EKKO®
MATERIAL HANDLING EQUIPMENT
MOVING AHEAD

SERVICE MANUAL

EK07S Series Counter Balanced Stacker

WARNING

You must understand the operation instructions in this manual before using it.
Attention:

- Please check the last page of this document and all the current product type identification on the name plate.
- Keep it for future use

Manual

1. Maintenance List

a. Overview of main components

List:1. Maintenance List

		Interval (month)			
		1	3	6	12
The hydraulic system					
1	Check the hydraulic cylinder, piston for damage noise and leakage		•		
2	Check hydraulic fittings and tubing for damage and leakage		•		
3	Check hydraulic oil level and refill if necessary		•		
4	Refill with hydraulic fluid (12 months or 1500 working hours)				•
Mechanical systems					
5	Check the fork for deformation and cracks		•		
6	Check the base for deformation and cracks		•		
7	Check that all screws are properly fastened		•		
8	Inspect door frame and chain for corrosion, deformation or damage and replace if necessary	•			
9	Check gear box for noise and leakage		•		
10	Check wheel for deformation and damage and replace if necessary		•		
11	Lubricated steering bearing				•
12	Check and lubricate the pivot points		•		
13	Lubricating grease nozzle	•			
14	If the protection and/or protection plate is damaged, replace it	•			
Electric System					

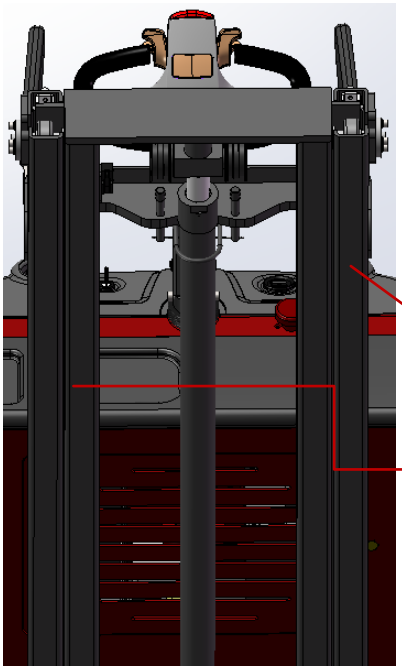
15	Check for damaged wires		•		
16	Check electrical connections and terminals		•		
17	Test emergency stop switch function		•		
18	Check the electric drive motor for noise and damage		•		
19	Detection display		•		
20	Check that the correct fuse is used and replace it if necessary		•		
21	Check the buzzer		•		
22	Check the current contactor		•		
23	Check frame for leakage (insulation test)		•		
24	Check accelerator function and wear		•		
25	Check the electrical system driving the motor		•		
Driving system					
26	Check braking performance		•		
storage battery					
27	Checking the Battery voltage		•		
28	Clean and grease terminals and inspect for corrosion and damage		•		
29	Check whether the battery casing is damaged		•		
Charger					
30	Check whether the main power cable is damaged		•		
31	Check the startup protection program during charging		•		

function					
32	Check the buzzer	•			

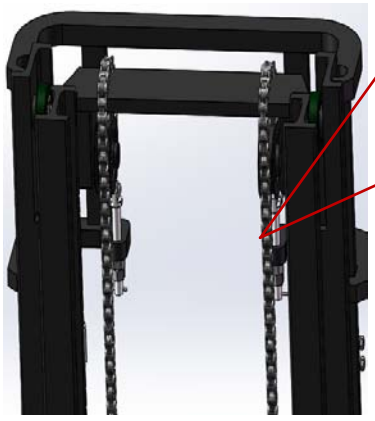
33	Check the air gap of the electromagnetic brake	•			
34	Test emergency brake function	•			
35	Test reverse braking and regenerative braking functions	•			
36	Check steering function	•			
37	Check lifting and descending functions	•			
38	Check whether the key switch is damaged and functional	•			
39	Detection speed limit switch (lifting height >~400mm)	•			
synthesize					
40	Check all labels for clarity and completeness	•			
41	Check that the guard plate and/or guard are not damaged	•			
42	Check casters, if worn height adjustment or replacement		•		
43	Run a trial run	•			

B. lubrication points

Lubricate marked points according to maintenance list. Required grease specification: DIN 51825 standard grease.

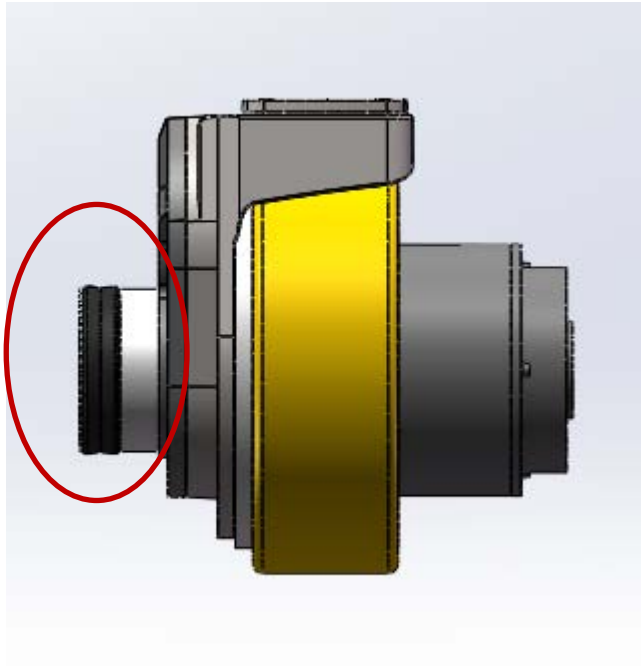


Door frame track lubrication



Chain lubrication

Axle lubrication



A. Check and correct electrolytes

The electrolyte density is based on 25℃.Therefore, when measuring, if the temperature of the electrolyte is higher or lower than 25℃, every 1℃higher, should be measured from the actual density value plus 0.0007;On the contrary, lower than 25℃, every 1℃, should be minus 0.0007;If the temperature difference is large,

Can be corrected by pressing the following formula:

Standard temperature of electrolyte (25℃) Density is converted according to the following formula:

D25 = Dt + 0.0007(T-25)

D25 -- electrolyte density at 25℃

Dt -- T ℃ measured electrolyte density

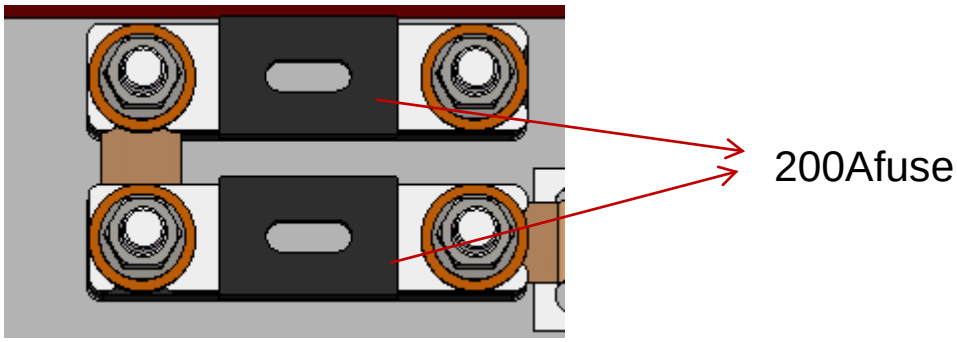
T -- Temperature of electrolyte when measuring density

Under the condition of normal working of charging function, the density of 1.26±0.005(25 ℃) temperature below 30℃ sulfuric acid electrolyte into the battery, liquid level requirements higher than the protection plate 0.6 ~ 1.0 in.

Leave the battery to rest for 3-4 hours, no more than 8 hours. Initial charging can be carried out only when the liquid temperature drops below 35℃.If the electrolyte level drops after standing, the electrolyte should be replenished.

The discarded batteries must be recovered and stored in the specified environmental protection area or the specified waste disposal area in accordance with the local laws and regulations, and the work must be carried out by qualified professional companies.

d. Check fuse



List 2: Fuse specification

	specification
Fuse 1	10A
Fuse 01	300A

Fault analyses

If the vehicle continues to malfunction, follow the instructions of the manual.

2.1 Common fault analysis

- 2.1.1Hand and foot brake common faults and troubleshooting methods

fault	cause	maintenance
Cargo cannot be lifted	Excessive cargo weight	Lift only the maximum load as shown on the nameplate
	Battery discharge	The battery
	The lift fuse has failed	Check and replace the lift fuse
	The hydraulic oil level is too low	Check and finally fill with hydraulic fluid
	The spill	Check tubing and/or cylinder for tightness
	Sensor failure	Check the sensor on the door rack
Oil leakage caused by suction	Oil is too high	Reduce oily
Stacker cannot operate	The battery is charging	Fully charge the battery, then unplug the main power plug from the power supply
	The battery is disconnected.	Connect batteries correctly
	The fuse is out of order	Check and eventually replace the fuse
	Battery discharge	The battery
	The emergency stop switch is activated	Insert and pull knob to eliminate emergency stop switch function
	The handle is in the operating area	First move the handle to the braking area
Traffic is going in one direction only	Traffic is going in one direction only	Check accelerator and connector

The forklift suddenly started	Controller damage	Replacing a Controller
	The accelerator has not moved back to the middle position	Repair or replace the accelerator
Other poor braking	Battery discharge	Check the battery condition on the discharge monitor
	The electromagnetic brake has been activated	Check electromagnetic brake
	The handle wiring harness is not connected or damaged	Check handle wiring harness and connectors
	At 400mm altitude, the speed decreases and the sensor fails	Check sensor
	Electrical system overheating	Discontinue use and cool the vehicle
	The thermal sensor is faulty	Check and replace the heat sensor if necessary

If the vehicle is malfunctioning and cannot be operated outside the work area, lift the vehicle up, place a load handling device under the vehicle and secure the vehicle, then remove the vehicle out of the channel.

Fault code display

Table 4:1212P fault codes

Programmer display	code	The fault phenomenon	fault diagnosis
BATTERY DISCONNECT FAULT	**4.5**	Battery don't answer	1) The battery is not connected
BRAKE OFF FAULT	**3.4**	Brake closing fault	2) Poor contact of battery end
BRAKE ON FAULT	**3.2**	Brake opening failure	1) Electromagnetic brake coil short circuit

CURRENTSENSE FAULT	**4.1**	Current detection fault	2) Electromagnetic brake drive open circuit
EEPROM CHECKSUM FAULT	**4.3**	EEPROM failure	1) Electromagnetic brake coil open
HARDWARE FAILSAFE	**4.2**	Motor voltage is out of range	2) Electromagnetic brake drive short circuit
HPD FAULT	**3.5**	HPD fault	1) Short circuit of motor or motor wiring
MAIN FAULT	**2.3**	The main contactor is faulty	2) The controller is faulty
MAIN OFF FAULT	**2.1**	Main contactor coil drive 'off' failure	1) EEPROM is faulty or invalid
MAIN ON FAULT	**2.4**	Main contactor coil drive 'on' failure	1) Motor voltage cannot match accelerator input
OVERVOLTAGE FAULT	**1.5**	Battery voltage is too high	2) Short circuit of motor or motor matching ring
PRECHARGE FAULT	**3.3**	Precharge failure	3) The controller is faulty
SPEED POT FAULT	**1.3**	The speed limiting potentiometer is faulty	1) Accelerator, key switch, promotion or prohibition
THERMAL FAULT	**1.1**	Over/under temperature cut-off	Input several actions out of order

THROTTLE FAULT	**1.2**	Potentiometer slip end or low	2) Wrong adjustment of accelerator
UNDERVOLTAGE FAULT	**1.4**	The terminal voltage is out of range	1) Main contactor adhesion or open

一、Methods for troubleshooting common faults

1、Code 4.5 Battery is not connected

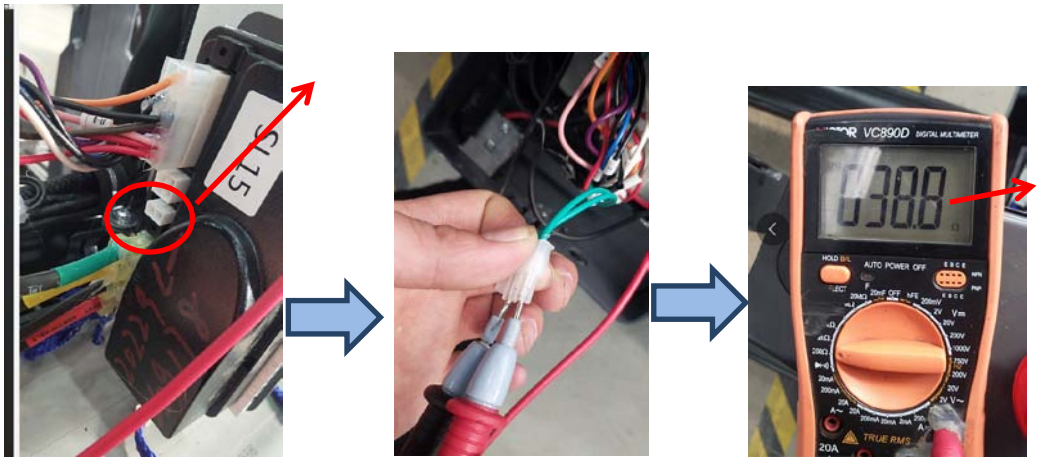
Check whether the fastening of cable terminals of the car body is loose, as shown below:

Check whether the cable connection (including other secured parts) is loose

2. Use a multimeter to measure the monomer voltage of the battery with load. The specific operation is shown as follows:

1、Codes 3.4 and 3.2 Electromagnetic brake line problems, or electromagnetic brake failure

Use a multimeter to measure the resistance of the two cores on the controller to the plug-in. The specific operations are as follows:



Normally, it should be about 40 ω. If no resistance is displayed, there is a problem with the brake line or a short circuit of the brake coil.

Code 4.1 Motor or motor line short circuit or controller failure

1. Remove the motor brake disc (the brake line is still connected), connect the motor M1 M2 directly to the positive and negative poles of the battery, observe whether the motor rotates normally, if not, the motor will fail.

2. If the motor turns normally, the controller should be replaced.

Operation sequence failure in 3.5 and 3.1
1, interlock switch under normal circumstances, use a multimeter to measure the controller 14 core plug-in between J1-6 and the negative pole, when the handle rod is in the switch working area, there is about 24V voltage. If not, check the interlock switch. For example, check whether the interlock switch is normal and whether the signal cable of the switch is connected to the controller.

4.2 Motor voltage cannot match accelerator input, motor or motor ring short circuit and controller fault, troubleshooting operations are shown as follows:

Switch the multimeter to 20V DC, insert the pen j1-1 (accelerator 0-5V speed signal) and 2 (negative pole) respectively, turn the accelerator after power on, and

If the voltage change of accelerator is normal, replace the controller.

Six, determine the controller fault

Unplug the accelerator docking plug, if the controller is still reported fault after powering on (in addition to the above faults), the controller is faulty.

7. If the controller fault is steady on and there is no walking, the troubleshooting steps are as follows:

1. Measure whether there is voltage output of accelerator 0--5V (between J1-1 and negative electrode)

2. Short-circuit j1-6 on the 14-core plug of the controller with line 7 on the 5-pin. After restarting, turn the accelerator to see if there is a walk.

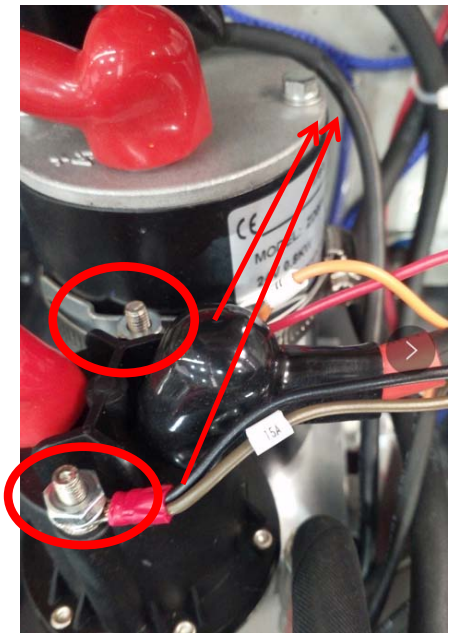
3. The brake is locked, remove the brake (the brake line is still connected), restart and turn the accelerator to check whether it is normal.

4, remove the motor brake disc (brake line is still connected), connect the motor M1 M2 directly to the battery positive and negative poles, observe whether the motor is normal rotation, if not, the motor failure.

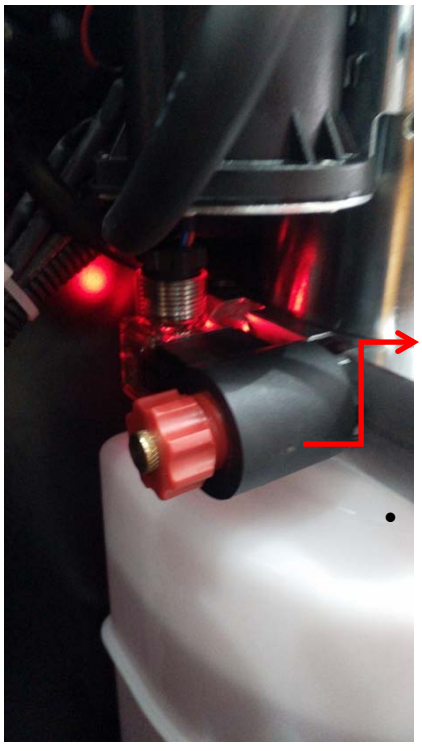
5. If all the above tests are normal, judge the controller problem.

Viii. If there is no lifting and dropping or the cylinder drops automatically, the troubleshooting method is as follows:

1.Here is the coil wiring of the lifting contactor (line numbers are 2 and 15). After powering on, press the lifting button to measure whether there is a voltage of about 24V at these two places. If so, and there is no sound of pulling on the contactor, then the contactor is faulty. If there is no 24V voltage, then line 15 at the measuring handle is connected to line 15 at this point.



2、Press down button, down solenoid valve signal red light should be steady on

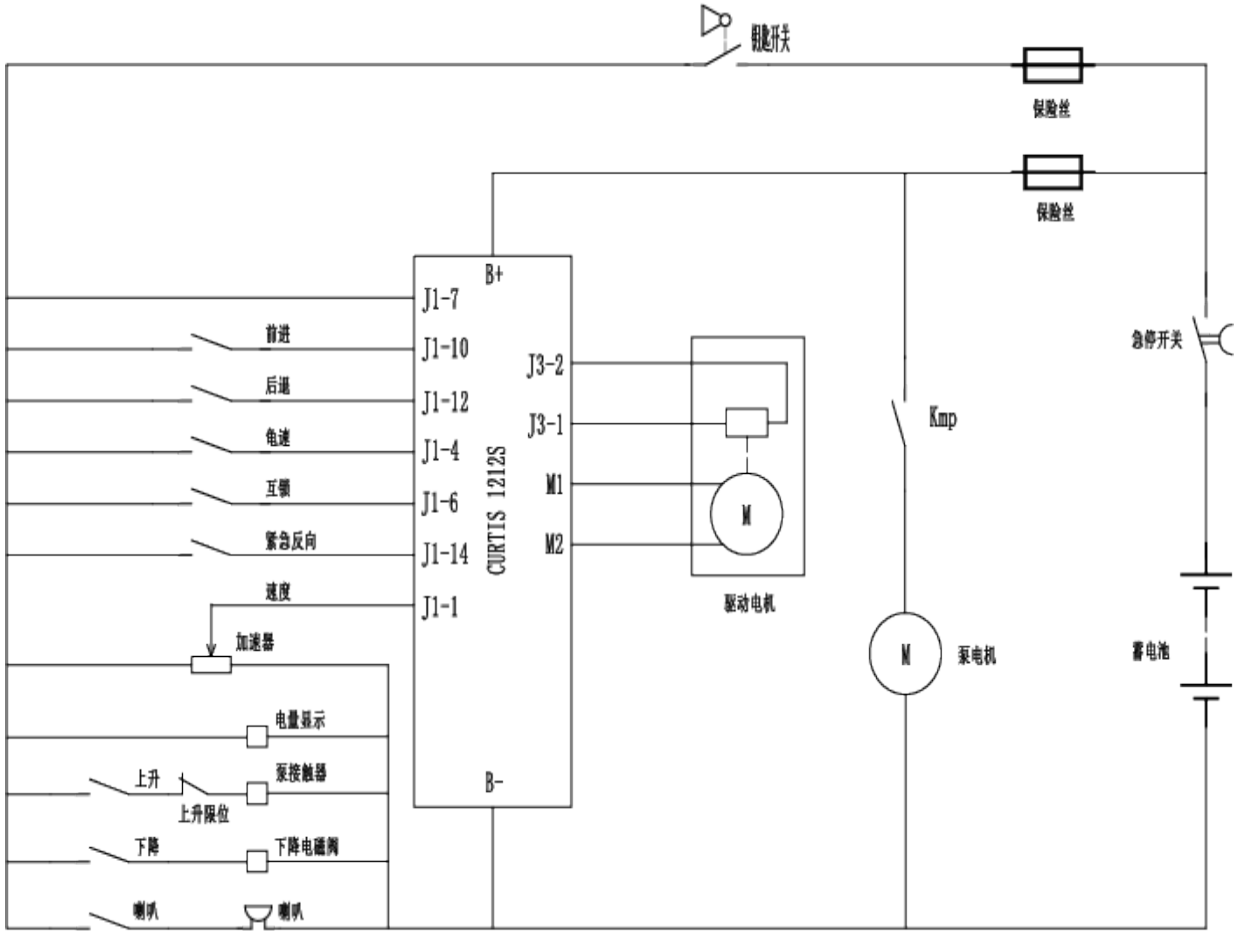


1. If the vehicle cannot be lifted normally, for example, the original 3300 lbs. vehicle can only be lifted less than 2200 lbs., then the oil pump pressure can be adjusted, but this operation must be carefully, if the hydraulic pressure is adjusted so that the vehicle load exceeds the rated, it may make the frame deformation. Specific operations are as follows: The wrench unscrewed the pressure nut.

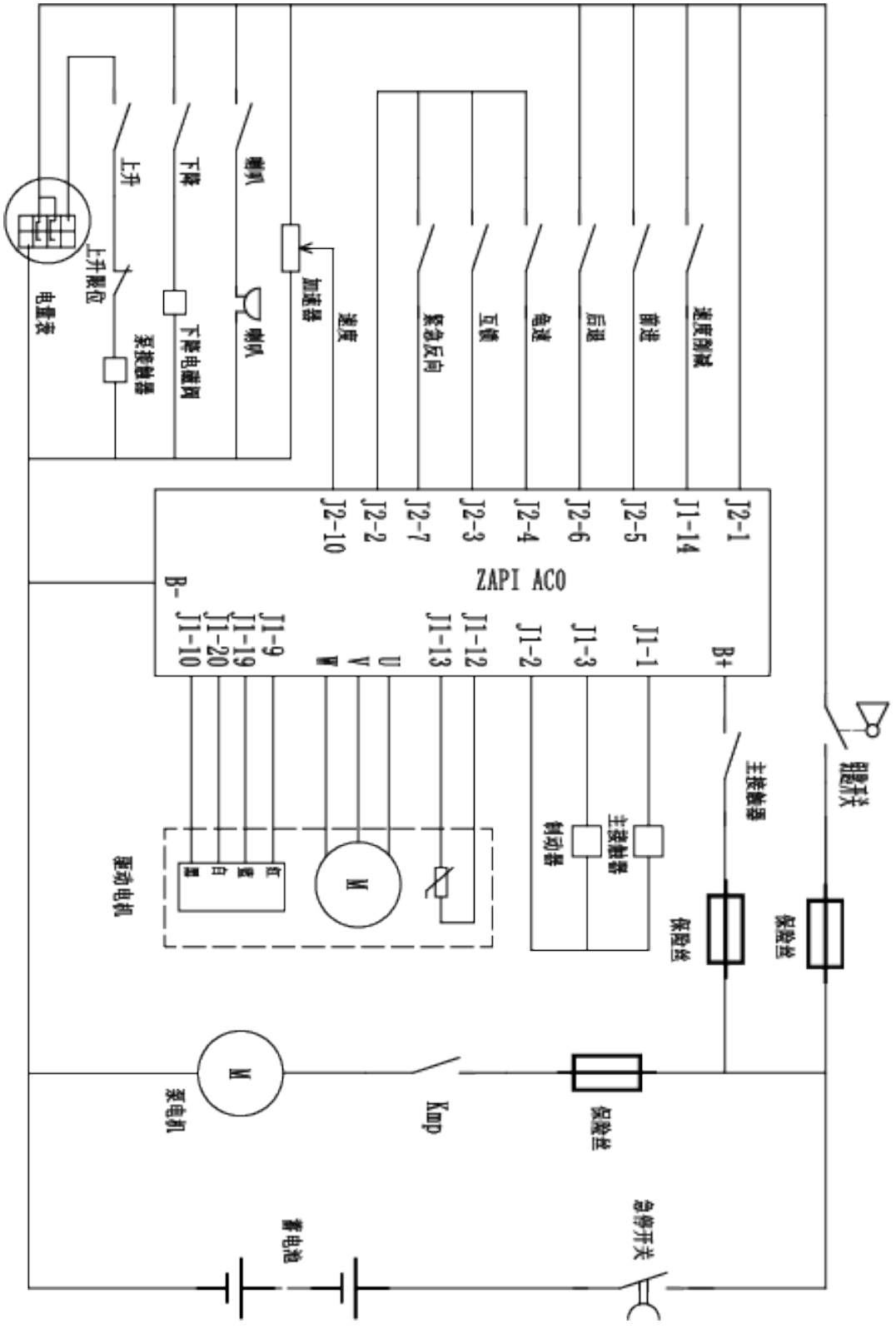
Using an inner hexagon wrench, adjust the pressure.

a、 Schematic diagram, and wiring diagram

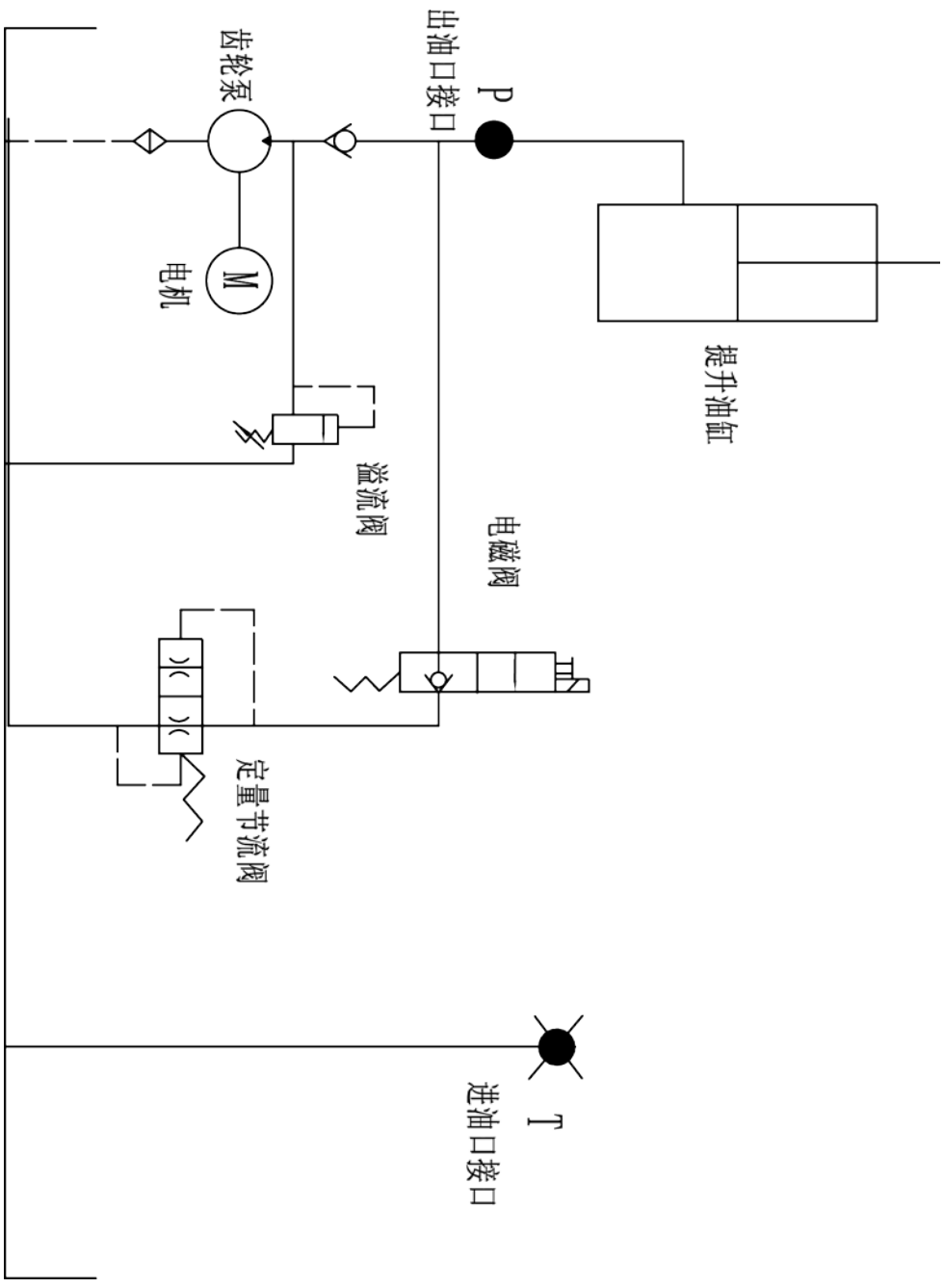
EK05S Electrical Schematic diagram



EK07S Electrical Schematic diagram



B、Hydraulic circuit



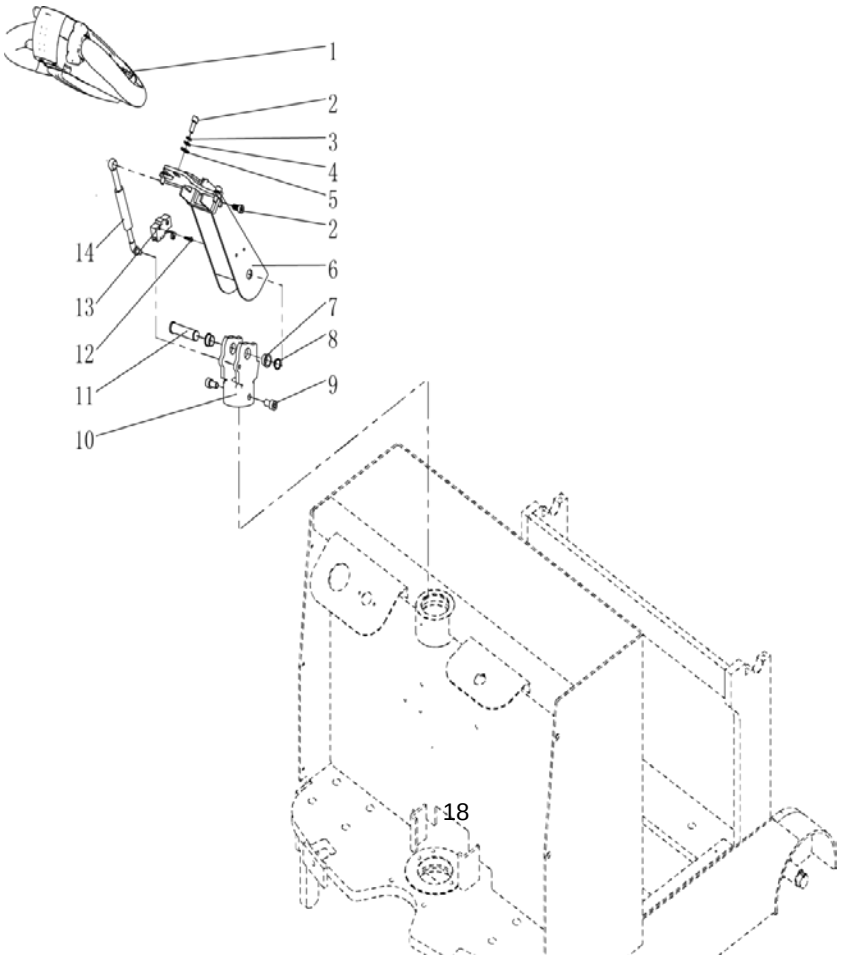
Hydraulic circuit

Hydraulic oil inspection

Appearance	odor	condition	results
Clear not discoloration	good	good	can be used
color transparency	good	with other oil mix	check viscosity, if qualified can continue to use
Color changes like milk	well	mixed with air and water	to separate moisture or replace hydraulic fluid
The color becomes dark brown	not good	for oxidation	replacement of hydraulic oil
Clear color but small black spots	good	mix with other particles	can be used after filtering

4、Dissassembly of main parts

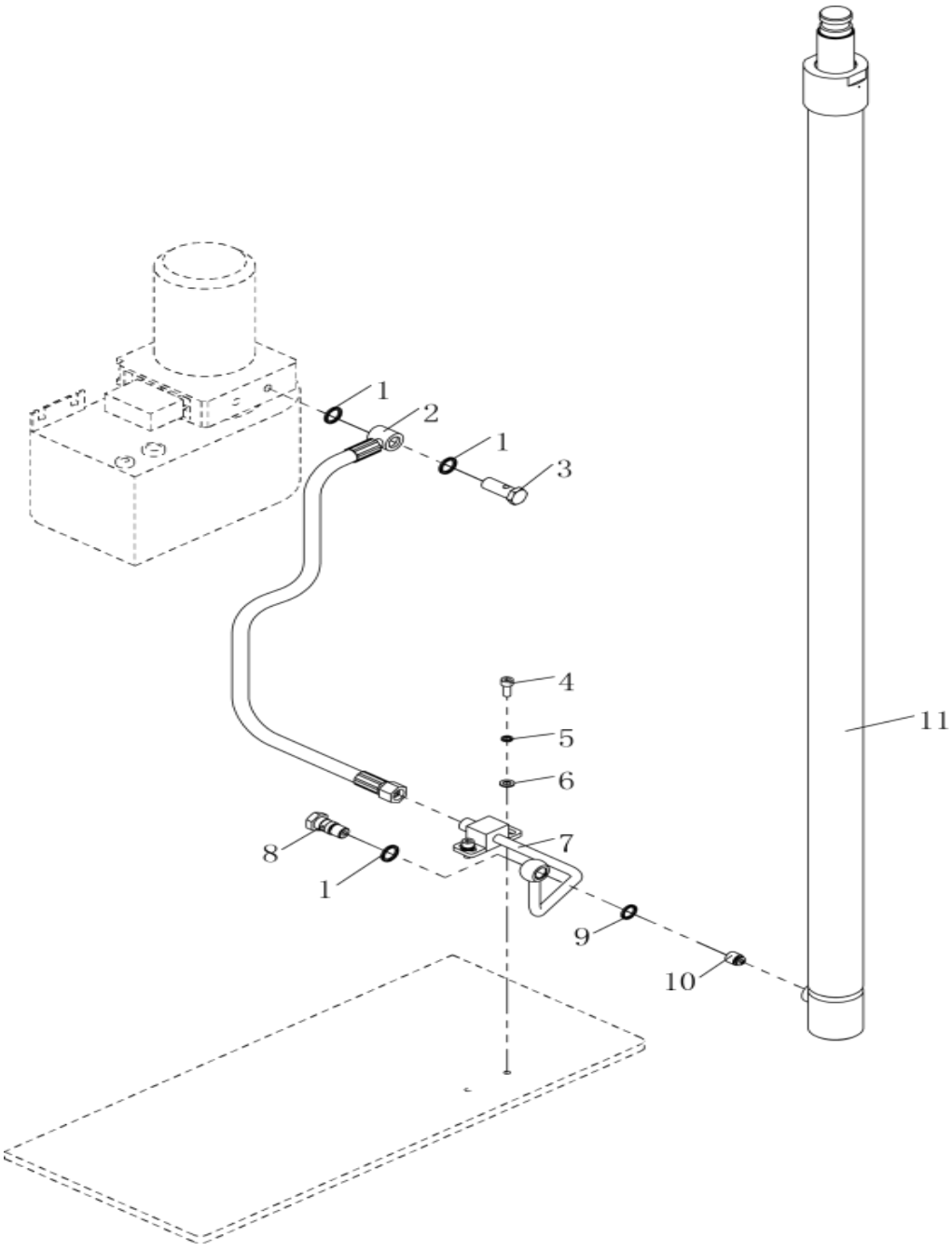
A、Removal of handle assembly



NO.	code	Name	Specification	quantity	Specification
1	T600	T600 Dtong handle		1	
2	GB/T 70.1-2000	Hexagon socket head screws	M8×20	4	
3	GB / T93-1987	Elastic washer	Φ8	3	
4	GB / T95-2002	Flat washer	Φ8	3	
5	GB/T 95-2002	Flat washer	Φ10	1	
6	Q1545.07.01	Handle bar welded		1	
7	CL10.5-1	Composite sleeve with shoulder		2	
8	GB 894.1-86	Shaft with elastic retainer	Φ17	1	
9	GB/T 70.1-2000	Hexagon socket head screws	M10×20	2	
10	CL10.5-4/G	Handle coupling		1	
11	CL10.5-3	Handle shaft		1	
12	GB/T 818-2000	Cross recessed pan head screws	M4×20	2	
13	RZ-15DW2-83	Microswitch (handle)		1	
14	CL10.5.2.2/E	Gas spring		1	

A、Removal of handle assembly

B、Removal of electric control component



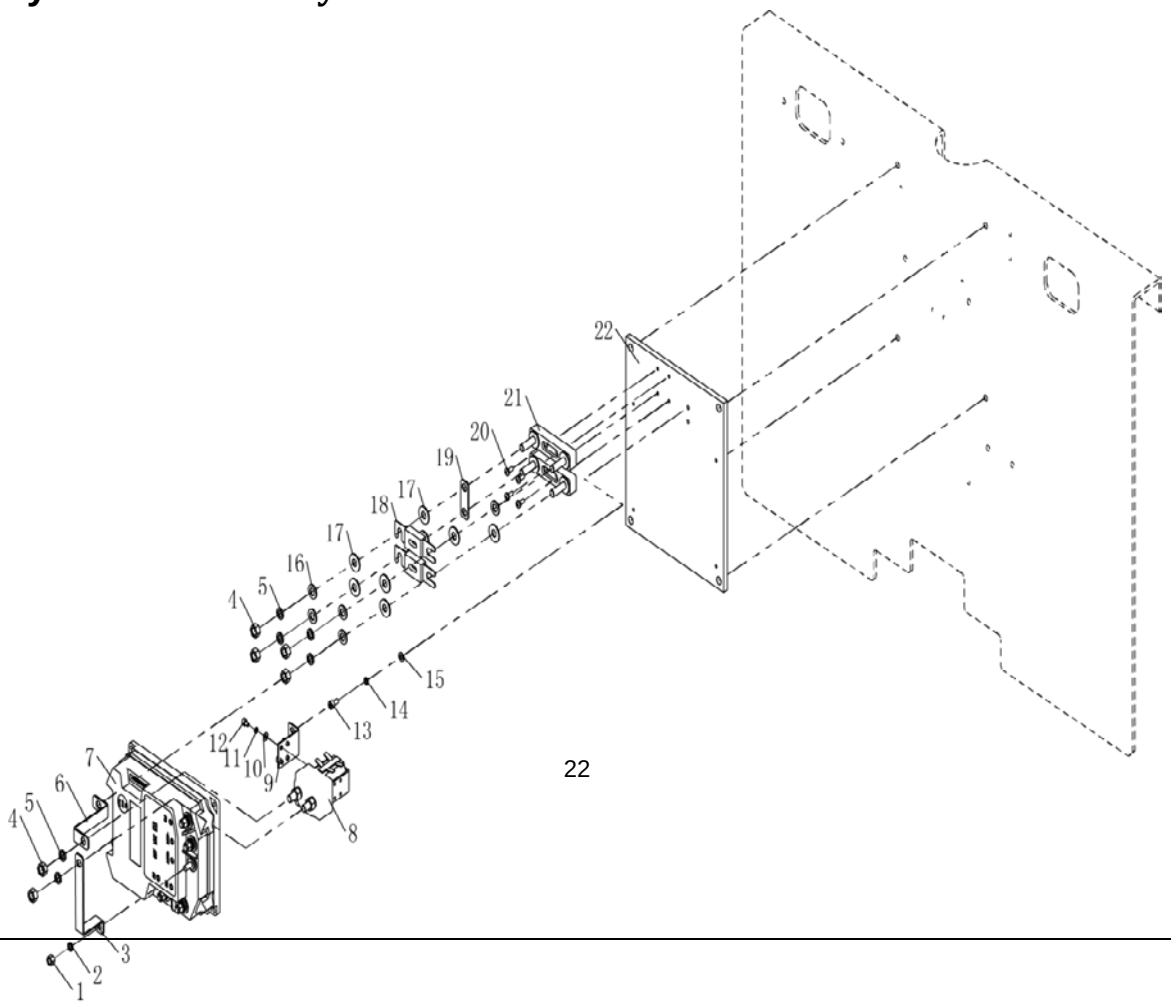
B、

No.	Code	name	Specification	quantity	remark

Removal of electric control component

1	GB982-77	Combination gasket	Φ18	3	
2	E05JZ-02.4.2B	hose		1	
3	E1230X.03-5	Hollow bolt		1	
4	GB/T 70.1-2000	Hexagon socket head screws	M8×20	2	
5	GB/T 93-1987	Elastic washer	Φ8	2	
6	GB/T 95-2002	Flat washer	Φ8	2	
7	E05JZ-02.4.1	Steel pipe		1	
8	SPN10.8-6	The tubing connector		1	
9	GB982-77	φ 16 combined gasket		1	
10	G1/4	Explosion-proof valve		1	
11	SPN1030.8	Oil cylinder		1	

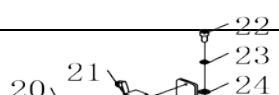
C、Hydraulic assembly removal



1	GB/T 41-2000	Hexagonal nut	M6	5	

c、Hydraulic assembly removal

2	GB/T 93-1987	Elastic washer	Φ6	5	
3	SL20 CL 老款	Controller B+ connects to a copper bar		1	
4	GB/T 6170-2000	Hexagonal nut	M8	6	
5	GB/T 93-1987	Elastic washer	Φ8	6	
6		Main contactor connecting piece		1	
7		ZAPI AC0 controller		1	
8	SW80	relay		1	
9		Contactor fixing plate		1	
10	GB/T 95-2002	Flat washer	Φ4	4	
11	GB/T 93-1987	Elastic washer	Φ4	4	
12	GB/T 70.1-2000	Hexagon socket head screws	M4×6	4	
13	GB/T 70.1-2000	Hexagon socket head screws	M5×10	2	
14	GB/T 93-1987	Elastic washer	Φ5	2	
15	GB/T 95-2002	Flat washer	Φ5	2	
16	GB/T 95-2002	Flat washer	Φ8	5	
17		Copper gaskets		8	
18	200A	The fuse		2	
19		Safety connector 1		1	
20	GB/T 818-2000	Cross recessed pan head screws	M4×10	4	
21	SYY	Fuse base		2	
22	SL20 CL	ZAPI Aluminum plate of AC0 controller		1	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20

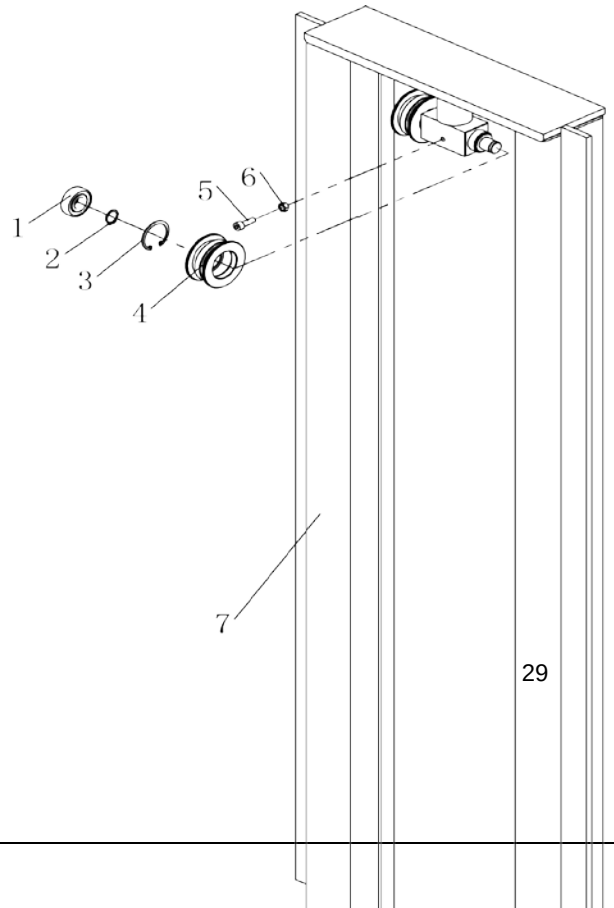
No.	Code	Name	Specification	Quantity	Remark

1	E05JZ-02.1.1	The outer door frame is welded		1	
2	GB/T 70.1-2000	Hexagon socket head screws	M8×20	16	
3	GB/T 93-1987	Elastic washer	Φ8	18	
4	GB/T 95-2002	Flat washer	Φ8	16	
5	SPN10.7.1	Guide wheel shaft seat weld piece		2	
6	GB/T 276-94	Deep groove ball bearing	6204	2	
7	GB 894.1-86	Shaft with elastic retainer	20	2	
8	GB 893.1-86	Holes with elastic retainers	47	2	
9	SPN10.7.1-3/CL10.7.3	Idler pulley		2	
10	GB/T 119-2000	Cylindrical pin	8×30	4	
11	SPN10.11-3	Limit wheel		4	
12	SPN10.12	Welded parts of left and right stop wheel frame		2	
13	SPN10.11	Rear stop wheel frame weld piece		2	
14	SPN10.0-2	Oil cylinder hoop		1	
15	GB/T 889.1-2000	Hexagon lock nuts	M8	2	
16	GB/T 5781-2000	Hexagon head bolts full thread	M10×65	1	
17	GB/T 93-1987	Elastic washer	Φ10	1	
18	GB/T 95-2002	Flat washer	Φ10	1	
19	GB/T 889.1-2000	Hexagon lock nuts	M10	1	
20	GB/T 818-2000	Cross recessed pan head screws	M4×25	2	

21	TY-01.35	Rz-15gw2s-b3 Microswitch (length)		1	
22	GB/T 70.1-2000	Hexagon socket head screws	M6×12	2	
23	GB/T 93-1987	Elastic washer	Φ6	2	
24	GB/T 97.1-2002	Flat washer	Φ6	2	
25	CLJ1030.06-5	Limit switch mounting plate		1	

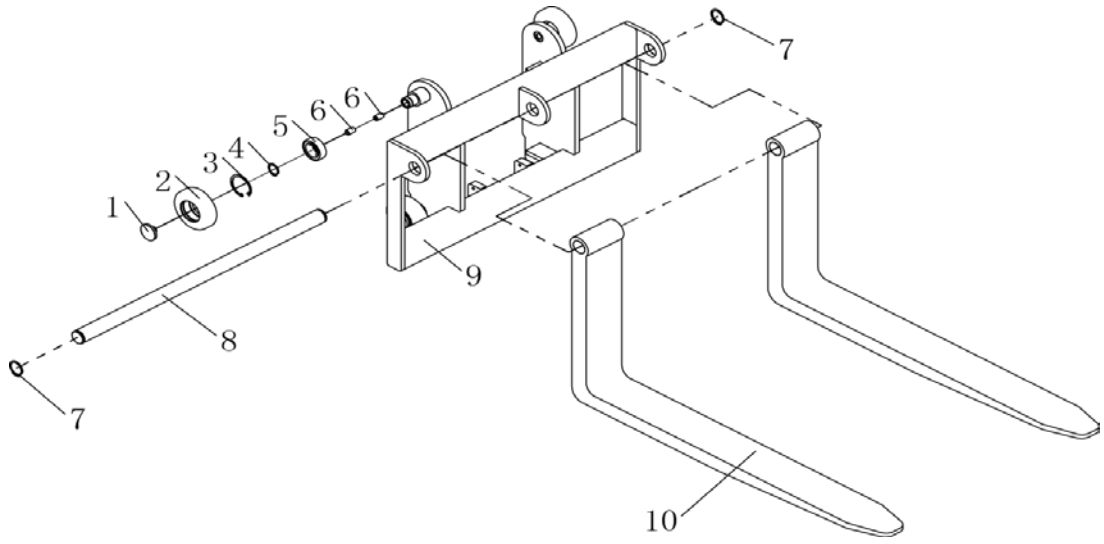
E、Internal door frame assembly removed

NO.	Code	Name	Specification	Quantity	Remark



NO.	CODE	NAME	Specification	Quantity	Remark
1	GB/T 276-94	Deep groove ball bearing	6204-2Z	2	
2	GB 894.1-86	Shaft with elastic retainer	Φ20	2	
3	GB 893.1-86	Holes with elastic retainers	Φ47	2	
4	SPN10.2-5	sprocket		2	
5	GB/T 70.1-2000	Hexagon socket head screws	M8×25	1	
6	GB/T 6170-2000	Hexagonal nut	M8	1	
7	E05JZ-02.2.1	Inner frame welding (3 m)		1	
8	GB/T 77-2000	Hexagon socket set screws with flat end	M12×20	4	
9	GB/T 276-94	Deep groove ball bearing	6205-2Z	2	
10	GB 894.1-86	Shaft with elastic retaining ring type A	Φ25	2	
11	GB 893.1-86	Holes with elastic retainers	Φ52	2	
12	SPN10.2-1	Inner door stand roller		2	
13	SPN10.3-3	Lateral pressure pad		2	

F、Remove slide frame assembly



1	SPN10.3-3	Lateral pressure pad		4	
2	SPN10.3-1	Tray rack roller		4	
3	GB 893.1-86	Holes with elastic retainers	Φ52	4	
4	GB 894.1-86	Shaft with elastic retaining ring type A	Φ25	4	
5	GB/T 276-94	Deep groove ball bearing	6205-2Z	4	
6	GB/T 77-2000	Hexagon socket set screws with flat end	M12×20	8	
7	GB 894.1-86	Shaft with elastic retaining ring type A	32	2	
8	SPN10.3-2	Long axis		1	
9	E05JZ-02.3.1	Pallet holder welded parts		1	
10		Lateral pressure pad		2	

5、CURTIS Hand held unit

Precautions for operation:

The attention function of the hand-held unit is to facilitate vehicle inspection and maintenance. It is not allowed to adjust the controller parameters without the approval of the vehicle manufacturer, so as to avoid vehicle and personal safety accidents.

The hand-held unit will automatically save the modification parameters, just need to close the key switch, restart.

The CURTIS handheld unit can be connected in the event of a controller power or power failure

Vehicle fault reading process:

1. After connecting the hand held unit with the controller, open the key switch

2, From the menu list of CURTIS handheld units, find: Faults...

3. When the vehicle is running and the hand-held cursor flashes, there will be English fault content, which can be interpreted by referring to the fault code table

Vehicle signal detection:

1. After connecting the handheld unit with the controller, open the key switch

2, According to the menu list of CURTIS hand held unit, find: Monitor.....

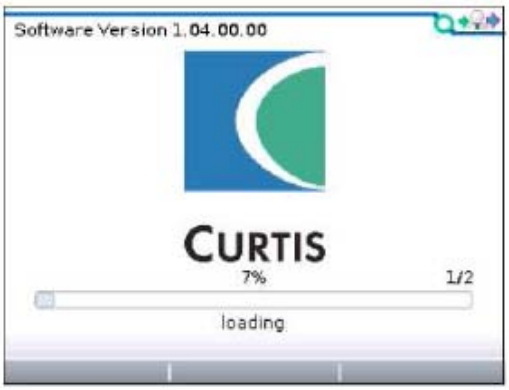
3. According to requirements, open the corresponding sub-item of the detection menu, run the vehicle, and observe the change of the hand-held value.

CURTIS Contents of hand held unit menu:

The Curtis 1313 hand held programmer is used to configure the Curtis electric control system.Through this programmer, you can adjust and save the 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 braking.A dangerous situation can occur if the vehicle control system is not programmed correctly or exceeds safety.Only the vehicle manufacturer or an authorized service agent can program the control system

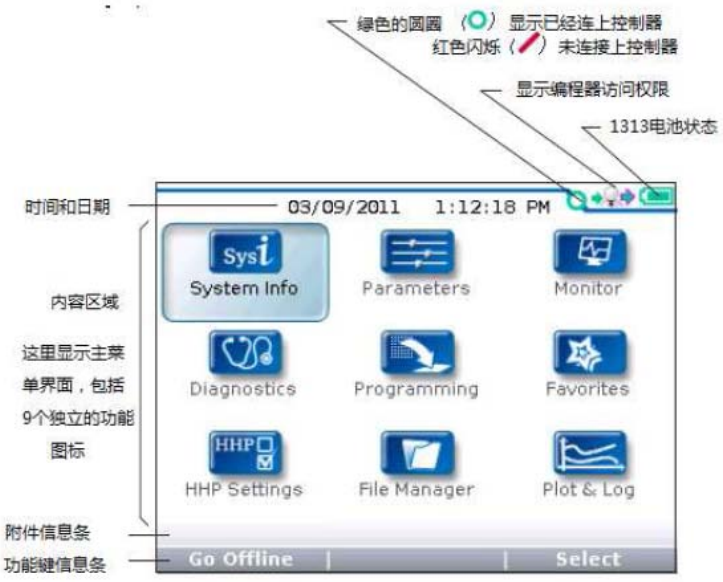
The programmer has two interfaces, one is used to communicate with the electric control, the other is used to communicate with the PC, the programmer has a battery box and a memory card slot



当编程器加载完控制器的信息后，编程器上会显示主菜单。

The programmer is powered on

The connection line of the handheld programmer can be connected to the controller by inserting the programming port of the controller. After connecting the controller, the handheld programmer will be powered on automatically and the control information will be displayed on the programmer.



The function keys

Since 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 LCD screen above.

Direction arrow key

The displayed information can be selected up, down, or left by four directional buttons.

+ / - buttons

You can add and subtract parameters by using these two keys. In addition, "+" can mean "Yes" and "-" can mean "No". In some cases, it can also be used as a scrolling option.

Power key

When the programmer inserts a controller that has been powered on, the programmer does not have to press the power button to use it. The programmer will

Collect keys

There are two ways to enter the Favorites menu. You can enter Favorites from the main menu or press this key

The menu structure

The main menu consists of nine sub-menus, and each sub-menu is displayed with a specific icon. Each item in the sub-menu is arranged by hierarchy.

Some menus contain only one item of information, but most menus contain more than one item of information, and open each item folder to access the next level of sub menus.Expand the table through the grid option, enter a group of execution commands through the dialog box option, and return to the upper menu regardless of the interface by pressing the left direction button.

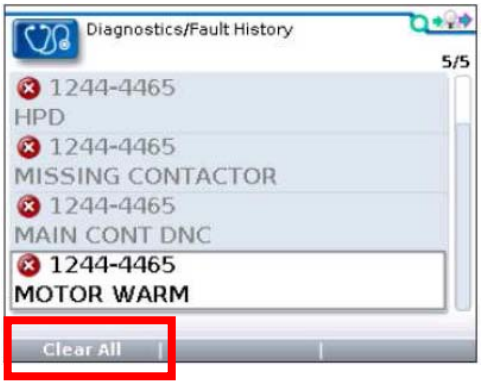
The names of all nine sub menus are shown in bold on the main menu and below the icon.When entering the stepped menu, the name of the sub menu or the path you are in is displayed at the top of the screen.

Fault Diagnosis menu

On the main menu, Select Diagnostics and press Select to access the Fault diagnosis menu. The Fault diagnosis menu contains Present Errors current faults and Fault History historical faults

Note: Sometimes a fault caused by a temporary event captured in the circuit is not a system fault. You can determine whether the fault exists by restarting the system and observing whether the fault disappears automatically.

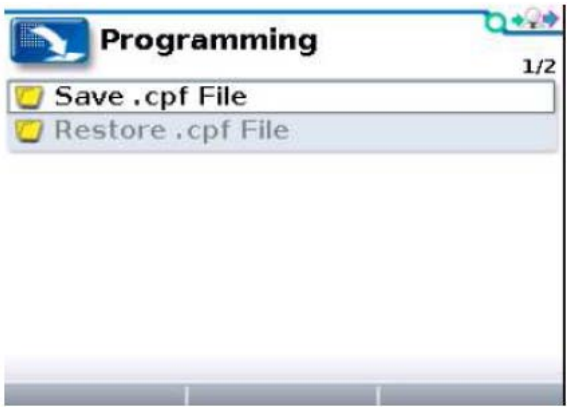
The historical faults folder lists all faults encountered after the last historical fault is cleared. By clearing the fault content in the entire folder, you can record the historical faults again.



Clear All is used to Clear historical fault folders. A function key is highlighted only when there are historical failures in the historical failures folder and grayed out when there are no historical failures.

Programming menu

On the main menu, Select The Programming icon and press Select to access the menu. Save and restore parameter Settings files (.cpf files) through programming menus



Save.cpf File (Save.cpf File)

Use the save. CPF file function in the programming menu to back up the currently set parameters. You can save as many.cpf files as you want, and you need to name each.cpf file differently

Restore. CPF File (Restore.cpf File)