Service Manual

Electric Pallet truck

EPT-15D

Warning

You must read and understand the operating instructions in this manual before using it.

Caution:

- Please check the last page of this document and the nameplate for all current product type designations.
- Take care to store for future use.

Version 05/2019

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Ⅰ Repair list

Main parts overview

Table 1:Maintenance list

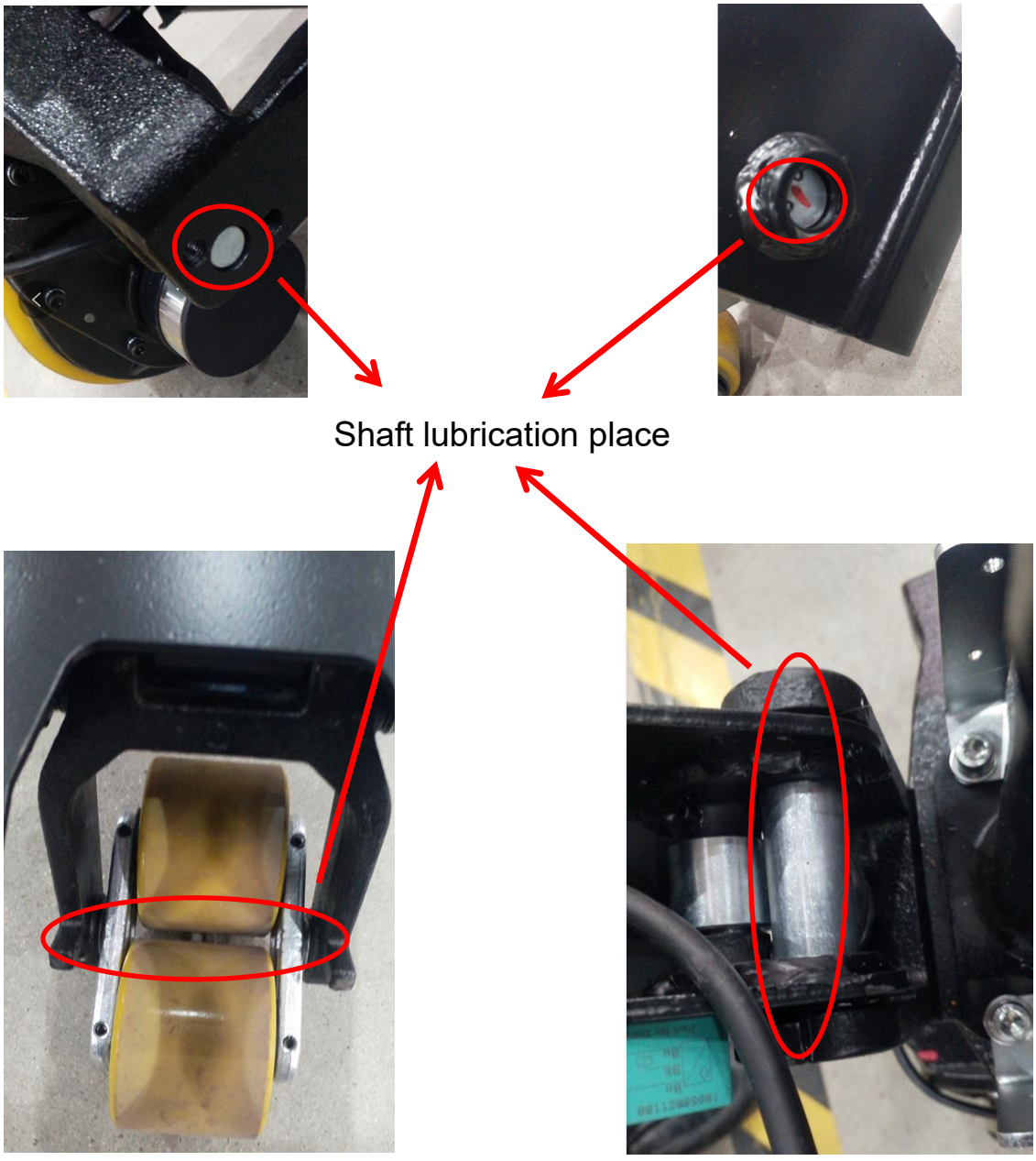
		Interval (months)			
		1	3	6	12
Hydraulic system					
1	Check the hydraulic cylinder and piston for damage, noise and leakage		●		
2	Check hydraulic connectors for damage and leaks		●		
3	Check the hydraulic oil level, and refill if necessary		●		
4	After 12 months or 1500 hours of operation, refill the hydraulic oil				●
5	Check and adjust the function of hydraulic valve (1500kg/2000kg +0/+10%)				●
Mechanical system					
6	Check whether the forks are deformed and broken		●		
7	Check whethe the chassis is deformed or broken		●		

		Interval (months)			
		1	3	6	12
8	Check that all screws are fixed		●		
9	Check whether the push rod is deformed and damaged		●		
10	Check whether there is noise and leakage in the gearbox		●		
11	Check whether the wheels are not deformed and damaged		●		
12	Lubricate the steering bearings				●
13	Check and lubricate the axle points		●		
14	Lubricate grease nozzle	●			
Electrical system					
15	Inspect electrical wiring for damage		●		
16	Check electrical connections		●		
17	Test the emergency switch function		●		
18	Check the electric drive system for noise and damage		●		
19	Check the power meter		●		
20	Check for proper fuses		●		
21	Detect warning signals		●		
22	Check the current contactor		●		
23	Check the frame for leaks (insulation test)		●		
24	Check the function and wear of the drive controller		●		
25	Check the electrical system of the drive motor		●		
Brake system					
26	Check brake performance, replace brake discs or adjust air gap if necessary		●		
Battery					
27	Check the voltage of the battery		●		
28	Check terminals for corrosion and damage and lubricate terminals		●		
29	Check the battery cover for damage		●		
Charger					
30	Check mains cable for damage			●	
31	Check the start-up protection program during charging			●	
Function					
32	Check the horn function	●			
33	Check the air gap of the solenoid valve	●			
34	Detect emergency braking	●			
35	Detects reverse braking and regenerative braking	●			
36	Detect belly switch function	●			
37	Check steering function	●			
38	Check lifting and lowering function	●			
39	Checking handle proximity switch function	●			
Comprehensive					
40	Check all labels are clear and complete	●			
41	Check the load-bearing wheels and adjust the height, replace if worn		●		
42	Perform a test run	●			

a. Lubrication point

According to the points marked for lubrication in the maintenance list. The required grease specification is: DIN 51825 standard grease.

a. Pic.1: Lubrication point



Bearing lubrication

Grease filling port

b. Check and refill the hydraulic oil

The recommended hydraulic oil type according to the temperature is:

Temperature	–5℃~25℃	>25℃
Model	HVLP 32， DIN 51524	HLP 46， DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Oil volume	0.4 L	

Waste materials such as used oil, used batteries or other materials must be disposed of and recycled in accordance with national regulations and, if necessary, turned over to a recycling company for pickup.

The oil level should not be lower than the minimum amount of oil required to start the vehicle.

If necessary, add oil to the refueling point.

c. Check electrical fuses

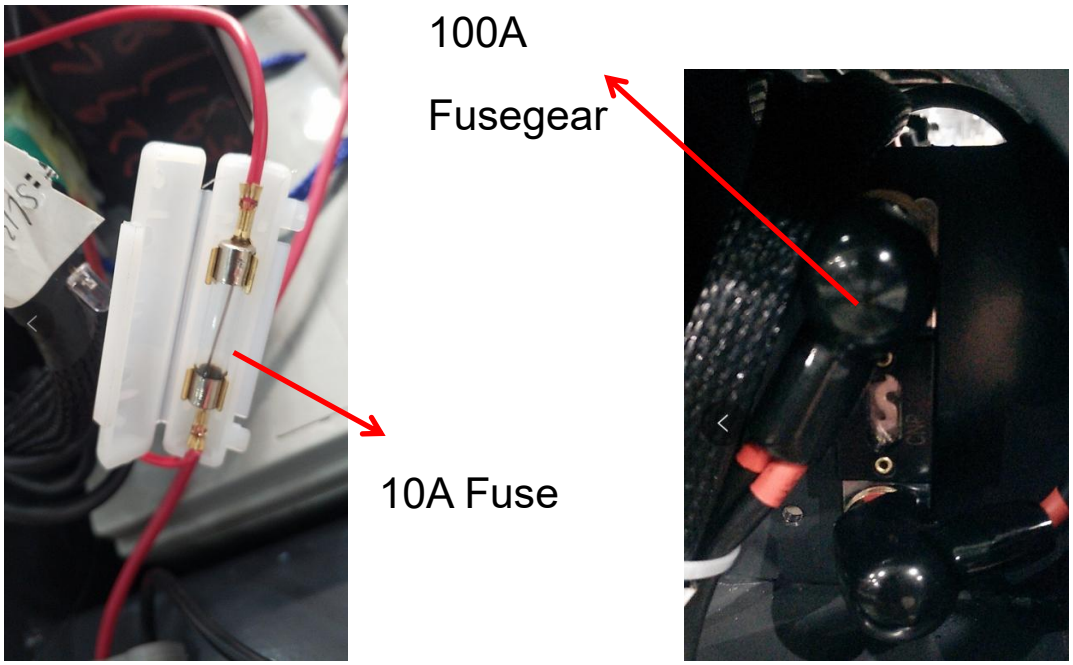


Table 2:Fuse specifications

	Specifications
Fuse 1	10A
Fuse 01	100A

Ⅱ Failure Analysis

a. Analysis of common failures

If the vehicle still fails, follow the instructions in Chapter 6 of the manual.

Table 3: Failure Analysis

Failure	Cause	Repair
Cargo cannot be lifted	Excessive load weight	Lifting the cargo not heavier than the maximum capacity
	Battery discharged	Battery charging
	Lifting fuse is faulty	Check and replace lifting fuse
	Hydraulic oil level is too low	Check and refill hydraulic oil
	Oil leak	Check cylinder seal condition
Suction type oil leakage	Oily is too high	Reduce oily

Failure	Cause	Repair
Vehicle can not be operated	Battery is charging	Battery is fully charged, then unplug the mains from the power socket
	Battery not connected	Battery properly connected
	Fuse is faulty	Check and replace fuse
	Low battery level	Battery charging
	Emergency switch is activated	Turn emergency switch clockwise
	Handle is not in the operating area	Move the handle to the braking area first

If the vehicle breaks down and cannot be operated outside the work area, jack up the vehicle, place a load handling device under the vehicle and secure the vehicle, then move the vehicle out of the access road.

b. Instrument fault code display

Table 4:1212P Fault Codes

Programmer display	Code	Fault phenomenon	Trouble shooting
BATTERY DISCONNECT FAULT	**4.5**	Battery not connected	1) The battery is not connected 2) Poor battery contact
BRAKE OFF FAULT	**3.4**	Brake off fault	1) Electromagnetic brake coil short circuit 2) Electromagnetic brake drive open circuit
BRAKE ON FAULT	**3.2**	Brake on fault	1) Electromagnetic brake coil open circuit 2) Electromagnetic brake drive short circuit
CURRENTSENSE FAULT	**4.1**	Current detection fault	1) Motor or motor wiring short circuit 2) Controller failure
EEPROM CHECKSUM FAULT	**4.3**	EEPROM Fault	1) EEPROM fault or failure
HARDWARE FAILSAFE	**4.2**	Motor voltage out of range	1) Motor voltage does not match gas pedal input 2) Motor or motor mating ring short circuit 3) Controller failure
HPD FAULT	**3.5**	HPD Fault	1) Accelerator, key switch, actuation or prohibition Input several actions in the wrong order of operation 2) The gas pedal is incorrectly adjusted
MAIN FAULT	**2.3**	Main contactor failure	1) Main contactor sticking or open circuit 2) Main contactor coil drive error

Programmer display	Code	Fault phenomenon	Trouble shooting
MAIN OFF FAULT	**2.1**	Main contactor coil drive 'off' fault	1) Main contactor coil incorrectly turned on
MAIN ON FAULT	**2.4**	Main contactor coil drive 'on' fault	1) Main contactor coil wrongly closed
OVERVOLTAGE FAULT	**1.5**	Battery voltage too high	1) Battery voltage > 31V 2) Charger still connected while vehicle is running 3) Bad battery contact
PRECHARGE FAULT	**3.3**	Pre-charge failure	1) Controller failure 2) Low battery voltage
SPEED POT FAULT	**1.3**	Speed limiting potentiometer failure	1) Speed limiter potentiometer open circuit or short circuit 2) Speed limiter potentiometer open circuit
THERMAL FAULT	**1.1**	Over/under temperature cut off	1) Temperature > 80℃ or < -10℃ 2) Vehicle overload 3) Operating in extremely harsh environment 4) Electromagnetic brake is not released properly
THROTTLE FAULT	**1.2**	Potentiometer slip end or low voltage is out of range	1) Open circuit or short circuit at accelerator input 2) Faulty accelerator potentiometer 3) Wrong accelerator type selection
UNDERVOLTAGE FAULT	**1.4**	Battery voltage is too low	1) Battery voltage <17V 2) Bad battery or controller wiring

Common fault specific troubleshooting methods

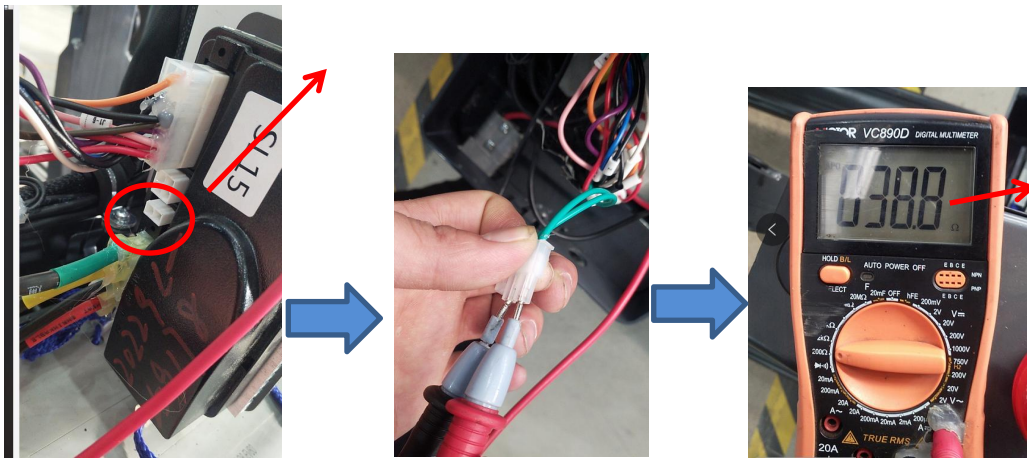
1. CODE 4.5　Battery is not connected

1) Check whether the car body cable terminal fastening is loose, as follows：

2)Use a multimeter to measure the single cell voltage of the battery under load, as follows：

2. Code 3.4 and 3.2 Electromagnetic brake cable problem, or electromagnetic brake failure

1) Measure the resistance of the two-core plug-in on the controller with a multimeter as follows：



The normal condition should be around 40 Ω. If no resistance is shown, there is a problem with the brake line or the brake coil is short-circuited.

3. Code 4.1 motor or motor line short circuit or controller failure

1)Remove the motor brake disc (brake line is still connected), the motor M1 M2 directly connected to the positive and negative battery, observe whether the motor is rotating normally, if not, the motor failure.

2) If the motor rotation is normal, the controller should be replaced.

4.Code 3.5 and 3.1 Operating sequence failure

Interlock switch under normal conditions, use a multimeter to measure between J1-6 and the negative pole on the controller 14 core plug-in, there is about 24V when the handle bar is in the working area of the switch. If not, check the interlocking switch, for example, you can observe whether the interlocking switch lights up normally and whether the signal line from the switch to the controller is connected.

5.Code 4.2 Motor voltage cannot match gas pedal input, motor or motor mating ring short circuit and controller failure, troubleshooting operation as follows.

Multimeter to 20V DC gear, the meter pen is inserted into J1-1 (gas pedal 0 - 5V speed signal), 2 (negative), power up and turn the gas pedal, observe whether the multimeter readings have 0 - 5V voltage linear change.

Accelerator If the voltage changes normally, replace the controller.

6.Quickly determine controller failure

Unplug the gas pedal docking plug, if the controller is still reporting a fault after powering up, the controller is faulty.

7.Controller fault is always on, no walking, then troubleshoot the problem steps are as follows.

1)Measure whether the gas pedal 0 - 5V voltage output (between J1-1 and the negative pole)

2)Short the J1-6 on the 14-core plug of the controller with the 7 line on pin 5, restart and turn the gas pedal, whether there is walking.

3)Brake hold, remove the brake (brake line is still connected), restart and turn the accelerator, is it normal.

4)Remove the motor brake disk (brake line is still connected), the motor M1 M2 directly connected to the positive and negative battery, observe whether the motor is normal rotation, if not turn the motor failure.

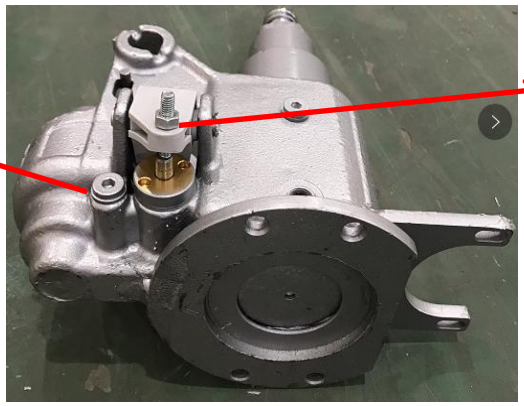
5)If the above tests are normal, the controller is judged to be the problem.

8.No lift down or cylinder self-lowering, troubleshooting methods are as follows.

Manual descent:

Here is the lifting contactor coil wiring (line number is 2 and 15), after power up, press the lifting button, measure whether there is about 24V voltage in these two places, if there is, and there is no sound of this contactor sucking, then this contactor is faulty. If there is no 24V voltage, then press the metal button switch to measure whether it is connected.

Pressure adjustment valve. Note: This valve should not be over-adjusted to avoid deformation caused by overloading the frame.



This is the descending valve, if the descending is slow or self-lowering, adjust the descending chain loosely, or check this valve core.

Electric descent:

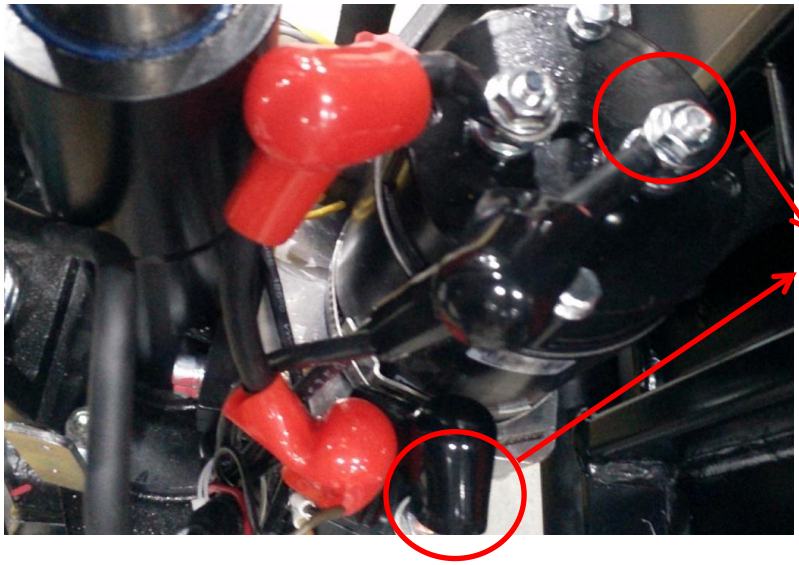
1) No lifting, the basic principle of the same as the manual descent, electric descent configuration of the model in the lifting line increased lifting limit switch. In case of no lifting, in addition to the above steps, check whether the limit switch is working properly when investigating the problem.

2)No descent, can be measured according to the following steps.

This is the drop solenoid valve plug-in, and a multimeter can be used to measure whether there is 24V voltage between the gray line and the black line when the drop button is pressed and held. If there is voltage, replace the descending valve body. If there is no voltage, measure whether the metal button switch of the descent is working properly.

9.The whole vehicle is not energized, you can first measure whether the battery voltage is normal, as follows:

1)



The two measured voltage for the battery voltage, observe whether the voltage is normal, if there is no voltage, then unplug the battery body plug-in and measure the battery voltage.

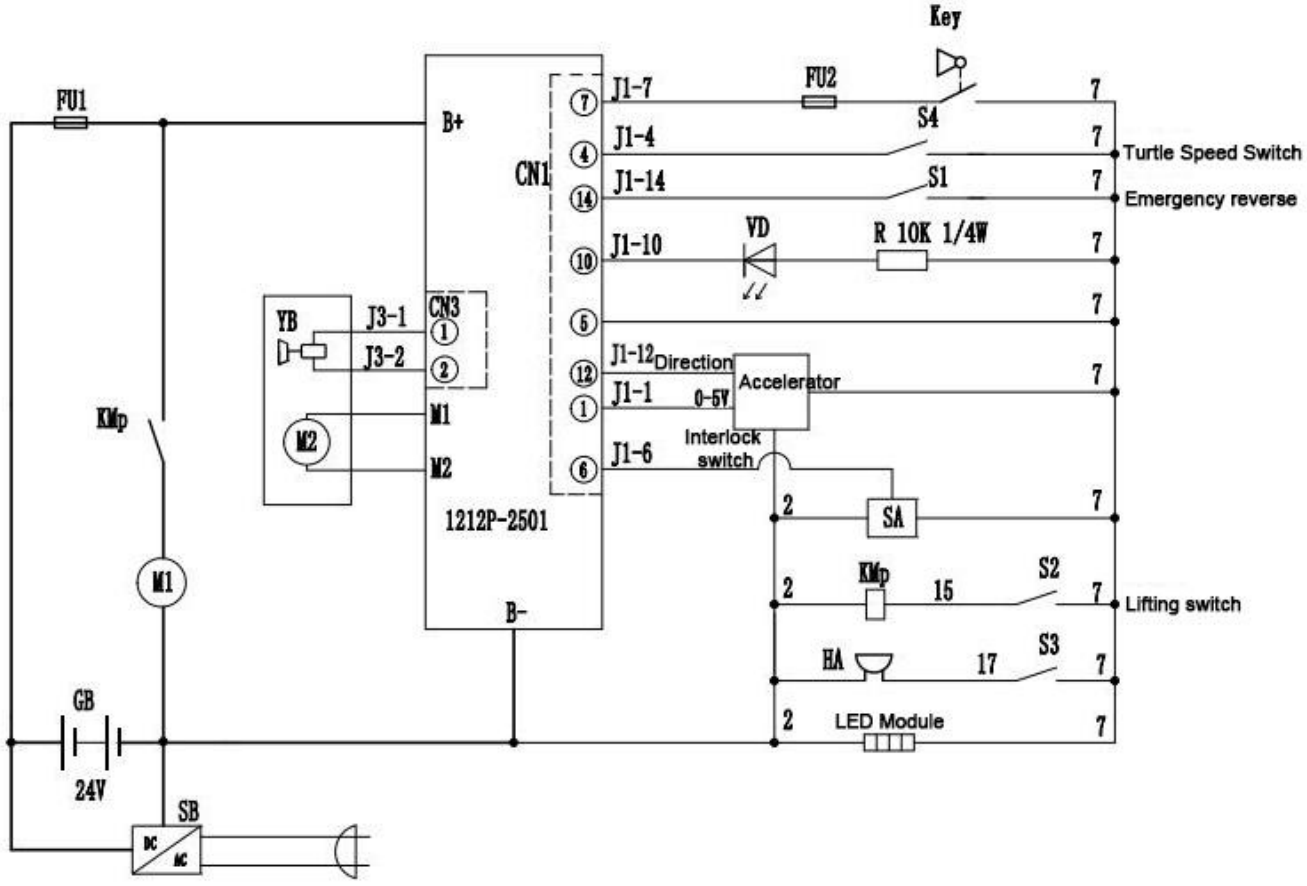
2)Observe whether the fuse is blown.

10.About the battery charging problem

When charging. This switch needs to be turned on. If charging is not encountered, measure the battery voltage to see if it is normal.

Ⅲ Wiring / circuit diagram

a.Circuit diagram



S1	Emergency reverse	S2	Lifting switch
S3	Horn switch	KMp	Pump contactors
S4	Turtle switch	HA	Horn
LED	Power indicator	SA	Interlock switch
ET	Accelerator	Key	Key Switch
YB	Electromagnetic brake	M2	Traveling motor
GB	Battery	SA	Interlock switch
SB	Charger	VD	Fault light
FU1 FU2	Fuse		

b.Hydraulic circuit

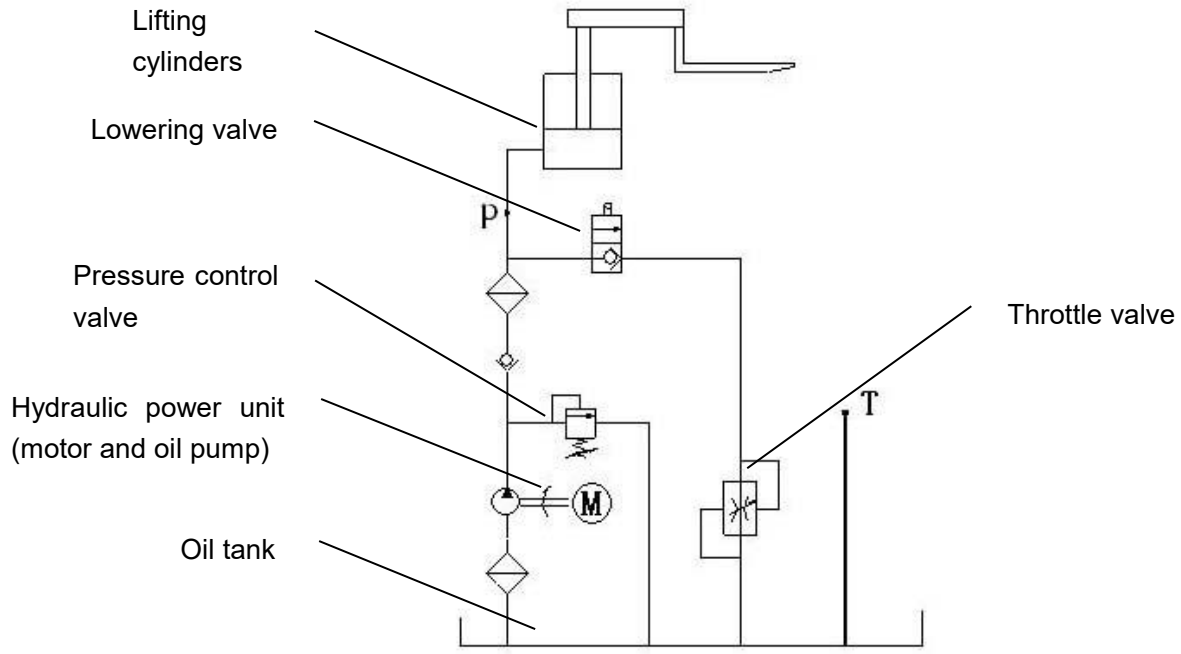


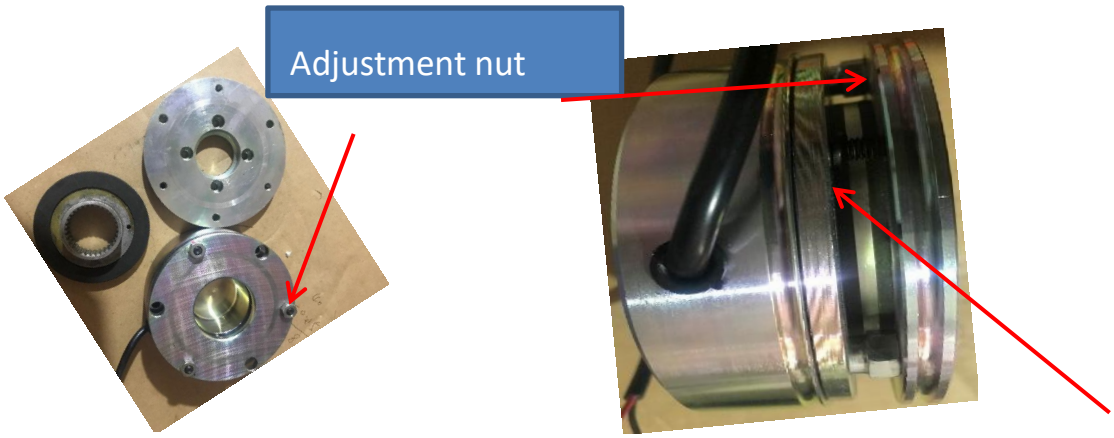
Chart.8: Hydraulic circuit

Hydraulic oil inspection

Appearance	Smell	Condition	Result
Clear without discoloration	Good	Good	Can be used
Clear color	Good	Mix with other oil	Check viscosity, if it passes, it can continue to be used
Color changes like milk	Good	Mix with air and water	Separate water or replace hydraulic fluid
Color changes to dark brown	Bad	Oxidation	Replace hydraulic fluid
Clear color but small black spots	Good	Mix with other particles	Filter and use

Ⅳ Main parts disassembly

a、Battery brake adjustment



Note: Electromagnetic brake in the free state of the power can not be normal suction, need to use external force or installed to suction

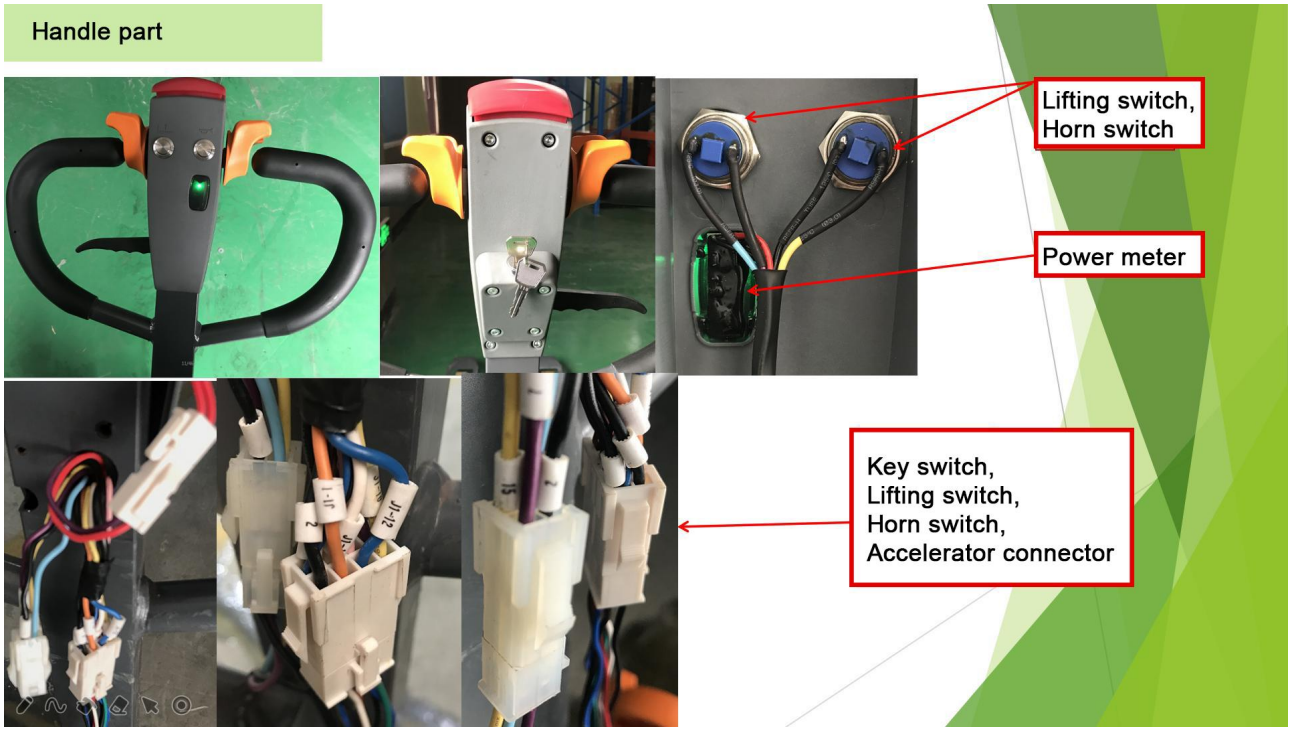
The gap of electromagnetic brake is about 25-35 silk, about the thickness of a hundred yuan. It needs to be carefully adjusted repeatedly to ensure that the gap between the three adjustment surfaces is the same, and the power will emit a crisp suction sound.

b、Drive assembly disassembly

c、Drive brake disassembly

d、Drive internal gears, bearings

e、Handle assembly



Ⅴ、CURTIS Handheld units

Operating Precautions.
Handheld unit attention function is to facilitate vehicle inspection and maintenance, without the vehicle manufacturer's approval, it is not allowed to adjust the controller parameters to avoid vehicle and personal safety accidents.

After the handheld unit modifies the parameters, it will be saved automatically and only needs to be turned off the key switch and restarted.

CURTIS handheld unit can be connected with the controller powered or unpowered
Vehicle fault reading process.

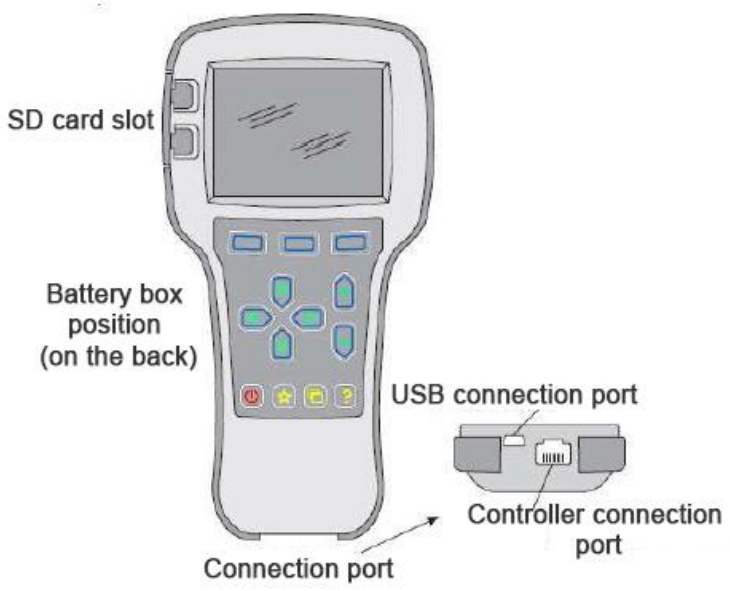
After connecting the handheld unit to the controller, turn on the key switch
According to the CURTIS handheld unit menu list, find: Faults .....
Run the vehicle, handheld cursor flashing line will appear in English fault content, refer to the fault code table to read.

Vehicle signal detection
After connecting the handheld unit to the controller, turn on the key switch
According to the CURTIS handheld unit menu list, find: Monitor (detection) .....

According to the need, open the corresponding detection menu sub-section, run the vehicle and observe the change of handheld value.

CURTIS handheld unit menu content
The CURTIS 1313 handheld programmer is used to configure the Curtis electronic control system. This programmer allows you to adjust and save the set parameters, monitor controller data and troubleshoot in real time.

The programmer has 2 interfaces, one is used to communicate with the electronic control, the other is used to communicate with the PC, the programmer has a battery compartment and a memory card slot.



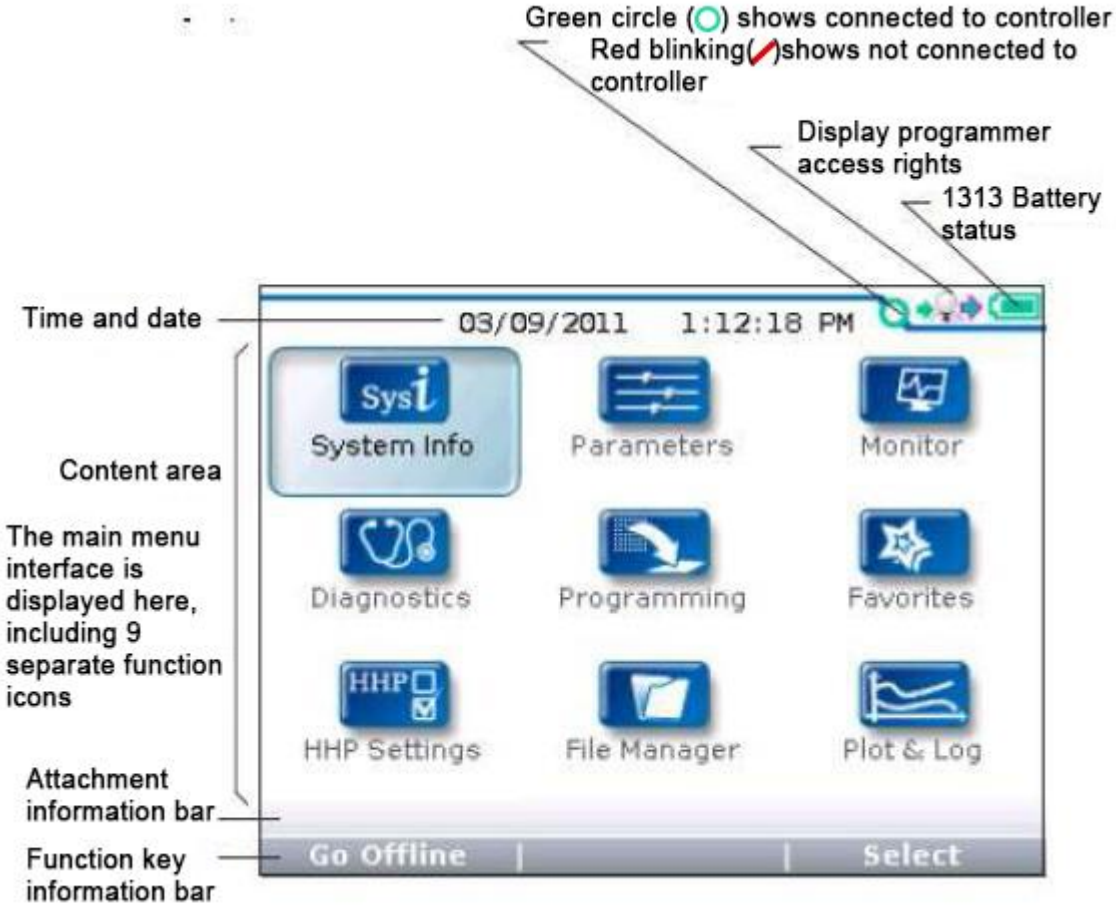
WARNING: The control system affects the acceleration rate, deceleration rate, hydraulic system and brakes of the vehicle. Dangerous conditions can occur if the vehicle control system is programmed incorrectly or in excess of safety. Only the vehicle manufacturer or an authorized service agent may program the control system

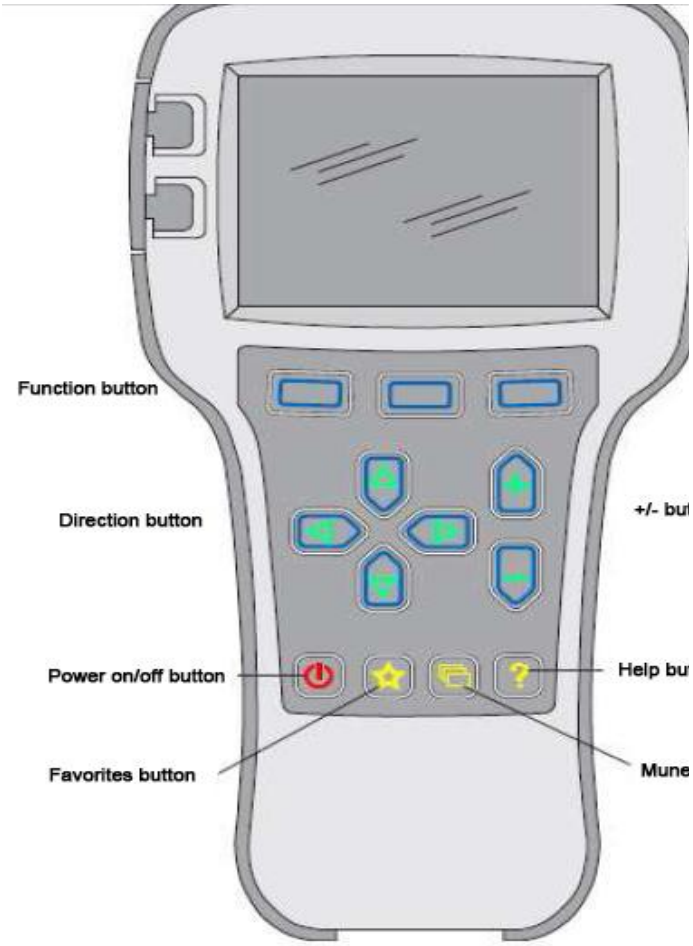
When the programmer is finished loading the information for the controller, the main menu is displayed on the programmer.

Programmer power up

The difference of the connection cable of the handheld programmer

The handheld programmer can be connected to the controller by plugging the connection cable of the handheld programmer into the programming port of the controller. After connecting to the controller, the handheld programmer will automatically power up and display the control information on the programmer.





Function button

The three keys are blank because their functions are determined by what is assigned to them. At any given time, the function of the keys is displayed on the LCD screen above.

Direction button

The 4 directional keys allow the displayed information to be selected up, down, left or right.

+/- button

These 2 buttons allow the parameters to be added or subtracted. Also "+" means "Yes" and "-" means "No" in the operation. In some cases, it can also be used as a scrolling option.

Power on/off button

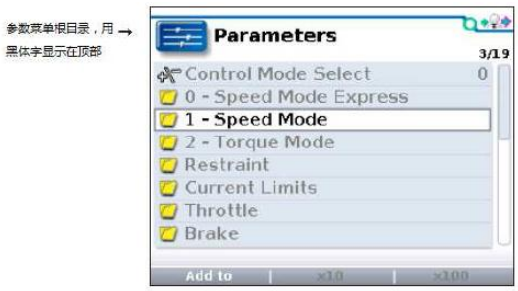
When the programmer is plugged into a powered controller, it is not necessary to press the power button to use the programmer; the programmer will automatically power on. When

Menu Structure

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

Some menus contain only one piece of information, but most menus contain multiple pieces of information, and by opening each folder you can access the next level of submenu. The grid option expands the table, the dialog box option accesses a set of execution commands, and using the left directional button returns to the previous level of the menu, regardless of the screen.

The names of all nine submenus are shown in bold on the main menu and are displayed below the icons. When going to a step menu, the names of the submenus or the path you are on are displayed at the top of the screen.

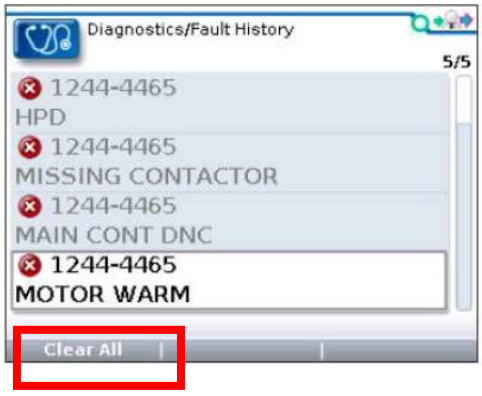


Nine menus

Troubleshooting menu

In the main menu, select the "Diagnostics" troubleshooting icon and press Select to enter the troubleshooting menu, which includes two folders: "Present Errors In the troubleshooting menu, there are two folders: "Present Errors" and "Fault History".

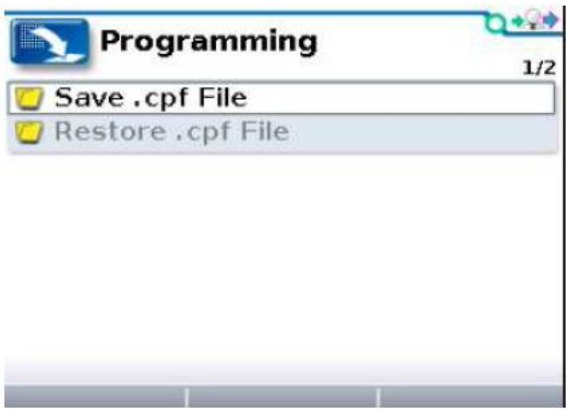
Note: Sometimes the faults caused by temporary events captured in the circuit are not system faults. You can determine whether the faults really exist by restarting the system and observing whether the faults will disappear automatically.
The faults listed in the Fault History folder are all faults encountered since the last history fault was cleared, and the history can be restarted by clearing the entire folder.



"Clear All" is used to clear the History Fault folder. A function key will only highlight when there are historical faults in the History Fault folder, and will gray out when there are no historical faults.

Programming Menu

In the main menu, select the "Programming" programming icon and press the corresponding function key "Select" to enter the menu. The programming menu allows you to store and restore parameter settings files (.cpf files)



Save.cpf File

Use the Save.cpf File function in the programming menu to make a backup of the currently set parameters. You can save as many .cpf files as you need, and you need to name each .cpf file differently

Restore.cpf File (restore .cpf file)

Restore.cpf File allows you to select an earlier saved .cpf file to replace the current controller's .cpf file. When the whole data recovery process is completed, a dialog box will pop up on the screen asking for a reboot of the system.