Service manual

Electric Reach Truck

EK18RR / RRL

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

Manual

1. Maintenance List 1
a. Overview of main components 2
b. Lubrication point 3
c. Check and refill hydraulic oil 4
d. Check the fuse 5
2. Fault Analysis 6
a. Common Fault analysis 7
b. The fault code is displayed 8
3. Wiring/circuit Diagram 9
a、Schematic diagram and wiring diagram 10
b、 Hydraulic circuit 11
4、Main parts disassembly 12
A. Drive assembly 18
B Operating handle assembly 19
C. Electrical assembly 20
D. Chain assembly 22
E. Door frame assembly 25
F. Pallet rack assembly 29
5. CURTIS Handheld unit 33

1. Maintenance List

a. Overview of main components

Maintenance List

		Interval (month)			
		1	3	6	12
hydraulic system					
1	Check the hydraulic cylinder, piston for damage noise and leakage		•		
2	Check hydraulic connectors for damage and leakage		•		
3	Check hydraulic oil level and refill if necessary		•		
4	Fill hydraulic fluid after 12 months or 1500 hours of work				•
5	Check and adjust the function of hydraulic valve (1500kg/2000kg +0/+10%)				•
mechanical system					
6	Check the fork for deformation and breakage		•		
7	Check chassis for deformation and cracking		•		
8	Check that all screws are in place		•		
9	Check push rod for deformation and damage		•		
10	Check gear box for noise and leakage		•		
11	Check wheel for deformation and damage		•		
12	Lubricated steering bearing				•
13	Check and lubricate the pivot points		•		
14	Lubricating grease nozzle	•			
Electric System					
15	Check whether electrical wiring is damaged		•		
16	Checking Electrical Connections		•		
17	Check emergency switch function		•		
18	Check electric drive system for noise and damage		•		
19	Detection meter		•		
20	Check that the correct fuse is used		•		
21	Detection warning signal		•		
22	Check the current contactor		•		
23	Check frame for leakage (insulation test)		•		
24	Check whether electrical wiring is damaged		•		
25	Checking Electrical Connections		•		
braking systems					
26	Check brake performance and replace brake discs or adjust air gaps if		•		

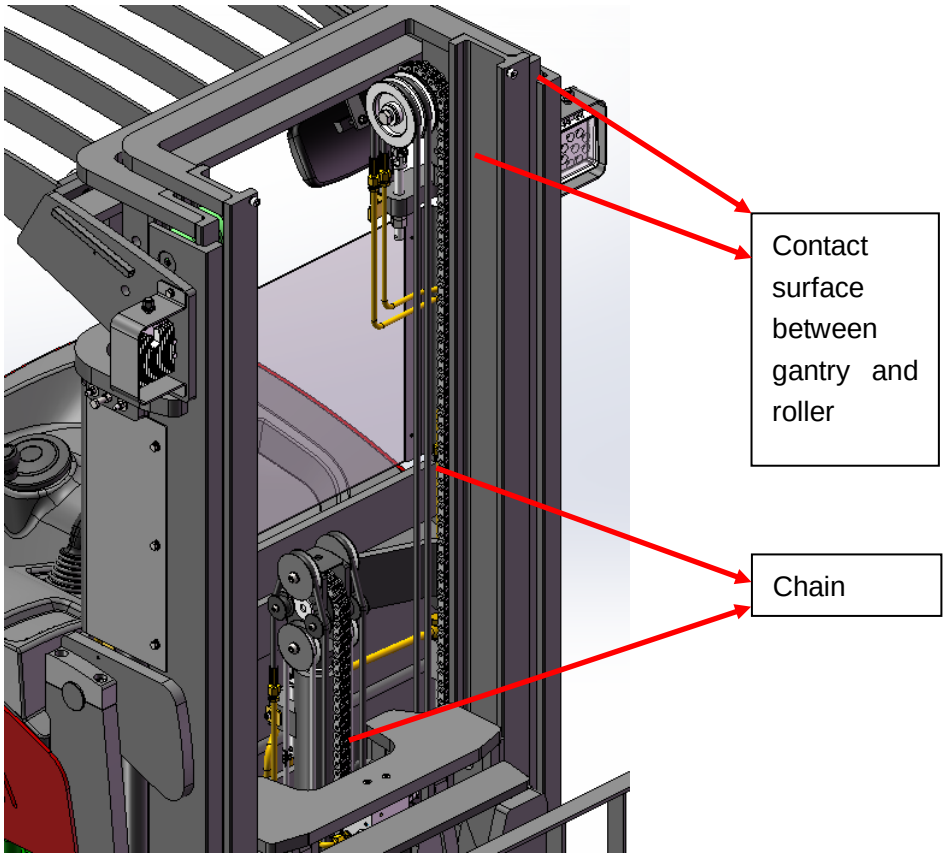
	necessary				
storage battery					
27	Check the voltage of the battery		•		
28	Inspect terminals for corrosion and damage and lubricate terminals		•		
29	Check whether the battery cover is damaged		•		
charger					
30	Check the main cable for damage			•	
31	Check the start up protection program during charging			•	
function					
32	Check horn function	•			
33	Check solenoid valve air gap	•			
34	Detect emergency brake	•			
35	Detect reverse braking and regenerative braking	•			
37	Check steering function	•			
38	Check lifting and descending functions	•			
synthesize					
40	Check all labels for clarity and completeness	•			
41	Check load bearing pinion and adjust height, replace if worn		•		
42	Run a test run	•			

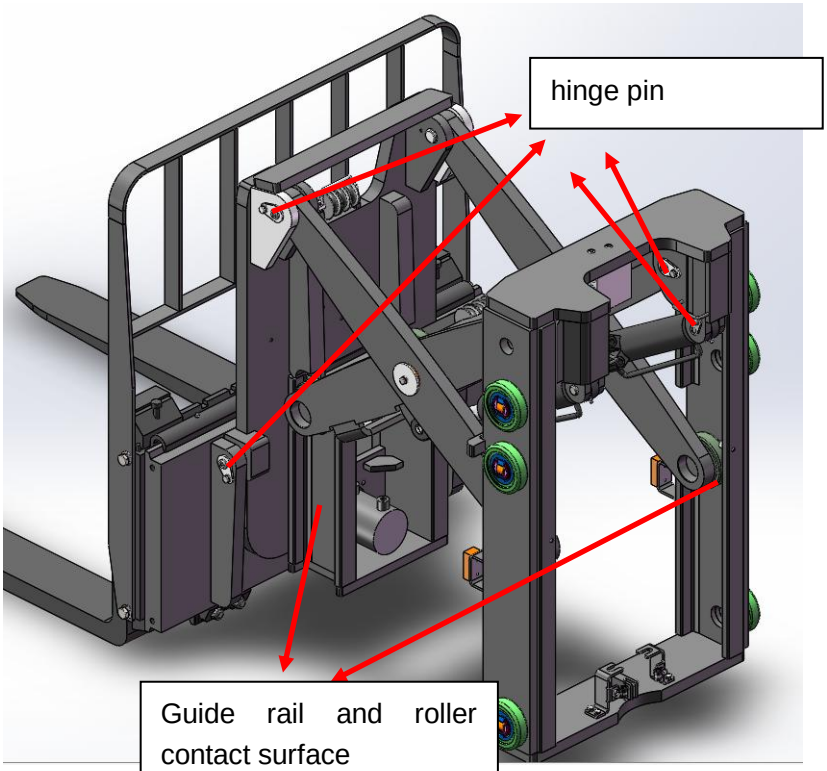
Lubrication point.

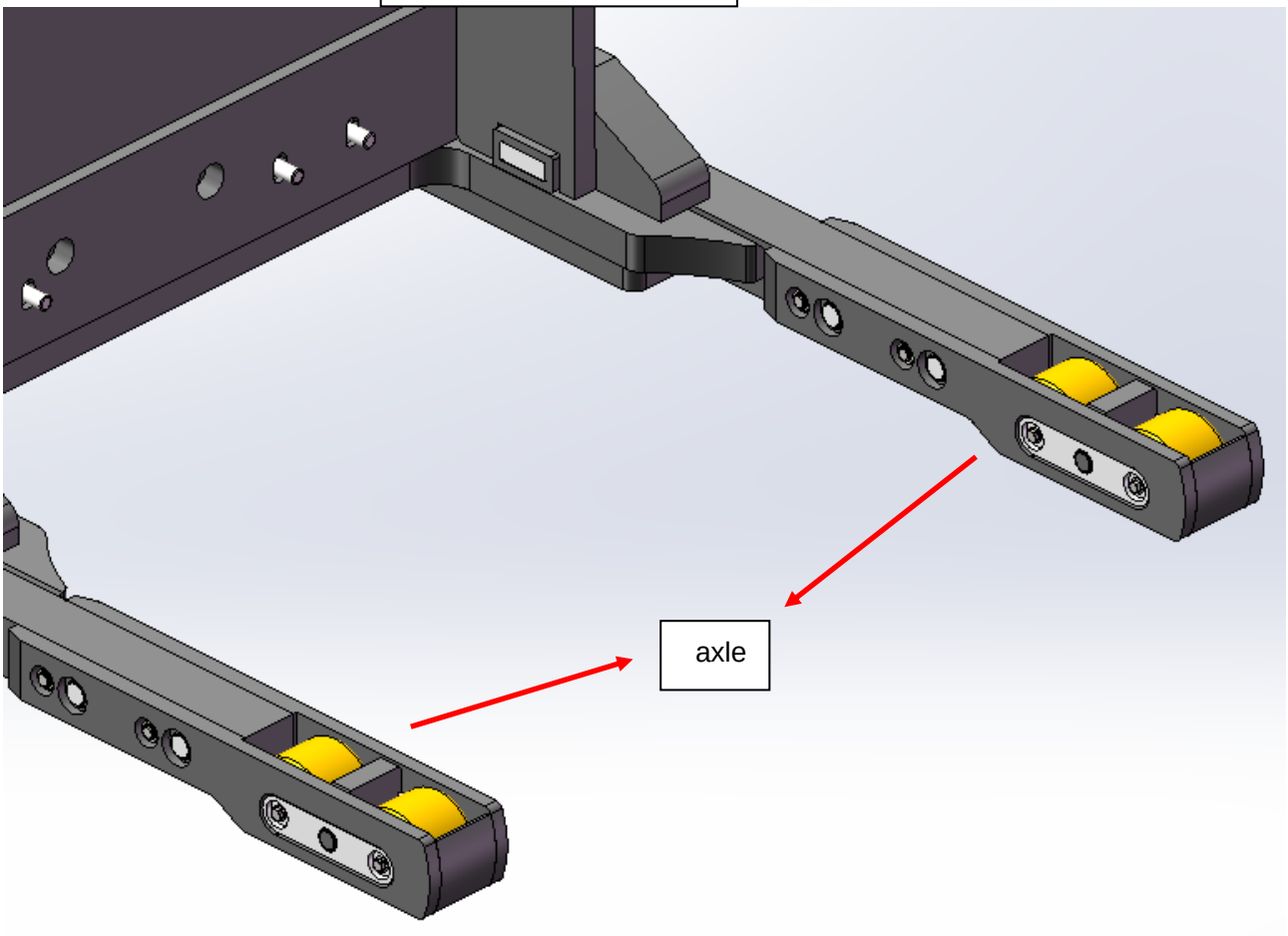
Lubricate marked points according to maintenance list. Required grease specification: DIN 51825 standard grease。

Lubrication point.

。




hinge pin
Guide rail and roller contact surface


axle

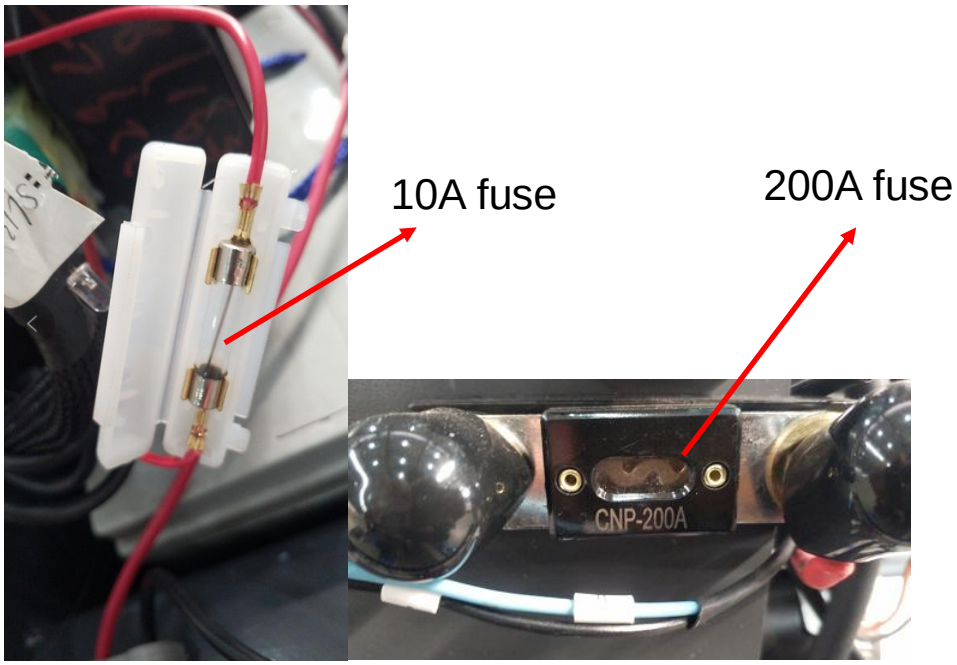
Check and refill hydraulic oil

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	27 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。

Check the electrical fuse



List 2:Fuse specification

	specification
Fuse 1	10A
Fuse 01	300A

2. fault analysis

a. 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
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	Inspect tubing and/or cylinder for tightness
Oil leakage caused by suction	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
	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
Moving in one direction	Accelerator and connector damage	Check accelerator and connector
Traffic moves slowly	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
	Electrical system overheating	Discontinue use and cool the vehicle
	The thermal sensor is faulty	Check and replace the heat sensor if necessary
	400mm trigger sensor, stacker auto speed down	Check whether the sensor is normal
The vehicle started suddenly	Controller damage	Replacing a Controller
	The accelerator has not moved back to the middle position	Repair or replace the accelerator

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

1、Steering fault code

Code	Fault name	Possible reason
12	Controller Overcurrent 控制器过流	1. The steering motor is short-circuited 2. The controller fails
13	Current Sense Fault 电流传感器故障	1. The controller fails
14	Precharge Fault 预充电故障	1. The controller fails
15	Controller Severe Undertemp 控制器严重低温	1. The controller runs in a low-temperature environment 2. The temperature sensor is damaged
16	Controller Severe Overtemp 控制器严重过温	1. Vehicle overload 2. The controller runs in an ultra-high temperature environment 3. The controller is improperly fixed
17	Severe Undervoltage 严重欠压	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 Overvoltage 严重过压	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 电机温度过高削减	1. Vehicle overload 2. The controller runs in an ultra-high temperature environment
22	Controller Overtemp 控制器过温	1. Vehicle overload 2. The controller runs in an ultra-high temperature environment 3. The controller is improperly fixed
23	Motor Polarity Fault 电机极性故障	1. The motor polarity is reversed 2. The polarity of the position feedback device is reversed
24	5V Output Failure 5V 输出故障	1.5V output overload 2. The controller fails
31	Main Driver Fault 主接触器故障	1. The internal relay coil is damaged 2. The internal relay drives open or short
32	Relay Welded 继电器粘连	1. Internal relays are adhered 2. The controller fails
33	Relay Did Not Close 继电器未吸合	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

	硬件故障	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 故障输出失效	1. The output cable is improperly connected 2. The controller fails
36	Motor Stalled 电机堵转	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 电机开路	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 模拟量 1 指令超出范围	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 模拟量 2 指令超出范围	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 模拟量 1 反馈超出范围	1. Analog feedback input 1 (J1-11) is out of range 2. The parameter Settings are incorrect
44	Feedback Analog2 Out of Range 模拟量 2 反馈超出范围	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 参数更改故障	1. If the parameter value changes, you need to restart the system 2. Restore the parameters to default values
46	EEPROM Failure 存储器故障	1. The verification calculation of storage parameters is incorrect 2. The controller fails
47	Encoder Fault 编码器故障	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 没找到 Home 位置	1. The Home switch fails 2. The installation or cable connection is incorrect
62	Communication Fault 通讯故障	he communication s lost
63	Communication Lost 通讯丢失	1. Cables to the Rx(J1-8) are faulty 2. A hand held programmer is being used on the walking controller
71	Software Fault 软件故障	1. Software failure 2. The controller fails
73	Following Error 跟随故障	1. The parameter Settings are incorrect 2. The position feedback device fails 3. Steering motor failure

75	Parameter Conflict 参数冲突	1. The Home switch fails 2. The installation or cable connection is incorrect
78	CAN bus Loading CAN 总线加载	1、 1. The CAN bus is abnormal 2、 2. Message sending is abnormal 3、
79	PDO Mapping Error PDO 映射误差	1. Incorrect mapping data
81	Bad Calibrations 校验不准	1. Check data is out of range
82	Parameter Out of Range 参数超范围	1. Parameter data is out of range
84	Supervision 监测	1. Defects in monitoring procedures

2、Fault code of the walking controller

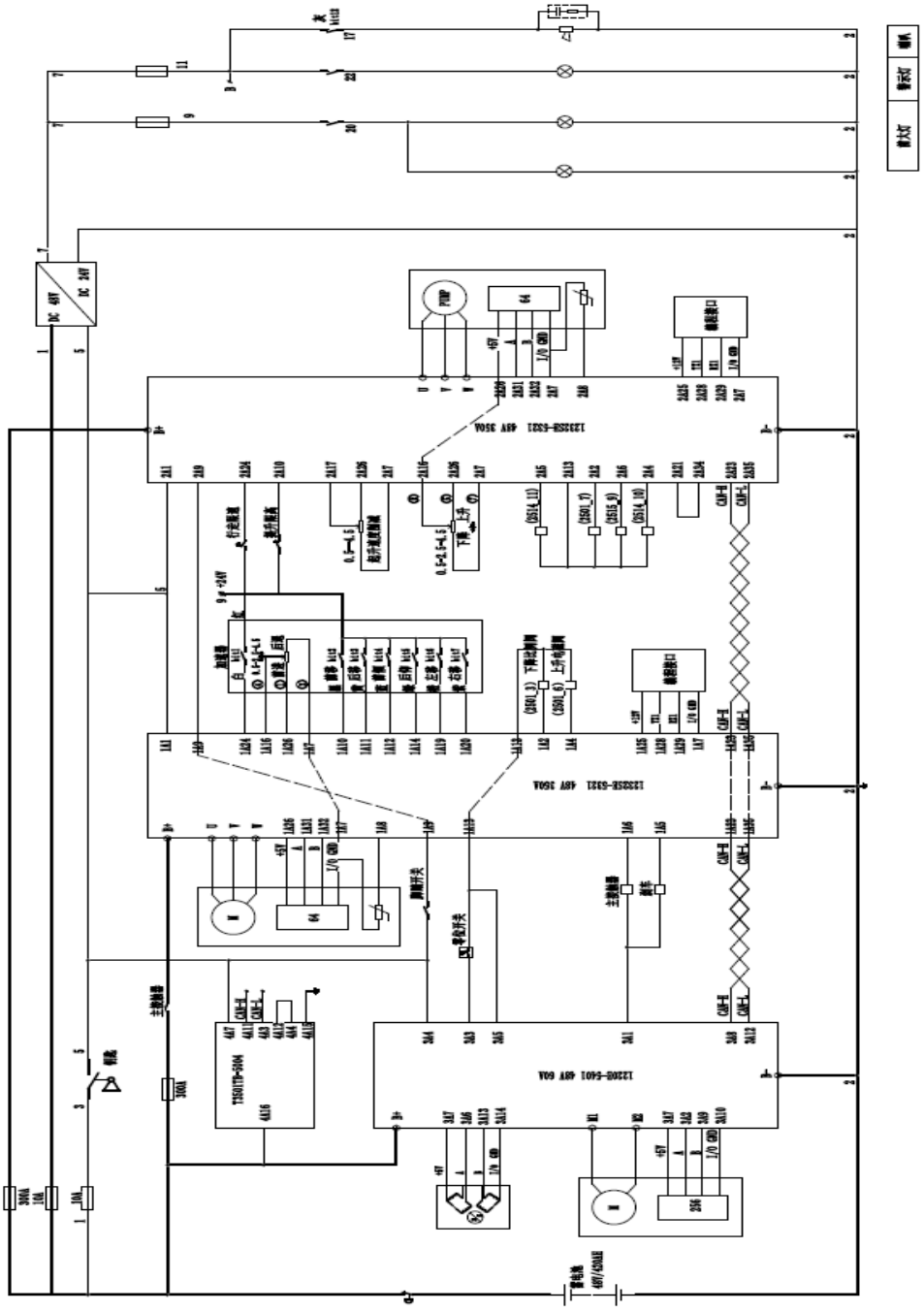
Code	Fault name	Possible reason
1	Controller Overcurrent	1, motor external U,V or W connection short circuit 2. Motor parameters do not match 3. The controller is faulty
2	Current Sensor Fault	1, motor U, V, W through the stator on the car body short circuit, resulting in leakage 2. The controller is 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

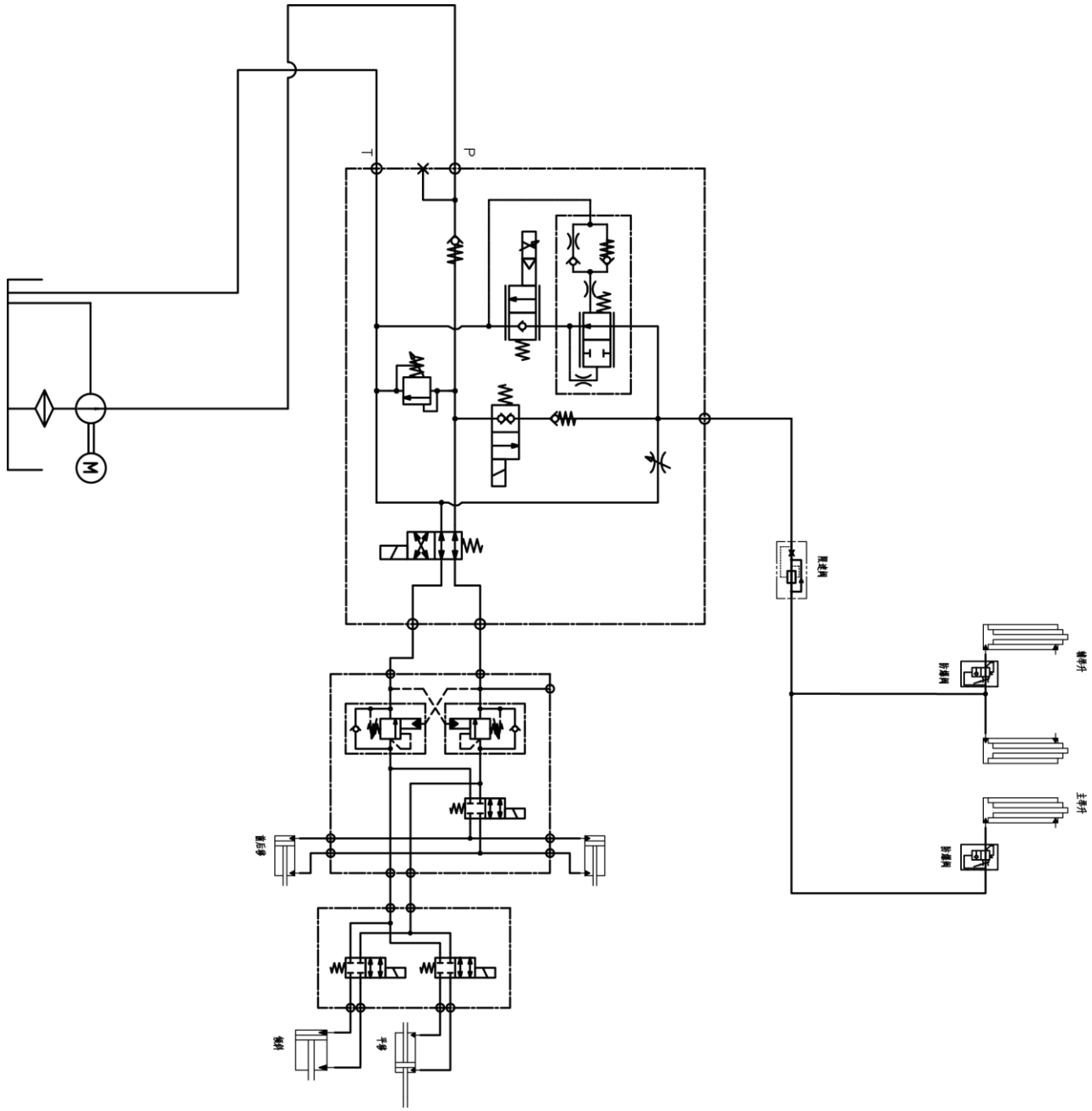
24	Encoder Fault	1. Motor encoder failure 2. Wrong wiring
25	Motor Open	1, motor phase deficiency 2. Wrong wiring
26	Main Contactor Welded	1, main contactor contact fusion 2. Motor U or V is disconnected or phase is missing 3. The circuit charging capacitor connected to the B+ terminal exists
27	Main 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	1Failed 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 parameter error, e.g. "Exit Supply 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).



b、hydraulic principle diagram

Hydraulic principle diagram



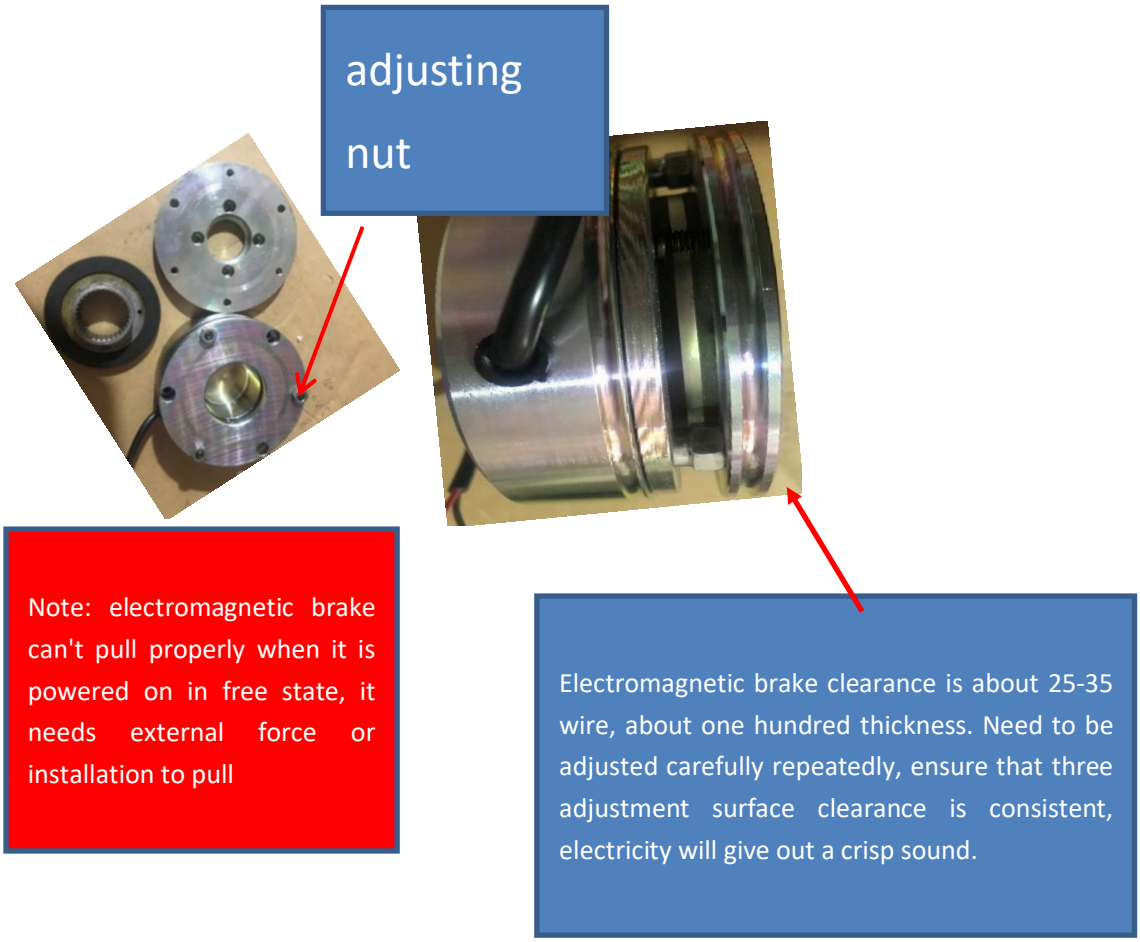
Hydraulic oil inspection

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

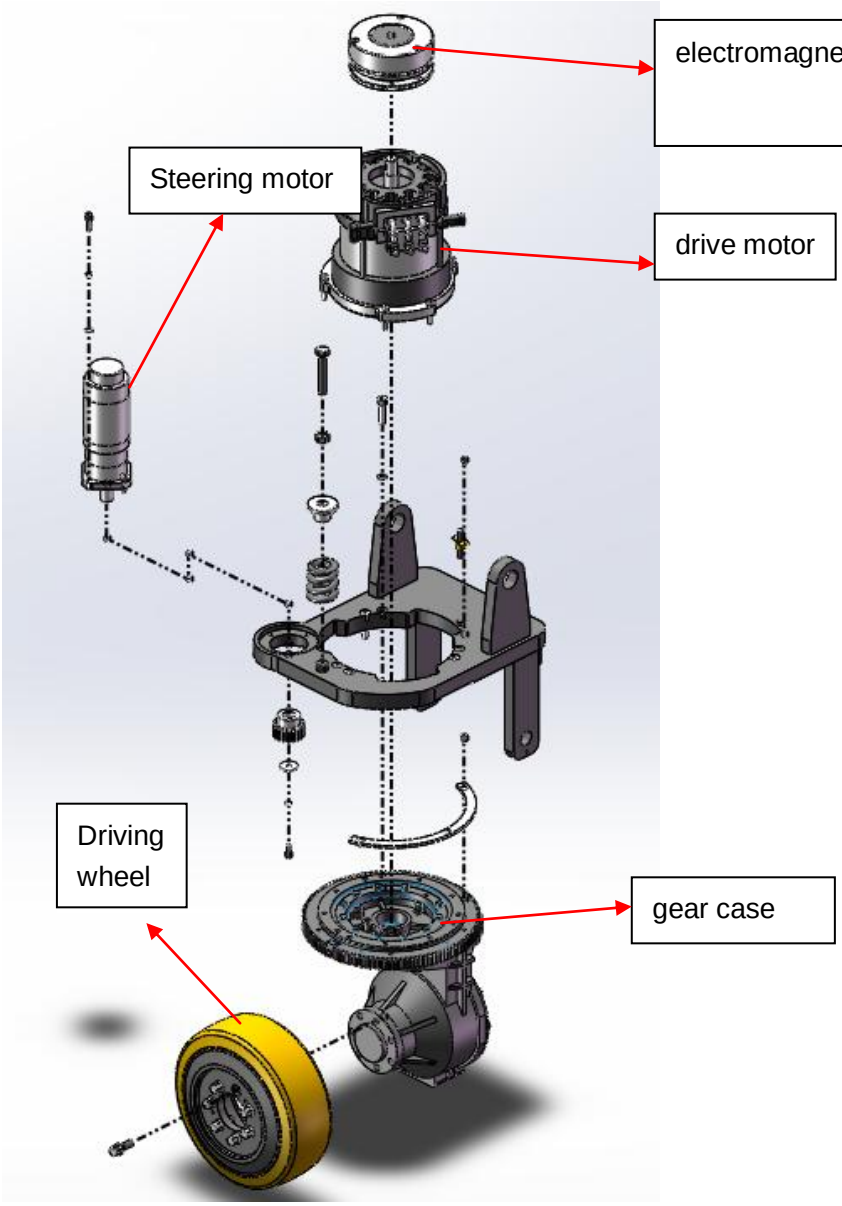
Clear color but small black spots	good	mix with other particles	can be used after filtering

4、Disassembly of main parts

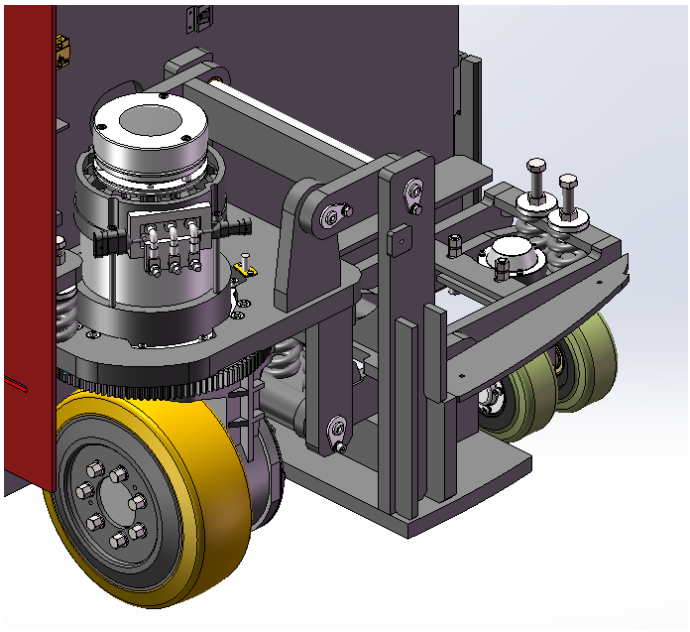
Electromagnetic brake adjustment

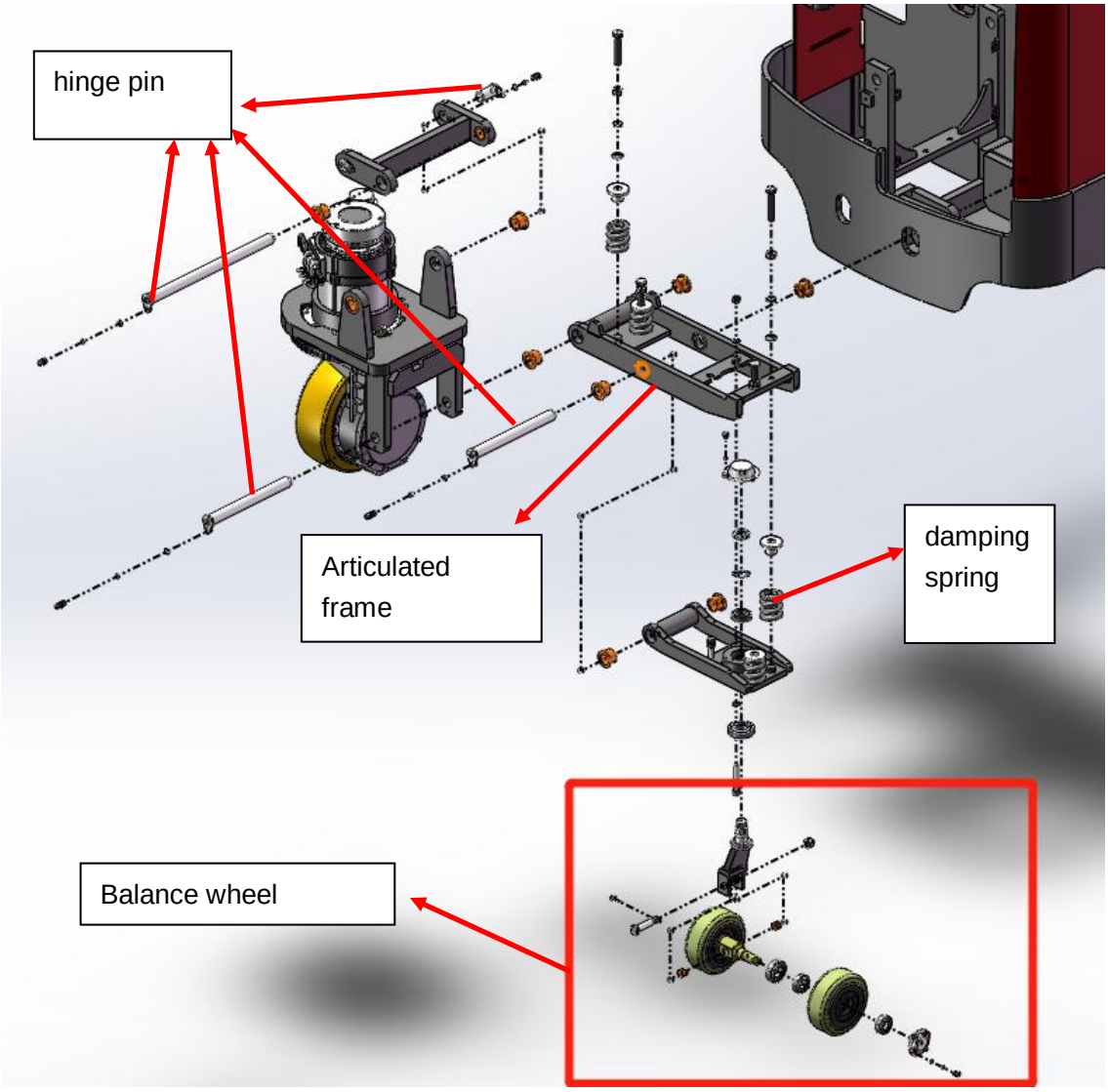


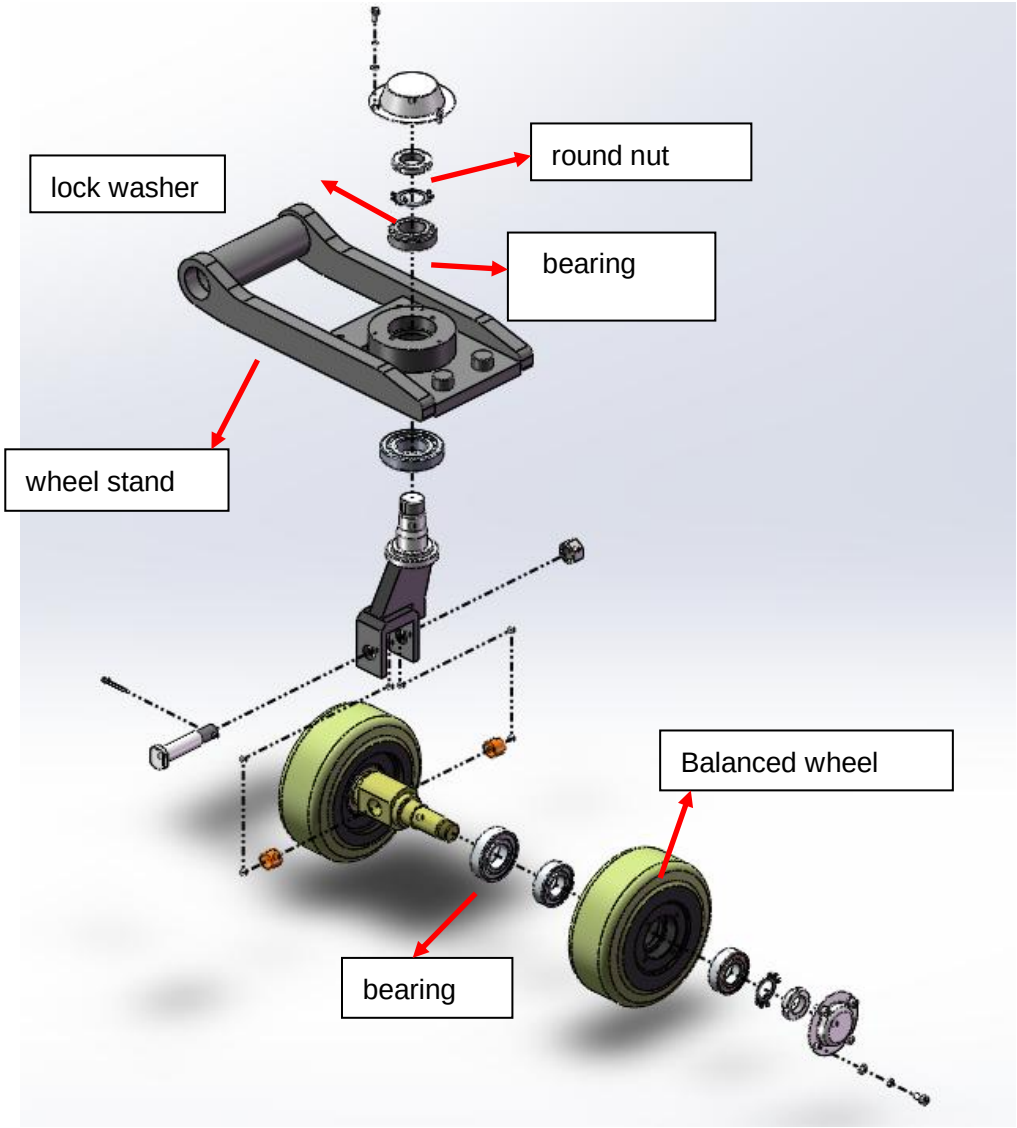
b、Drive the disassembly diagram



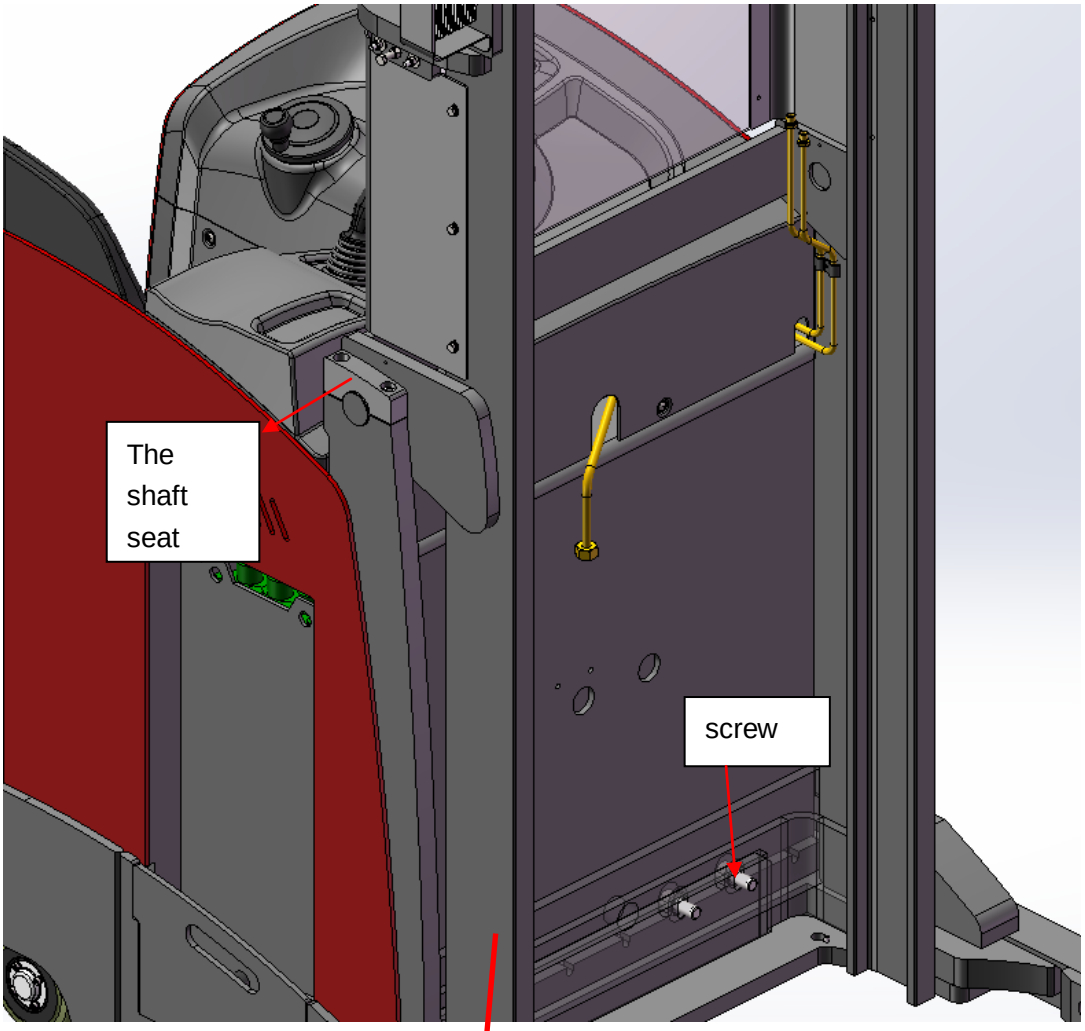
c、Drive and balance wheel disassembly





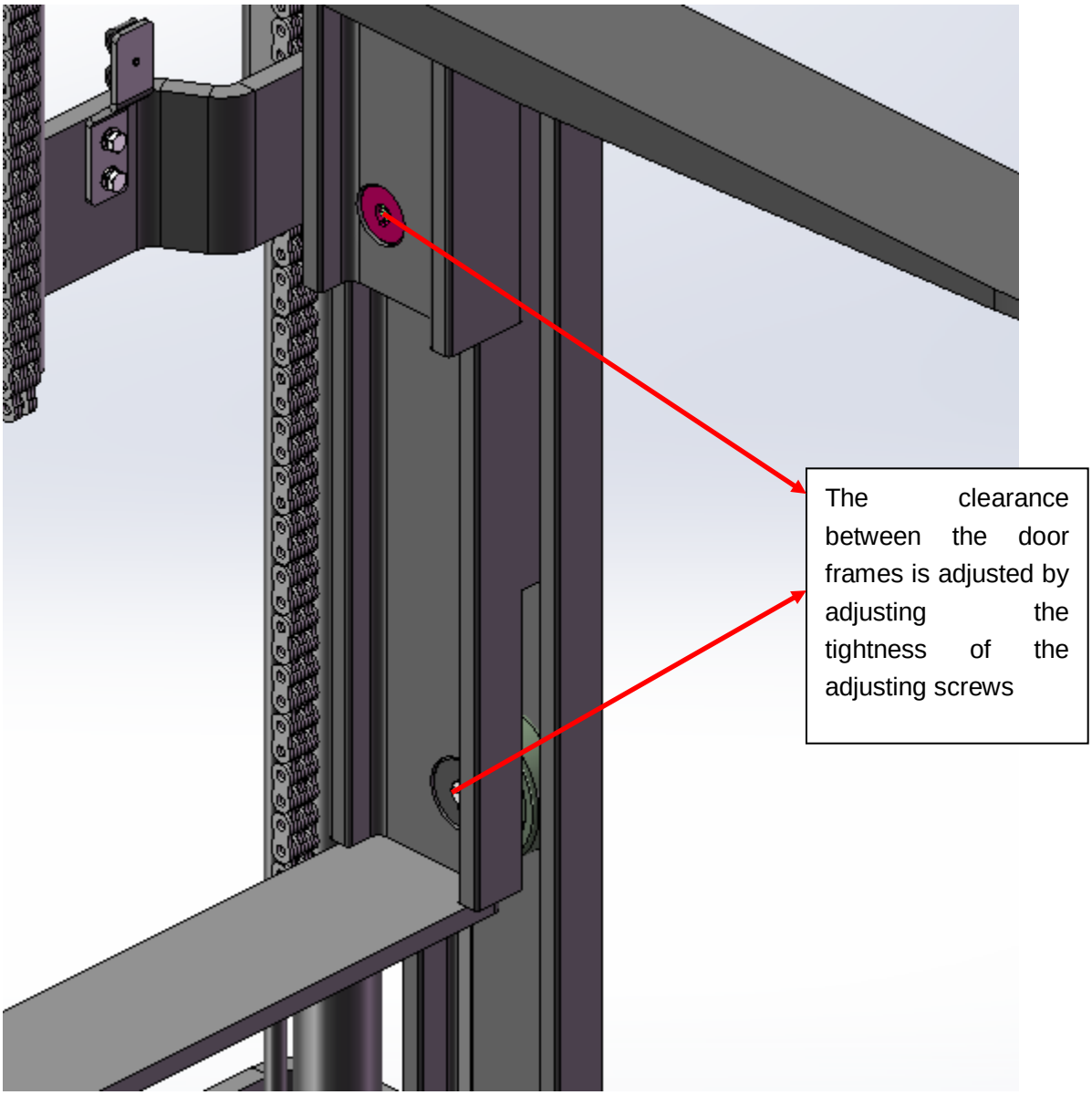

round nut
lock washer
bearing
wheel stand
Balanced wheel
bearing

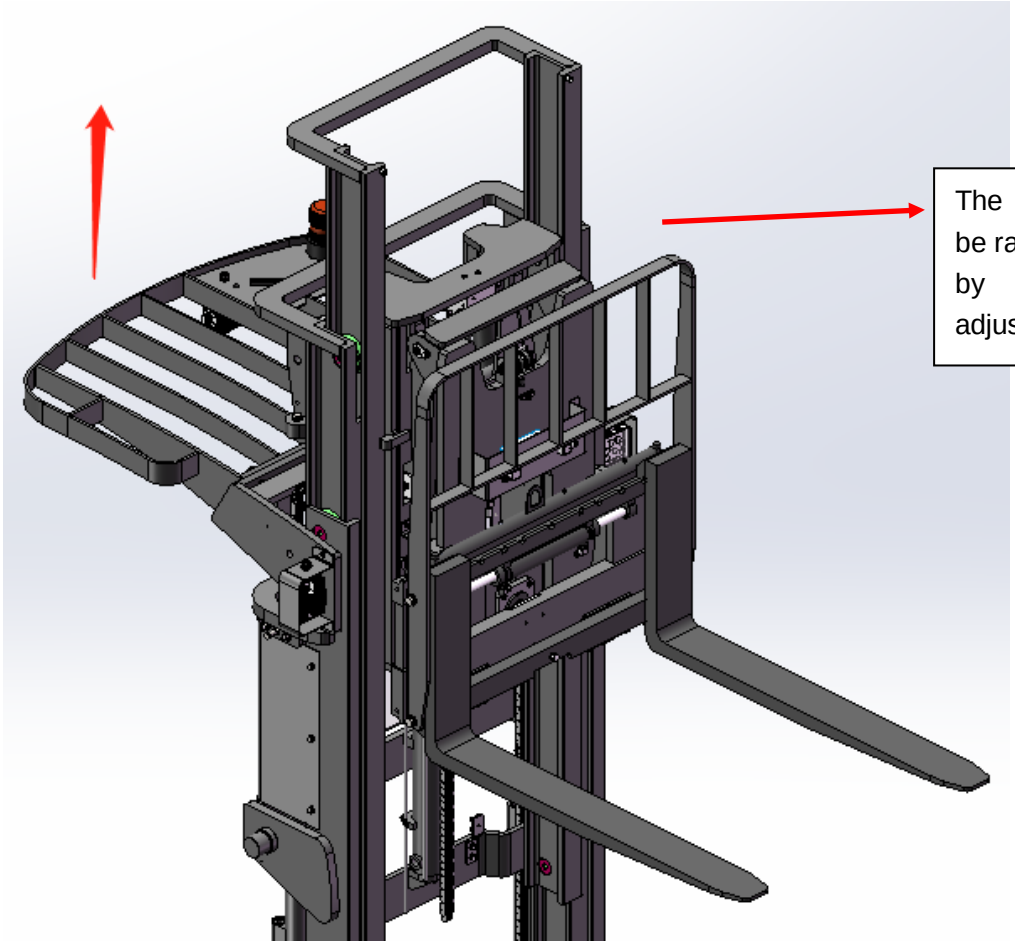
d、Dismantling of frame and door frame



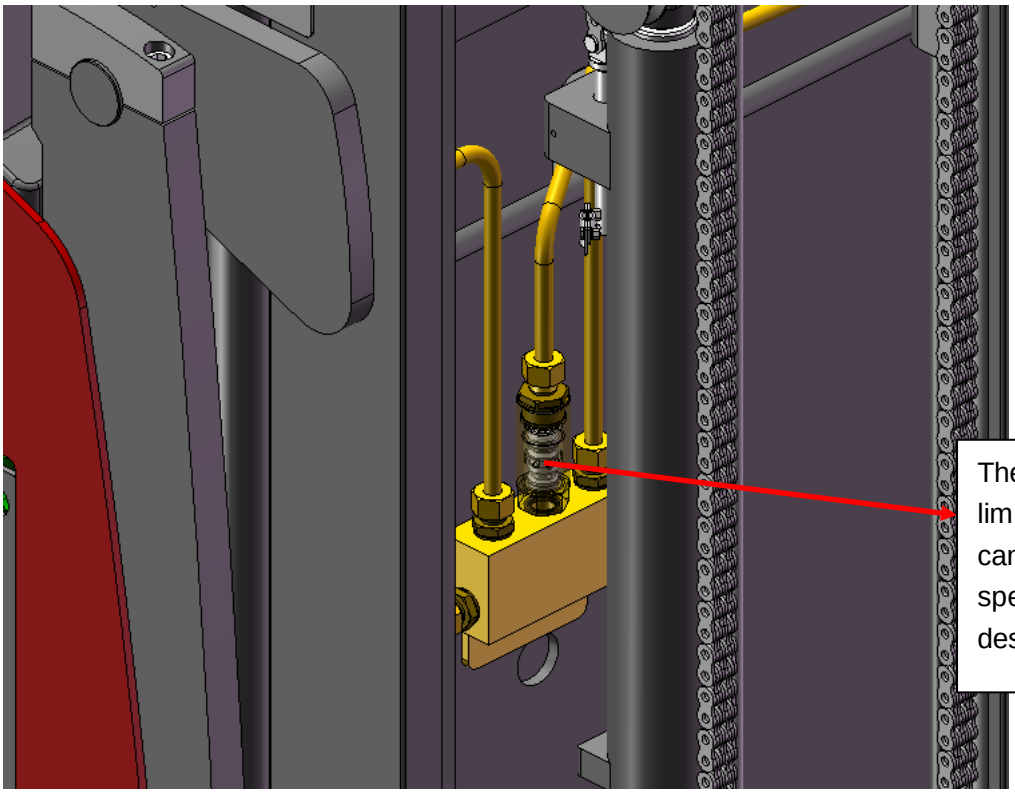
After removing the axle seat cover and screws, the door frame can be separated from the frame. Note: the body and door frame shall be fixed with external objects during disassembly to avoid safety accidents in the process of disassembly.

e、Mechanical part of door frame





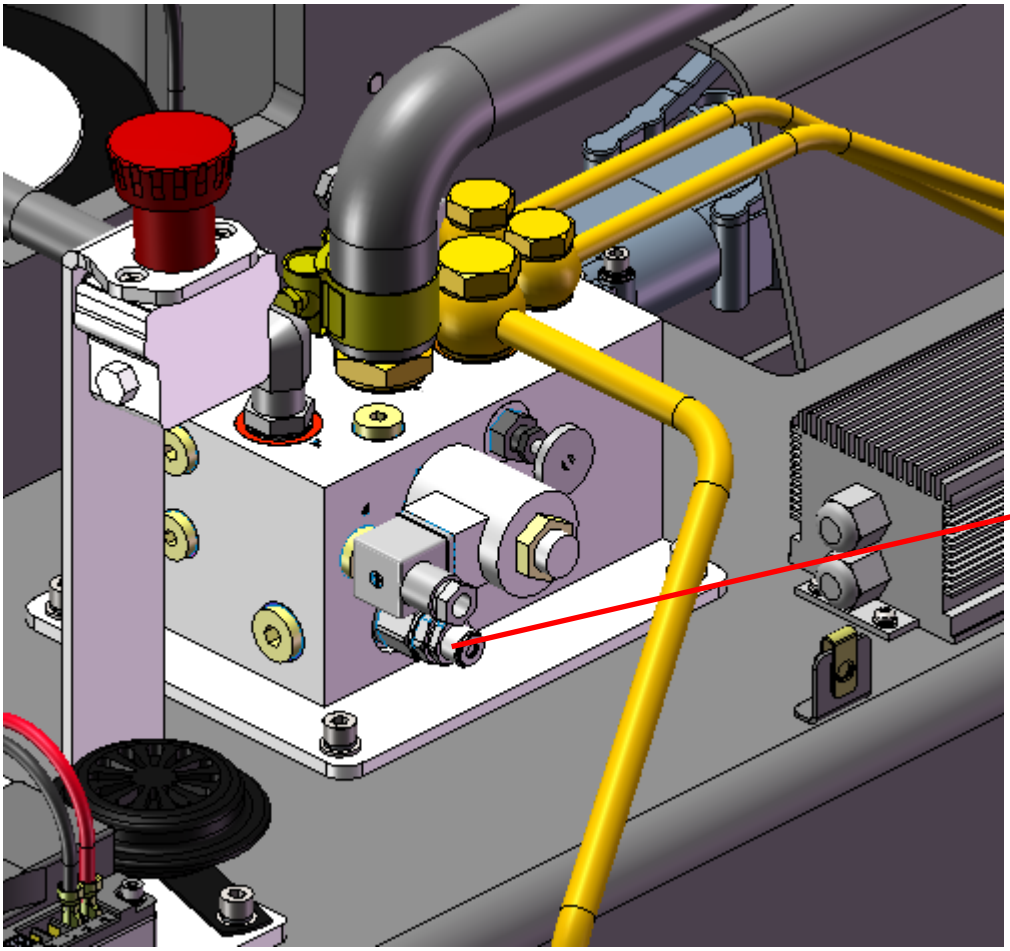
The door frame can be raised step by step by loosening the adjusting screw.



The speed limiting valve can adjust the speed of descent

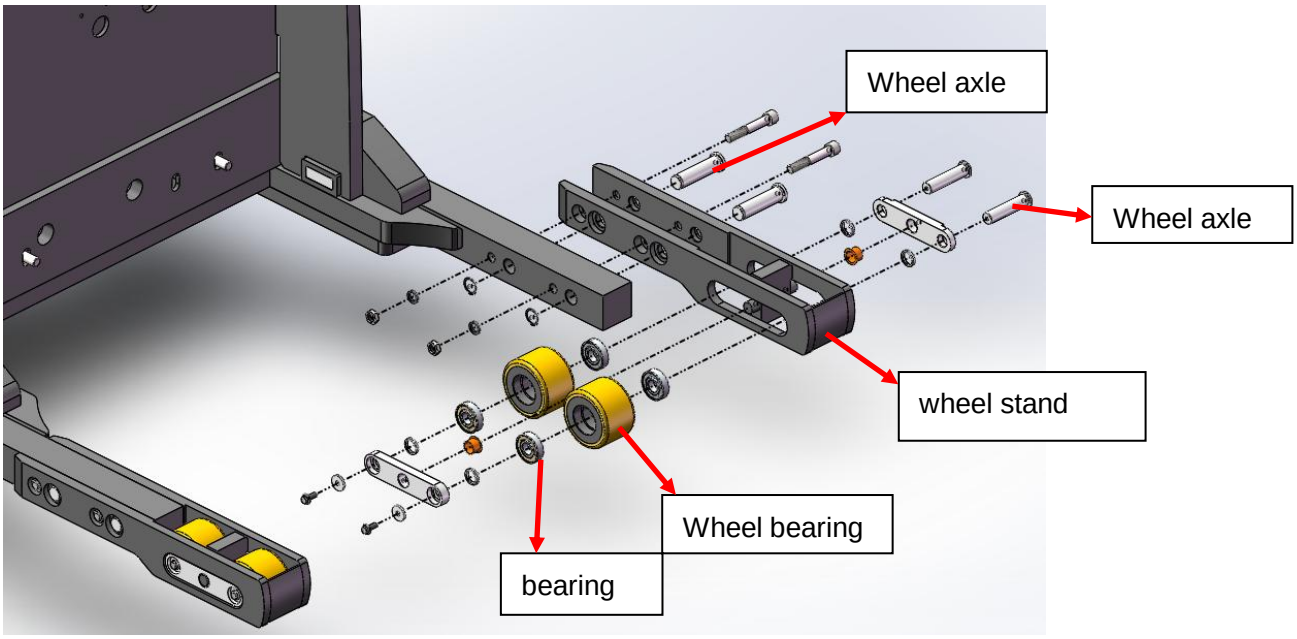
f、Frame mechanical part

Pressure regulation

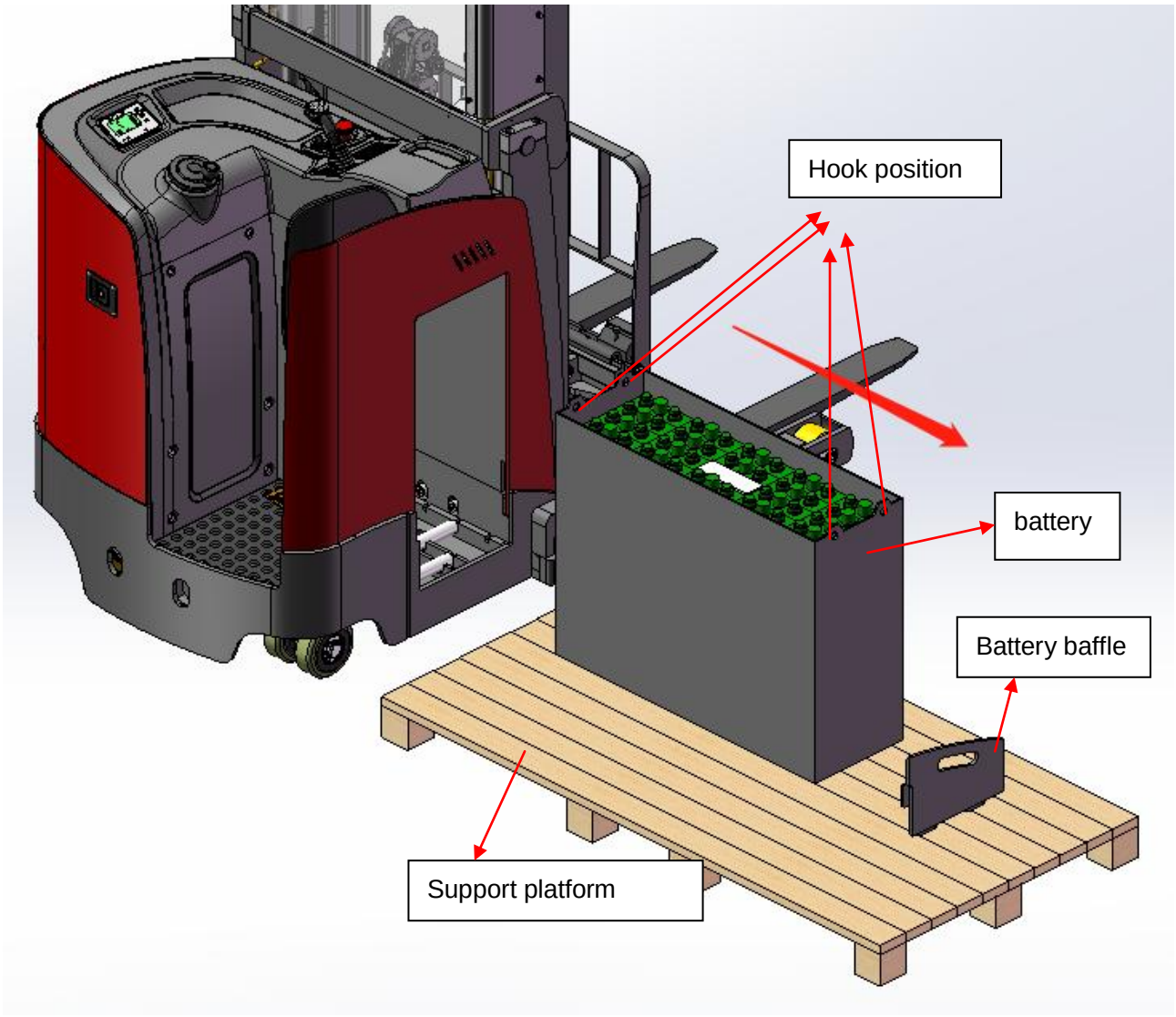


The relief valve is used to adjust the oil pressure, which should be adjusted slowly to avoid excessive pressure causing damage to the car body.

Disassembling diagram of bearing wheel



Battery removal diagram



Before taking out the battery, prepare a support platform of appropriate height. First remove the battery baffle, then fix the battery side with the hook and slowly drag the battery to the support platform. After the battery is placed firmly on the support table, hook the hook position on both sides of the battery, and then place the battery in the appropriate position. The battery can be put into the car body in reverse order. Caution: Be careful during the operation, confirm the safety of the lifting device before lifting, do not place body parts (such as feet) under the lifting object, to avoid heavy objects accidentally falling off and being injured.

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

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.

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.

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.

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 start up automatically. When you hold it down for a few seconds, the programmer will prompt you whether to turn it off. You can decide whether to turn it off by selecting the "Yes" and "No" represented by the function key. After closing the programmer, press for a few seconds and the programmer will restart. collection keys

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

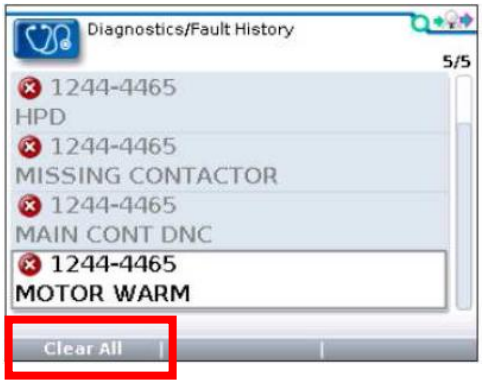
Nine menu

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.

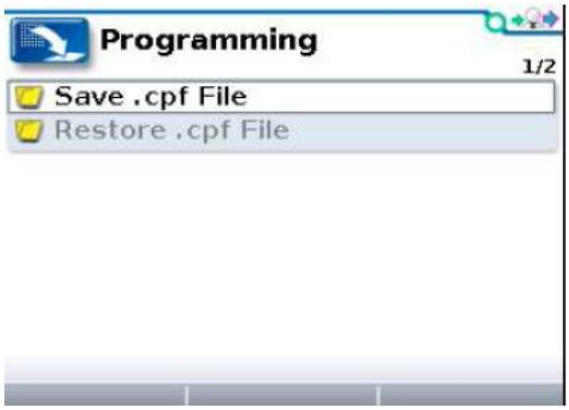


Clear All is used to Clear historical fault folders. A function key is highlighted only when there are historical failures in the historical failures folder and grayed out when there are no historical failures.

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 box is