service manual

Electric Scissor Reach Stacker

ER15/ER15L

warning

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

Note:

· Please check the last page of this document and nameplate for all current product type identification.

Keep it for future use

09/2021

Manual

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1. Maintenance List

a. Overview of main components

Maintenance List

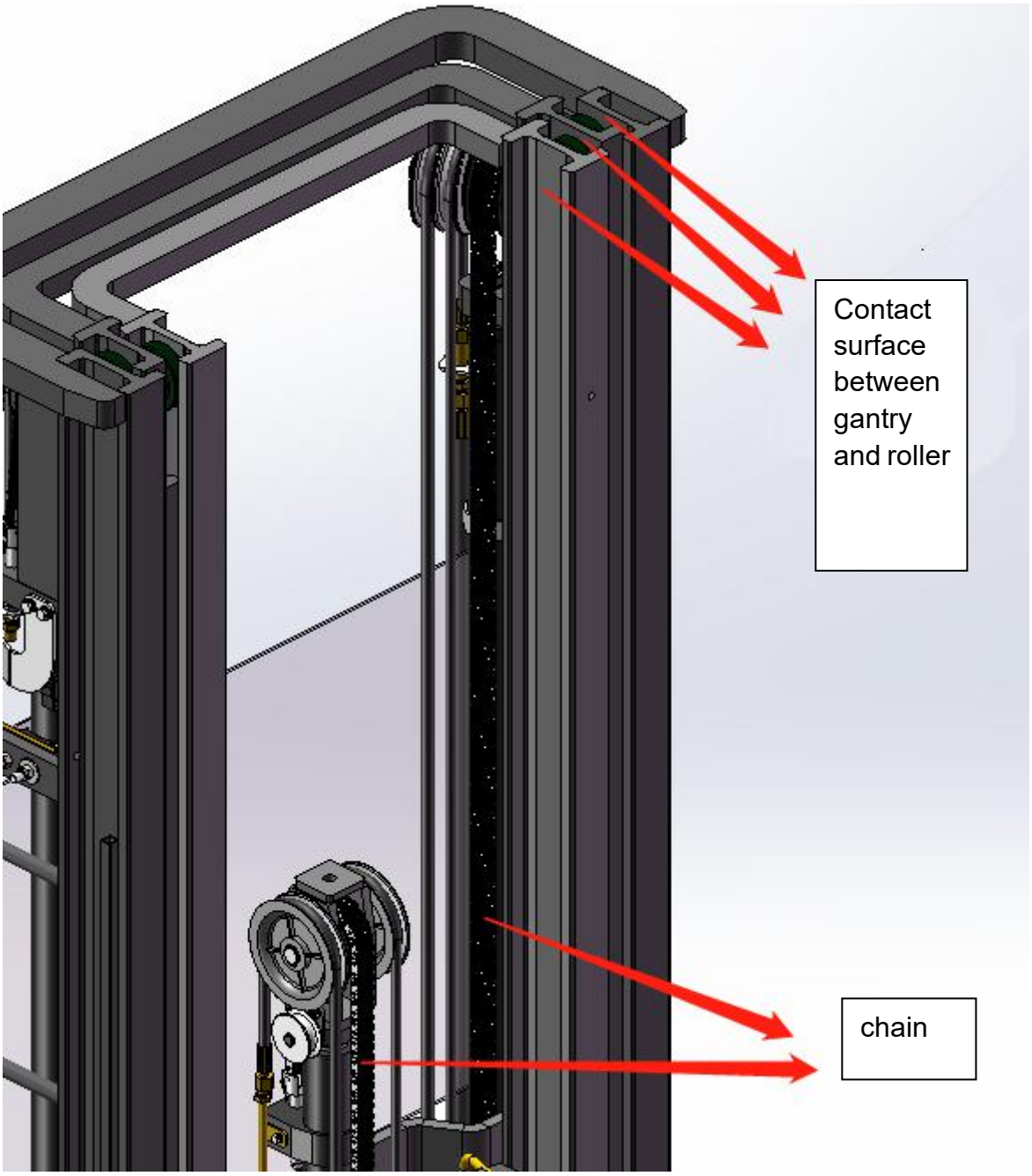
		Interval (month)			
		1	3	6	12
The hydraulic system					
1	Check whether there is damage noise and leakage of hydraulic cylinder and piston		●		
2	Check the hydraulic connector for damage and leakage		●		
3	Check the hydraulic oil level and refill if necessary		●		
4	Fill hydraulic oil after 12 months or 1500 hours of work				●
5	check and adjust the function of the hydraulic valve (1500kg/2000kg +0/+10%) Mechanical systems				●
Mechanical systems					
6	Check whether the fork is deformed or cracked		●		
7	Check whether the chassis is deformed or cracked		●		
8	Check that all screws are fixed properly		●		
9	Check whether the push rod is deformed or damaged		●		
10	Check the gear box for noise and leakage		●		
11	Check whether the wheel is deformed or damaged		●		
12	Lubricate steering bearings				●

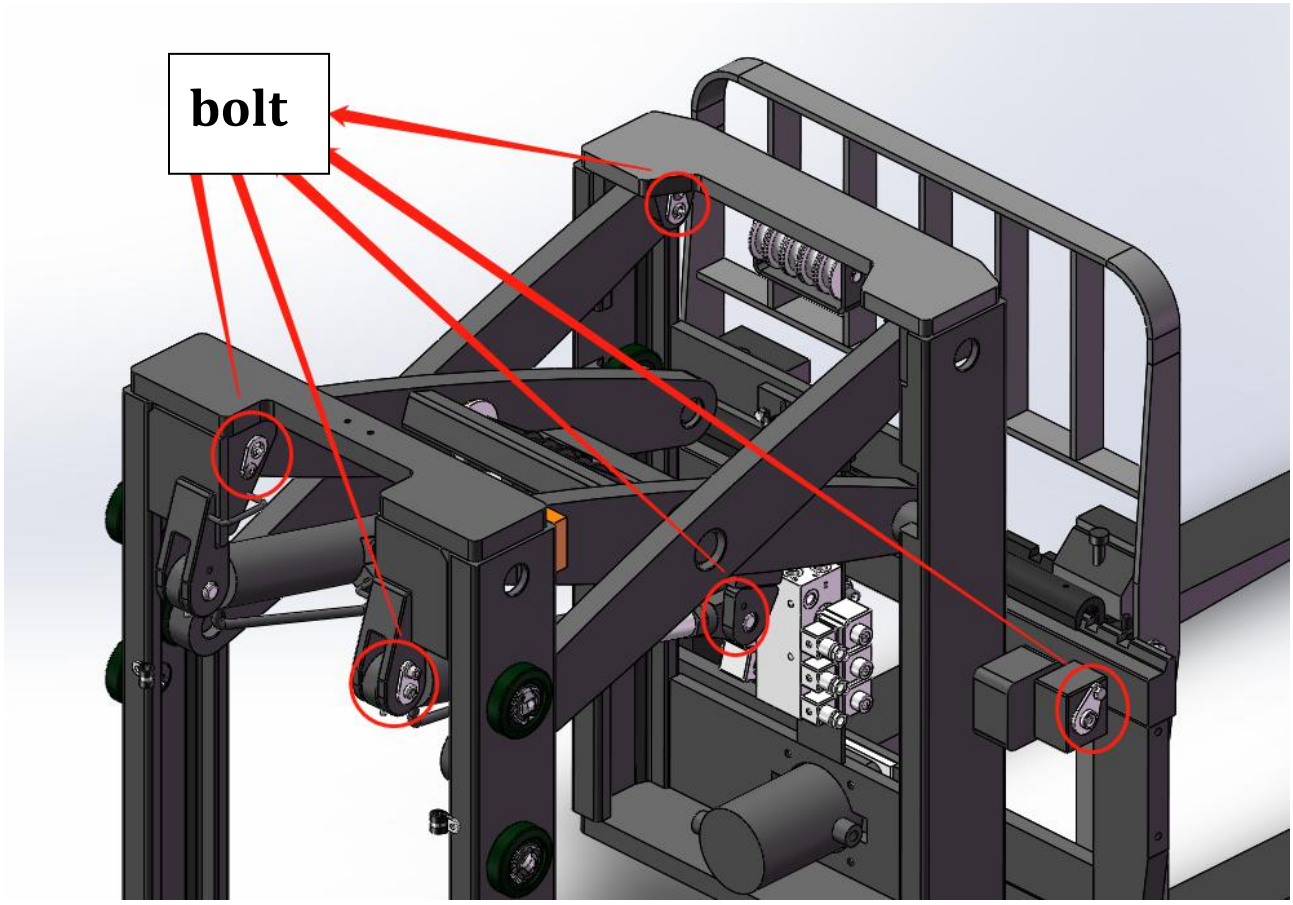
13	Check and lubricate the pivot points		●		
14	Lubricate grease nozzle	●			
Electrical system					
15	Check whether power cables are damaged		●		
16	Check the electrical connections		●		
17	Check the function of the emergency switch		●		
18	Check whether the power drive system is noisy or damaged		●		
19	Test electricity meter		●		
20	Check whether the correct fuse is used		●		
21	Detect warning signals		●		
22	Check the current contactor		●		
23	Check frame for leakage (insulation test)		●		
24	Check the function and wear of the drive controller		●		
25	Check the electrical system that drives the motor		●		
The brake system					
26	Check brake performance, replace brake disc or adjust air gap if necessary		●		
The battery					
27	Check the voltage of the battery		●		
28	Check whether the cable terminals are corroded or damaged and lubricate them		●		
29	Check whether the battery cover is damaged		●		
The charger					
30	Check whether the main cable is damaged			●	
31	Check the start up protection program during charging			●	
Function					
32	Check the function of the speaker	●			
33	Check the air gap of solenoid valve	●			
34	Check emergency brake	●			
35	Detect reverse braking and regenerative braking	●			
36	Check belly switch function	●			
37	Check steering function	●			
38	Check lift and fall functions	●			
39	Check the function of the handle proximity switch	●			
comprehensive					
40	Check whether all labels are clear and complete	●			
41	Check load bearing pinion and adjust height, replace if worn		●		
42	Run a test run	●			

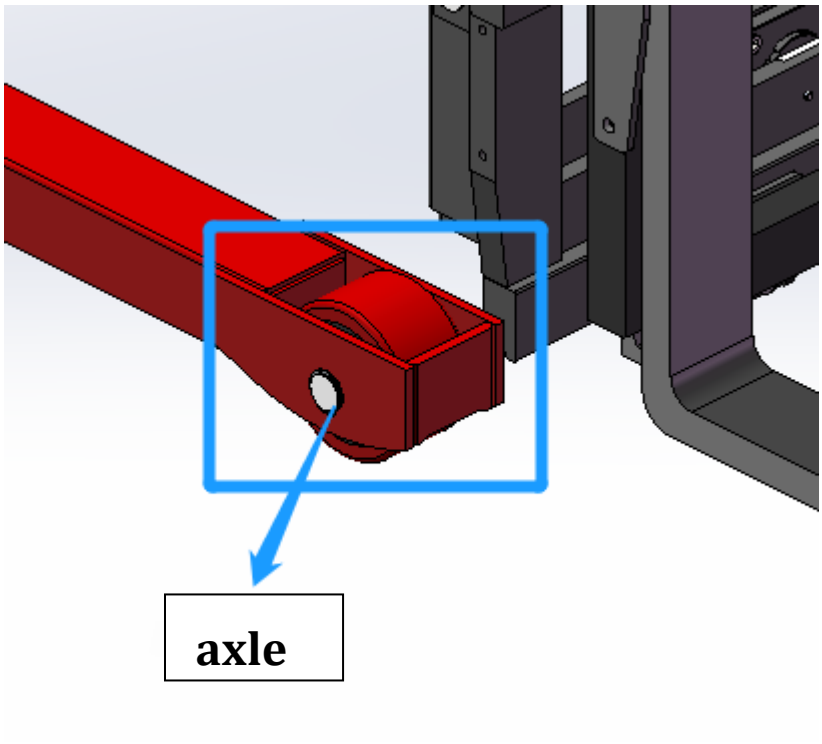
Lubrication point.

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

Pic 1. Lubrication point


Contact surface between gantry and roller
chain





Check and refill hydraulic oil

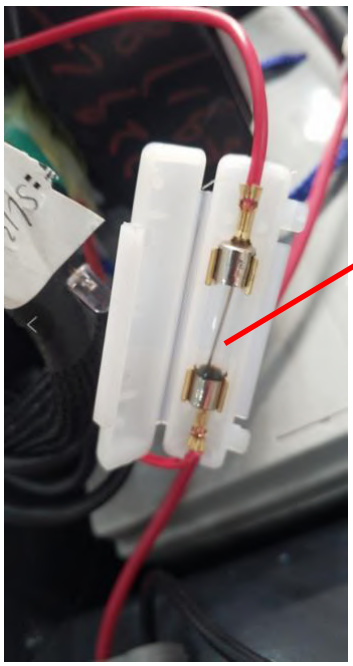
Recommended hydraulic oil model according to temperature::

Ambient temperature	–5℃~25℃	>25℃

mark	HVLP 32， DIN 51524	HLP 46， DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Oil	1.5 L	

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

B.Check the electrical fuse





List 2:Fuse specification

	specification
Fuse 1	10A
Fuse 01	300A

a. Fault analysis

Common fault analysis

If the vehicle continues to malfunction, follow the instructions in chapter 6 of the manual.

List 3: fault analysis

Failure	cause	maintenance
The load of goods cannot be lifted	If the weight is too large	only the maximum capacity shown on the nameplate can be lifted
	Battery loss	Battery charge
	Fuse failure	Check and replace fuse
	the hydraulic oil level is too low	Check and refill the hydraulic oil
	oil leak	Check the seal condition of oil cylinder
Suction oil leakage	Oil is too high	Reduce oily
Vehicle inoperable	The battery is charging	Fully charge the battery, then remove the main power plug from the power socket
	The battery is disconnected.	Connect batteries correctly
	Fuse failure	Check and replace the fuse

	Battery low	battery charge
	The emergency switch is activated.	Pull the emergency switch
	the handle is not in the operating area,	move it to the braking area first
Vehicle driving in one direction only	Accelerator and connector damage	Check accelerator and connector
The forklift moves slowly	Battery discharge	Check the battery status on the discharge monitor
	The electromagnetic brakes have started.	Check the electromagnetic brakes
	Handle wiring harness not connected or damaged	Check handle wiring harness and connectors
	400mm height to reduce speed, sensor failure	check sensor
	The electrical system overheats	stops use to cool the vehicle
	the thermal sensor failure	Check and replace the thermal sensor if necessary
The forklift suddenly starts	the controller is damaged	Replace the controller
	The accelerator is not moved back to the middle position	maintenance or replacement

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.
Note: This vehicle fault can be divided into three parts, 1, steering, 2, walking, 3, hydraulic

1、Fault code display

Steering fault code

Code	Fault name	Possible reason
12	Controller Over current	1.The steering motor is short-circuited 2.The controller fails
13	Current Sense Fault	1.The controller fails
14	Pre-charge Fault	1.The controller fails
15	Controller Severe Under temp	1.The controller runs in a low-temperature environment 2.The temperature sensor is damaged
16	Controller Severe Over temp	1. Vehicle overload 2. The controller runs in an ultra-high temperature environment 3. The controller is improperly fixed
17	Severe Under voltage	1. The battery or battery cable is faulty 2. There are other heavy loads connected to the battery 3. The battery is dead or the model is different
18	Severe Over voltage	1. In Regen mode, the battery or battery cable resistance is too high 2. The battery cable is disconnected during regen
21	Motor Temp Hot Cutback	1. Vehicle overload 2. The controller runs in an ultra-high temperature environment
22	Controller Over temp	1. Vehicle overload 2. The controller runs in an ultra-high temperature environment 3. The controller is improperly fixed
23	Motor Polarity Fault	1. The motor polarity is reversed 2. The polarity of the position feedback device is reverse
24	5V Output Failure 5V	1.5V output overload 2. The controller fails
31	Main Driver Fault	1. The internal relay coil is damaged 2. The internal relay drives open or short

32	Relay Welded	1. Internal relays are adhered 2. The controller fails
33	Relay Did Not Close	1. The internal relay receives the pull-in instruction but fails to pull-in 2. Oxidation of internal relay patch
34	Hardware Fault	1. A hardware fault is detected 2. The motor voltage is out of range 3. The IIC communication is lost 4. The power tube is short-circuited
35	Fault Output Failed	1. The output cable is improperly connected 2. The controller fails
36	Motor Stalled	1. Motor is blocked 2. The encoder of the steering motor fails or the cable is disconnected 3. Cables to the steering motor are disconnected 4. The parameters do not match the motor
37	Motor Open	1. Open cables to the steering motor 2. The motor is incorrectly connected 3. The controller fails
38	Motor Short	1. The steering motor is short-circuited
41	Command Analog1 Out of Range	1. Analog input 1 (J1-6) is out of range 2. Low end of instruction (J1-14) out of range (for resistance type) 3. The parameter Settings are incorrect
42	Command Analog2 Out of Range	1. Analog input 2 (J1-13) is out of range 2. Analog quantities 1 and 2 fail to be cross-checked 3. The parameter Settings are incorrect
43	Feedback Analog1 Out of Range	1. Analog feedback input 1 (J1-11) is out of range 2. The parameter Settings are incorrect

44	Feedback Analog2 Out of Range	1. Analog feedback input 2 (J1-3) is out of range 2.J1-11 and J1-3 analog cross check failed 3. The parameter Settings are incorrect
45	Parameter Change Fault	1. If the parameter value changes, you need to restart the system 2. Restore the parameters to default values
46	EEPROM Failure	1. The verification calculation of storage parameters is incorrect 2. The controller fails
47	Encoder Fault	1. The encoder data exceeds the allowable range 2. Open A or B phase of the orthogonal encoder 3. Polarity encoder phase B is open
53	Home Position Not Found	1. The Home switch fails 2. The installation or cable connection is incorrect
62	Communication Fault	1. The communication between running and running is lost
63	Communication Lost	1. Cables to the Rx(J1-8) are faulty 2. A hand held programmer is being used on the walking controller
71	Software Fault	1. Software failure 2. The controller fails
73	Following Error	1. The parameter Settings are incorrect 2. The position feedback device fails 3. Steering motor failure
75	Parameter Conflict	1. Parameter Settings conflict with other parameters

steering compartment

Methods for troubleshooting common faults

Code 3.2 Motor polarity fault, which generally occurs after the replacement of the steering controller or the steering motor, the solution is to swap M1 and M2 on the steering controller.

code 3.6 motor blocking, this failure can be caused by two reasons: encoder failure and steering motor blocking.Specific can be seen when the car is powered on, the drive wheel to find the action of the

median, if the drive wheel is motionless, the probability is the motor blocked, observe whether there is a foreign body stuck steering gear, the steering motor can be removed for testing.If the driving wheel to find the median, about 20 or 30 degrees will stop, reported 36 failure, it is encoder failure.



After the encoder can be removed, observe whether the PCB part is black or water

Code 4.7 encoder failure, replaceable encoder test

Code 5.3 can not find the median. This fault is manifested in the form of the driving wheel continuing to spin around in place after the vehicle is powered on.At this time, pay attention to observe the median induction switch, whether it works normally, you can rotate the switch down a few threads, reduce the induction distance of the switch.



Adjust the induction switch distance

2、Walking fault code

Code	Error name	Possible cause
1	Controller Overcurrent	1, motor external U,V or W connection short circuit 2. Motor parameters do not match 3. The controller is faulty
2	Current Sensor Fault	1, motor U, V, W through the stator on the car body short circuit, resulting in leakage 2. The controller is faulty
3	Precharge Failed	1. Negative load is connected to the positive end of the capacitor, so that the capacitor can not be charged normally
4	Controller Severe Undertemp	1. The working environment of the controller is too harsh
5	Controller Severe Overtemp	1. The working environment of the controller is too harsh 2. Vehicle overload 3. The controller is incorrectly installed
6	Severe Undervoltage	1. Battery parameters are incorrectly set 2. Power consumption of non-controller system 3, the battery impedance is too large 4. The battery is disconnected 5, the fuse is disconnected, or the main contactor is not connected
7	Severe Overvoltage	1. Battery parameters are incorrectly set 2. The battery impedance is too high 3. Battery connection is disconnected during regenerative braking
8	Controller Undertemp Cutback	1. The controller works under restricted conditions 2, the controller working environment is harsh
9	Controller Overtemp Cutback	1, the controller working environment is harsh 2. Vehicle overload 3. The controller is incorrectly installed

10	Undervoltage Cutback	1. The battery is low 2. Battery parameters are incorrectly set 3. Non-controller system runs out of power 4. Excessive battery impedance 5. The battery is disconnected 6. Fuse is disconnected or main contactor is disconnected
11	Overvoltage Cutback	1, regenerative braking process regenerative system The running current causes the battery voltage to rise 2. Battery parameters are incorrectly set 3, the battery impedance is too large 4. Battery connection is broken during regenerative braking
12	+5V Supply Failure	1, the external load impedance is too low
13	Digital Out 6 Failure	1, the external load impedance is too low
14	Digital Out 7 Overcurrent	1, the external load impedance is too low
15	Motor Temp Hot Cutback	1. The motor temperature reaches or exceeds the alarm temperature set by the program, resulting in the reduction of current output 2. The motor temperature parameters are incorrectly set 3. If the motor does not use a temperature sensor, program parameters "Temp Compensation" and "Temp" Cutback must be set to OFF.
16	Motor Temp Sensor Fault	1. The motor temperature sensor is incorrectly connected If the motor does not use a temperature sensor, the programming parameters are "Temp Compensation and Temp" Cutback must be set to "OFF"
17	Coil 1 Driver Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring

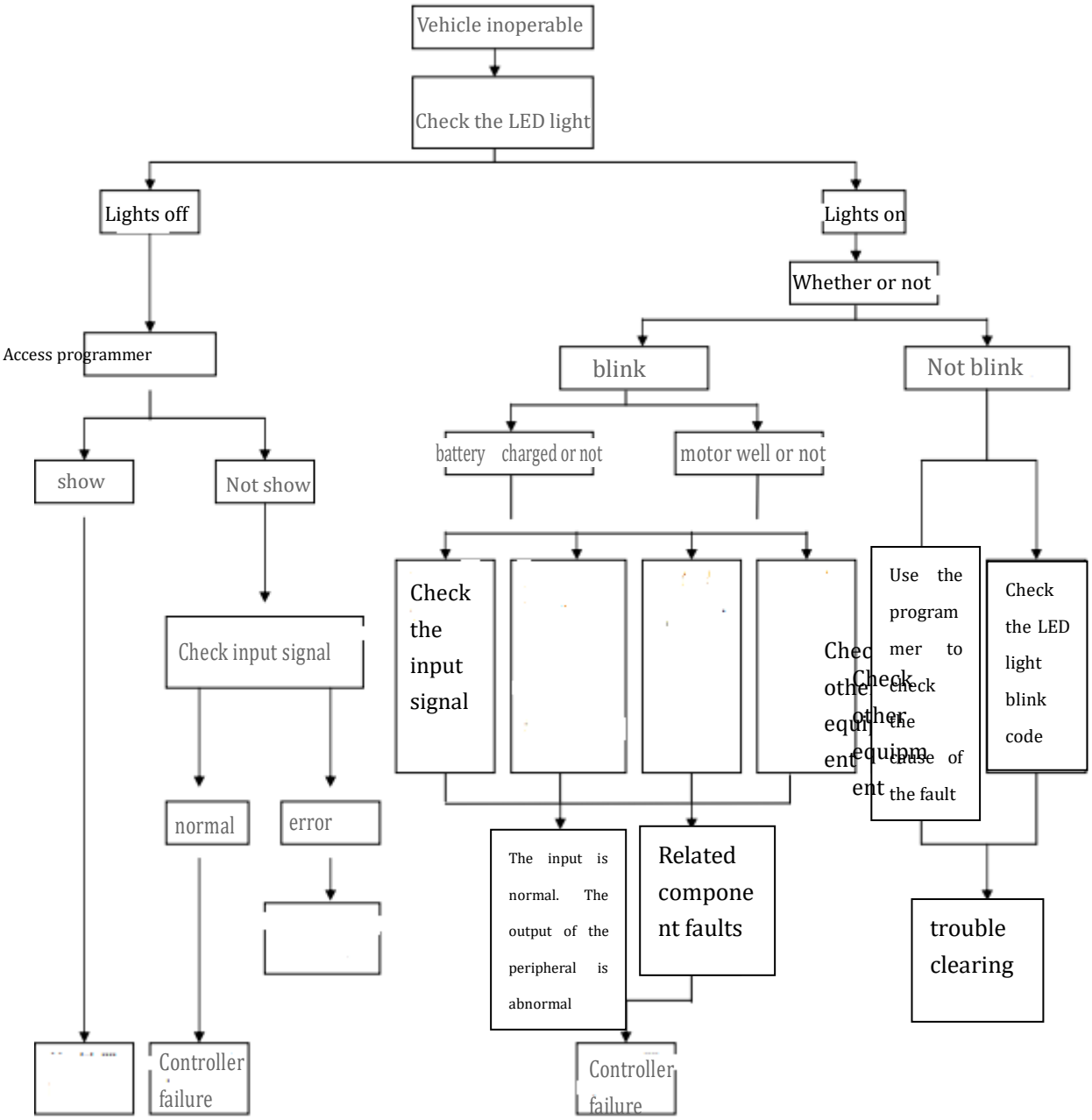
18	Main Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring
19	Coil2 Driver Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring
20	EMBrake Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring
21	Coil3 Driver Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring
22	Coil4 Driver Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring
23	PD Open/Short	1. Connect load open or short 2. The connecting pin is defiled 3. Wrong wiring
24	Encoder Fault	1. Motor encoder failure 2. Wrong wiring
25	Motor Open	1, motor phase deficiency 2. Wrong wiring
26	Main Contactor Welded	1, main contactor contact fusion 2. Motor U or V is disconnected or phase is missing 3. The circuit charging capacitor connected to the B+ terminal exists

27	Main Contactor Did Not Close	1. The main contactor is not closed 2, the main contactor contact oxidation, melting Or the connection status is unstable 3. The capacitor is charged by external devices 4. The fuse is disconnected
28	Throttle Wiper High	1, accelerator potentiometer output voltage is too high
29	Throttle Wiper Low	1, accelerator potentiometer output voltage is too low
30	Pot2 Wiper High	1, potentiometer 2 output voltage is too high
31	Pot2 Wiper Low	1, potentiometer 2 output voltage is too low
32	Pot Low Overcurrent	1, potentiometer impedance is too low
33	EEPROM Failure EEPROM	1. Failed to write to the EEPROM storage.This may be caused by VCL writing to EEPROM storage, or by CAN BUS, or by a parameter error programmed into the controller after the programmer parameters are adjusted.
34	HPD/Sequencing Fault	1. Incorrect setting of key start, interlock, direction and accelerator input sequence. 2, wiring, switch key, interlock, direction, or accelerator input failure
35	Emer Rev HPD	1. The emergency reverse operation has ended, but the accelerator, forward and reverse input and interlock have not been reset.
36	Parameter Change Fault	1. In order to ensure the safety of the vehicle, the modification of some specific parameters must take effect after the key switch is restarted.
38	VCL RunTime Error	1. The VCL code timed out

39	External Supply Out of Range	1, the external load in 5V and 12V power source current is too large or too small Checking Menu parameters are incorrect, for example, ExtSupply Max, Ext Named "Supply" Min
40	OS General	1. The internal controller fails
41	PDO Timeout	1. The CAN PDO message receiving time exceeds the PDO time limit
42	Stall Detected	1. Motor blocking 2. Motor encoder failure 3. Wrong wiring 4. Power supply of the input motor encoder is faulty
43	Motor Characterization Fault	1, in the motor matching process of modern code comparison: 0 = normal 1= The controller receives the encoder number, But the impulse quantity is undefined.Please hand set Buy pulse value 2= Motor temperature sensor failure 3= High temperature reaction failure of motor 4= motor overheating reaction failure 5= Low temperature reaction failure of motor 6= low voltage response failure 7= high pressure reaction failure 8= The controller cannot detect the encoder message Alpha, channel signal is down 9= Motor parameter setting exceeds the range
44	Motor Type Fault	1. The motor type parameter value is out of range

45	VCl/OS Mismatch	1. The VCL program in the controller does not match the OS program
46	EM Brake Failed to Set	1. The vehicle is still moving after the electromagnetic brake command is set. 2, electromagnetic brake braking force is too small
47	Encoder LOS (Limited Operating Strategy)	1. Due to motor blocking or encoder The failure causes the restricted operating state to be The activation 2. Wrong wiring 3. Traffic jams
48	Emer Rev Timeout	1. The emergency reverse timeout is activated because the EMR Timer expires 2. The emergency reverse switch is always in the On position
49	Illegal Model Number	1. The controller model cannot be identified 2. Hardware and software do not match each other 3. The controller is damaged
50	Dualmotor Parameter	The Enable parameter of dual motors is set to ON, and the control Mode selection parameter is not set to (Speed Mode Express) or 1 (Speed Mode).

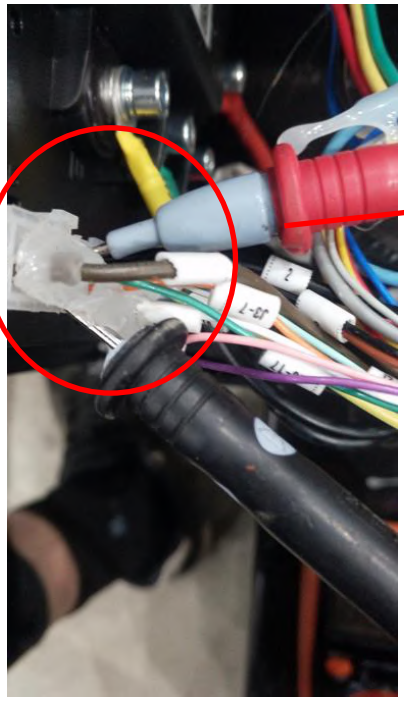
4. Troubleshooting



running gear

Analysis of common walking failures

1.Code 20 Electromagnetic brake coil open or short.It is generally the electromagnetic brake disc line problems, or electromagnetic brake failure.The plug of the controller can be used to measure whether the line between the controller and the electromagnetic brake is normal and whether the internal resistance of the electromagnetic brake is normal.



Measure the resistance of the electromagnetic brake



2Code 24 encoder failure.This problem is generally manifested as slow movement of the vehicle, the car stops after three or five seconds, and the motor line is hot.The wiring of the walking encoder should be checked for problems, and if not, the encoder should be replaced.

3. Fault 27 The main contactor is not connected.It may be that the main contactor of the vehicle is not closed, and the main contactor can be replaced.

28 The output of the faulty accelerator is high.The accelerator can be removed for testing. If the failure is not reported, the accelerator is faulty.

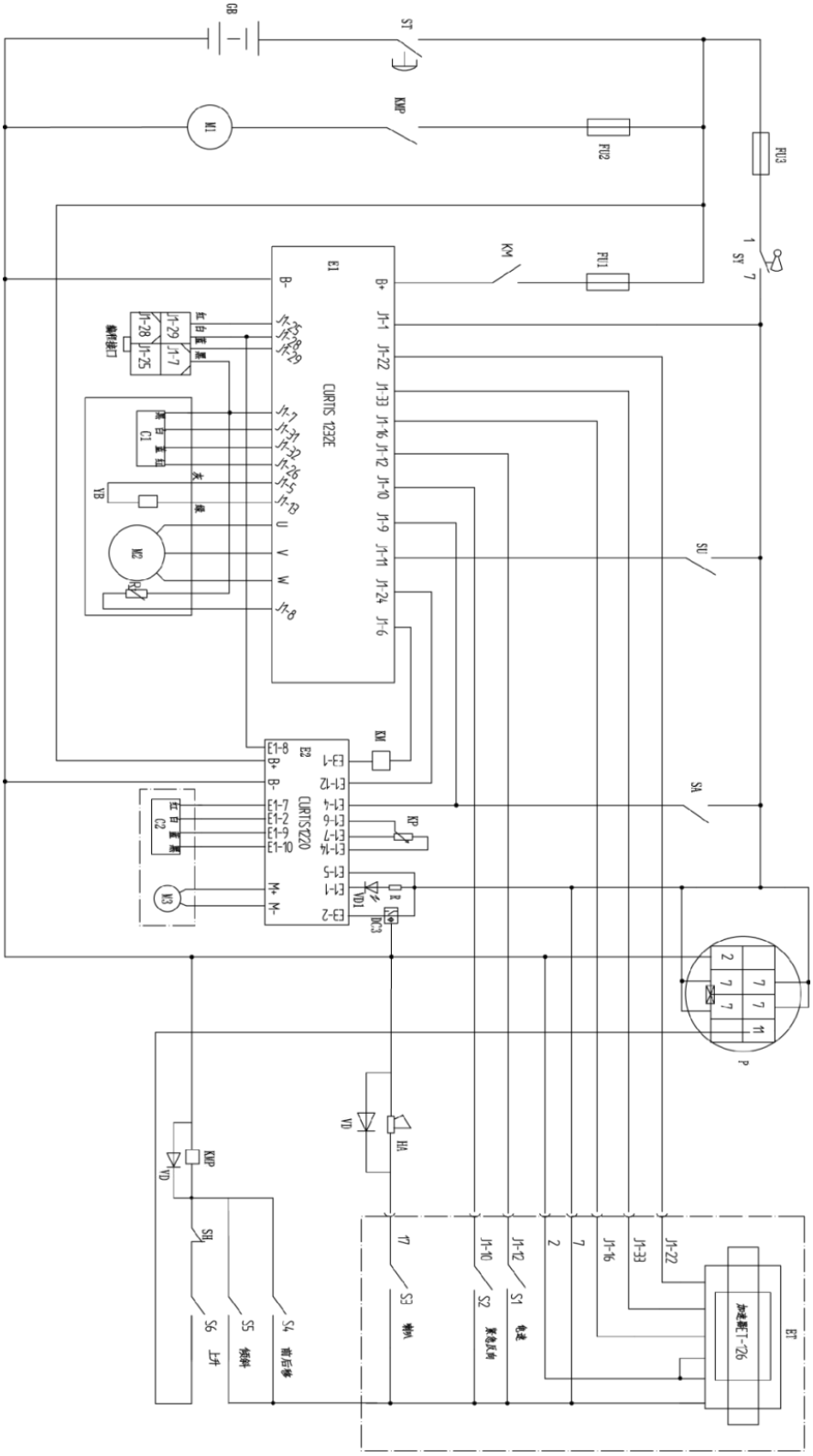
.34 Sequence faults.If the key switch, interlock and accelerator do not cooperate well, you can check the interlock switch or check whether the operation sequence is wrong

42 The motor is blocked.The reported fault may be the vehicle transmission stuck, or the electromagnetic brake disc is not open.

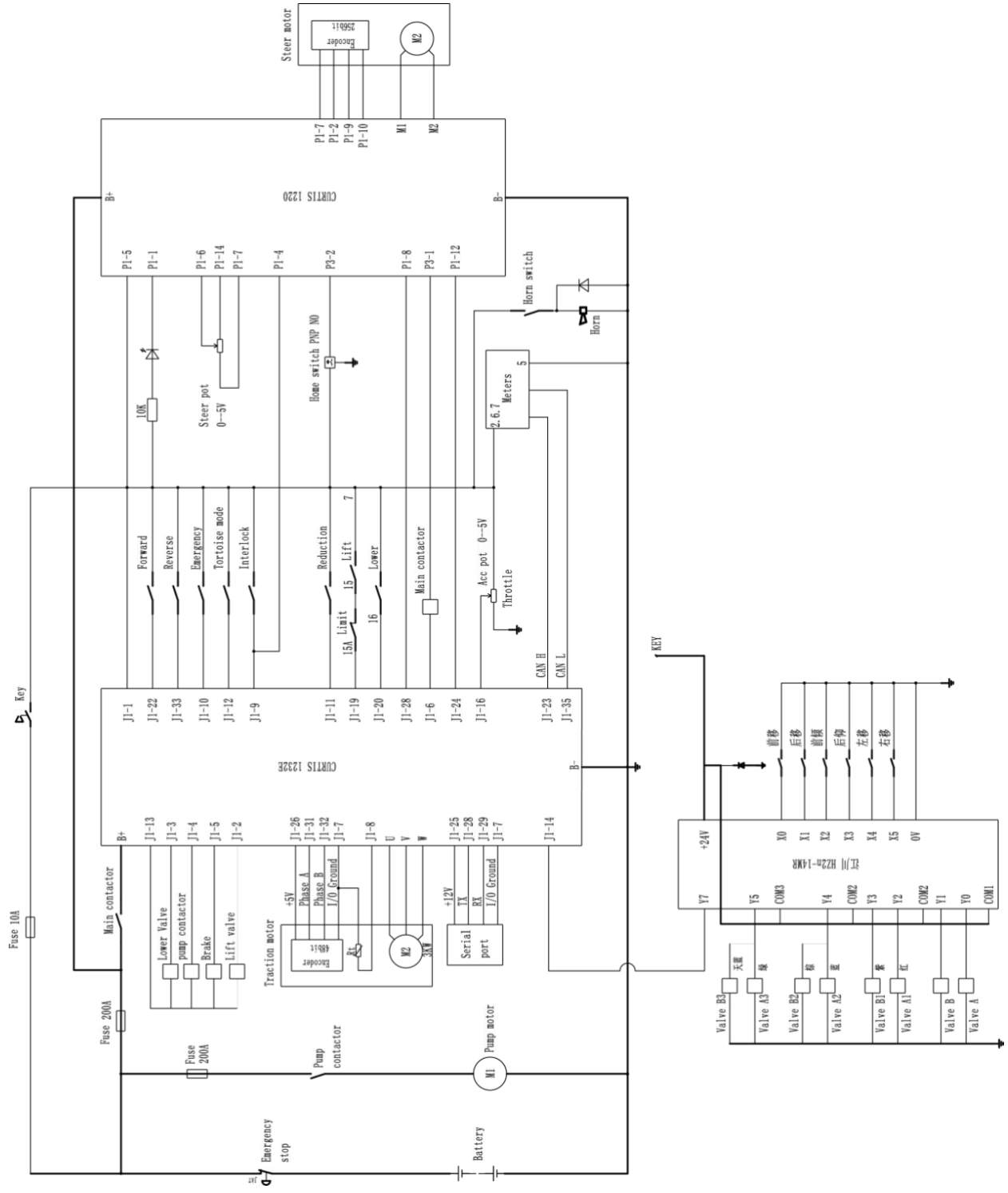
Wiring/circuit diagram

A. Schematic diagram and wiring diagram

B. Electrical schematic diagram of multi-way valve



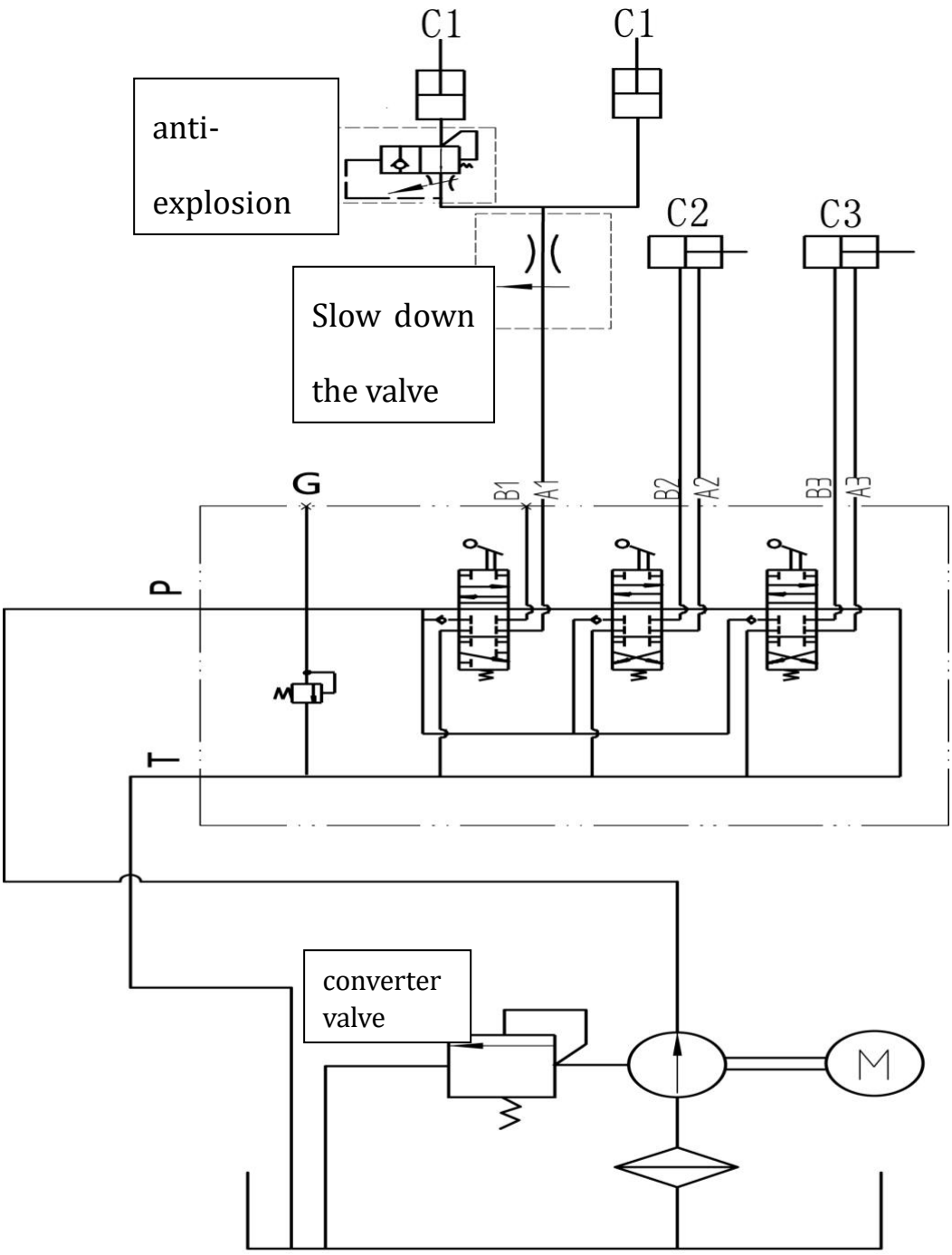
Electrical schematic diagram of solenoid valve



b、oil hydraulic circuit

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Multi-way valve hydraulic schematic diagram

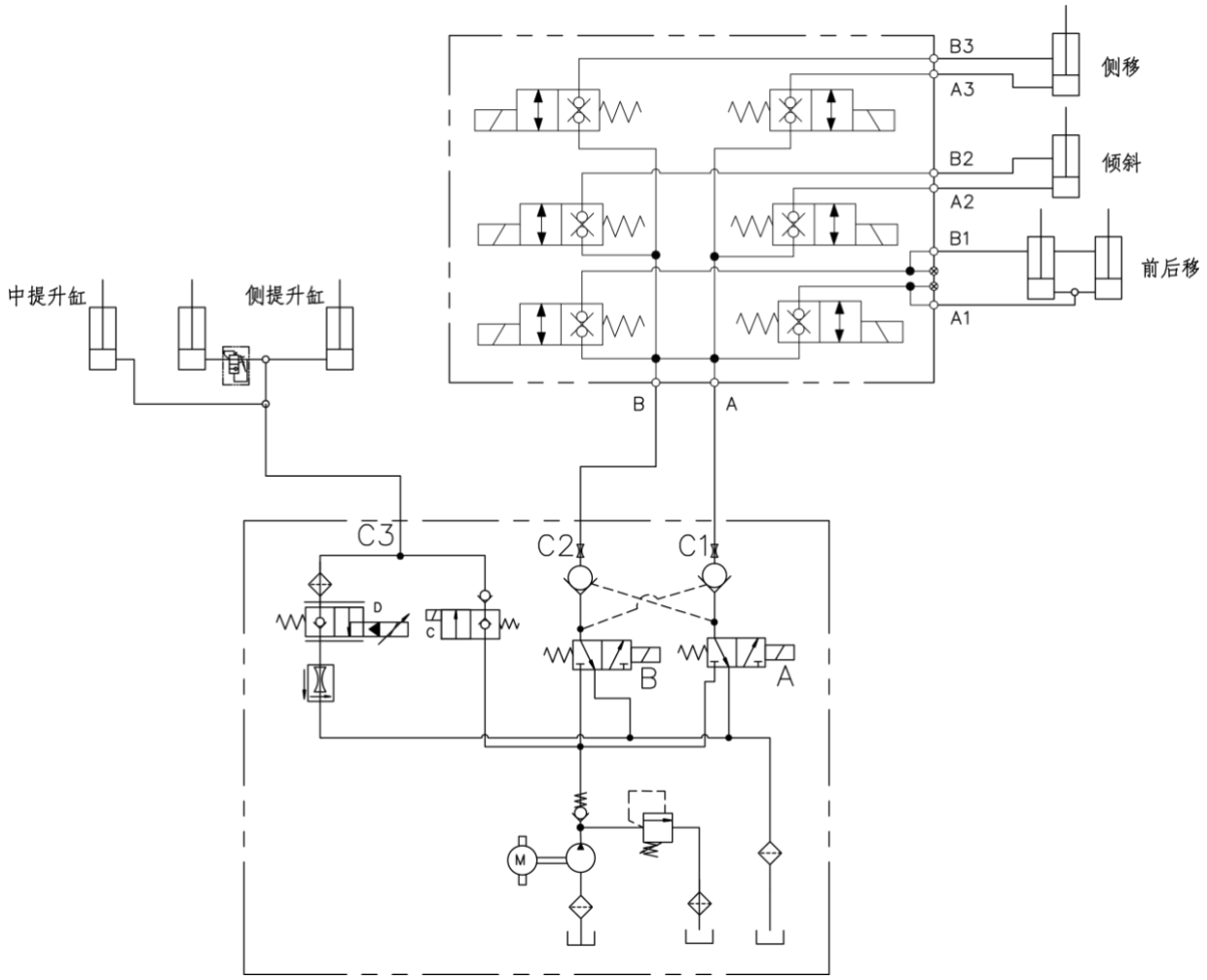


C1： lift ram

C2：forward/back cylinder

C3： Rake forward/recline cylinder

Solenoid valve hydraulic schematic diagram

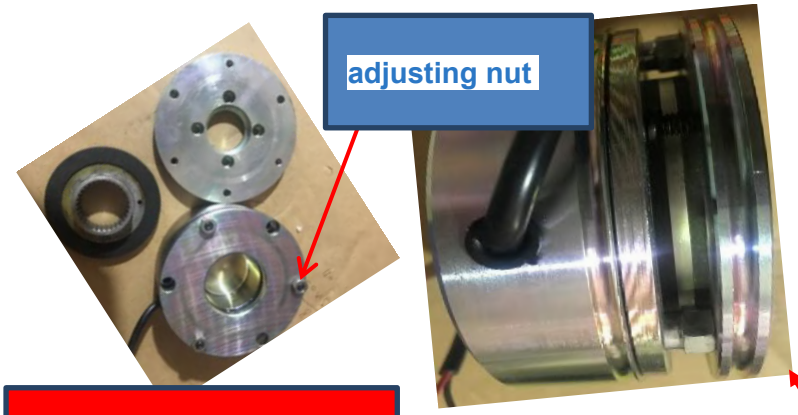


Hydraulic oil inspection

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. Main parts dis-assembly

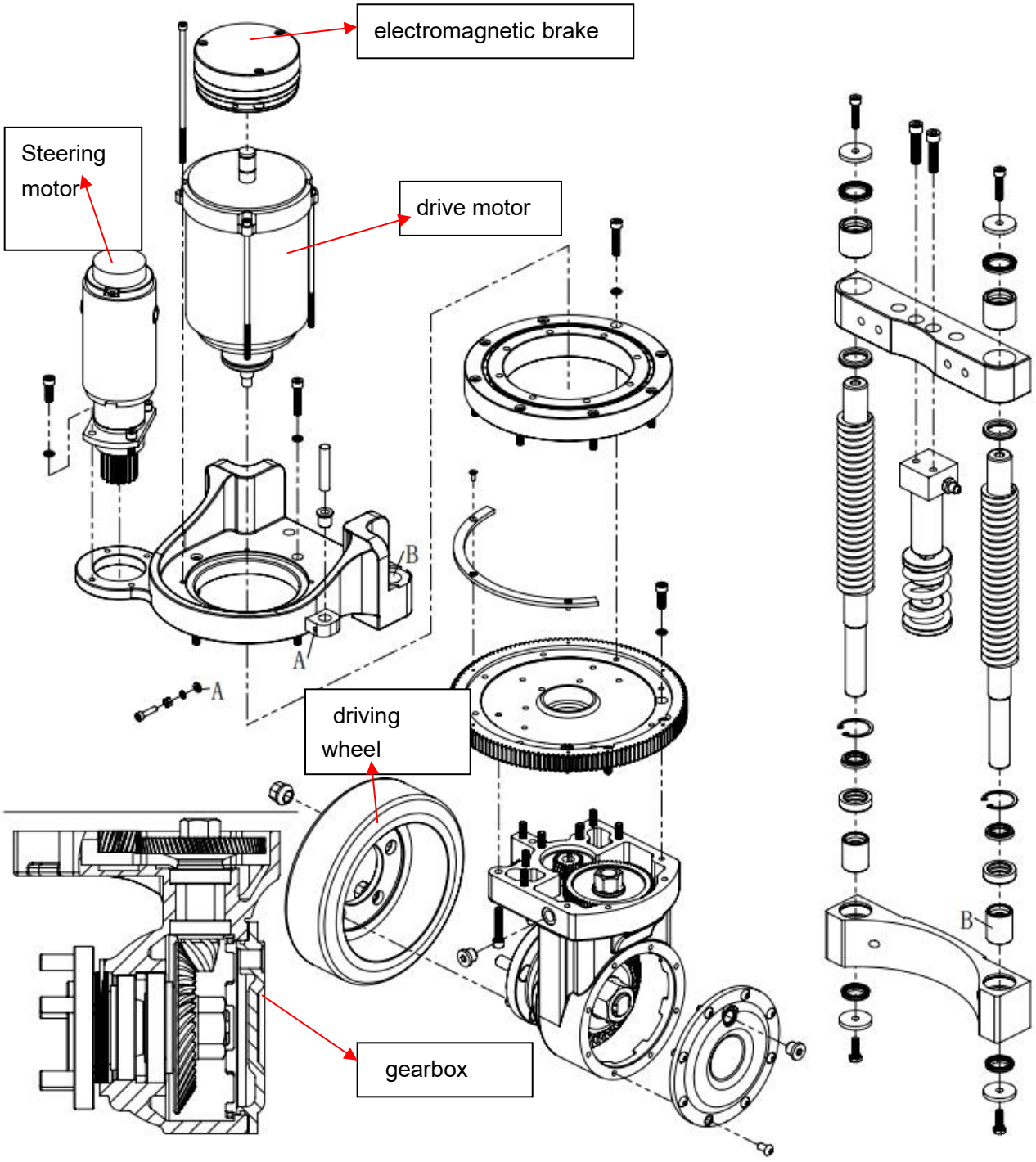
A, electromagnetic brake adjustment



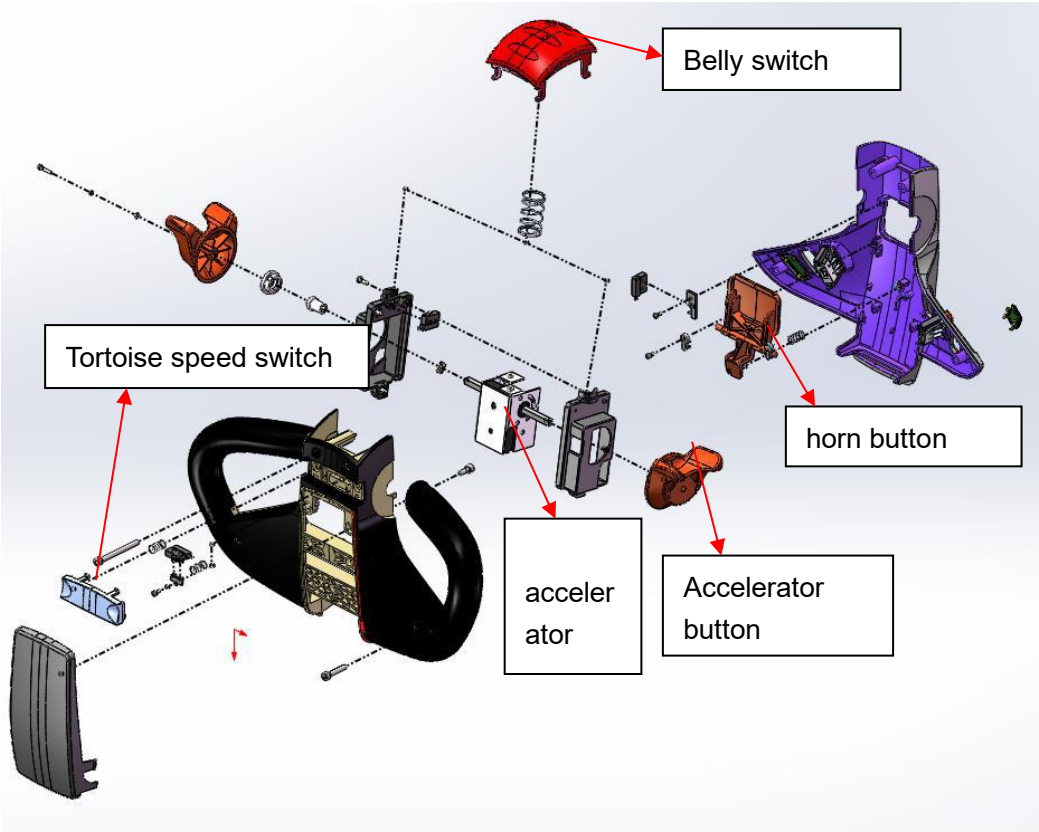
Note: electromagnetic brake can't pull properly when it is powered on in free state, it needs external force or installation to pull

Electromagnetic brake clearance is about 0.25-0.35mm, about the thickness of a piece of paper.Need to be adjusted carefully repeatedly, ensure that three adjustment surface clearance is consistent, electricity will give out a crisp sound.

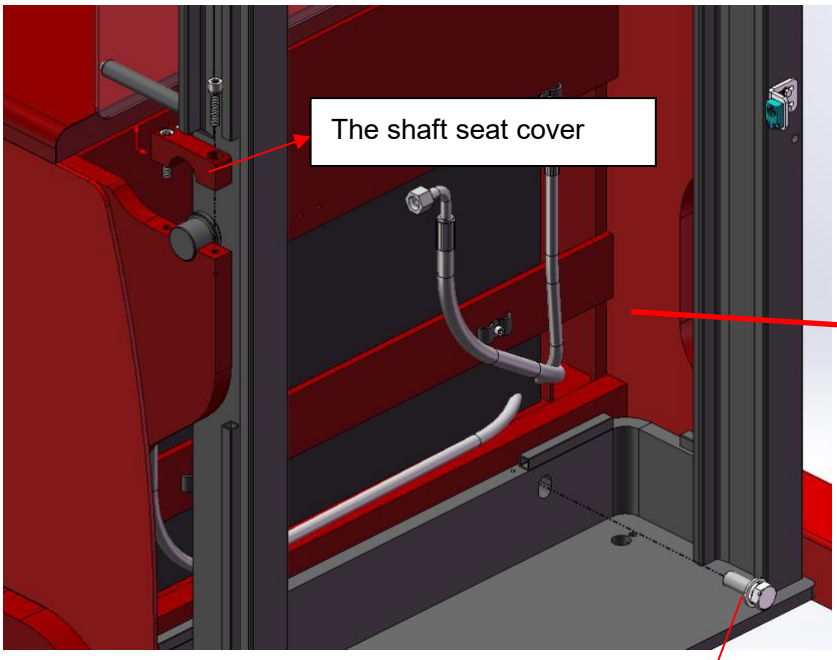
b、Drive the dis-assembly diagram



c、Handle assembly

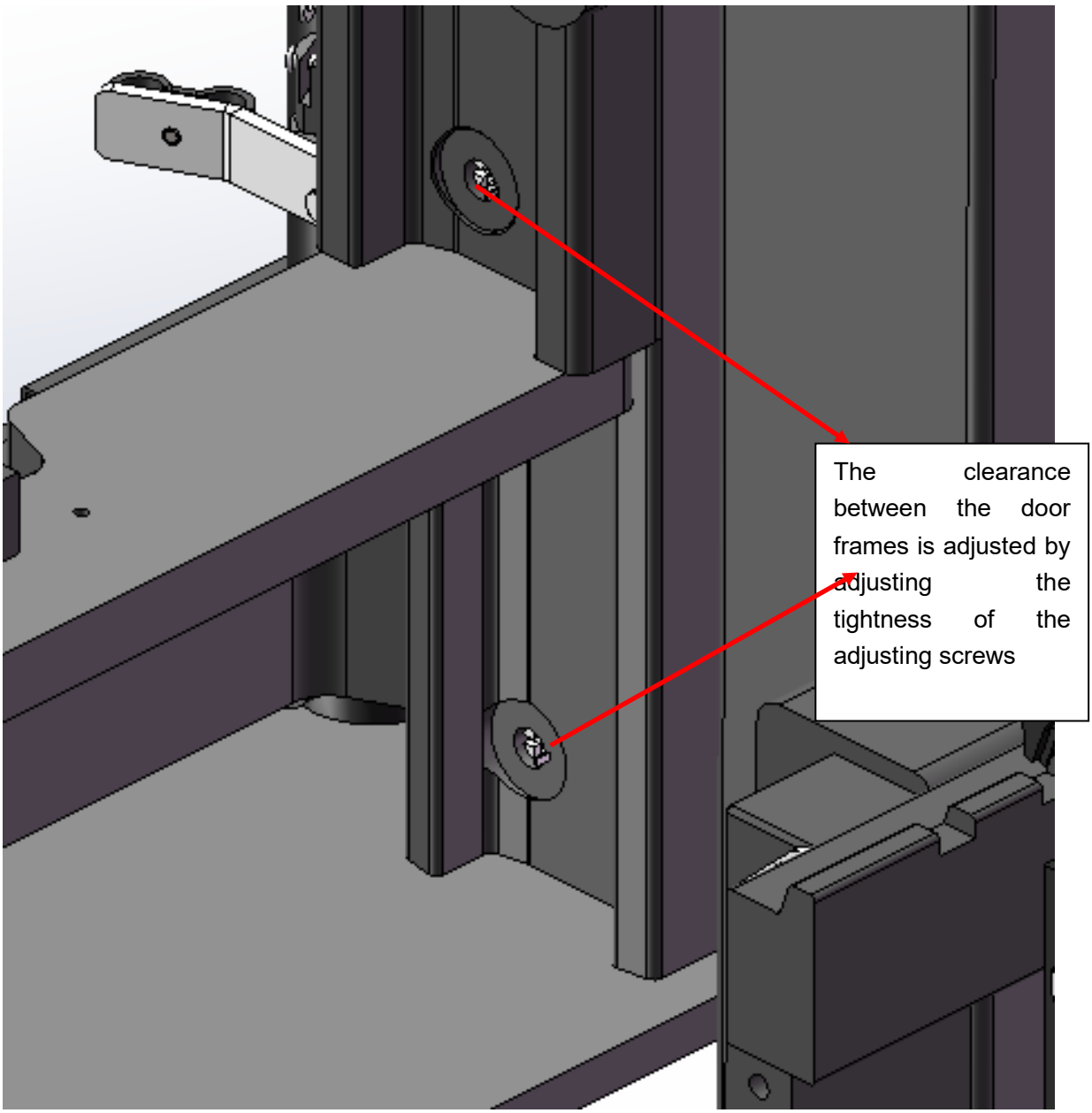


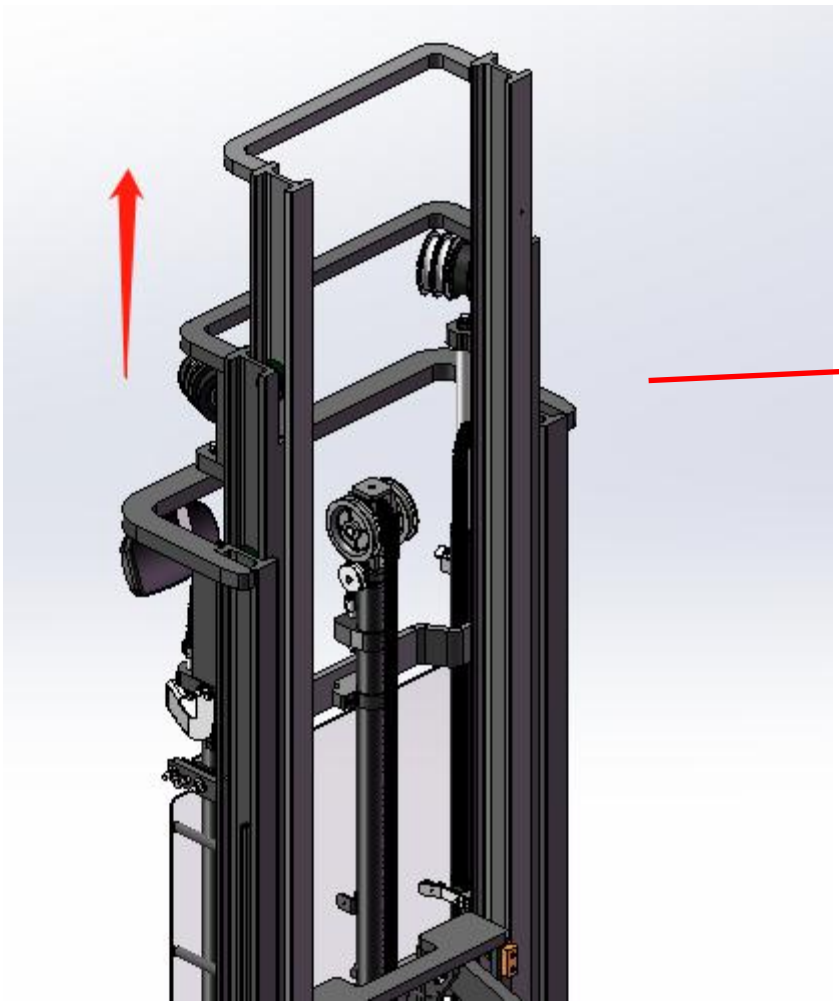
d、Dismantling of frame and door frame



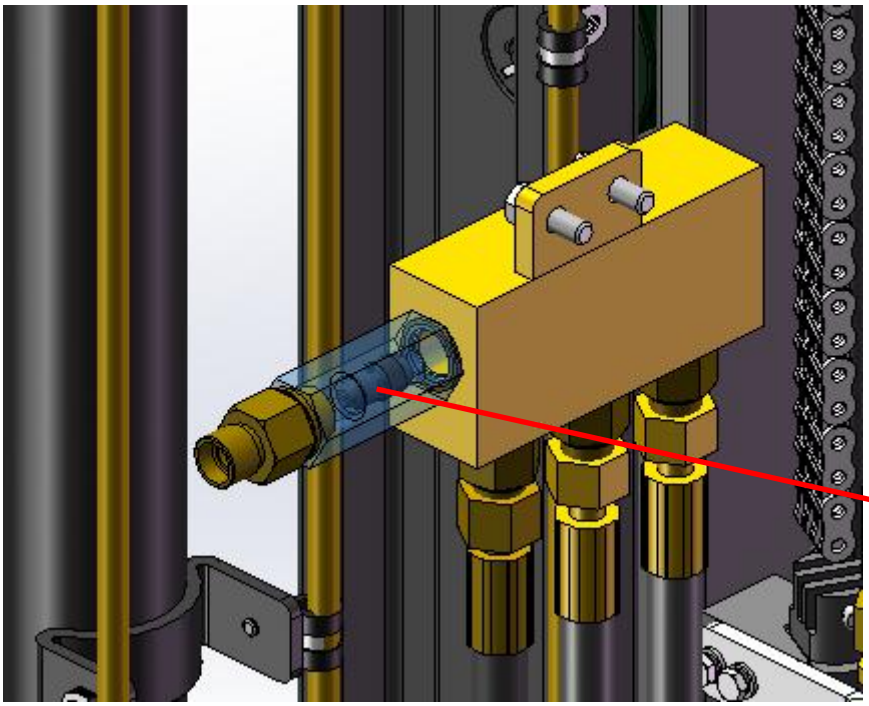
After removing the axle seat cover and bolt, the door frame can be separated from the frame.Note: the body and door frame shall be fixed with external objects during dis-assembly to avoid safety accidents in the process of dis-assembly.

e、Mechanical part of door frame



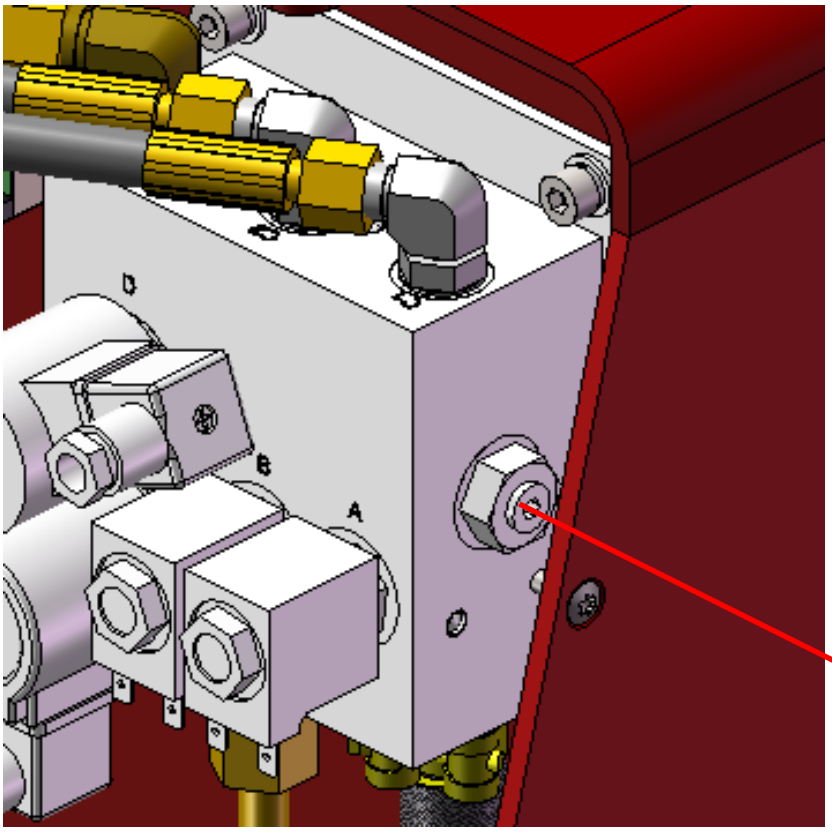


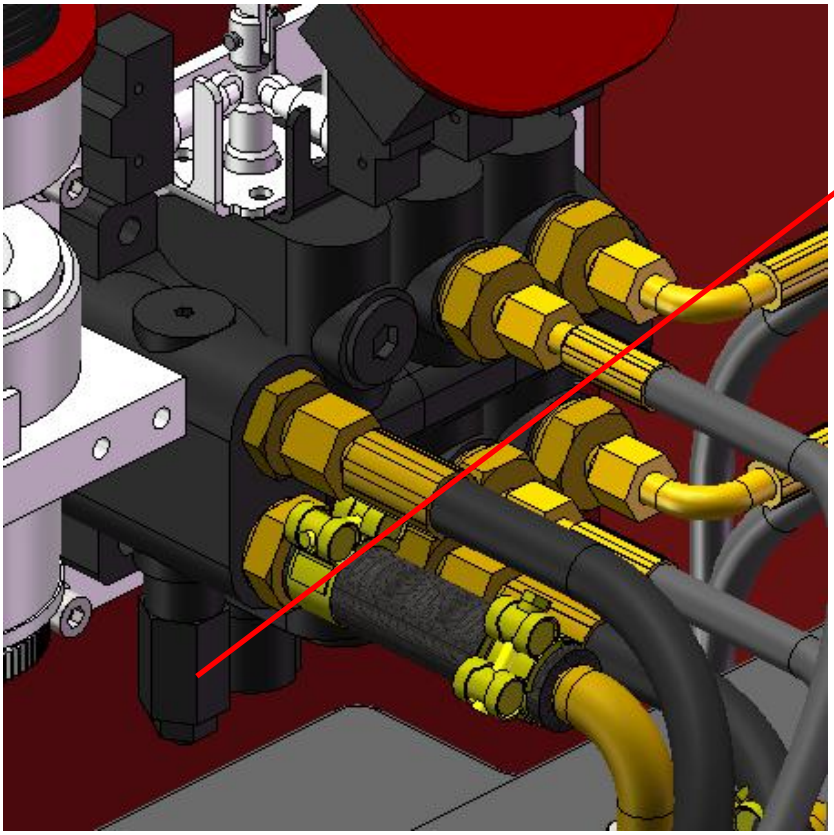
The door frame can be raised by loosening the adjusting screw



The speed limiting valve can adjust the speed of descent

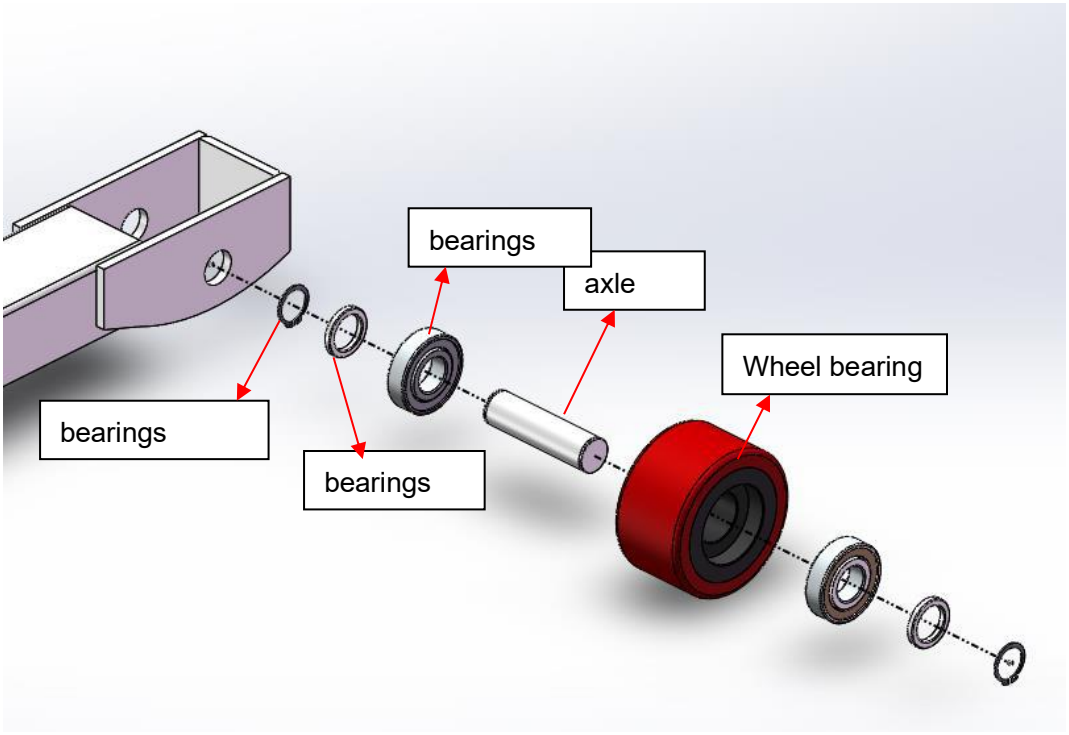
f、Frame mechanical part





The pressure valve is used to adjust the oil pressure, and the pressure should be adjusted slowly to avoid excessive pressure causing damage to the car body.

Disassembling diagram of bearing wheel



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 hand held 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 hand held 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 hand held 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





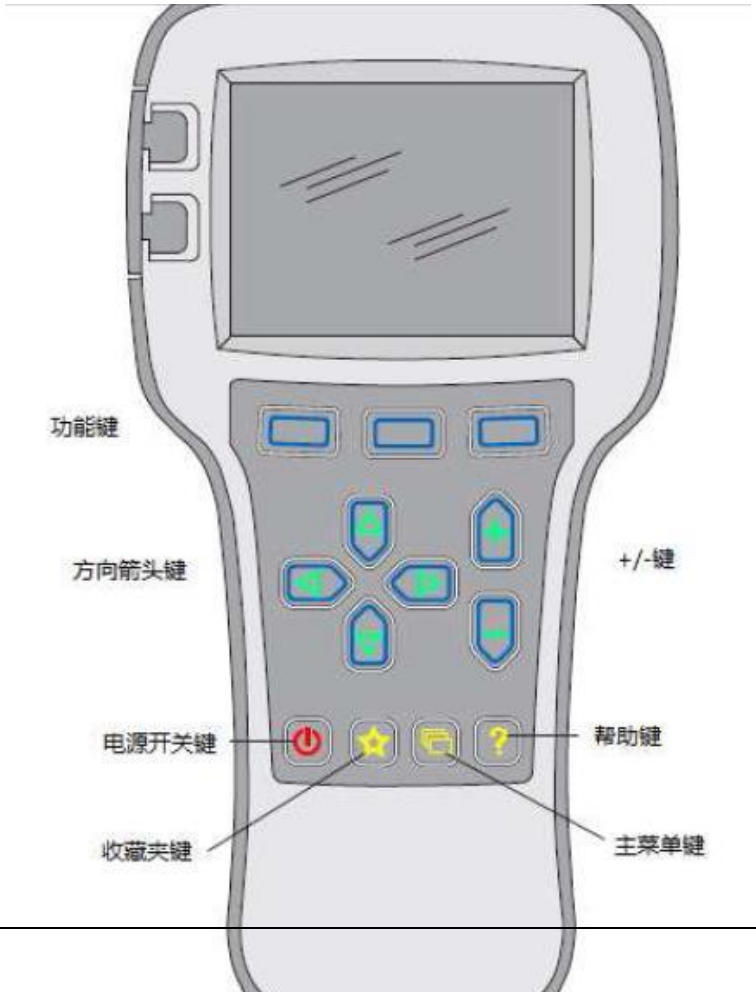
当编程器加载完控制器的信息后，编程器上会显示主菜单。

The programmer is powered on

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


绿色的圆圈（ ）显示已经连上控制器
红色闪烁（ ）未连接上控制器
显示编程器访问权限
1313电池状态
时间和日期
03/09/2011 1:12:18 PM
内容区域
这里显示主菜单界面，包括9个独立的功能图标
System Info
Parameters
Monitor
Diagnostics
Programming
Favorites
HHP Settings
File Manager
Plot & Log
附件信息条
功能键信息条
Go Offline
Select

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



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.



Nine menu

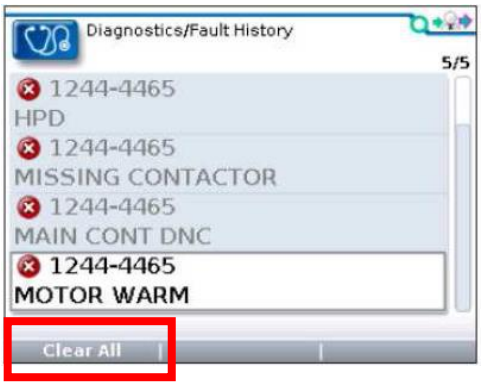


Fault Diagnosis menu

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.

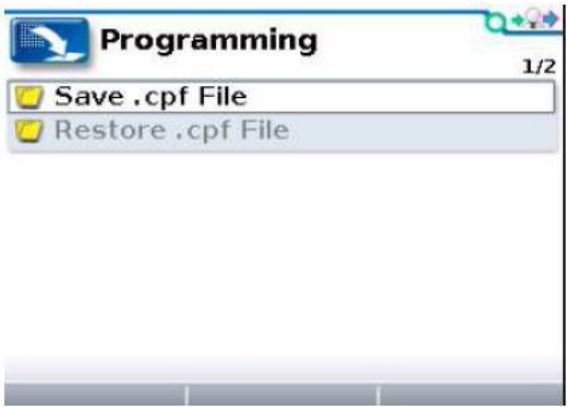
The historical faults folder lists all faults encountered after the last historical fault is cleared. By clearing the fault content in the entire folder, you can record the historical faults again.



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)

Restore. CPF File The. CPF File saved earlier can be used to replace the. CPF File of the current controller.When the data recovery is complete, a dialog