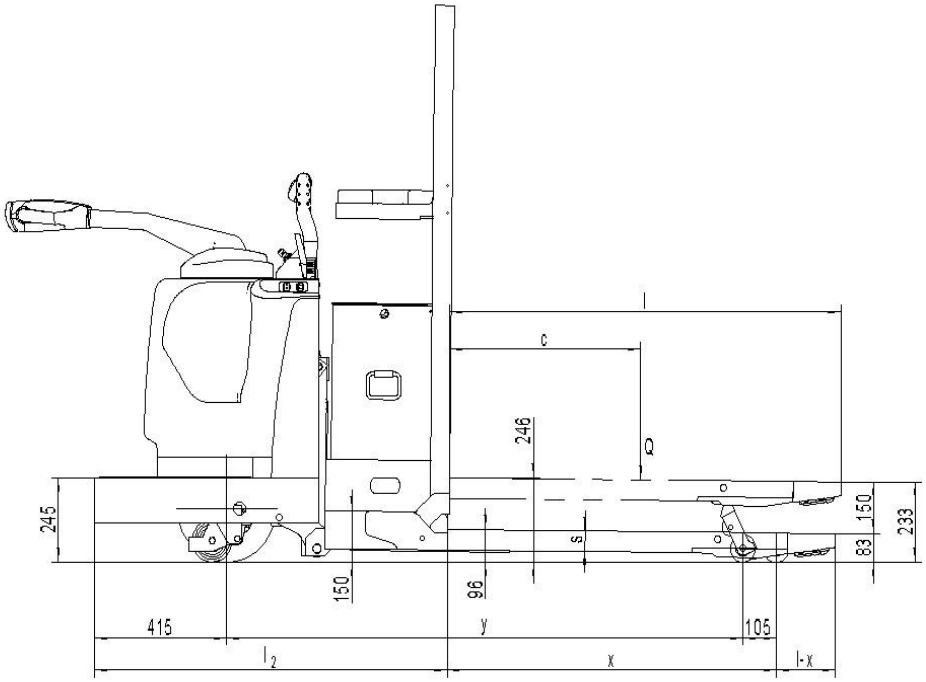
2.1 Overview of the main components



1	Foot plate	12	Shelves
2	Cover	13	Pallet fork
3	Left knee pad	14	Wheel bearing
4	Key switch	15	Battery
5	Electricity meter	16	Battery plug
6	Handle	17	Switch seat
7	Bulley button	18	Electric meter cover
8	Bulley button	19	Right knee pad
9	Accelerator	20	fuel tank
10	Handrest cover	21	Steering wheel
11	Storage cover	22	Drive motor and drive wheel
23	Handle cover		

2.2 Specification table





			PT 27R 货叉尺寸						PT 36R 货叉尺寸		
Fork length		mm	915	1067	1220	1372	1525	2440	2135	2362	2440
Actual fork length	l	mm	908	1060	1213	1365	1518	2433	2128	2355	2433
Overall length	l1	mm	2025	2177	2330	2482	2635	3550	127.8	136.8	3550
wheelbase	y	mm	1305	1458	1615	1765	1917	2835	2130	2130	2130

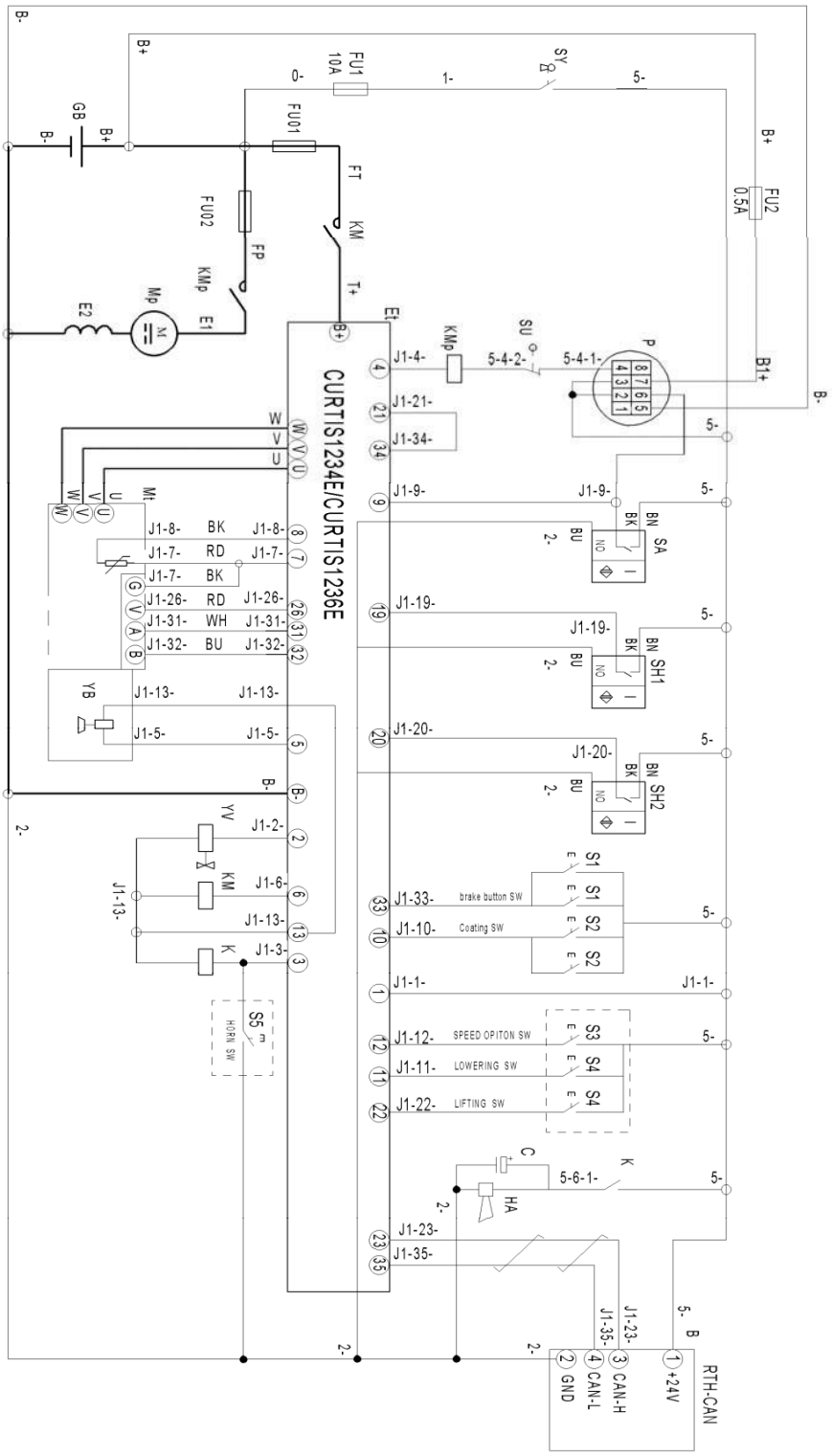
Load distance ,centre of drive axle to fork	x	mm	723	875	1028	1180	1333	2248	1567	1567	1567
fork end size	l-x	mm	185	185	185	185	185	185	560	795	864
Turning radius	Wa	mm	1840	1992	2145	2297	2450	3365	2660	2660	2660
Fork width	e	mm	230						255		

		Type sheet for industrial truck acc. to VDI 2198			
General data	1.2	Manufacturer`s type designation		PT 27R	PT 36R
	1.3	Power (battery, diesel, petrol, gas, manual)		Battery	Battery
	1.4	Operator type		Pedestrian	Pedestrian
	1.5	Load Capacity / rated load	Q (kg)	2700	3600
	1.6	Load centre distance	c (mm)	600	1220
	1.8	Load distance ,centre of drive axle to fork	x (mm)	1035	1345
	1.9	Wheelbase	y (mm)	1615	2130
Weight	2.1	Service weight	kg	1070	1150
	2.2	Tires	kg	1390/2380	1300/3470
	2.3	Tire size, front	kg	830/240	920/250
Tires, chassis	3.1	Tire size, rear		聚氨酯轮	聚氨酯轮
	3.2	Additional wheels(dimensions)	x w (mm)	310 x 105	310x 105
	3.3	Wheels, number front/rear(x=driven wheels)	x w (mm)	82x 82	82 x 70
	3.4	Track, front	x w (mm)	125 x60	125x 60
	3.5	Track, rear		1 x +2/4	1 x +2/8
	3.6	Service weight	b10 (mm)	455	455
	3.7	Tires	b11 (mm)	560/685	585/710
Dimensions	4.4	Lift height	h3 (mm)	150	150
	4.9	Height of tiller in drive position min./ max.	h14 (mm)	880/1550	880/1550
	4.15	Height, lowered	h13 (mm)	83	83
	4.19	Overall length	l1 (mm)	2330	3350
	4.20	Length to face of forks	l2 (mm)	1095	1095
	4.21	Overall width	b1 (mm)	940/960	940/960
	4.22	Fork dimensions	s/e/l (mm)	60/230/1220	60/255/2440
	4.25	Distance between fork-arms	b5 (mm)	560/685	585/710

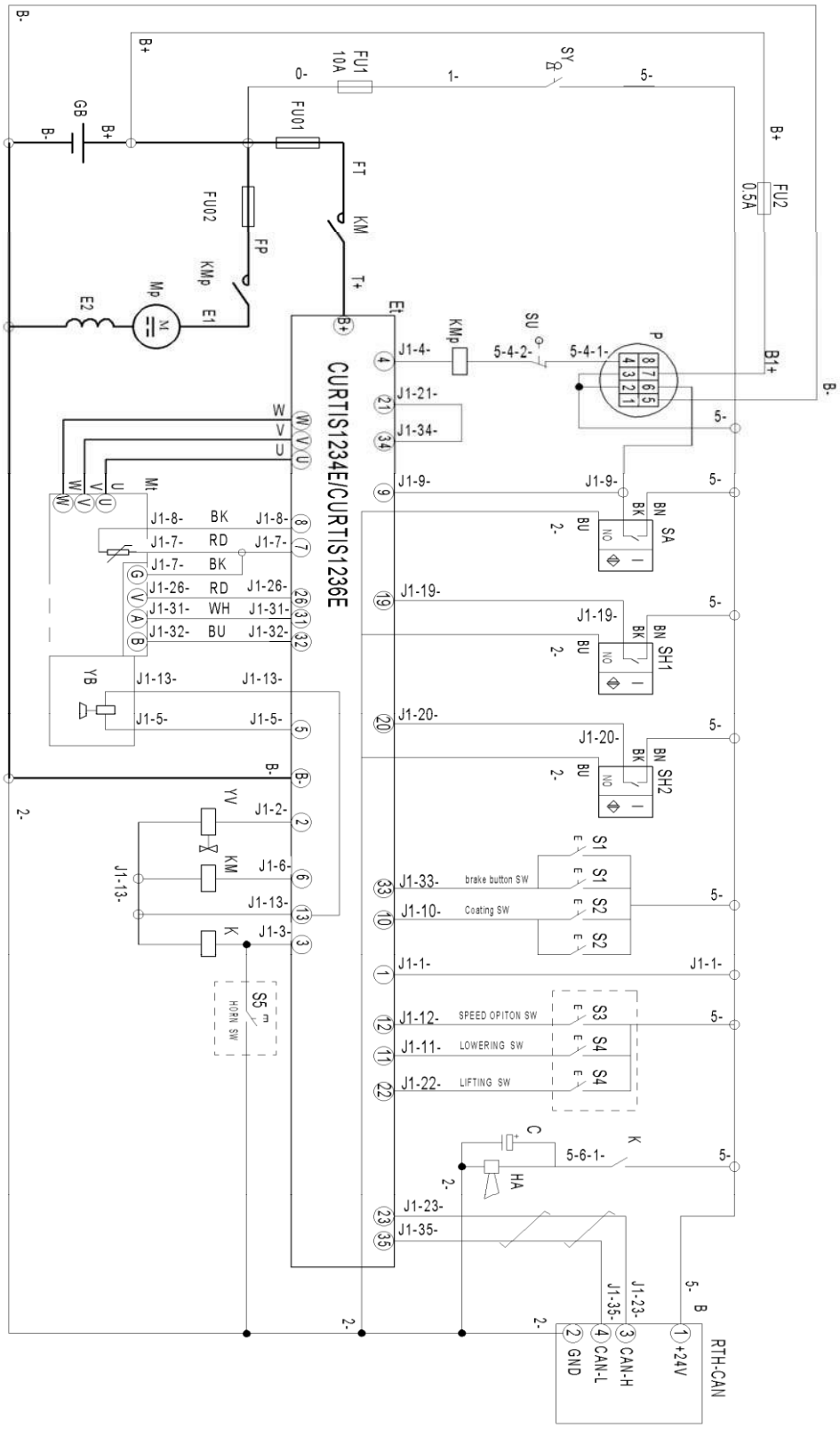
	4.32	Ground clearance, centre of wheelbase	m2 (mm)	25	25
	4.34	Aisle width for pallets 800X1200 lengthways	Ast (mm)	2700	3900
	4.35	Turning radius	Wa (mm)	2145	2660
	5.1	Travel speed, laden/ unladen	km/h	11/14	9.5/12
	5.2	Lift speed, laden/ unladen	mm/s	38/49	30/40
	5.3	Lowering speed, laden/ unladen	mm/s	55/50	45/42
	5.8	Max. gradeability, laden/ unladen	%	8/15	6/15
	5.10	Service brake		电磁制动	电磁制动
	6.1	Drive motor rating S2　60min	kw	3.8	3.8
	6.2	Lift motor rating at S3　10%	kw	2.2	2.2
	6.3	Battery acc. to DIN 43531/35/36 A, B, C, no		no,5Pzs	no,5Pzs
	6.4	Battery voltage, nominal capacity K5	V/ Ah	24/350	24/350
	6.5	Battery weight	kg	320	320
	6.6	Energy consumption acc: to VDI cycle			
Performance	8.1	Type of drive control		交流变频控制	交流变频控制
	8.4	Sound level at driver's ear acc. to EN 12053	dB(A)	68	68
	8.6	steering		Manual steering	Manual steering

3. Electrical system

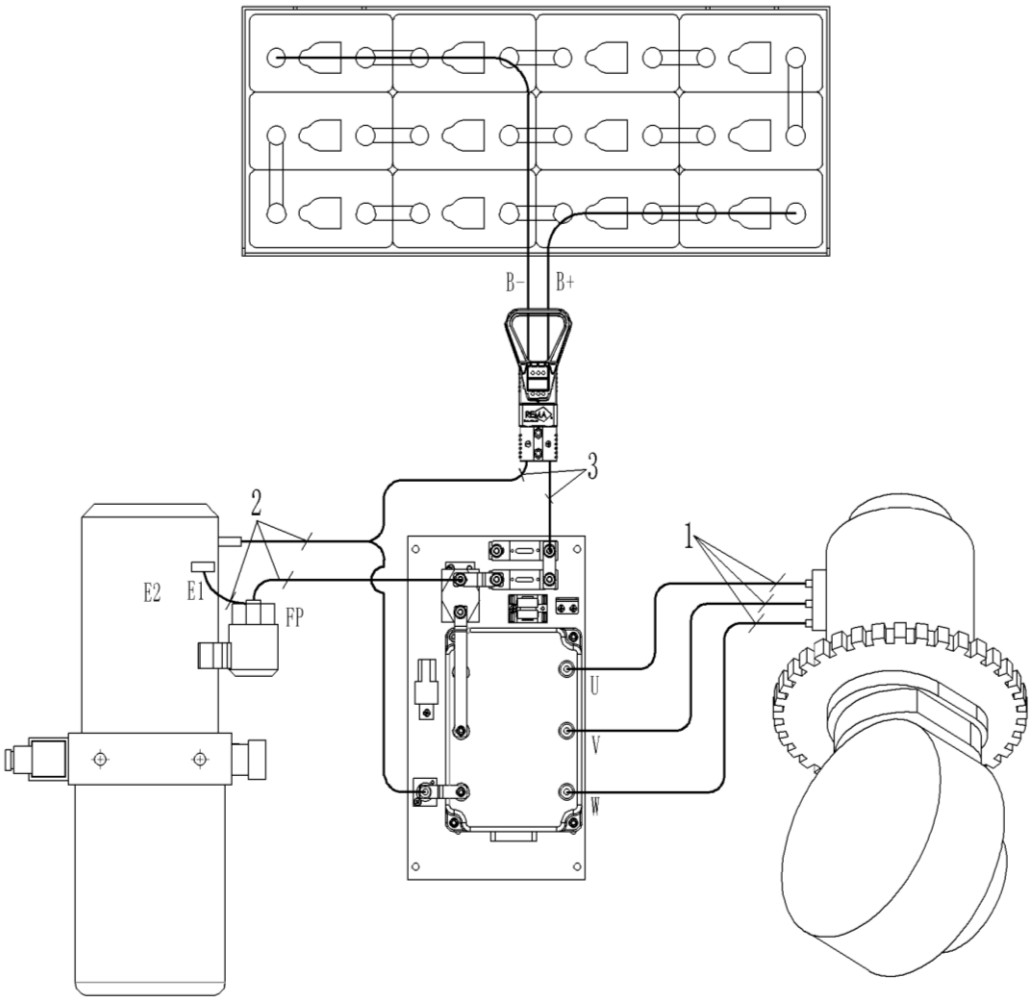
3.1 Electrical circuit diagram　PT27R



PT36R



Electrical assembly



No.	Art No.	New Code	Description
1	9000010237	506333010002	Cable-U-50-8-10-900
		506333010003	Cable-V-50-8-10-800
		506333010004	Cable-W-50-8-10-700
2	9000010160	506233010006	Cable-FP-25-6-8-1150
		506233010007	Cable-E1-25-8-8-150
		506233010008	Cable-E2-25-8-8-1050
3	9000010161	506233010009	Power supply cable

4. Battery Using

Charging of the battery

The storage battery shall be charged with the original charger, and the operation shall be carried out strictly in accordance with the maintenance instruction.

A) The battery electrolyte shall not be kept too low.

⚠ The battery electrolyte shall be kept to the specified level, otherwise the battery will overheat or burn out.

· When the battery electrolyte is insufficient, the battery life will be shortened.

B) Add distilled water, the new storage battery is normally used for 1-1.5 years, only the distilled water needs to be added, and the later stage only needs to be supplemented with the acid solution.

c) Never overcharging

d) The charging place shall be well ventilated

⚠ The battery charging process should be carried out in a well-ventilated place and should avoid moisture.

E) Open the battery cover

⚠ Hydrogen will be generated in the charging process of the battery, and the battery cover shall be opened during charging.

F) Check the terminal, cable and connector.

⚠ Check the connector and cable before charging to ensure that there is no damage. Do not charge when the connector electrode is damaged. The terminal and cable line are corroded. These conditions can lead to sparks, burning items and fires and explosions and other accidents.

⚠ Check the connector and cable before charging to ensure that there is no damage.
Do not charge when the connector electrode is damaged.
The terminal and cable line are corroded.
These conditions can lead to sparks, burning items and fires and explosions and other accidents.

g) Turn off the key switch and charge it

h) Check specific gravity Before charging, measure the specific gravity of all the single cell electrolyte, so that the abnormal condition of the storage battery can be found. First, understand the specific gravity and then charge to avoid the occurrence of some accidents.

I) The plug-in or handle should be held in the plug-in power connector, and the cable should not be held.

The reference value of battery measurement is as follows:
when the battery is full, the specific gravity is p = 1.28-1.30g/cm; when the monomer voltage is ≥ 2.1 V, the specific gravity is p = 1.16-1.17g/cm; the single voltage is less than 1.7 V, and the monomer voltage is less than 1.7 V.

TEM℃	-15	0	15	30	45
Gravity g/cm³	1.31	1.30	1.29	1.28	1.27

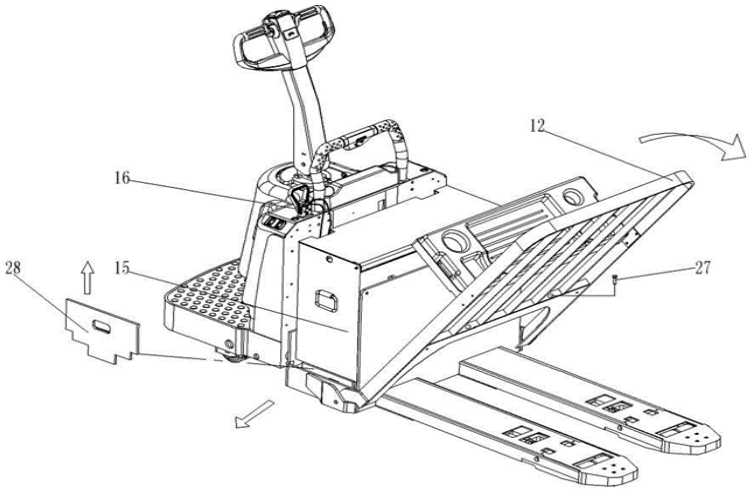
⚠ Do not unplug the cable.
When the cable and power connector are damaged, you should contact our after-sale department to replace the damaged cable and power connector.
J) disconnect charging process

⚠ ·The steps of disconnecting the charging process must be operated in strict accordance with the maintenance instructions .
Do not unplug the charger when charging, otherwise there will be electric sparks causing danger.

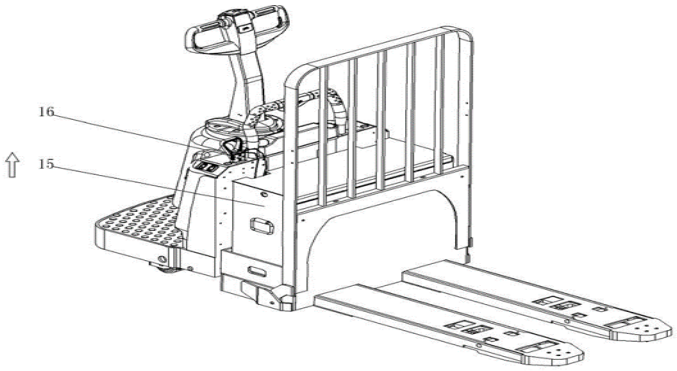
4.1 Battery replacement

When the Pallet uses a working cycle continuously and the battery is completely used up, the battery on the original vehicle should be replaced with another group of fully charged batteries in time, and the replaced batteries should be charged.

⚠ When replacing a battery, ensure that the battery matches the pallet. Using a battery that doesn't match the pallet will shorten the working hours or cause the pallet to tip over as it travels.
Replacement batteries shall be carried out on a designated working platform.
Replace the battery according to the following steps:
A. replacement
Replace the battery from the side with a specific device. Make sure the device is used correctly when replacing the battery!
If the equipment is not used correctly, the battery may tip over!
Have a storage jar
Park the vehicle safely, turn off the key switch (7), unplug the battery connector (16), unscrew the screw (27), and pull back the shelf. Pull up the battery baffle (28) and pull out the battery (15) according to Figure 14. The battery can also be hoisted from above.



No storage cover
Park the vehicle safely, turn off the key switch (7), and unplug the battery connector (16). Then use a lifting tool to lift out the battery.
Installation is the opposite procedure of removal. Please connect the positive terminal first, otherwise the vehicle is vulnerable to damage



4.2 Maintenance of batteries (lead-acid batteries)

1. Cause of water supply of battery
The battery recharge is due to the electrolytic effect of the battery at the later charging stage, which makes the moisture part of the electrolyte electrolyze. After a long period of charge and discharge, the water content of the battery will be more electrolytic, which will increase the electrolyte potency and decrease the liquid level. At this time, it is necessary to supplement distilled water to restore the liquid level to the original height and maintain the normal potency of electrolyte to ensure the service life of lead-acid battery.
2.Note:
(1) Remember not to drop the liquid level below plate before starting to replenish water. Once the plate is exposed to air, the battery performance can be seriously affected.
(2) In order to reduce the number of water recharging, battery charging should be strictly required by the instructions, do not overcharge. Overcharge will aggravate the battery water loss.

3. Distill-Water-adding materials and tools

(1) Water requirements: it is recommended to use battery special supplementary liquid or distilled water. In case of emergency, pure water for drinking water on the market can also be used, but remember not to use tap water, mineral water and other water containing impurities.

(2) Water filling tool: water funnel, water ladle. If the tool used can be made of plastic or glass, it shall not be made of metal.

(3) for users with large amount of water, the self-made water filling device in large bucket is adopted.

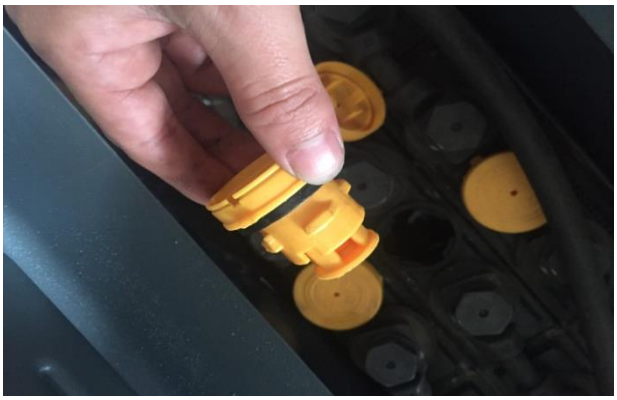
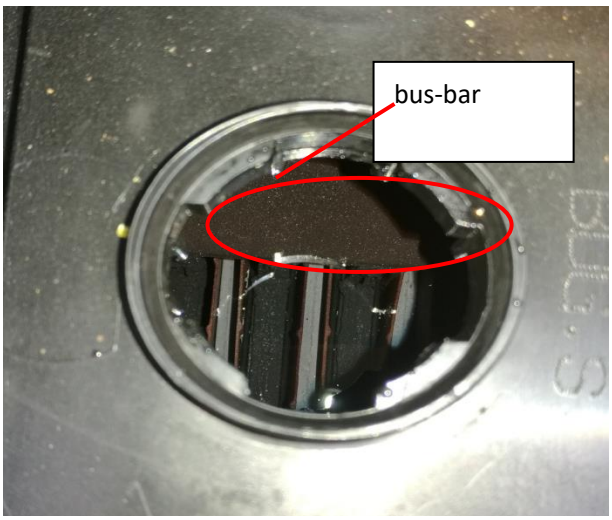
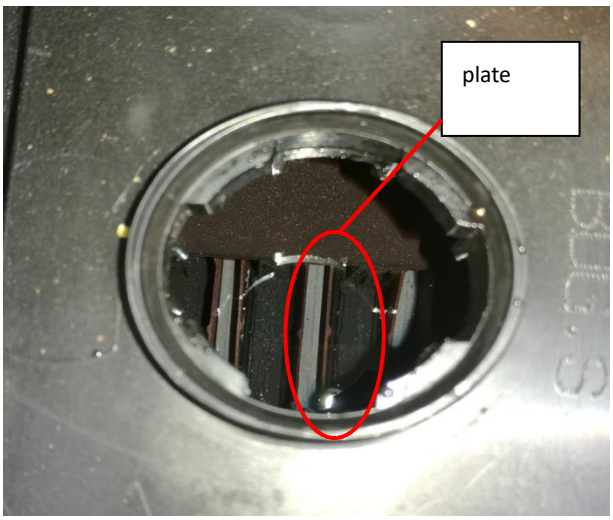
4. When the water supply does not lead to the water shortage of the battery in time, it can cause:

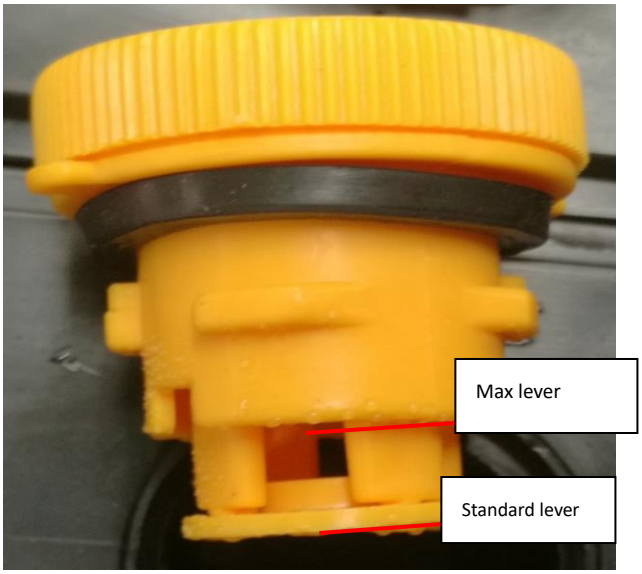
1) As the electrolyte surface decreases, the temperature rise is high when the battery is charged;

2) the capacity of the battery is reduced;

3) If the plate is exposed to the air, it can be oxidized

4) the specific gravity of the electrolyte is increased, and the corrosion of the polar plate can be easily degraded.

	
1.Unplug battery switch	2.Uncap
	
3. Electrolyte lever is lower than bus-bar, then add distill water	4. can't see the bus-bar for some models Liquid lever is 10mm lower than plate, then add distill water

	
5．Use a plastic funnel to add water.	6. add-water lever

Checking Items	Maintenance requirements	Tool	Daily （8hrs）	Weekly （50h）	Monthly （200h）	Every three months （600h）	Half a year （1200h）
Battery	electrolyte level	See by eye	√	√	√	√	√
	Electrolyte gravity	densimeter		√	√	√	√
	quantity of electricity		√	√	√	√	√
	Whether the pile head is loose or not		√	√	√	√	√
	Whether the connecting wire is loose		√	√	√	√	√
	Clean surface			√	√	√	√
	Is there any impurity on the surface		√	√	√	√	√
	Whether the breathable cover is firm or not			√	√	√	√
	Stay away from the open fire		√	√	√	√	√

4.3 Test of the battery

A. Battery status check

the weak battery may cause or cause problems with the controller and the power circuit. Make sure the battery is in good condition before troubleshooting other areas.

The preliminary step

confirms whether the polarity of the battery connector and the control panel is correct. The positive cable shall be located in the line fuse (fuse) and the negative pole shall be on the negative pole of the control panel.

When the pallet is working

Battery load test

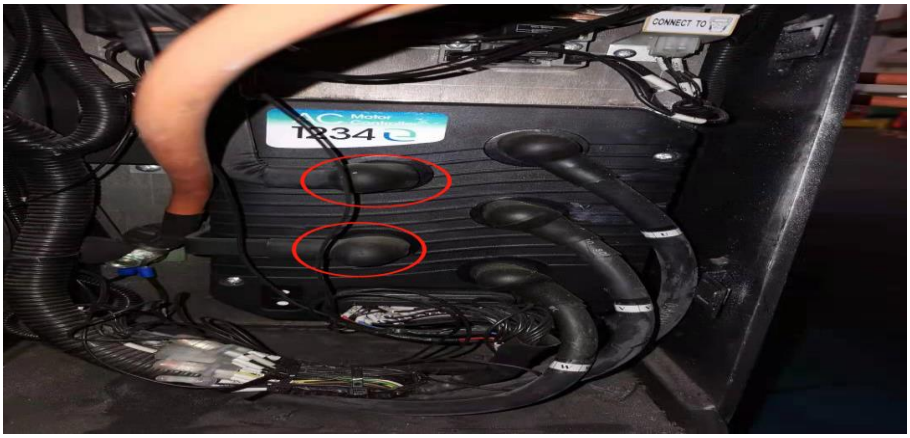
Turn the range switch on the multimeter to read the battery voltage.

connection battery

connects the multimeter lead between b + (1) and b-(2) of the controller.

In the safety area, operate the hydraulic system (load) and read the voltage indicated on the multimeter at the same time.

If the indication is less than the limit value (19.0v), the battery needs to be charged or repaired before continuing to troubleshoot.



When the pallet is not working and the battery is suspicious.

A battery pressure drop test

Measure the voltage of each unit cell when the pallet is energized and the pump motor is running.

Normal voltage should be between 1.7 v and 2.1 v per unit cell. If the voltage on each of the individual cells is less than 1.7 v, the electrical pool must be charged or repaired before continuing the troubleshooting.

The index between the batteries should not exceed 0.15 volts. If so, the battery must be charged or serviced

B．Battery shell insulation inspection

The resistance between the pallet wiring and any point in the pallet body shall be at least 10,000 Ω or higher. The short-circuit of the battery case results in a number of faults. A short circuit in the chassis in the pallet wiring may cause a problem as the battery may have a chassis leak. to prevent problems due to a short circuit

Do as following:

Disconnect the battery and discharge the controller.

Random measurement of any component connections or wiring connections to the pallet chassis with a minimum resistance of 10,000 Ω. Any test point with low resistance must remove the chassis short.

Always keep the battery clean to minimize current leakage to the chassis.

Ensure that all accessories, such as the horn and the lamp, are designed to have no chassis connection (two-wire system)

5. Charger

5.1 Notes

Battery polarity cannot be reversed, otherwise it will damage the smart charger and battery. The intelligent charger should be installed in a special place with good ventilation, dry, no serious dust, no corrosive gas and no strong electromagnetic field interference. The housing shall be reliably grounded (there are grounding bolts in the lower part of the box).

the intelligent charger is suitable for indoor and outdoor, water is strictly prohibited in the machine.

intelligent charger input power supply for two-phase 110-220V,50HZ, input wire cross section is not less than 62.

the output line should depend on the distance far and near, choose the suitable cable, the total line voltage drop is not more than 5%.

the intelligent charger is suitable for the ambient temperature of -10°C ~50°C, the altitude is less than 1000 meters, and the obstacles such as the wall which affects the ventilation and heat dissipation from the periphery of the machine should be more than 0.6 meters, so it is necessary to check whether the fan is running normally regularly.

When charging, plug in the battery connector and then connect the power supply.

5.2 Instrument description

No.	Item.	Digital tube display status	Error and troubleshooting	Remark
1	Current	The last three digits of the digital tube represent the number of current C-XXX	The four basic states shown by the normal working cycle of the charger are as follows: charging current, output voltage, charging progress and charging time.	normal condition
2	Battery Voltage	The last three digits of the digital tube represent the number of voltage U-XXX		
3	Progress	The last two digits of the digital tube represent the number of progress rate S--XX		
4	Charging intervals	The first two digits of the digital tube represent the "Hour" and the latter two represent the "Minutes". XX-XX		
5	Transformer temperature protection	tr---	The temperature of the transformer is too high, the automatic protection of charging is stopped, and the normal operation is resumed after the	Automatic recovery

			temperature is reduced.	
6	Battery voltage is too low	UOL-L	battery damage or battery mismatch with charger model	beyond retrieve
7	Battery voltage is too high	UOL-H	battery mismatch with charger model	beyond retrieve
8	open circuit	ACOFF	The AC power is not on, or the socket is out of power	
9	End of charge	P-end	Normal charging end	normal condition
10	End of charge	Ovend	Timeout charging is over, battery failure or AC voltage is too low	

5.3 Common faults of charger

After the charger turns on the AC, the charger is not shown.

Solution: the external charger, only after the battery is connected, the digital tube will be displayed. If the battery is not shown after connecting the battery, check whether the battery has an open circuit.

Fault 2, after the charger is connected with the battery to open the AC switch of the charger, the ACOFF state is always displayed.

Solution: Please check whether the socket has current, and ACOFF doesn't represent current.

Fault 3, the charger shows OVEND after charging.

Solution: this state is the end of the charging timeout of the charger, the charging time is more than 14 hours, please check whether the battery has a short circuit phenomenon or the AC voltage is too low.

Fault 4: In the process of charging the charger, there is a sound.

Solution: This phenomenon is a normal phenomenon for the charger to automatically adjust the current or the noise of the transformer.

6. Controller

6.1 Controller function

The model is equipped with a drive motor and a pump motor, which is controlled by a controller. It offers powers to controller by turning on the key switch. once the controller is energized, the magnetic coil built in the line contactor receives power from the driven motor controller. then two contact points that work like switches will contact each other and then connect the line between the battery and the controller. therefore, the controller becomes a three-phase three-wire AC power supply and is transmitted to the motor through each group of U/V/W connections. The line contactor is equipped with 150A fuse to prevent overcurrent.

The drive controller
Controller is connected by the following sensors, switches, contactors and actuators.
Key switch
Power switch
Forward / backward Direction switch (Accelerator)
Handle proximity switch

In hardware, the controller is programmed with different types of firmware to implement different functions. The safety and high efficiency operation performance and complete operation function of the electric vehicle can be realized by correctly setting the technical parameters of each motor of the controller.

The speed of pallet can be set. It can make run for a long time at low speed conditions.
The acceleration rate can be set. Acceleration is the "soft and hard" feeling of accelerator when operating. By setting the acceleration rate, pallet can meet the requirements of acceleration operation under different working conditions.
The anti-slippage function of the ramp. Pallet with AC traction motor has the excellent function of not falling on the ramp.
The maximum speed can be set. The maximum running speed of the electric vehicle is set to be reasonable, and the driving motor can be prevented from being overloaded due to the high speed.
5. Safety and protection function. If the part of the controller is damaged in operation, the controller will disconnect the main contactor in the shortest time; when the temperature of the controller is too high, the controller will automatically limit the current of the motor; when the battery voltage is too low, the controller will stop working to ensure safety.
6. The drive motor controller has a self-diagnostic function. In operation, the controller will show the fault code once a fault has occurred and automatically stop working to ensure the security of the operating system.
7. The electric quantity of battery and the working hours will be showed on the display instrument.

6.2 Error code

We can check error code from meter instrument and handle when there is something wrong with pallet. There is Handle-connector to each of controller.
Error code shows on meter, you could find detail information from error code list.

6.3 Controller test

Measure the diode voltage inside the controller and check if there is burnout and damage.

Test according to the following table, each test item must be repeatedly tested more than 3 times.

Item				
	Multimeter terminal	range of data		
	Red electroprobe	Black electroprobe	Voltage	Resistence
1	B+	U/V/W/B-		1MΩ 以上
2	B-	U/V/W		1MΩ 以上
3	U/V/W	B+	0.3-0.6V	

Pull the multimeter to Ω (resistance measurement), multimeter to pull it to the diode (measurement of the polarity value)

Disassemble controller's wire, release electricity from internal capacitors（by resistant 30Ω/5W to B+ & B-）

Using a multimeter to measure the voltage of the diode (0.3 - 0.6 v) and check if it is normal

Test 1: measure diode voltage, red electroprobe to B- , black one to U, V, W

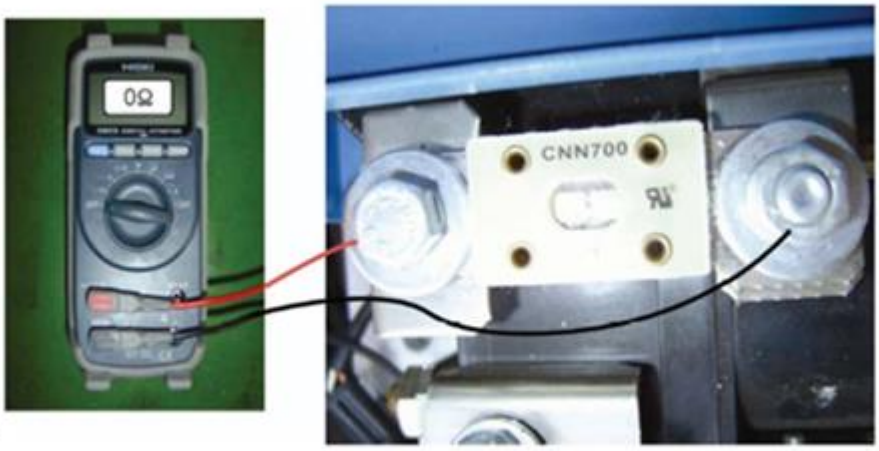
Test 2：red electroprobe to U /V /W , black one to B+

Note: electroprobe of multimeter can't be reversed.

6.4 Contactor and fuse

线路接触器

图 2-22



线路保险丝

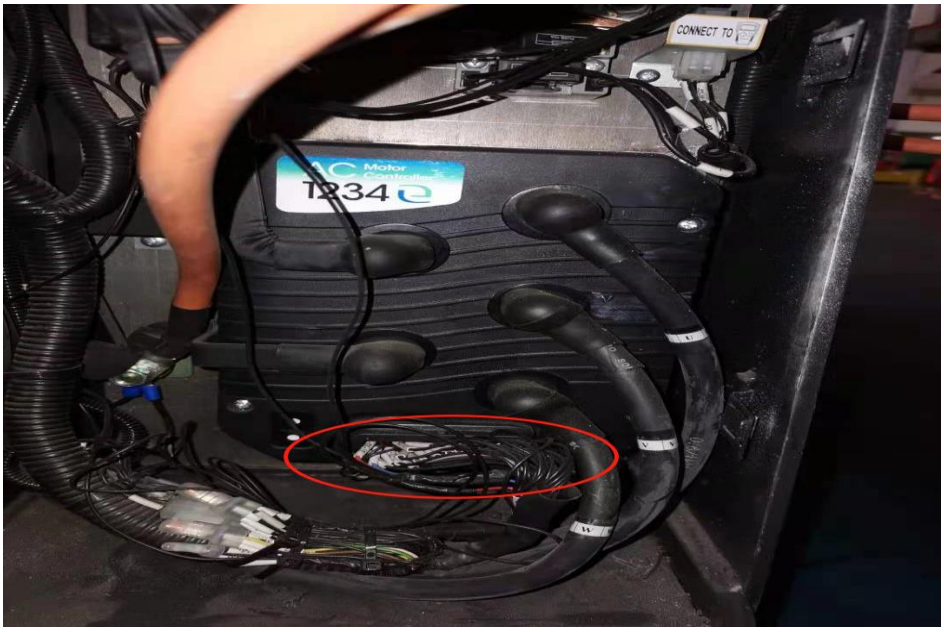
图 2-23

For contactor and fuse, using ohm scale to check if the value is the same.

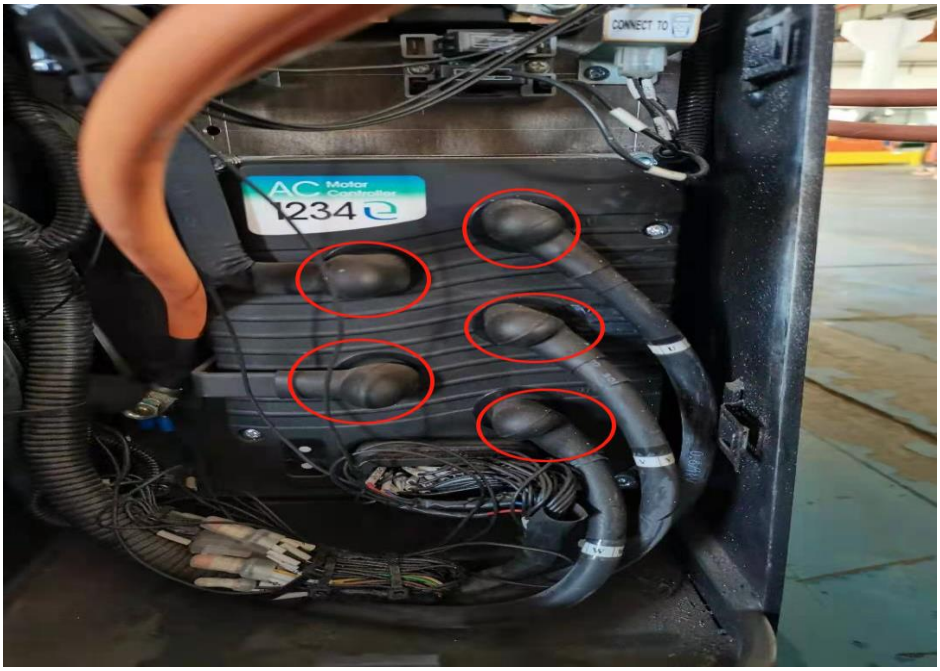
6.5 controller of driving motor disassemble / assemble

1.cut off battery

2.keep the key on and discharge the power module twice for 30 seconds.
3.Turn off the key
4.Remove the cover and find controller of driving motor
Notes: Controller contains ESD (Electrostatic discharge) sensitive components. Appropriate precautions should be taken when connecting, disconnecting and handling.
5.Disconnect the control harness from the controller.



6.Disconnect u, v and w cables.
Installation torque: 9. 5 ±1 n ·m (7. 0 ±0. 7 lb ft)
7.Remove B+ and B- connectors 8



8.Remove the drive motor controller.

9.Install the drive motor controller in reverse order

6.6 Contactor and relay Common malfunctions

Fault	Checking items	reasons
Relay don't work	Whether the input voltage meets the rated voltage of the device	• Circuit breaker or fuse drops • Wiring error, mission • Screw terminal mounting not tighten
	Whether Relay specification compliance with input voltage	Relays of DC 48v specification were used on the DC 24v voltage line
	Is input voltage descending	Lack of power supply capacity long distance wiring
	Is the relay broken	Coil is but off fell and pound caused mechanical damage
	Is output circuit abnormal	Output side power • Poor load • Poor wiring • Poor contact
	Poor contact	Abnormal contact Loss of contact caused by service life - Damage of mechanical properties
Relay not reset	Is the input voltage completely disconnected	Electrical leakage Voltage applied by circuitous circuits Diode control circuits with residual voltage
	Relay abnormal	Contact Oxidation Aging insulation Mechanical breakage Induction voltage
Relay misoperation	Is abnormal voltage applied on the relay input terminal	Induction voltage Circuitous Circuits Caused by Inductive Voltage
	vibration, whether the impact is too large	Bad environment
scaling loss	Is the coil burning	over rated voltage
	Is the point of contact burning	Over-point rated current Poor external contact Short circuit current.

6.7 Error code list

No.	Error code Description	code	Possible cause of failure	Cause/solution of deep fault
1	Controller Overcurrent Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake The pump stopped working	1,2	1, the motor external U,V or W connection short circuit 2. Motor parameters do not match 3. Controller failure	Cause: phase current exceeds limit current Solution: reset the key switch
2	Current Sensor Fault Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake and pump stop working	1,3	1. Motor U, V and W short-circuit the car body through the stator, resulting in leakage 2. Controller failure	Cause: controller current sensor reading bias Solution: reset the key switch
3	Precharge Failed Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake Pump stops working	1,4	The positive end of the capacitor is externally loaded so that the capacitor can not be charged properly	Cause: the key switch input voltage failed to charge the capacitor. Solution: Reset or re-enter the interlock switch using the VCL function precharge()
4	Controller Severe Undertemp Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake Pump stops working	1,5	The operating environment of the controller is too harsh	Reason: Radiator temperature below -40℃ Solution: restart the key switch or interlock switch if the temperature rises above -40℃

5	Controller Severe Overtemp Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake and pump stop working	1,6	1. Controllers work in harsh environments 2. Vehicle overload 3. Controller installation error	Reason: Radiator temperature is higher than 95℃ Solution: Reduce temperature to below 95 ° C and restart key switch or interlock switch
6	Severe Undervoltage Drive torque reduction	1,7	1. Battery parameter setting is wrong 2. Power consumption of non-controller system 3, the battery impedance is too large 4. Battery connection is disconnected 5, the fuse is disconnected, or the main contactor bit connection	Reason: MOSFEET bridge works when the capacitance voltage is below the minimum voltage limit Solution: Increase the capacitance voltage
7	Severe Overvoltage The voltage is too high Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake Pump down	1,8	1. Battery parameter setting is wrong 2. Battery impedance is too high 3. Battery connection disconnects during regenerative braking	Reason: the capacitance voltage of MOSFEET bridge exceeds the maximum voltage limit Solution: lower the voltage and restart the key switch
8	Controller Undertemp Cutback Too low temperature of the controller results in performance degradation No faults (unless VCL is set to produce faults)	2，1	1. The controller works under limited conditions 2. The controller works in a harsh environment	Reason: Radiator temperature below -25℃ Solution: make the radiator temperature higher than -25℃

9	Controller Overtemp Cutback Overheating of the controller results in performance degradation Reduced drive and regenerative braking torque	2，2	1. The controller works in a harsh environment 2. Vehicle overload 3. The controller is not installed correctly	Cause: radiator temperature over 85℃ Solution: Reduce the temperature
10	Undervoltage Cutback Undervoltage Cutback Drive torque reduction	2，3	1. Low battery power 2. Battery parameter setting error 3. The non-controller system runs out of power 4. Battery impedance is too large 5. Battery connection is disconnected 6. Disconnect the fuse or the main contactor	Cause: capacitance voltage is too low Solution: raise capacitance voltage
11	Overvoltage Cutback Overvoltage CutbackReduced regenerative braking torque	2,4	1. The regenerative braking current in the process of regenerative braking causes the battery voltage to rise 2. Battery parameter setting error 3, the battery impedance is too large 4. Battery connection disconnects during regenerative braking	Reason: the capacitance voltage of MOSFEET bridge exceeds the maximum voltage limit Solution: reduce capacitance voltage
12	+5V Supply Failure +5V Supply Failure No faults (unless VCL is set to produce faults)	2,5	External load impedance is too low	Reason: 5V output has a margin of error of more than ±10% Solution: adjust the output voltage to the normal range

13	Digital Out 6 Failure Driver 6 output overcurrent Driver 6 output cannot be turned on	2,6	External load impedance is too low	Cause: Output current of drive 6 exceeds 15mA Solution: Adjust the load and then restart the driver with VCL setting "set_digout ()"
14	Digital Out 7 Overcurrent Digital Out 7 Overcurrent Digital Out 7 cannot be turned on	2,7	External load impedance is too low	Cause: Output current of drive 7 exceeds 15mA Solution: Adjust the load and then restart the driver with VCL setting "set_digout ()"
15	Motor Temp Hot Cutback Overheating of the motor results in performance degradation Drive torque reduction	2,8	1. The motor temperature reaches or is higher than the alarm temperature set by the program, resulting in the decrease of current output 2. Motor temperature parameter setting is wrong 3. If the motor does not use a temperature sensor, the programming parameters "Temp Compensation" and "Temp Cutback" must be set to "OFF".	Reason: the motor temperature sensor input voltage value is 0 or greater than 10V Solution: Motor temperature return to normal range
16	Motor Temp Sensor Fault Motor Temp Sensor Fault Maximum speed reduced to LOS status, motor temperature protection function failure.	2,9	1. The motor temperature sensor is connected wrong 2. If the motor does not use temperature sensor, the programming parameters "Temp Compensation and Temp Cutback" must be set to "OFF".	Reason: the motor temperature sensor input voltage value is 0 or greater than 10V Solution: Adjust the motor temperature sensor input voltage value to the normal range

17	Coil 1 Driver Open/Short Coil 1 Driver Open/Short Coil 1 Driver is off	3,1	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Reason: drive 1 output (6 pin) open circuit or short circuit. This fault is only set on "Main Enable" Only happen when it's OFF Resolution: Correct open/short circuit errors and restart output
18	Main Open/Short Main Open/Short Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake Pump down	3,1	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Cause: main contactor coil (6 pin) open or short circuit. This fault can only occur when "Main Enable" is set to "ON". Resolution: Correct open/short circuit errors and restart output.
19	Coil2 Driver Open/Short Coil2 Driver Open/Short Coil2 Driver is off	3,2	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Reason: drive 2 output (5 pin) open circuit or short circuit. This failure can only occur if "EM brake Type" is set to 0 Resolution: Correct open/short circuit errors and restart output
20	EMBrake Open/Short EMBrake Open/Short Electromagnetic brake disconnection Accelerator failure The brake	3,2	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Cause: The electromagnetic brake output (5 pin) is open or short circuit. This fault may occur only when the EM brake Type is set greater than 0. Resolution: Correct open/short circuit errors and restart output
21	Coil3 Driver Open/Short Coil3 Driver Open/Short Coil3 Driver is off	3,3	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Reason: drive 3 output (4 pin) open circuit or short circuit Resolution: Correct open/short circuit errors and restart output
22	Coil4 Driver Open/Short Coil4 Driver Open/Short Coil4 Driver is off	3,4	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Reason: drive 3 output (3 pin) open circuit or short circuit. Resolution: Correct open/short circuit errors and restart output

23	PD Open/Short PD Open/Short PD off	3,5	1, connect the load open circuit or short circuit 2. Contamination of connecting pin 3. Wrong wiring	Cause: proportional drive (2 pin) open circuit or short circuit Resolution: Correct open/short circuit errors and restart output
24	Encoder Fault Encoder Fault Electromagnetic brake disconnection	3,6	1. Motor encoder failure 2. Wrong wiring	Cause: Encoder malfunction Solution: Restart the key switch
25	Motor Open Motor Open Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake Pump down	3,7	1, motor phase loss 2. Wrong wiring	Reason: the motor is lack of phase, U, V, W one-phase or multi-phase open circuit Solution: Check the phase and restart the key switch。
26	Main Contactor Welded Main Contactor Welded Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure The brake Pump down	3,8	1, the main contactor contact fusion 2. Motor U or V is disconnected or phase missing 3. There is a situation that the circuit connected to B+ terminal charges the capacitor	Cause: Too many main contactor connectors Capacitance voltage cannot be released Solution: Restart the button switch
27	Main Contactor Did Not Close Main Contactor Did Not Close Motor stops working Main connector disconnected Electromagnetic brake disconnection Accelerator failure	3,9	1. The main contactor is not closed 2, the main contactor contact oxidation, melting, or unstable connection state 3. Capacitors are charged by external devices 4. The fuse is	Cause: Capacitor voltage does not reach B+ voltage when the main contactor is required to close. Solution: Check contactor and restart key switch

	The brake Pump down		disconnected	

28	Throttle Wiper High Throttle Wiper High Accelerator failure	4,1	Throttle Wiper High	Causes: Accelerator potentiometer (16 pin) output voltage is above the output voltage limit (VCL can be used to change the limit, setup_pot_faults()） Solution: reduce the output voltage of accelerator potentiometer
29	Throttle Wiper Low Throttle Wiper Low Accelerator failure	4,2	Throttle Wiper Low	Causes：The output voltage of the accelerator potentiometer (16 pin) is below the output voltage limit (the limit can be changed with VCL, setup_pot_faults()） Solution: increase the output voltage of accelerator potentiometer
30	Pot2 Wiper High Pot2 Wiper High Full braking	4,3	Pot2 Wiper High	Causes: Potentiometer 2 (17 pin) output voltage is above the output voltage limit (VCL can change the limit value, setup_pot_faults()） Solution: reduce the potentiometer output voltage
31	Pot2 Wiper Low Pot2 Wiper Low Full braking	4,4	Pot 2 output voltage is too low	Reason: Potentiometer 2 (17 pin) output voltage below the output voltage limit (VCL can change the limit value, setup_pot_faults()） Solution: improve the potentiometer output voltage

32	Pot Low Overcurrent Pot Low Overcurrent Accelerator failure Complete the brake	4,5	Potentiometer impedance is too low	Reason: Potentiometer low-end (18 pin) current exceeds 10mASolution: lower low-end current, restart key switch
33	EEPROM Failure EEPROM Failure The motor stopped The main contactor stops Electromagnetic brake stop Accelerator stop Interlock stop 1-4 output stops Proportional drive stop The brake Pump stop	4,6	Failed to write to EEPROM storage. This may be caused by VCL writing to EEPROM storage, CAN BUS, or errors in coding parameters into the controller after the programmer's parameters are adjusted.	Cause: The controller operating system attempted and failed to write to the EEPROM. Solution: Download the correct software (OS), set the correct parameters to control it, and then restart the key switch.
34	HPD/Sequencing Fault HPD/Sequencing Fault Accelerator failure	4,7	1. Incorrect setting of key starting, interlocking, direction, and accelerator input sequence. 2, wiring, switch key, interlock, direction, or accelerator input failure	Cause: High pedal protection due to incorrect key start, interlock, orientation, and accelerator input Settings And the boot sequence is wrong. Solution: Re-enter the entries in the correct order
35	Emer Rev HPD Emer Rev HPD Accelerator failure	4,7	The emergency reverse operation is over, but the accelerator, forward and reverse input and interlock have not been reset.	Cause: At the end of the emergency reverse, all types of input are not reset, resulting in failure. Solution: Re-enter the entries in the correct order
36	Parameter Change Fault Parameter change failed Motor stops working The main contactor stops working The electromagnetic brake stops working	4,9	In order to ensure the safety of the vehicle, some specific parameter changes must take effect after the key switch is restarted.	Reason: changes in parameters require a reboot of the key switch Solution: Restart the key switch

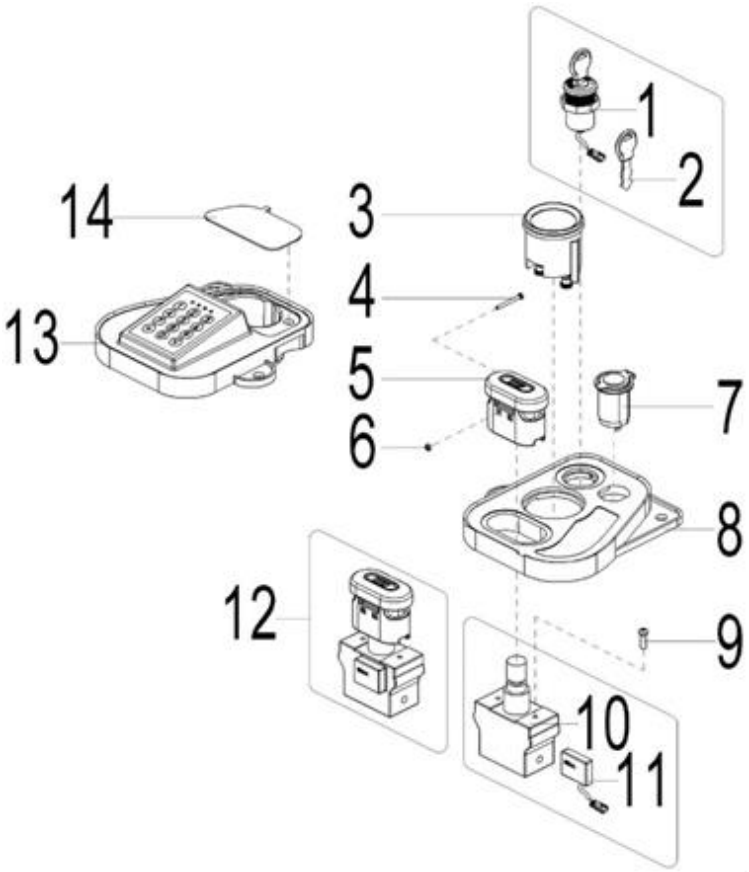
	Accelerator failure The brake Pump down			
37	OEM Faults OEM failure (custom failure)	51-67	Users can define their own faults for some phenomena, which are represented by VCL code	According to the user-defined.
38	VCL RunTime Error VCL RunTime Error The motor stopped The main contactor stops Electromagnetic brake stop Accelerator stop Interlock stop 1-4 output stops Proportional drive stop The brake Pump stop	6,8	The VCL code timed out on the run time	Cause: runtime VCL code error Solution: Edit the VCL application software to correct errors, check the new software to make sure it matches the parameters correctly; Key switch restarts
39	External Supply Out of Range External power output out of range	6,9	1, the external load at 5V and 12V supply current is too large or too small 2.Error in Checking Menu (e.g. Extsupply Max, ExtSupply Min)	Reason: The upper limit of External Supply current (total current: 5V (26 pin) and 12V (25 pin)) beyond the limit range is defined by External Supply Max, and the lower limit is defined by External Supply Min. Solution: adjust the external current

40	OS General Operating system failure The motor stopped The main contactor stops Electromagnetic brake stop Accelerator stop Interlock stop 1-4 output stops Proportional drive stop The brake Pump stop	7,1	Internal controller failure	Cause: Internal controller failure Solution: Restart the key switch
41	PDO Timeout The PDO timeout Interlock stop CAN NMT State is set to Preoperational	7,2	CAN PDO message received time exceeded the PDO time limit	Causes: Can PDO message acceptance time exceeded the PDO time limit Solution: Restart key switch, or receive CAN NMT message
42	Stall Detected Motor blocked Electromagnetic brake stop Control mode conversion to LOS (Restricted operation state)	7,3	1, the motor is stuck 2. Motor encoder failure 3. Wrong wiring 4, input motor encoder power failure	Cause: Motor encoder cannot be detected Solution: Restart the key switch, or detect a valid signal from the motor encoder in LOS mode and set the parameter toThrottle Command=0,Motor RPM=0
43	Motor Characterization Fault The motor stopped The main contactor stops Electromagnetic brake stop Accelerator stop The brake Pump stop	8,7	Code control occurs during motor matching: 0 = normal 1= The controller receives the encoder number, but the pulse amount is undefined. Please manually set the pulse value 2= Motor temperature sensor failure 3= Motor high-temperature reaction failure 4= Motor overheating	Cause: Motor matching process failed Solution: Correct error, restart key switch

			reaction failure 5= Low temperature reaction failure of motor 6= Low voltage reaction failure 7= High pressure reaction failure 8= The controller cannot detect the encoder signal and the channel signal disappears 9= Motor parameter setting out of range	
44	Motor Type Fault	8,9	Motor type parameter value out of range	Reason: The MOTOR_TYPE parameter is set to an invalid value Solution: Reset and restart the key switch
45	VCl/OS Mismatch VCL/OS The main contactor stops Electromagnetic brake stop Accelerator stop Interlock stop 1-4 output stops Proportional drive stop The brake Pump stop	9,1	The VCL program in the controller does not match the OS program	Cause: The VCL program in the controller does not match the OS program Solution: Update the correct VCL and OS programs
46	EM Brake Failed to Set Electromagnetic brake failure Accelerator failure	9,2	1. The vehicle is still moving after the electromagnetic braking command is set. 2. The braking force of electromagnetic brake is too small	Cause: after the electromagnetic brake is locked, the vehicle still moves Solution: Check whether the accelerator is working properly

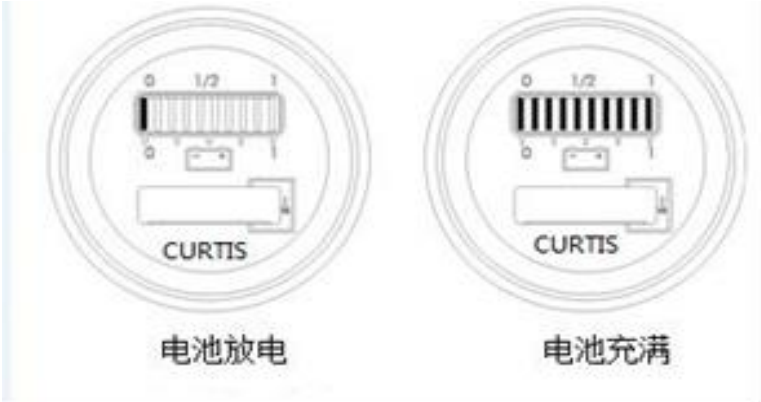
47	Encoder LOS (Limited Operating Strategy)	9,3	1. The restricted operation state is activated due to motor blocking or encoder failure 2. Wrong wiring 3, the vehicle is stuck	Cause: Restricted operation condition is activated due to motor jam or encoder failure Solution: Restart the key switch, if Motor is blocked, make sure the encoder is working properly, Throttle Command=0,Motor RPM=0
48	Emer Rev Timeout Electromagnetic brake failure Accelerator failure	9,4	1. An emergency reverse timeout is activated because the EMR Timer has expired 2. The emergency reverse switch is always in the position of ON	Cause: The emergency reverse function runs after activation until the emergency reverse timing ends. Solution: Check the status of emergency reverse switch
49	Illegal Model Number The motor stopped The main contactor stops Electromagnetic brake stop Accelerator stop The brake Pump stop	9,8	1. The controller model cannot be identified 2. Hardware and software don't match each other 3. Controller is damaged	Cause: The controller model cannot be identified Solution: select the right controller, download the right controller software.
50	Dualmotor Parameter Mismatch Close the main contactor Turn off electric brake Shut down the accelerator Full brake, turn off the pump	9,9	The Enable parameter for dual motors is set to ON, and the control Mode selection parameter is not set to 0 (Speed Mode Express) or 1 (Speed Mode).	Reason: the control Mode selection should be set to 0(Speed Mode Express) or 1(Speed Mode) when the dual-drive software is enabled, otherwise there will be a failure. Solution: adjust to the appropriate value and switch KSI.

7. Meter



7.1 Coulombmeter

The discharge condition is represented by 10 display segments.



Low battery power　　The battery is full of electricity

The power of the battery is represented by 10 led display segments, and each grid represents 10% of the electricity. With the gradual discharge of the battery, the led lamp goes out in turn, but only one grid at a time. When the power is insufficient, the battery symbol flashes and the red indicator flashes.

A the second led lamp flashes from the left, indicating "energy reserve" (70 per cent discharge depth).

B the two led lights flashes alternately on the leftmost side, indicating "power empty" (80% discharge depth).

Common malfunction of electricity meter.
A electricity meter wire harness B+, and B- ,there is a 12 v voltage, the meter does not show.
Replace the power meter with the above fault.

Battery switch common fault
When the battery switch is closed, but it is open-circuit or emergency switch without 24V (meter doesn't show). Replace the battery switch

Key common fault
Turn key on(meter doesn't show), replace key if it is open-circuit by multimeter
。

7.2 Meter disassemble/assemble

1. Disconnect the battery connector.
2. Keep the key switch open so that the power module is discharged. Twice for 30 seconds.
3. Turn off the key switch.
4. Remove the housing
5. Disconnect the meter port.
6. Unscrew the two fixed nuts of the meter by hand.
7. Remove the ring of the meter and remove the meter
8. Install the meter in reverse order.

7.3 Battery switch disassemble and assemble

1. Disconnect the battery connector.
2. Keep the key switch open so that the power module is discharged. Twice for 30 seconds.
3.Turn off the key switch.
4.Remove the housing
5.Remove the top cover
6.Remove the blade panel
7.Unscrew the power connection cable of the power switch.
8. Remove the mushroom head of the power switch
9. Unscrew the two fixed screws of the power switch and remove the power switch.
10.Do the above steps in reverse order to install the power switch.

7.4 Key disassemble and assemble

1. Disconnect the battery connector.
2. Remove the housing
3. Disconnect the key switch connector.
4. Unscrew the fixing screw of the key switch and remove the key switch.
5. Do the above steps in reverse order to install the key switch.

7.5 Coded lock

A. Product introduction

Password ignition switch (password lock) like an electronic alarm electronic system, the machine will not be allowed to start until an authorized password is entered, the main function is to prevent unauthorized people from operating the machine. In addition to easy to use, the product is also of great help to the anti-theft and safety of the machine.

B. Main specification parameters

working voltage range: 12v-60v

working environment:-40 ℃ to 90 ℃ p

rotection grade: ip65

C. Main Control Codes and Functions

At present, the password lock supports up to 5 ID cards and 1 group of hand-in password operations. Each group of passwords is mainly composed of four digits with a range of 0-9 digits. Please check the separate instructions for the administrator password. Refer to separate instructions.

D. Operating steps

1. ID card operation

ID card close to the password lock button panel. If the ID card is a valid id card, the password lock will make a brief buzzer, followed by the blue indicator light, indicating that the password lock is working properly, the electric lock switch signal is output normally. (The red light flashes when the card is swiped incorrectly).

Password operation

Enter password, and then press the "√" button and release. If the password is correct, the Pallet can start operating. Press the "×" button on the lower board and release and close the pallet. Enter the password again if you want to re-operate

E. Password lock indicator defines

Red light-fault indication

Blue light-status indicator

Yellow light-waiting indication

Green light-power indication

8. Driving motor

On the electric side, the drive motors rotate their drive wheels, allowing pallet to move forward/backward Controlled by the controller

The drive motor is connected to the controller via U, V and W lines. The controller runs the drive motor according to the input from multiple switches and sensors and the internal parameter settings.

When the following conditions are met, the drive motor is operated:
key switch is turned on, then the controller is powered
handle is pressed down (the proximity switch is in the induction area),
determine the driving direction (accelerator button)
twist the accelerator button (accelerator)

8.1 Motor speed sensor

Each drive motor is equipped with an encoder that serves as a speed sensor for the motor. It includes two hole sensors and is equipped with gears on the drive shaft of the motor to interact with the sensors. The gear rotates at the same time as the drive shaft so that the gear teeth periodically pass through the magnetic field of each hole sensor. When the top platform of the gear passes through the magnetic field, it is close to the hole sensor, so the magnetic flux increases. On the other hand, when the bottom platform passes through the magnetic field, the distance increases and the magnetic flux decreases accordingly

The cycle occurs again and the magnetic flux has a waveform that generates a voltage pulse. The amplitude of the pulse is analyzed to calculate the speed of the motor.

Like other sensors, the encoder produces the main signal (signal a) and the signal (signal b) through two-hole sensors. The resulting signal sequence varies according to the direction of rotation.

8.2 Overheat protection

Each drive motor is equipped with a heat sensor to prevent overheating. Once the motor is heated to 145°c (293°f), the overheating alarm is activated and the performance is limited.

Speed sensor

Item	Specification
PPR	64 impulses per turn
connector	4-pins AMP

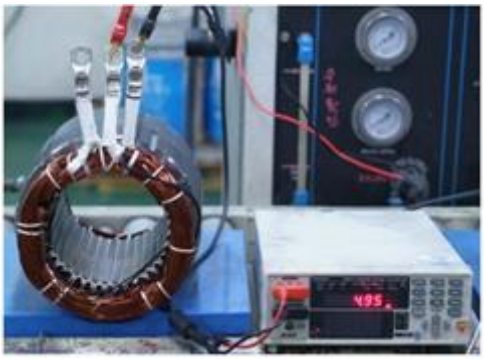
Heat sensor

Item	Specification
Part no.	It is inside motor
repellence	Under 25°C（77°F）, 603Ω±3％
connector	Pins AMP

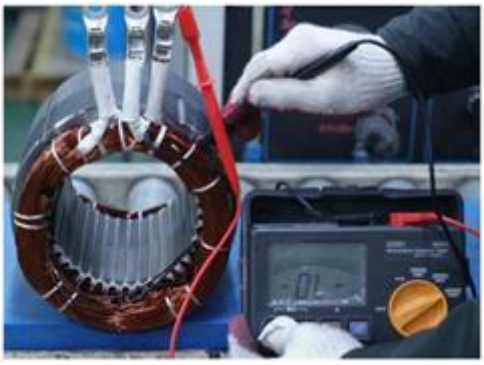
8.3 Stator testing

Carefully wipe contaminants on the stator surface using a clean cloth dipped in alcohol

Notes: Contaminants in the stator may cause damage to the coil and therefore to the stator itself.
Measurement of resistance per phase (uv,vw,wu) using multimeter
Rated resistance:0.4Ω

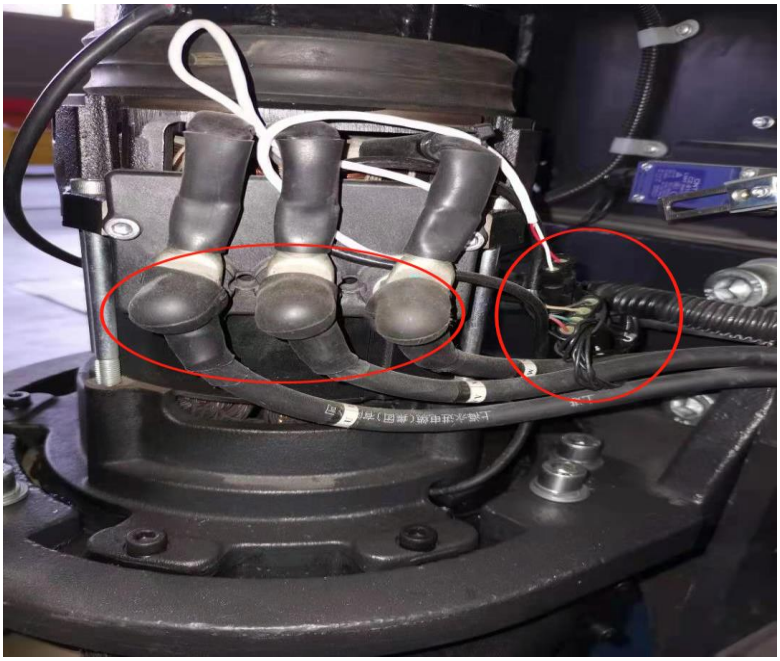


Test insulation at 1000 vac and min.10 MΩ using insulation tester.
If there is insulation problem, please replace the new stator.

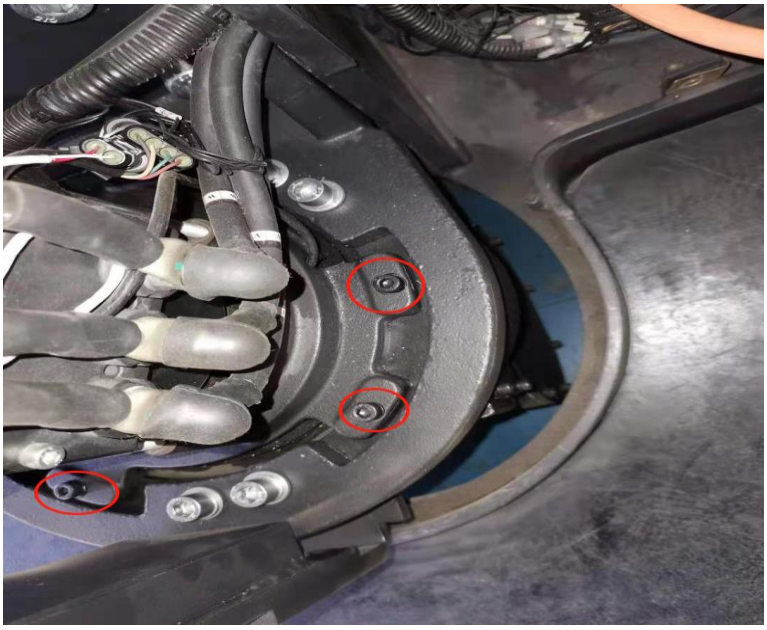


8.4 Drive motor disassemble and assemble

1. Remove motor U/V/W connection
2. Remove motor speed sensor, temperature sensor and electromagnetic brake connection



3. Remove drive assembly fixing bolt.



4.Remove drive assembly by lifting equipment.

5. Do above steps in reverse order to assemble drive motor.

8.5 Drive motor common fault

Problem	Reason
Drive motor doesn't work Drive motor doesn't work	Switch is not off (battery connector, key switch, proximity switch): Turn off switch. If still not running, use a voltmeter to test the power of the control panel and the current of each switch.
	Bad signal. fuse burned: check battery connection. Check the connection of the battery Check fuse, driver and logic. Replace fuse if burned. Check the drive motor and control panel which possible cause fuse breakage. Some of the reasons are: operating under excessive load, the current limit is too high.
	Battery voltage low: Check the battery terminal voltage. Charge the battery if too low. Check if there is one or more defective cell cells.
	Incorrect operate
	Speed sensor fault
Traction does not work during normal operation	The brake is defective, resulting in excessive resistance. The heat increases, causing the motor to stop. Check braking adjustment
Traction does not last throughout the normal working period.	Too much heat in the control panel for the following reasons: Overweight traction load: Reduced duty cycle load. Heat sensor failure: These may cause malfunction of the drive motor, failure of the control handle or opening of the drive fuse
	The pallet is equipped with too small batteries
Battery positive (+) or negative (-) is in direct contact with the vehicle frame (body) or drive motor	Battery not charged fully during battery charging: Check if battery charges Check if battery charger is malfunction.
	Battery replacement interval is too long or battery replacement cooling time is too short.
	The battery has one or more defective single batteries, causing the rated capacity and capacity of the battery to be below normal:

	Due to the failure of the drive system, the drive system consumes too much battery power. Check the brake adjustment. Check the wheel bearings, axles and other mechanical parts for correction to eliminate the failure. Replace the smaller friction tire.
	After a work shift, the pallet capacity exceeds its designed capacity without the power available:
	The battery is dirty, the electrolyte is on top of the battery. The current flows through the battery box, which applies voltage on the forklift frame: clean the battery with baking soda
The vehicle did not reach its maximum speed	Battery or control panel wire connection in contact with frame: Conduct continuity test and move wire. Remove wire in sequence until troubleshooting. Fault will be disconnected at the end of the wire.
	Wet motor
	The battery is not fully charged or the battery is poor charge the battery. Check the cell of battery. If necessary, please replace the cell of battery
Slow acceleration of vehicles	Failure in driving motor, control handle or transmission system Check speed in both directions. If you need to adjust the controller, follow the corresponding part of the manual programmer. If the drive motor fails, test the motor assembly.
	Drive control overheat, temperature induction switch on. Note: If temperature is 145°c (293°f), heat – sensoe will issue warning.
Problem	Reason

8.6 gearbox remove/assemble

1.Loosen the gearbox retaining bolts

2. Lift the body to make the body empty

3 can be removed from the gearbox

9. Hydraulic System

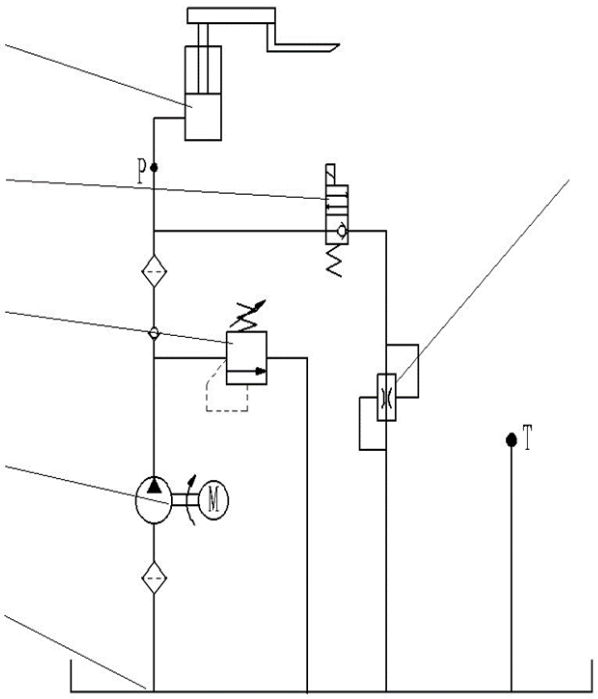
The hydraulic system operates other hydraulic parts through hydraulic force from pump.
The main hydraulic pump is driven by the pump motor controlled by the controller.
The main hydraulic pump uses the rotating force output from the motor to pressure the oil in the hydraulic tank and conveys the oil to the lifting cylinder.
The hydraulic tank stores the hydraulic oil returned from the cylinder. The stored oil is suncted by the main hydraulic pump for reuse.

The pump motor transmits the power to the main hydraulic pump by electric mode in order to pump the hydraulic oil to operate the hydraulic system.

The pump motor is connected to the pump motor controller through the pump contactor and (B-)line. The controller runs the pump motor according to the input of the lifting switch and sensor.

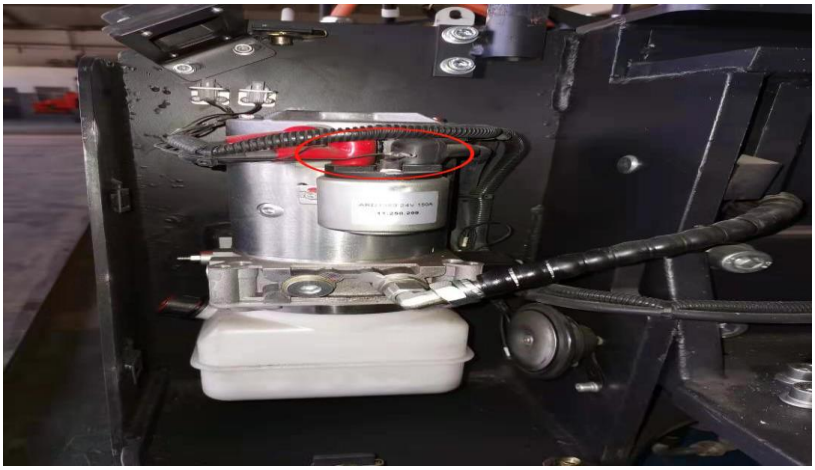
When the following conditions are met, the pump motor runs:
the key switch is turned on.
Upper limit switch closing
handle rising-switch closed
pump contactor suction

9.1 Hydraulic circuit

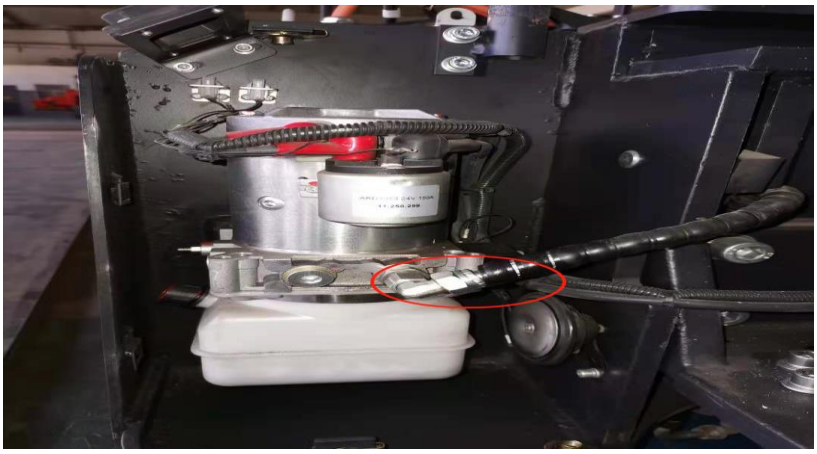


9.2 Disassembly of pump motor

1. Disconnect pump motor B+ /B- terminal cable.



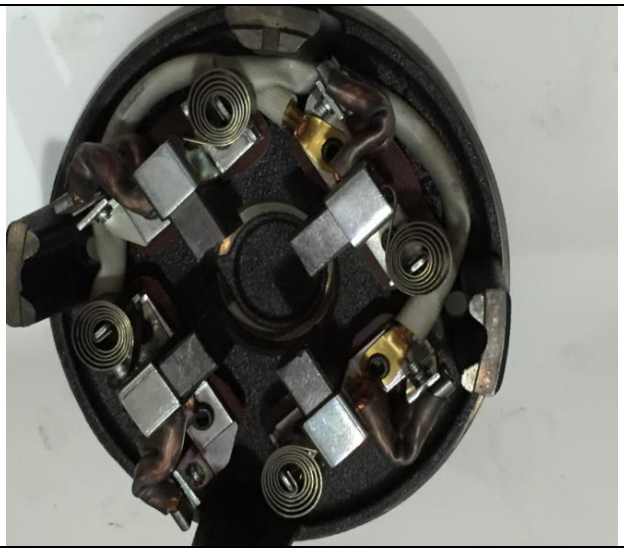
2. Disconnect hose from hydraulic pump.

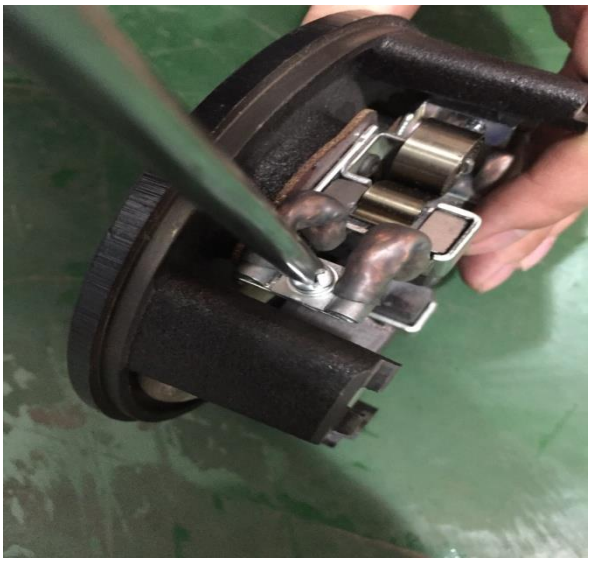


3. Remove fixing bolt between pump motor and pump, then remove motor.

4. Install pump motor in reverse order.
5. Add hydraulic oil to tank according to specifications given in manual.

9.3 Replace pump motor carbon brush

	
1. Unscrew the bolt with a 10mm open wrench	2. Remove the cover

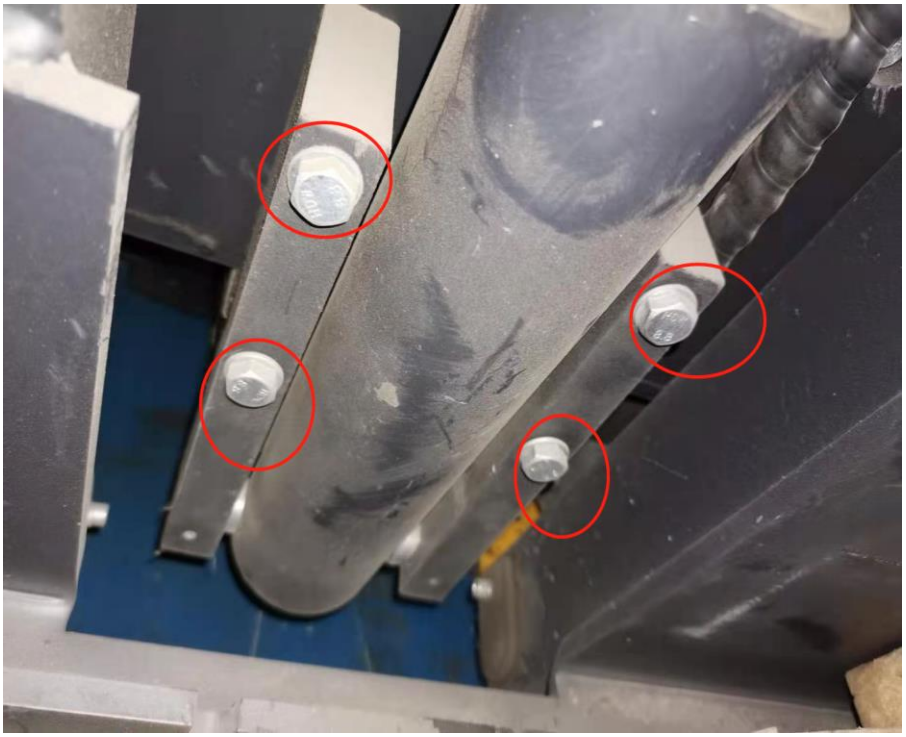
	

3.Unscrew the screw with a cross screwdriver and take out the carbon brush and replace it. Installation process and the inverse process of the above process.

9.4 Replace oil seal of lifting cylinder

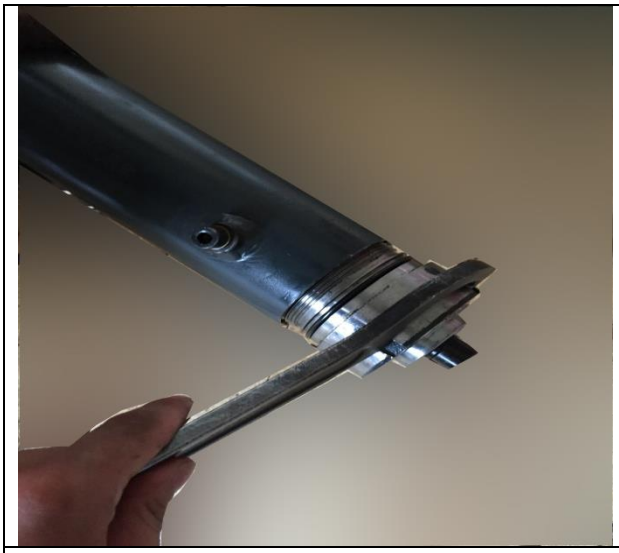
1. Remove the top retaining bolt

2 Remove the cylinder retaining Seat



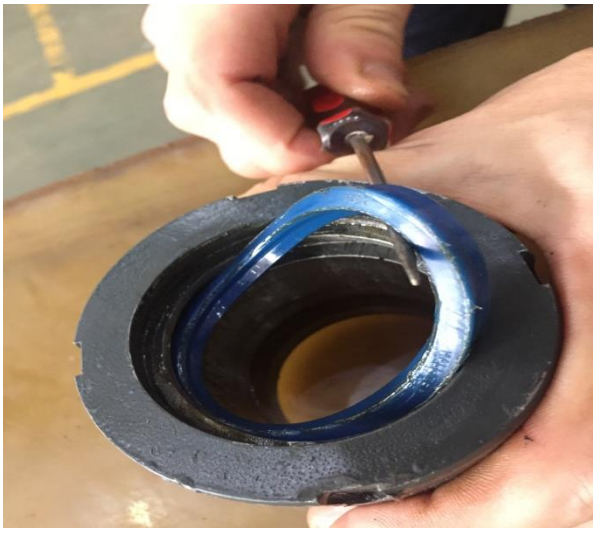
3 Remove the oil cylinder by lifting the cargo fork frame

9.5 Replace the sealing ring of the lifting cylinder



1. Remove the cylinder head with a crescent wrench

2.Remove piston, then remove retaining ring




3.Remove dustproof seal and shield ring and Y-type seal


4. Remove o-seal and shield ring, then repair hose . Installation way is in reverse sequence

9.6 Hydraulic motor fault

Breakdown	Reason
Hydraulic motor doesn't work	Bad connection or fuse burning. Check the battery connection. Check the key fuse. Check if hydraulic pump motor is likely to cause fuse burning.
	The key switch or pump station contactor is not turned off. Turn off the key switch. Check the power of pump station contact coil and pump station contactor with multimeter. Check the voltage output and upper limit switch of pin-4 in the meter. The key switch must be turned off, the rising button and the pump station connector ,then make the power steering function run.
	Insufficient voltage. Charge or replace batteries. Check for one or more defective battery cells in battery. Check cable terminals are tightly aligned with battery terminals and control panel connectors. Check cable internal wires are broken.
	The lift and drive system is not operating correctly.
The battery will not continue to work properly	The battery installed on the vehicle is too small. According to the working hours, choose the appropriate battery capacity.
	The battery is not fully charged during the battery charging operation. Check if battery is balance-charging (charging makes the proportion of all batteries is the same). Check if battery charger defects
	The battery charging interval is too long or the rechargeable battery cooling time is too short. Reduce battery duration. Please extend the cooling time of the battery before it can be put into use.
	Batteries have one or more defective battery cells, which may result in lower rated capacity and battery capacity. Test and identify defective cells. Replace defective

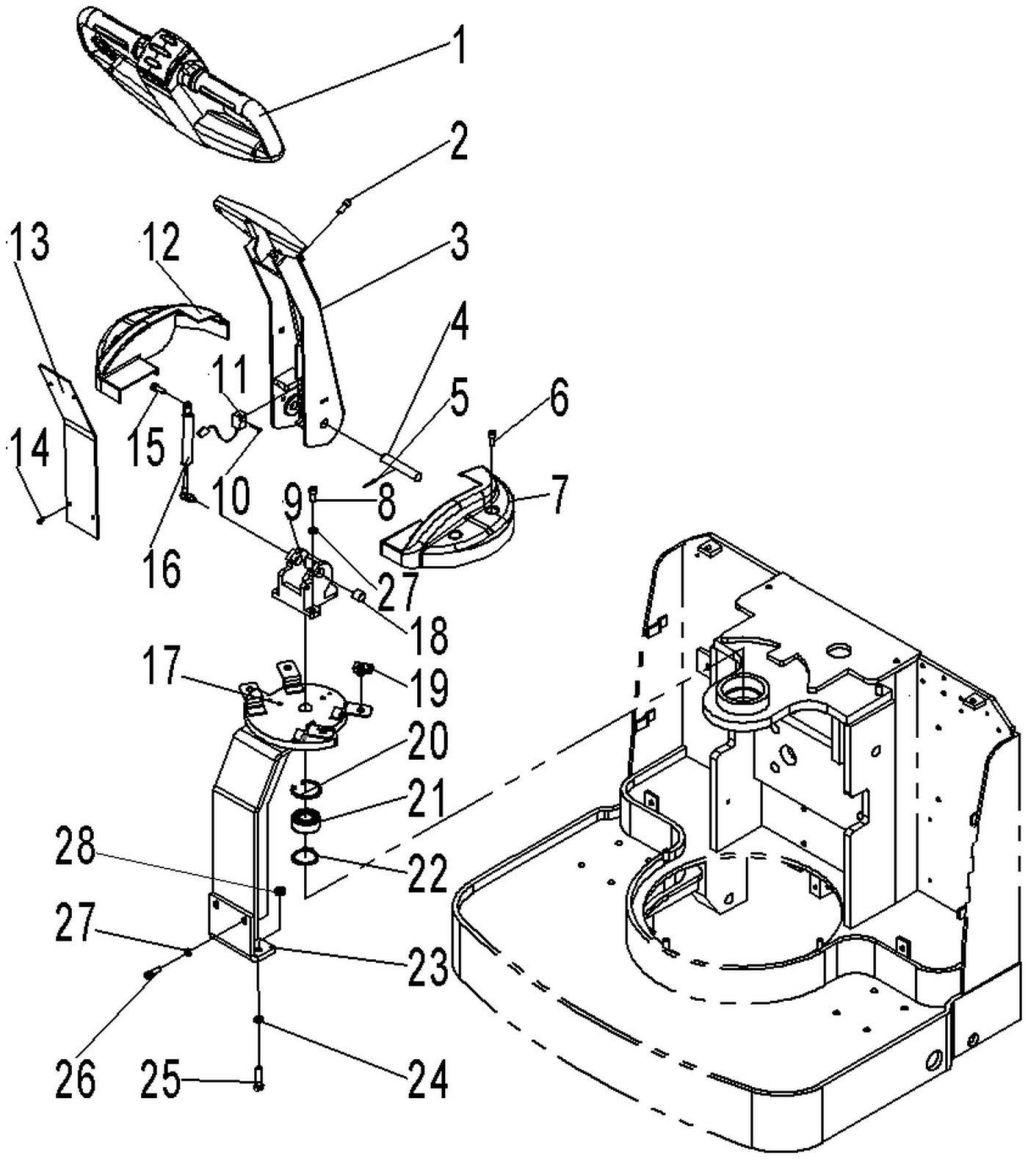
	cells. Battery units are connected in series. A bad battery causes high resistance in series with other batteries. This reduces the speed of the motor. This may occur when other batteries are almost fully charged.
	The hydraulic pump motor is overheated.

9.7 Hydraulic pump fault

Breakdown	Reason
Pump noise	Low oil level
	oil thick
	limit to the inlet line of the pump
	Worn parts in the pump.
	Oil dirty
	Air leaks into the inlet line
High temperature	Low oil level
	oil channel limited
	Safety valve settings are too low
	Oil thin
	Air leakage in the system
	Pump wear is too high
	The system operates at too high a pressure. The safety valve is too high. Restrictions in flow control valves, check valves and oil routes.
Pump seal oil leakage	Seal is worn
	Pump inside worn
	Too low an oil level in the tank causes the seal to be sucked
	During installation, seal is cut on the shoulder of the pump or keyway.
	Sealed lips dry and hardened by heat.
Pump can’t convey hydraulic	Low oil in tank
	Restrictions on the pump inlet pipeline
	air leakage in the inlet pipe. Loose bolts. Defects in the inlet pipe.
	viscosity of the oil is wrong
	Pump worn too much
	pump shaft fault
	The bolts of the pump do not have the correct torque

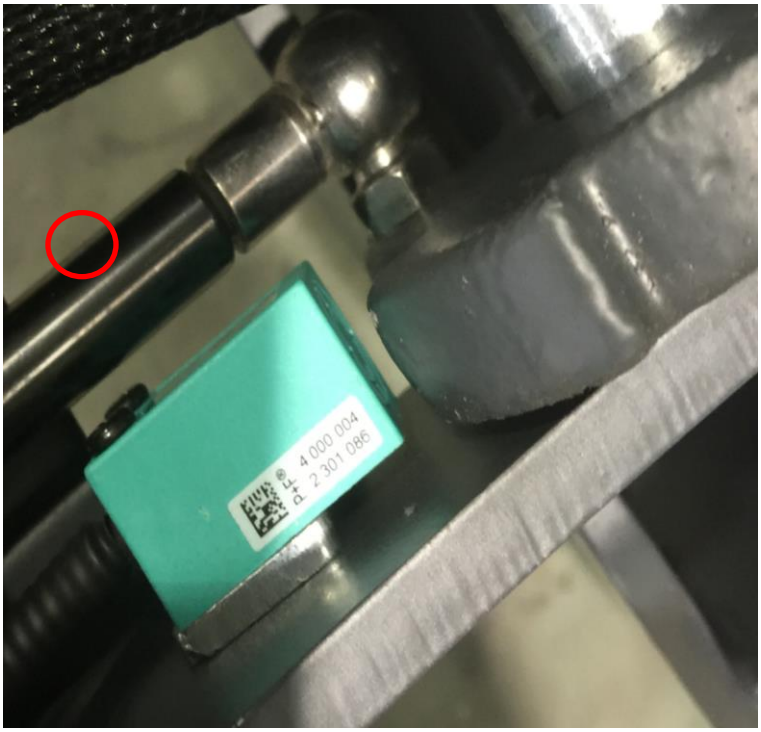
The main safety valve pressure has been adjusted before leaving the factory, and the user is not allowed to adjust and disassemble at will.

10. Tiller



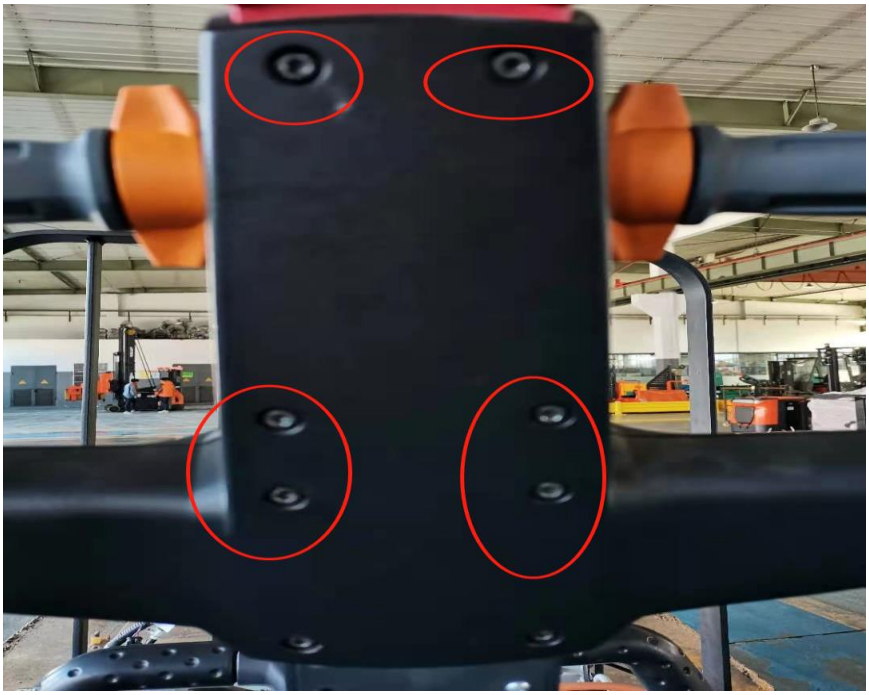
10.1tiller operate

1. Unscrew the two bolts to remove the proximity switch and replace it



2.Loose bolt , then remove gas spring

3 Remove the back bolt, open the handle and remove the retaining bolt to replace the handle



11. CURTIS

1 Precautions for Operation:

Handheld unit attention function is for the convenience of vehicle inspection and maintenance, without the approval of the vehicle manufacturer, the controller parameters are not allowed to adjust, in order to avoid vehicle and personal safety accidents.

After modifying the parameters of the handheld unit, it will be saved automatically. You only need to turn off the key switch and restart it.

The Curtis handheld unit can be connected when the controller is live or power off

2. Vehicle fault reading process

After connecting the handheld unit to the controller, turn on the key switch

According to the Curtis handheld unit menu list, find: Faults...

When the vehicle is running and the cursor is flashing, the fault content in English will appear, which will be interpreted with reference to the fault code table

3 Vehicle signal detection

After connecting the handheld unit to the controller, turn on the key switch

From the Curtis handheld unit menu list, find: Monitor...

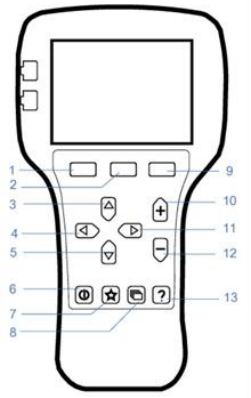
According to the need, open the corresponding detection menu sub-item, run the vehicle, observe the handheld value changes.

4 Curtis handheld unit menu contents

The Curtis 1313 handheld programmer is used to configure the Curtis electronic control system. Through this programmer, you can adjust and save set parameters, real-time monitoring of controller data and fault Diagnosis

Warning: The control system can affect the vehicle's acceleration rate, deceleration rate, hydraulic system and brakes. Dangerous conditions can occur if the vehicle control system is programmed incorrectly or beyond safety. Only the vehicle manufacturer or authorized service agent can program the control system

The programmer has two interfaces, one for communicating with the electronic control and the other for communicating with the PC. The programmer has a battery box and a memory card slot.



功能键（1, 2, 9）
导航键（3, 4, 5, 11）
电源键（6）
收藏键（7）
首页键（8）
加减键（10,12）
帮助键（13）

Power up the programmer

Connect to the controller by inserting the cable of the handheld programmer into the programming port of the controller. After connecting to the controller, the handheld programmer will automatically power on and display the control information on the programmer

当编程器加载完控制器的信息后，编程器上会显示主菜单。

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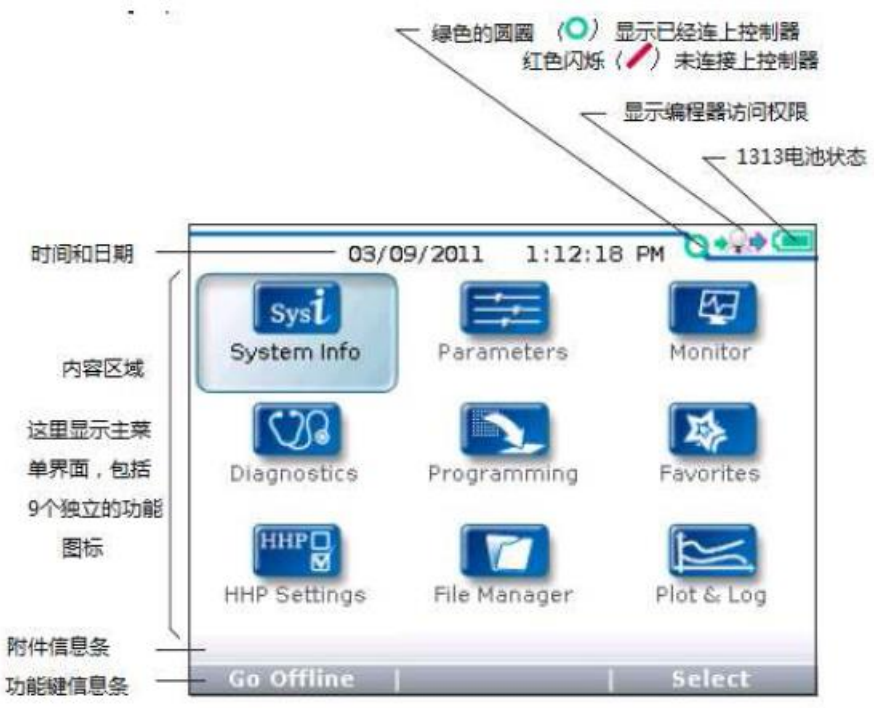


The function keys

Because the function of the three keys is determined by the specified content, the three keys are blank. At any given time, the function of the button is displayed on the upper LCD screen.

Direction arrow key

The information displayed can be selected up, down, left and right through four directional buttons.

+ / - buttons

These two keys can be used to add or subtract parameters. At the same time, "+" can mean "Yes" in the operation, and "-" can mean "No". In some cases, it can also be used as a scrolling option.

Power key

When the programmer inserts an already powered controller, the programmer does not have to press the power button to use, the programmer will automatically turn on. When pressed for a few seconds, the programmer will prompt whether to shut down, by selecting the function keys represented by "Yes", "No" to decide whether to shut down. When the programmer is turned off, press it again for a few seconds and the programmer will restart.

Collect keys

There are two ways to access the Favorites menu, either through Favorites from the main menu or by pressing this key

The menu structure

The main menu consists of nine submenus, each of which is displayed with a specific icon, and each item in the submenu is arranged in a hierarchy.

Some menus contain only one item of information, but most contain multiple items, and you can go to the next level of submenus by opening each item folder. Expand the table through the grid option, enter a group of execution commands through the dialog box option, no matter in which interface, use the left direction key, can return to the previous level of menu.

The names of all nine submenus are shown in bold on the main menu and below the icon. When you enter

a hierarchical menu, the name of the submenu or the path you are in is displayed at the top of the screen.

NINE MENU

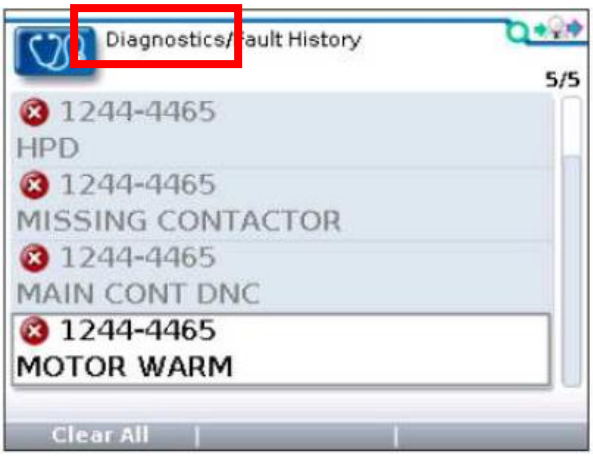
Troubleshooting menu

In the main menu, Select the "Diagnostics" icon and press the function key corresponding to Select to enter the Fault diagnosis menu, which contains two folders: "Present Errors" and "Fault History"

Note: Sometimes the fault caused by a temporary event caught in the circuit is not a system fault. It can be determined by rebooting the system and seeing if the fault disappears automatically.

In the historical fault folder, the faults listed are all the faults that have been encountered since the last historical fault was cleared. By clearing the contents of the entire folder, you can restart the historical fault

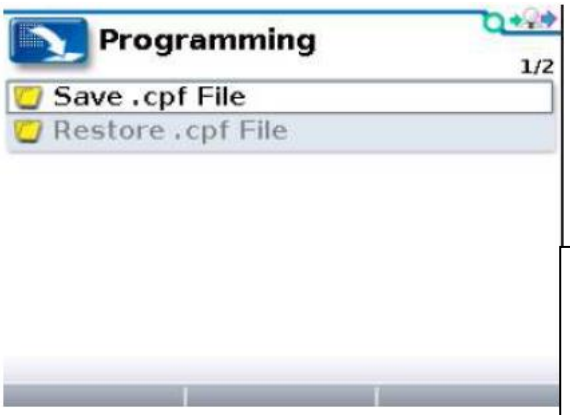
> “Clear All”用于清除历史故障文件夹。一个功能键只有在历史故障文件夹中有历史故障的时候才会高亮显示，在没有历史故障的时候会灰掉。



recording.

Programming menu

In the main menu, Select the "Programming" icon and press the function key corresponding to "Select" to enter the menu. You can store and restore parameter Settings files (.cpf files) through the programming menu



Save.cpf File（Save.cpf File）

Use the save in the programming menu. The CPF file feature allows you to back up the currently set parameters. You can save as many as you need. CPF files, and the need for each. CPF files have different names

Restore.cpf File（Restore.cpf File）

Restore.cpf File can choose from previously saved files. CPF file to replace the current controller. CPF file. When the entire data recovery process is complete, a dialog box will pop up asking for a reboot of the system.

5 Parameter Setting

Select "Parameters" in the home page and press adjust or modify the Parameters of the controller

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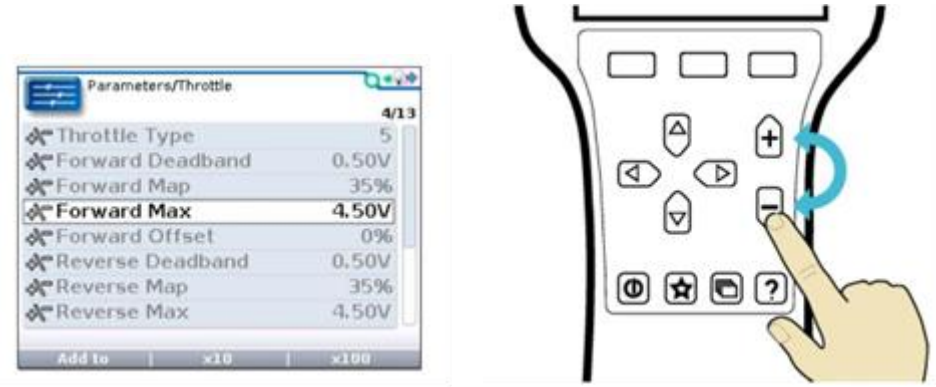
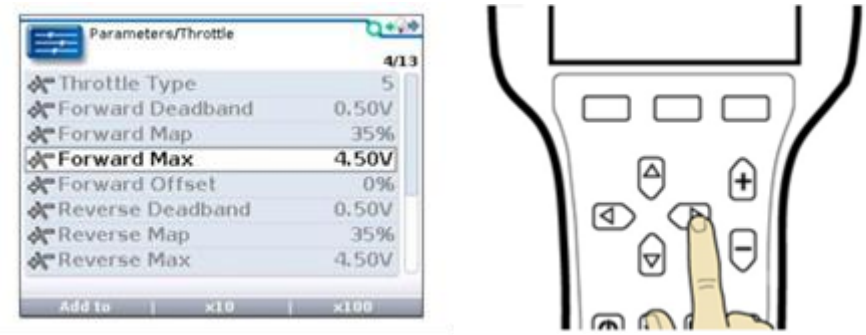
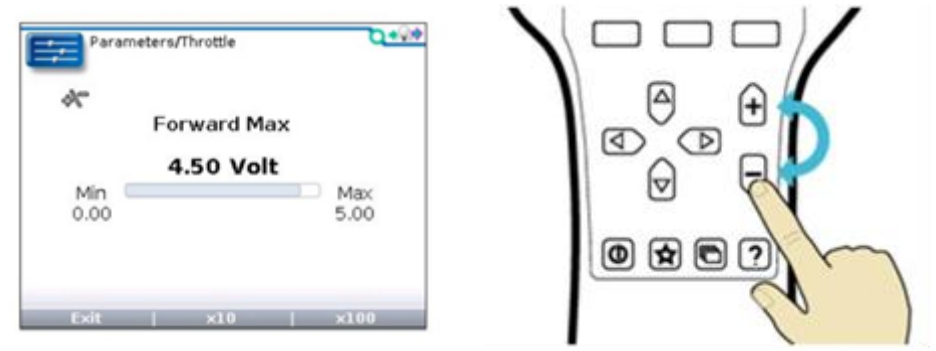
Parameters can be adjusted or modified in two ways, one is in the parameter list page, as shown in the

following figure



The other is to enter the parameter editing page, as shown in the following figure





Periodic maintenance

Only qualified and trained personnel are allowed to carry out maintenance work
Before maintenance, remove the goods from the fork and put down fork.to minimum position
For lifting the vehicle, use the specified binding or lifting equipment in accordance with Chapter IV. Before operation, place the safety device (e.g. specified lifting jack, wedge or wood block) under the car to prevent its accidental falling, moving or sliding

Pay attention to the maintenance of the handle lever. By compression, the gas pressure spring has been pre-installed. Carelessness may cause injury
Use approved and dealer-issued original spare parts
Please consider possible machine failures and accidents caused by leakage of hydraulic oil
Allow only trained maintenance technician to adjust the pressure valve
If you need to replace the wheel • Please follow the above instructions. The casters must be round and free

12. Maintenance list

		Intervals（Month）			
		1	3	6	12
Hydraulic system					
1	Check hydraulic cylinder if there is noise and leakage of piston		•		
2	Check hydraulic connectors and tubing if there is damage and leakage		•		
3	Check hydraulic oil level and recharge if necessary		•		
4	Add hydraulic oil after 12 months or 1500 hours of work				•
5	Check and adjust the function of hydraulic valve (1600/2000/2500kg +0/+10%)				•
Mechanical system					
6	Check if there is deformation and damaged on fork		•		
7	Check if there is deformation and damaged in chassis		•		
8	Check if all bolts are tightened		•		
9	Check if push rod is deformation and damaged		•		
10	Check if there is noise and leakage in transmission		•		
11	Check if there is deformation and damaged for tire		•		
12	Steering bearing				•
13	Check and lubricate spindle center points		•		
14	Lubricating grease nozzle	•			
Electrical system					
15	Check if there is wire damaged		•		
16	Check wire connecting		•		
17	Check emergency switch		•		
18	Check if there is noise and damaged in driving system		•		
19	Check monitor		•		
20	Check if correct fuse is used		•		
21	Check warning signal		•		
22	Check contactor		•		
23	Check if frame is leakage (insulation test)		•		
24	Check the function and wear of the drive controller		•		
25	Check the electrical system		•		

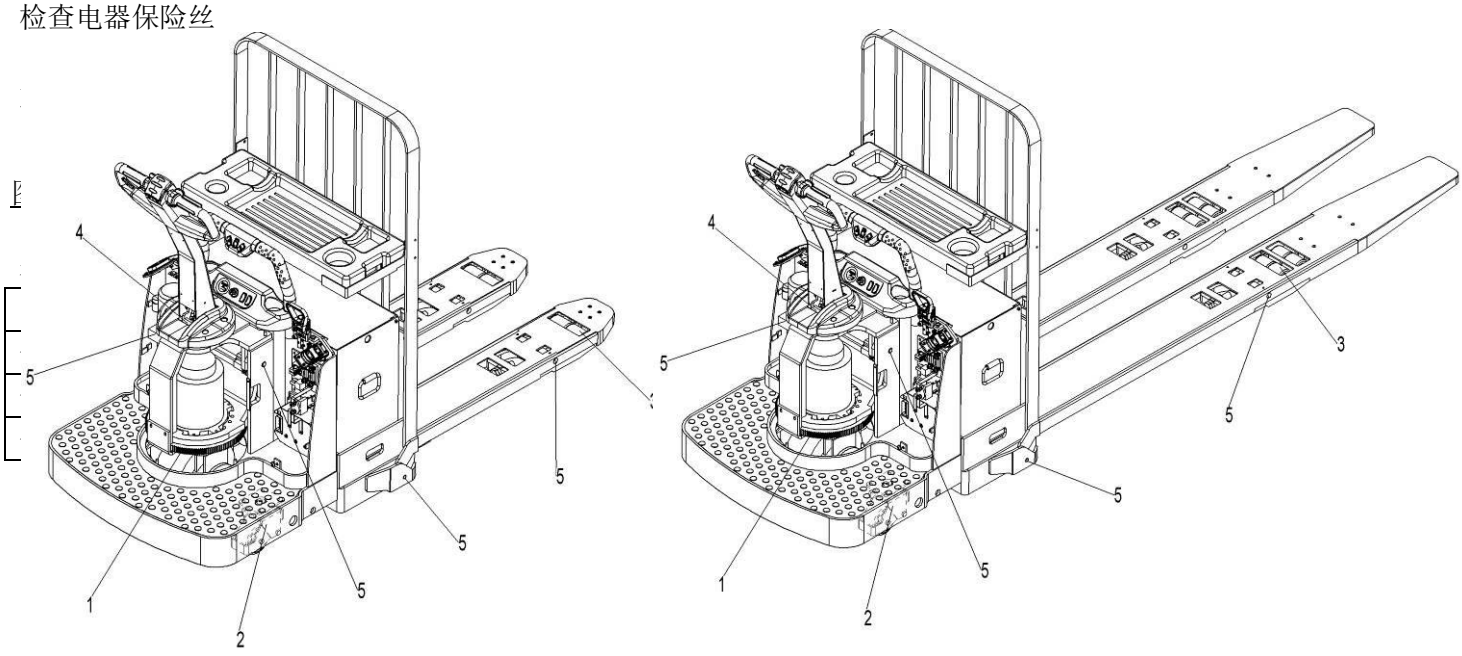
Brake system					
26	Check brake function, replace brake shoe or adjust if necessary		•		
Battery					
27	Check battery volatge		•		
28	Check if wiring end is corrosion and damage, lubricate the wiring end		•		
29	Check if battery cover is damaged		•		
Charger					
30	Check if main cable is damage			•	
31	Check startup protection procedures during charging			•	
Function					
32	Check Horn	•			
33	Check electromagnetic valve	•			
34	Check emergency brake	•			
35	Check reverse braking and regenerated braking	•			
36	Check belly button	•			
37	Check steering	•			
38	Check Lift up and down	•			
39	Check proximity switch of tiller	•			
Summary					
40	Check label	•			
41	Check bearing wheel and adjust height , replace if worn out		•		
42	Test one more time	•			

12.1 Lubrication

Maintain according to maintenance list. Spec of grease: DIN 51825

1. Gear box
2. Supporting wheel bearing
3. Load wheel bearing
4.Hydraulic system
5.JCT

检查电器保险丝

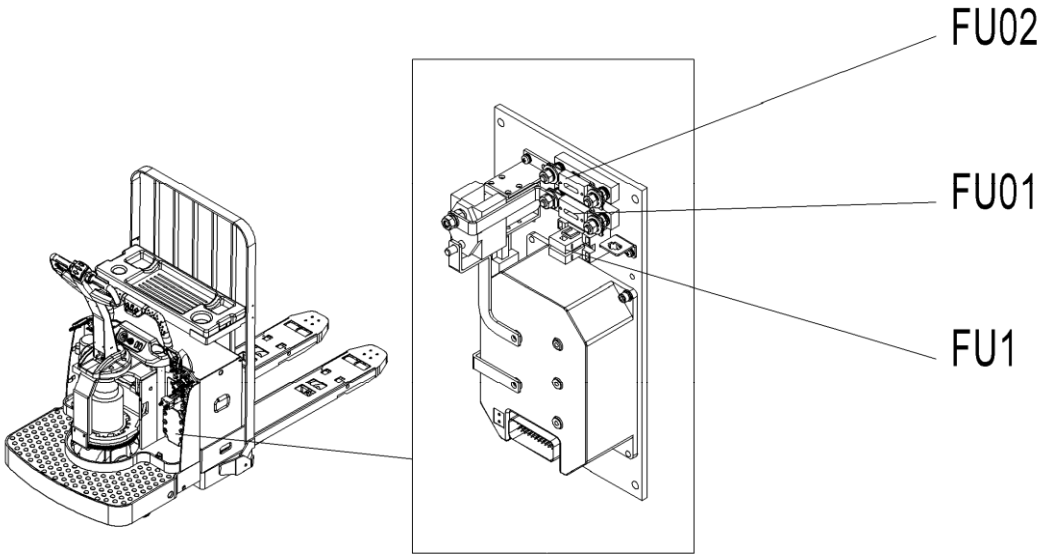


Check and add hydraulic
Spec of hydraulic:
H-LP 46, DIN 51524
Viscosity: 41.4 - 47
The amount of oil is 1,5L

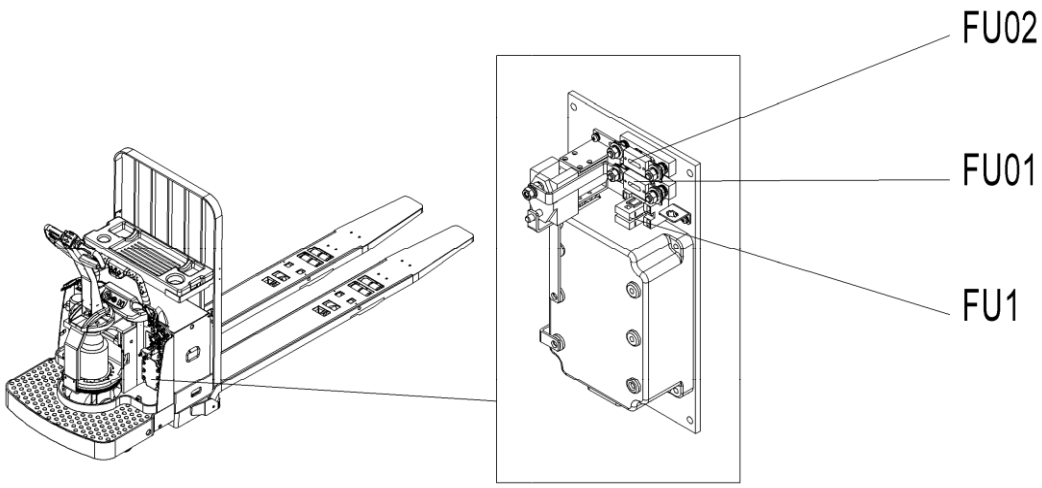
Waste materials such as waste oil, batteries or other materials must be treated and recycled in accordance with national regulations and, if necessary, submitted to the recycling company for recovery. The oil level should not be lower than the minimum amount of fuel required to start the vehicle. Add oil to the filling point if necessary.

12.2 Check fuse

Remove the main cover and leave the fuse in position as shown in figure 19 and 20



Pic.19: Fuse positon PT 27R



Pic.20: Fuse positon PT 36R

Table 4: Fuse positon PT 27R

	Rate
FU1	10 A
FU01	300 A
FU02	150A

Table 5: Fuse positon PT 36R

	Rate
FU1	10 A
FU01	350 A
FU02	150A

12.3 Error analysis

• If the vehicle still has the faults mentioned in Chapter 6

Table 6: Error analysis

Error	Causes	Maintenance and repair
Goods cannot be promoted	Excessive load weight	Only upgrade the large capacity shown on the nameplate
	Battery discharge	Charge the battery
	Lifting fuse is out of order	Check and replace the hoisting fuse
	Hydraulic oil level is too low	Check and refill the hydraulic fluid
	spill	Inspect tubing and/or cylinder seals
Suction oil leakage	Oil is too high	Reduce oily
Vehicle inoperable	battery is recharging	The battery is fully charged, then unplug the main power from the power socket
	Battery not connected	Connect the battery properly

	Fuse failure	Check and replace the fuse
	Low battery	Charge the battery
	The combined emergency switch is activated	Insert the key and pull the knob to disable the combined emergency switch
	The handle is in the operating area	First move the handle to the brake area

If the vehicle fails and cannot be operated outside the work area, lift the vehicle and place a load handling device under the vehicle to ensure the safety of the vehicle before moving the vehicle out of the aisle.