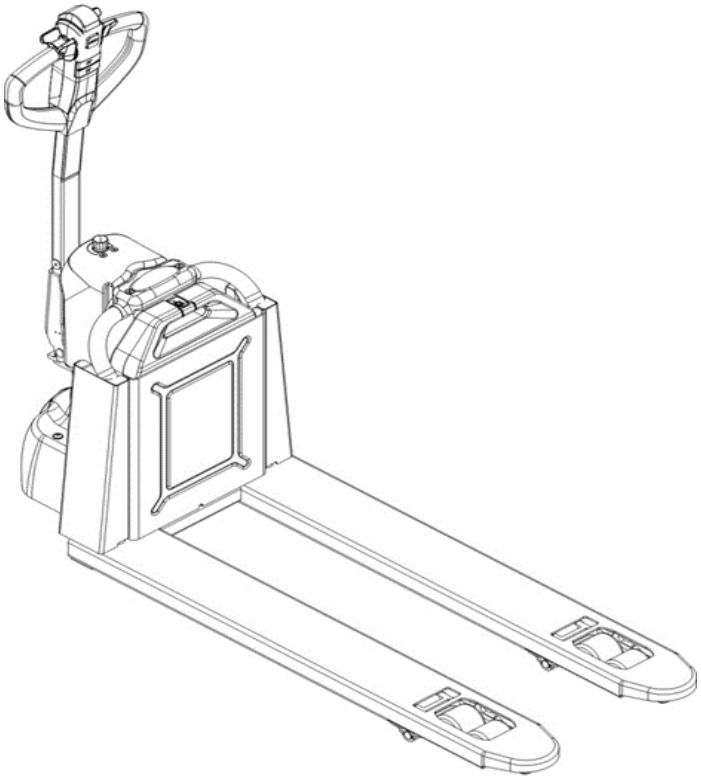
NOBLELIFT

Tell：4008-836115

Service & Maintenance Manual

Electric Pallet Truck

PTE15Q



WARNING

Do not use the pallet truck before reading and understanding these operating instructions.

NOTE:

- Please check the designations of your present type at the last page of this document as well as on the ID-plate.
- Keep for future reference.

Version 01/2022

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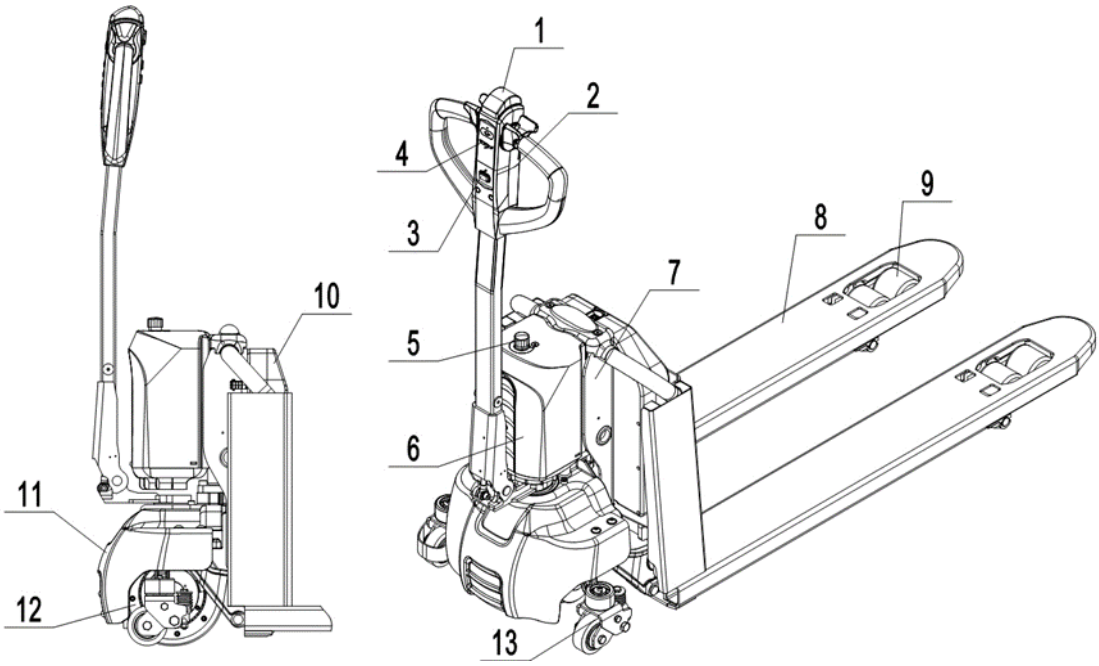
1. REGULAR MAINTENANCE

a. Maintenance checklist



1. Safety button / Belly button
2. Tiller
3. Magnetic lock
4. Discharge indicator and charging indicating LED
5. Emergence button
6. Hydraulic unit cover
7. chassis
8. leg
9. Load roller
10. Battery
11. Apron
12. Driving unit
13. Side roller (option)

Maintenance checklist

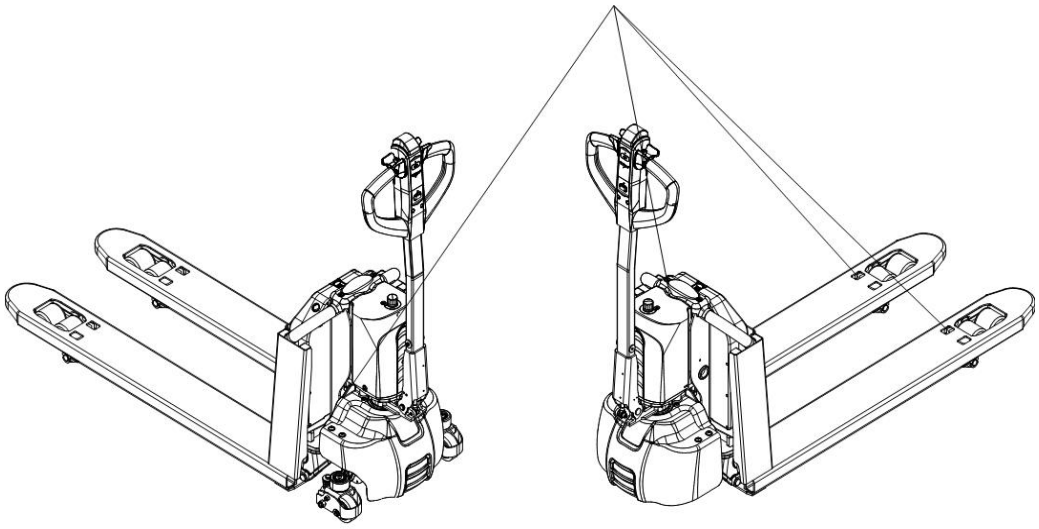
		Interval(Month)			
		1	3	6	12
	Hydraulic				
1	Check the hydraulic cylinder(s), piston for damage noise and leakage		●		
2	Check the hydraulic joints for damage and leakage		●		
3	Inspect the hydraulic oil level, refill if necessary		●		
4	Refill the hydraulic oil (12 month or 1500 working hours)				●
5	Check and adjust function of the pressure valve (1500kg/2000kg +0/+10%)				●
	Mechanical system				
6	Inspect the forks for deformation and cracks		●		
7	Check the chassis for deformation and cracks		●		
8	Check if all screws are fixed		●		
9	Check the push rods for deformation and damages		●		
10	Check the gearbox for noise and leakage		●		
11	Inspect the wheels for deformation and damages		●		
12	Inspect and lubricate the steering bearing				●
13	Inspect and lubricate the pivot points		●		
14	Lubricate the grease nipples	●			
	Electrical system				
15	Inspect the electric wiring for damage		●		
16	Check the electric connections and terminals		●		
17	Test the Emergency switch function		●		
18	Check the electric drive motor for noise and damages		●		
19	Test the display		●		
20	Check, if correct fuses are used		●		
21	Test the warning signal		●		
22	Check the contactor(s)		●		
23	Check the frame leakage (insulation test)		●		
24	Check function and mechanical wear of the accelerator		●		
25	Check the electrical system of the drive motor		●		
	Braking system				
26	Check brake performance, if necessary replace the brake disc or adjust the air gap		●		
	Battery				
27	Check the battery voltage		●		
28	Clean and grease the terminals and check for corrosion and damage		●		
29	Check the battery housing for damages		●		
	Charger				
30	Check the main power cable for damages			●	
31	Check the start-up protection during charging			●	
	Function				
32	Check the horn function	●			

33	Check the air gap of the electromagnetic brake	●			
34	Test the emergency braking	●			
35	Test the reverse and regenerative braking	●			
36	Test the safety (belly) button function	●			
37	Check the steering function	●			
38	Check the lifting and lowering function	●			
39	Check the tiller arm switch function	●			
General					
40	Check if all decals are legible and complete	●			
41	Inspect the castors, adjust the height or replace these if worn out		●		
42	Carry out a test run	●			

b. Lubrication points

Lubricate the marked points according to the maintenance checklist.
The required grease specification is: DIN 51825, standard grease.

Lubrication points



c. Check and refill hydraulic oil

It is recommended to use hydraulic oil in connection with average temperature:

Environment temperature	–5℃~25℃	>25℃
Type	HVLP 32，DIN 51524	HLP 46，DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Amount	0.4 L	

Waste material like oil, used batteries or other must be probably disposed and recycled according to the national regulations and if necessary brought to a recycling company.
The oil level height shall be in the not lifted position min. 0.3L to 0.5L. If necessarily add oil at the filling point.

d. Check electrical fuses

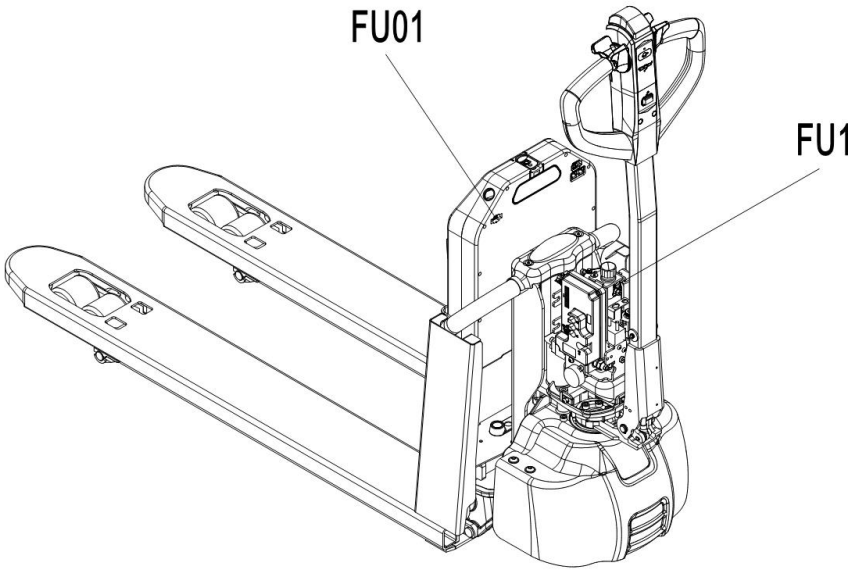


Table 2: Size of the fuses

	Rate
FU1	10A
FU01	70A

2. TROUBLE SHOOTING

a. Common trouble shooting

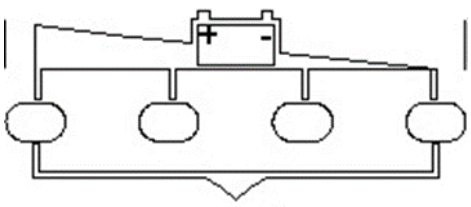
Table 3: Trouble shooting

TROUBLE	CAUSE	REPAIR
Load can't be lifted	Load weight too high	Lift only the max. capacity, mentioned on the ID-plate
	Battery discharged	Charge the battery
	Lifting fuse faulty	Check and eventually replace the lifting fuse
	Hydraulic oil level too low	Check and eventually refill hydraulic oil
	Oil leakage	Repair the sealing of the cylinder
Oil leakage from air breathing	Excessive quantity of oil	Reduce oil quantity
Truck not starts operating	Battery is charging	Charge the battery completely and then remove the main power plug form the electrical socket.
	Battery not connected	Connect the battery correctly
	Fuse faulty	Check and eventually replace fuses
	Low battery	Charge the battery
	Emergency switch is activated	Turn the emergency clockwise
	Tiller in the operating	Move the tiller firstly to the braking zone

If the truck has malfunctions and can't be operated out of the working zone, jack the truck up and go with a load handler under the truck and safe the truck securely. Then move truck out of the aisle.

b. Fault code

Four power lights flash, and then the first power light flashes, start to count. The forth power light flashes, start to count again. The fault code is the multiply the first count by ten and then plus the forth count.



Number	Fault code displayed on handle	Fault name	Fault description	Solution	Fault source
1	2	(UpRight_Fault)	the interlock switch is closed when upright driving	The interlock switch is closed in the upright driving mode. If the upright driving switch (tortoise speed switch) is released, the fault has not been cleared after resetting the interlock: 1. The uprightl drive switch (tortoise speed switch) is stuck, and the handle shall be replaced"	BM24C10-CAN controller
2	3	Inertlock_Fault	1. The interlock switch is closed in advance before startup 2. Wrong operation sequence of direction and interlock 3. Interlock switch is disconnected first and then closed during operation	If the interlock is reset, the fault has not been cleared: 1. Check whether the interlock switch harness (J1-9) is short circuited with 3 -; 2. Replace the interlock switch;	BM24C10-CAN controller
3	4	Pedal_Fault	1. Accelerator damaged 2. Handle analog quantity > 4096 or < 0	Accelerator analog out of range 1. Replace the handle	BM24C10-CAN controller
4	6	Precharge_Fault	The precharge circuit is damaged	Check whether the KSI port (J1-6) is in good contact If there is no abnormality, replace the controller	BM24C10-CAN controller
5	6	Precharge_Fault	Precharge time is too long	Check whether the KSI port (J1-6) is in good contact If there is no abnormality, replace the controller	BM24C10-CAN controller
6	8	MainOff_Fault	1. The main contactor is stick together or get stuck 2. Main contactor drive failure	replace the controller	BM24C10-CAN controller
7	9	MainOn_Fault	1. The main contactor drive loop is open	replace the controller	BM24C10-CAN controller
8	10	BrakeOff_Fault	1. Short circuit in brake drive loop 2. Short circuit of brake coil	replace the controller	BM24C10-CAN controller
9	12	BatDisconnect_Fault	Poor connection of battery B +, B- circuit	Check whether the power line B + / B - is well connected; If there is no problem, replace the controller	BM24C10-CAN controller
10	13	BrakeOn_Fault	1. Open circuit of brake drive circuit 2. Open circuit of brake coil	1. Check whether the electromagnetic brake harness (J1-1 /J1-2) is well connected; 2. If the electromagnetic brake is damaged, replace the electromagnetic brake; 3. Replace the controller;	BM24C10-CAN controller
11	15	Hardware_Fault	Controller hardware failure, replace the controller	replace the controller	BM24C10-CAN controller
12	15	OutRange_15V	Internal 15V voltage > 18 volts or < 12 volts	replace the controller	BM24C10-CAN controller
13	15	M1Short_Fault	1. M1 bridge arm fault and MOSFET damage 2. The motor line is short circuited to the outside	1. Replace the controller 2. Check whether M1 motor line is short circuited with B + / B - / motor housing, and replace the motor;	BM24C10-CAN controller
14	15	M2Short_Fault	1. M1 bridge arm fault and MOSFET damage 2. The motor line is short circuited to the outside	1. Replace the controller 2. Check whether M2 motor line is short circuited with B + / B - / motor housing, and replace the motor;	BM24C10-CAN controller
15	19	MotorDisconnect_Fault	1. The motor is not connected 2. Motor M1 and M2 circuits are poorly connected"	1. Check whether the connection between the motor line and the controller is good;	BM24C10-CAN controller
16	20	OverCurrent_Fault	The controller current is greater than the protection value	1. Short circuit of motor or motor line; 2. Restart. If the fault still exists, replace the controller	BM24C10-CAN controller
17	22	Controller_Temp_Fault	Controller temperature > 100 ℃ or < - 40 ℃	1. Whether the actual temperature of the controller is too high or too low; 2. If the controller temperature is - 40 ℃ < T < 100 ℃, replace the controller	BM24C10-CAN controller
18	26	OverVoltage_Fault	Battery voltage < 17 Volts	Battery voltage too high 1. Check whether the battery voltage is higher than 35V	BM24C10-CAN controller
19	28	UnderVoltage_Fault	Battery voltage <17 Volts	Battery voltage too low 1. Check whether the B + / B - power line is well connected; 2. If the battery voltage is too low ,charge it; 3. If the battery is damaged, replace the battery; 4. If the voltage is normal and the fault still exists, replace the controller;	BM24C10-CAN controller
20	29	EEprom_Fault	EEPROM read / write parameter failure	replace the controller	BM24C10-CAN controller
21	32	CAN_Fault	1. Check CAN line connection and CAN-BUS resistance; 2. Check the lithium battery BMS;	1. Check whether the can lines of battery, handle and controller are connected correctly; 2. Measure whether there is 60 Ω terminal resistance on CAN-BUS; 3. If the lithium battery BMS is damaged, replace the lithium battery; 4. If the handle communication module is damaged, replace the handle; 5. If the controller communication module is damaged, replace the controller	BM24C10-CAN controller
22	33	LiftOff_Fault	1. The relay drive circuit is short circuited. 2. Relay coil short circuit	replace the controller	BM24C10-CAN controller
23	33	LiftOn_Fault	1. Open circuit of relay drive circuit. 2. Open circuit of relay coil	1. Check whether the lifting relay harness (J1-5 / 3 -) is well connected 2. If the lifting contactor is damaged, replace the lifting contactor; 3. Replace the controller;	BM24C10-CAN controller
24	34	LowerOff_Fault	1. The relay drive circuit is short circuited. 2. Relay coil short circuit	replace the controller	BM24C10-CAN controller
25	34	LowerOn_Fault	1. Open circuit of relay drive circuit. 2. Open circuit of relay coil	1. Check whether the descending solenoid valve harness (J1-7 / 3 -) is well connected 2. If the lowering solenoid valve is damaged, replace the lowering solenoid valve; 3. Replace the controller;	BM24C10-CAN controller
26	37	EMR_Fault	1. Before the key switch is powered on, the emergency reverse switch is closed 2. Emergency reverse logic failure	The emergency reverse is triggered normally and an emergency reverse fault is reported. If the fault is not cleared after resetting the interlock: 1. Check whether the emergency reverse switch harness (J1-13) is connected well; 2. The emergency reverse switch is stuck; 3. Whether the type parameter setting of emergency reverse switch is correct;	BM24C10-CAN controller
27	38	BMSTimeout_Fault	Failed to connect with BMS 7S after power on	1. Check whether the CAN line between the battery and the controller is well connected; 2. Check whether the controller software is correct; 3. Check whether the battery BMS software is correct;	BM24C10-CAN controller
28	80		The tortoise speed button detects closure before power on.	1. Whether the handle speed button is pressed and stuck; 2. Check whether the microswitch under the turtle speed button is normally closed, and replace the microswitch assembly; 3. Replace the upper cover of the handle;	Handle

29	81	Lift fault	The lifting button is detected to be pressed before power on.	1. Whether the handle lifting button is pressed and stuck; 2. Whether the microswitch under the lifting button is normally closed, and replace the microswitch assembly; 3. Replace the upper cover of the handle;	Handle
30	82	Lower fault	The descent button is detected to be pressed before power on.	1. Whether the handle lowering button is pressed and stuck; 2. Whether the microswitch under the lowering button is normally closed, and replace the microswitch assembly; 3. Replace the upper cover of the handle;	Handle
31	83	BMS Communication Outage	1. Lithium battery BMS is damaged. 2. The communication line from the lithium battery to the handle is broken. 3. The communication module of the handle is damaged.	1. Replace the lithium battery; 2. Replace the handle harness, main controller harness and main power harness; 3. Replace the handle;	Handle
32	84	throttle_FAULT	Before entering the password, the throttle is not in the middle position, and the throttle needs to be reset to remove the fault.	1. If the throttle is in the neutral position and the power supply is restarted, whether the fault is removed; 2. Replace throttle components;	Handle
33	85	Controller Communication Outage	1. The controller BMS is damaged. 2. The communication line from the controller to the handle is broken. 3. The communication module of the handle is damaged.	1. Replace the controller; 2. Replace handle harness and main controller harness; 3. Replace the handle;	Handle
34	86	LowBDI	The battery level is lower than the low battery threshold setting	The current power is lower than the low power setting (15%): 1. The battery is low and needs to be charged; 2. Check whether the handle is correct and replace the handle (when the lead-acid battery is used, the handle needs to calculate the power);	BM24C10-CAN controller
35	87	Lift system failure	The output of the pump station operates continuously, and the lifting system fails, which may be the failure of the lift microswitch	1. If the limit switch cannot be triggered, adjust the electric control board; 2. The normally closed contact of limit switch is short circuited; 3. The lifting contactor is stuck;	Handle
36	90	Over Voltage	1. The charger may be overcharged. 2. There is a problem with the battery BMS. 3. When the vehicle goes downhill for a long time, the feedback current is caused by charging.	1. The charger is overcharged and the cut-off voltage of the charger is too high; 2. Replace the battery; 3. Caused by vehicle downhill for a long time;	lithium battery
37	91	Over Discharge	1. Lithium battery is not used for a long time, resulting in low battery power. 2. Overuse.	Regularly recharge the battery;	lithium battery
38	92	Communication Outage 电池通讯超时故障	Battery communication timeout, communication timeout with controller	Replace the battery	lithium battery
39	93	Under Voltage	1. Long term storage, no timely charging. 2. The internal cell of the battery is damaged, resulting in failure to charge.	1. Regularly recharge the battery; 2. Replace the battery;	lithium battery
40	94	Over Current	1. The device can not work according to the program originally set by the controller. 2. After the controller is replaced, the parameters do not match. 3. Lithium batteries have problems in current detection.	1. Replace the controller; 2. Modification of controller parameters; 3. Replace the battery;	lithium battery
41	95	Over Temperature Protect	The battery temperature is too high, and the use or transportation environment causes serious high temperature inside the battery.	1. The internal temperature of the battery is too high; 2. If the internal temperature sensor of the battery fails, replace the battery;	lithium battery
42	96	Temperature Protect	The battery temperature is too high and the use or transportation environment causes high temperature inside the battery.	1. The internal temperature of the battery is too high; 2. If the internal temperature sensor of the battery fails, replace the battery;	lithium battery

43	reserve	Motor_Temp_Fault	reserve		BM24C10-CAN controller
44	reserve	PumpSRO_Fault	The lifting switch is closed before opening		BM24C10-CAN controller
45	reserve	System task failure	reserve		BM24C10-CAN controller

PTE15Q Fault code

3. WIRING/CIRCUIT DIAGRAM

a. Electrical circuit diagram

PTE15Q

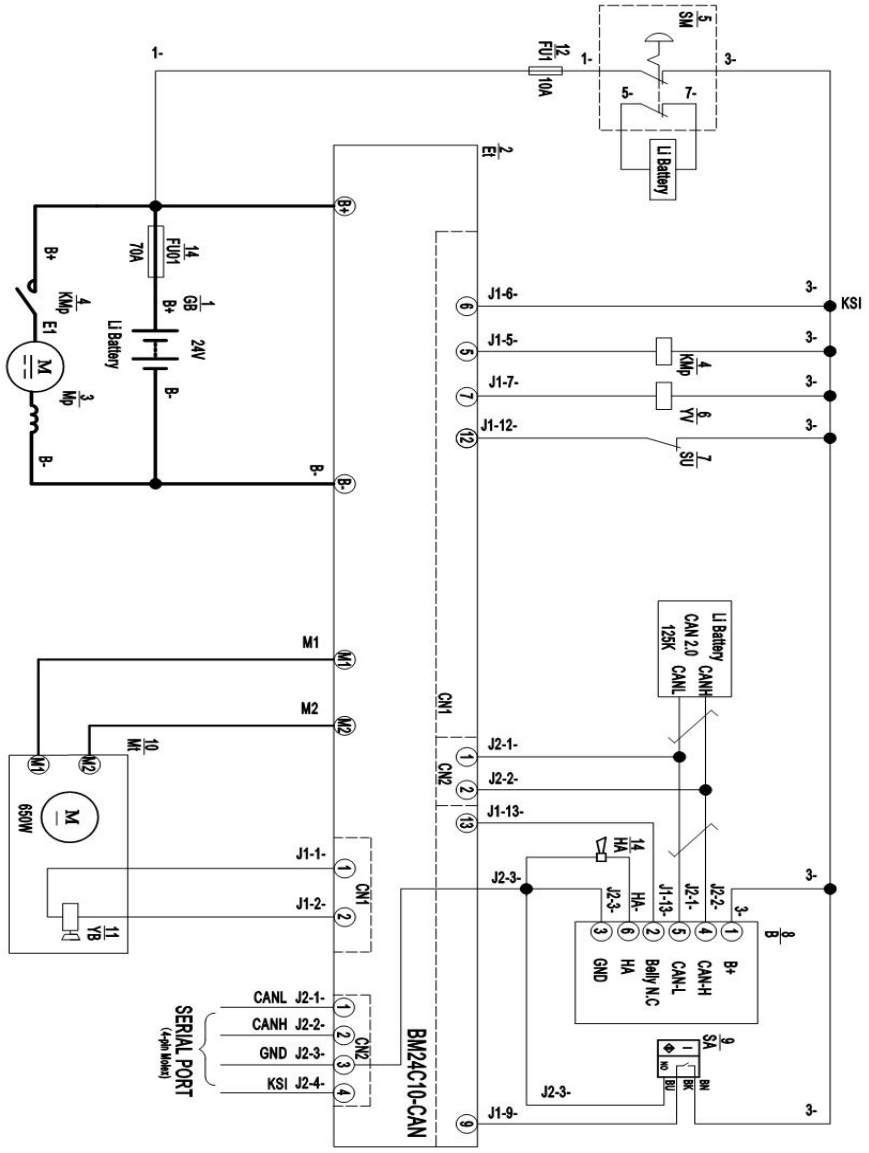


Table 4: Description of electrical diagram

Code.	Item	Code	Item
GB	Battery	B	CAN tiller
Et	Controller	SA	Proximity switch
Mp	Pump motor	Mt	Traction motor
KMp	Pump contactor	YB	Electromagnetic brake
SM	Emergency button	FU1	10A fuse
YV	Electromagnetic valve	FU01	70A fuse

SU	Micro switch		

b. Hydraulic circuit

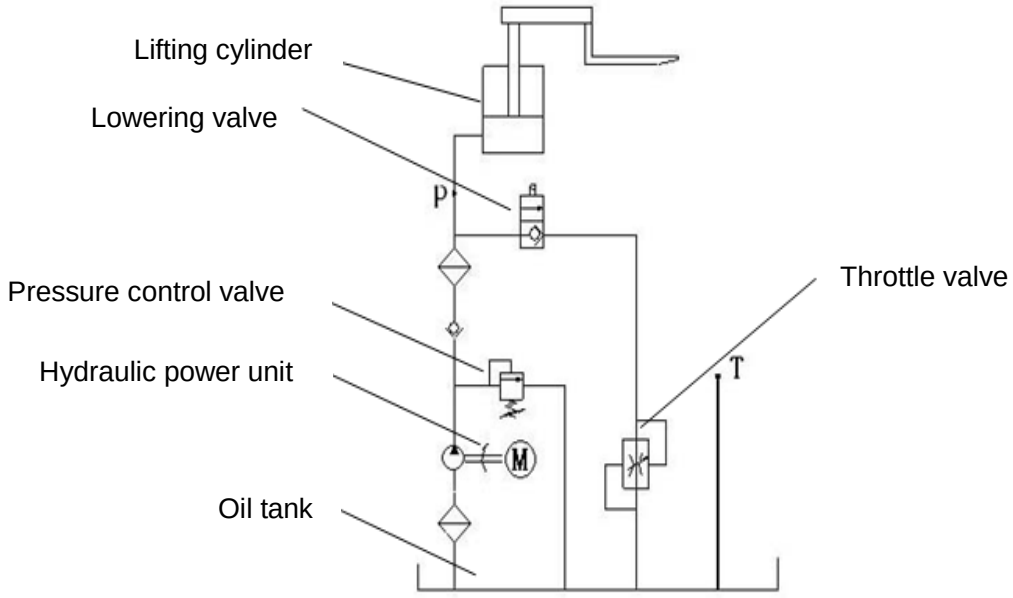


Table 5: Hydraulic oil inspection

Degree of purity	Smell	Status	Result
Clear and same color as before	Good	Good	Can be used
Transparent	Good	Mixed with other oil	Can be used if viscosity is fine
Milky	Good	Mixed with water and air	Separate water or replace hydraulic oil
Brown	Bad	Oxidation	Replace hydraulic oil
Transparent but with particles	Good	Mixed with other particles	Can be used after filtering

4. MAINTENANCE OF MAIN COMPONENTS

a. Battery replacement

Unplug the plug, flip the switch outward to remove the battery.

b. Battery and charger

1.8A&12A

2.Battery introduction

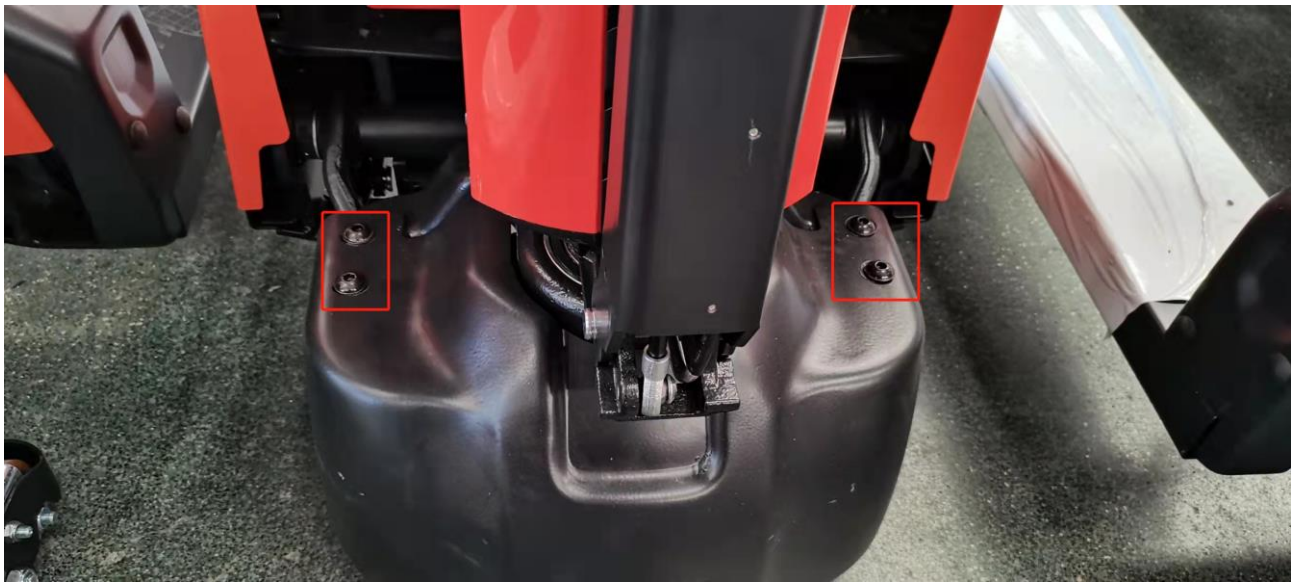
c. Outer-appearance parts

1.Remove the Electronically controlled cover and unscrew 4 screws to remove the cover.

2.Driving wheel cover

There are 2 fixed screws in the small cover.

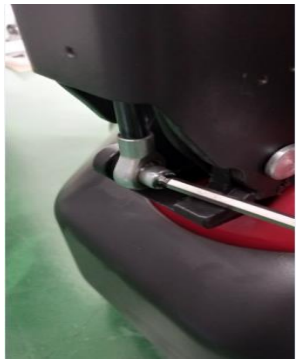
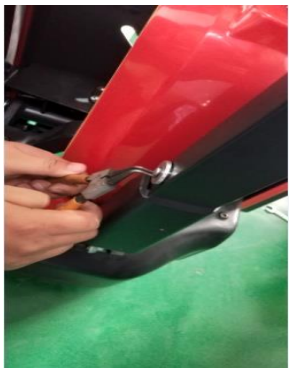
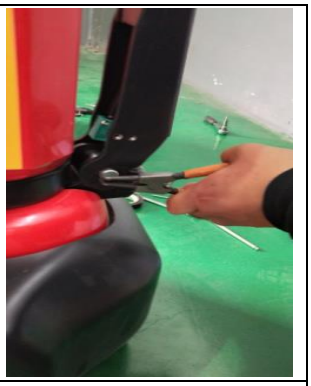
There are 4 fixed screws in the small cover.



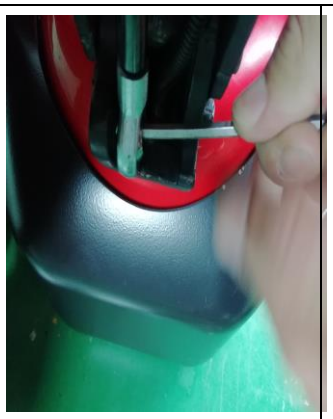
d. Tiller

1.Remove the two fixed screws to open the rear cover. Remove the internal wiring harness and remove the handle.

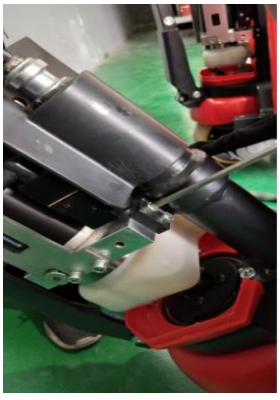
2.Disassembly of air spring

			
Remove the screw with 5mm Allen wrench.	Remove the circlip with circlip plier.	Remove the axle.	Remove the circlip and axle.

3.Assembly of air spring

			
Put the air spring into the tiller arm.	Insert the axle.	Make hole of axle and hole of screw on the same level with Allen wrench.	Support the air spring with flat metal tool to fix the screw.

e. Disassembly of cylinder

			
Remove the screw with 5mm Allen wrench.	Put a wooden block under the chassis.	Power on the truck, activate the lowering button and apply some force on top of the cylinder to retract the piston rod.	Turn over the cylinder.
			

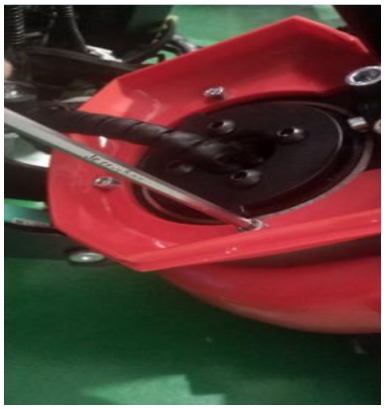
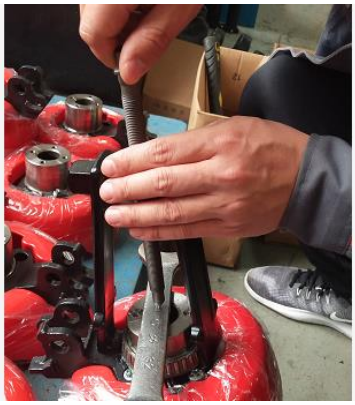
Pull out the protective cover from top.	Disconnect the cylinder from pump with 5mm Allen wrench. During assembly, it's required to apply thread locker with 1243 model.		

	
For PTE15Q, there is a O ring on the valve. Please keep it.	

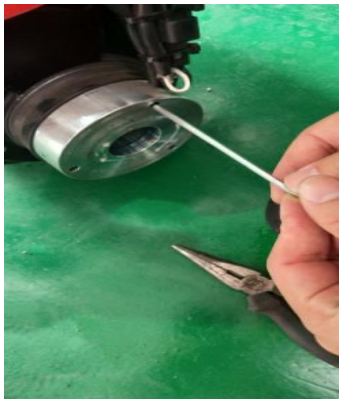
f. Pump disassemble from machine

			
Remove the left screw with 5mm Allen wrench.	Remove the right screw with 5mm Allen wrench.	Remove the top screw with 5mm Allen wrench.	Put a wooden block under the chassis.
			
Power on the truck, activate the lowering button and apply some force on top of the cylinder to retreat the piston rod	Turn over the cylinder.	Disconnect the cylinder from pump with Allen wrench.	After disconnection, there is an O ring on the valve.
			
Loosen the clamp with the screwdriver.	Disconnect the oil tank from pump, during assembly ensure O ring is inside the groove.	Loosen the screw with 10mm Allen wrench.	Tighten the screw with 3mm Allen wrench to increase the pressure or loosen the screw to release the pressure.

g. Disassembly of driving unit

		
Remove the screw with 6mm Allen wrench.	Remove 4 screws with 6mm Allen wrench. It's required to apply thread locker with 1243 model.	Remove the driving unit from the chassis.
		
Pad the hole in the middle with an iron sheet or other hard object and remove the bearing.	First remove the bearing, then remove 4 screws with 6mm Allen wrench to take out the flange. It's required to apply thread locker with 1243 model.	Remove the screw with 5mm Allen wrench to take out the plastic cover.

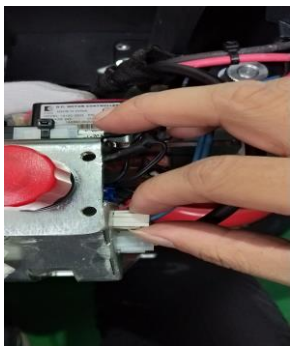
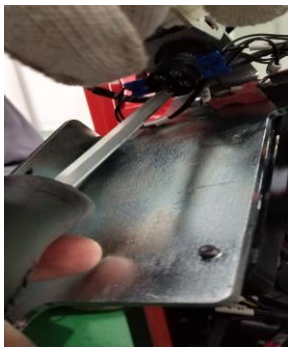
h. Disassembly of brake

	
Remove the plastic cover before replacement of brake, it's connected with glue	Remove three screws with 4mm Allen wrench to take out the brake.

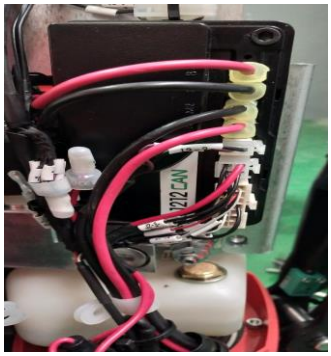
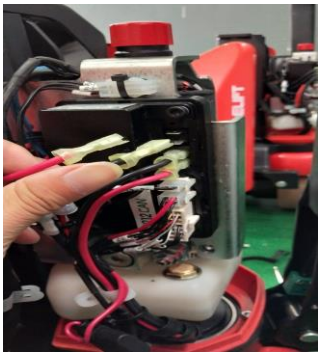
i. Driving wheel

	
Cut the plastic strip then disconnect the plug.	Remove 10 screws with 5mm Allen wrench, take out the wheel ring. NOTE：It should be changed if the thickness of PU rim is less than 1/3 of the thickness of the new rim.(the new rim thickness is 13mm)

J. Disassembly of emergency button

			
Remove the cable clamp with screwdriver.	Remove two screws on the right side of the frame with 5mm Allen wrench.	Remove the screws on the left side of the frame with 5mm Allen wrench.	Remove the cable clamp. Make sure during assembly of the clamp, hook must be fixed with mounting frame rather than controller.
			
Disconnect two plugs.	Hold the plug to disconnect from the frame.	Remove the cable under the emergency button with the screw driver.	Loosen the screw to remove the emergency button.

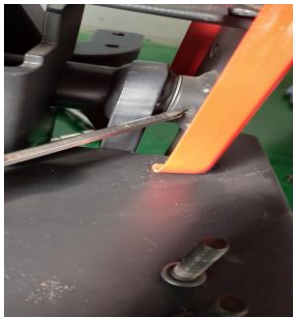
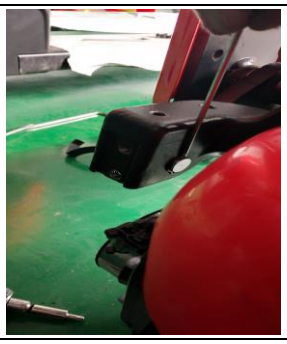
K. Disassembly of controller

PTE15Q		
		
It's recommended to make picture for the routing and connection before controller is disconnected. Four plugs here from top to bottom are battery positive pole, battery negative pole, motor negative pole and motor positive pole.	Remove the plugs.	Remove two screws with 5mm Allen wrench to take out the controller.

L. Disassembly of contactor

	
Disconnect cable terminals with 10mm wrench, and then remove one screw on mounting frame with screwdriver to take out the contactor together with frame.	Remove cables on side.

M. Disassembly of chassis

		
Remove the elastic pin to take out the axle, then disconnect rock arm from chassis. Note: elastic pin specification is 6*40.	Remove the circlip disconnect rock arm from body.	First remove four elastic pins. Note: elastic pin specification is 6*40.5*30.
		
Remove the axle to replace the roller.	Remove elastic pin to disconnect frame of roller from chassis. Note: The elastic pin specification is 5*30.	Remove elastic pin to disconnect frame of roller from push rod. Note: The elastic pin specification is 5*28.

N. Pump motor

	
Remove cable terminals from the motor with 10mm wrench, and then remove two screws on top of the motor with 10mm wrench to take out the motor.	There are four carbon brushes after motor cover is removed. Every two are welded to the positive and negative piles of the motor.

O. Side roller and adjustment

	
Remove the nut with 17mm wrench to take out the bolt.	Tighten screw clockwise with 13mm wrench to increase the pressure or anti-clockwise to release the pressure.

5. CURTIS handheld programmed

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

The process of reading fault code

After connecting the handheld unit with the controller, open the key switch
From the menu list of CURTIS handheld units, find: Faults...
Run the truck, fault contents will be shown with the hand cursor flashing. And then refer to the fault code table.

Signal detection

After connecting the handheld unit with the controller, open the key switch
From the menu list of CURTIS handheld units, find: Monitor...
According to the need, open the corresponding detection menu sub-item and run the vehicle to observe the change of hand-held value。

The Curtis 1313 handheld programmer is used to configure Curtis motor control systems. With the programmer, you can adjust and save parameter settings, monitor real-time data, and perform diagnostics and troubleshooting.

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 connectors, one for communicating with the motor controller and one for interfacing with a PC. It also has a battery compartment and a memory card slot.

Once the programmer has uploaded the information from the controller, it displays the Main Menu.

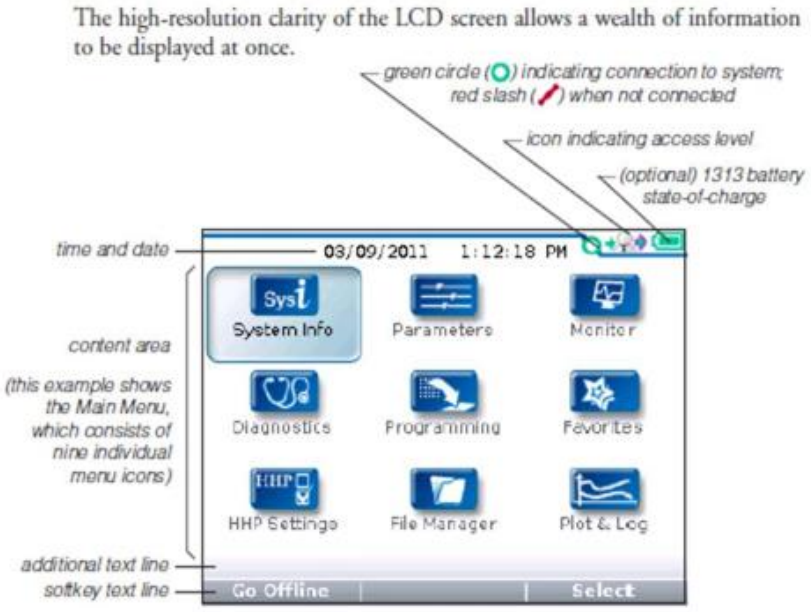
Powering up the programmer

Different cables

	
PTE15N	PTE20N

Connect the handheld programmer into the control system by plugging it into the controller's charger/programmer port.

The programmer automatically powers up, and displays this screen while it loads information from the controller.



Softkeys
These three keys are blank, because their function is context-specific. At any given time, their function is shown directly above them on the LCD screen. The symbol “»” indicates more options; pressing the soft key under the “»” will scroll to another set of options.

Arrow keys
With these four keys you can scroll up and down and right and left, within the display. In the Main Menu, you can use the arrow keys to highlight one of the menus; you then open the highlighted menu using the “Select” softkey. Within menus (other than the Main Menu), the left-arrow key is used to navigate backwards. Within menus (other than the Main Menu), the right-arrow key is used to navigate forwards—that is, to open highlighted submenus or items.

+ /- keys
These two keys allow you to increase or decrease the value of parameter settings. They also are used as “+ = Yes” and “- = No” buttons. In some cases, they are used to scroll through several options (as in selecting an access level, or selecting a language).

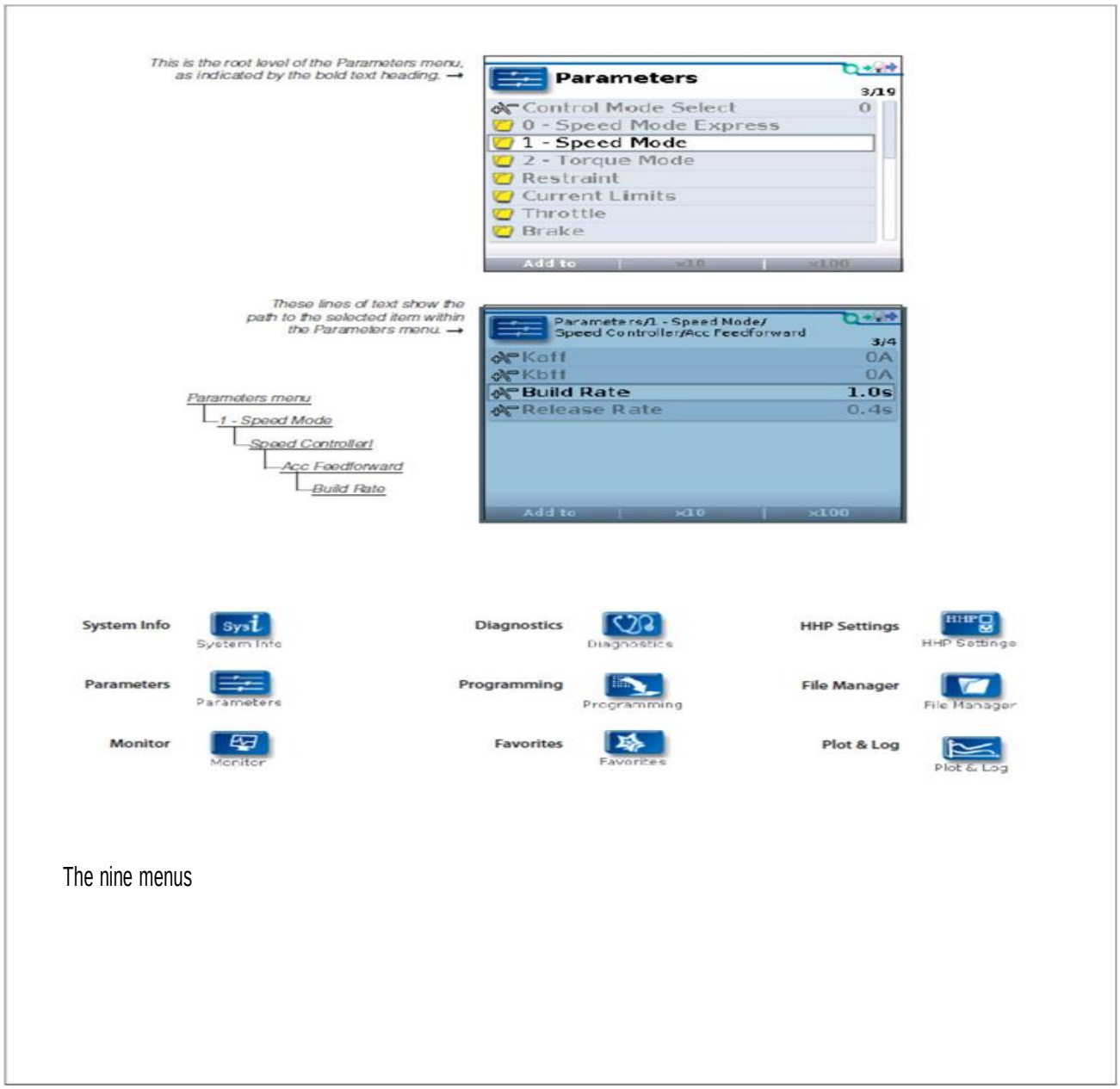
Power
It is not necessary to use the Power key to turn on the programmer when you plug it into an active control system; it will turn on automatically. To turn off the programmer, press and hold the Power key for a few seconds. You will then be asked whether you want to power off the programmer, and the soft key text will offer you the choices “Yes” and “No.”
If you have turned off the programmer, or if it has timed out and shut itself off, pressing the Power key will turn it on again.

Favorites
This key is an alternate way to bring up the Favorites menu. You can access the Favorites menu by selecting its icon in the Main Menu, or by using the Favorites key. See the Favorites menu section for more information.

MENU ORGANIZATION

The Main Menu contains nine menus, each identified by a menu-specific icon.
Items are arranged hierarchically within menus. Some menus may contain just one level of information, but most contain multiple levels. Items marked with a folder open as new submenus. Items marked with a grid open into tables. Items marked with a dialogue balloon open into a set of instructions for performing a procedure, such as calibration. At any point, you can use the left-arrow key ( ) to navigate back to the previous screen.

Each of the nine root menus displays the menu name in bold type at the top of the screen, beside the menu icon. As you move within a hierarchical menu, the text at the top of the screen shows the path you have taken.



The nine menus

DIAGNOSTICS MENU

In the Main Menu, highlight the Diagnostics icon and press the “Select” soft key to go to the Diagnostics menu. You can return to the Main Menu at any time by pressing the Main Menu key ( ). The Diagnostics menu contains two folders: Present Errors and Fault History.

Note: Sometimes the fault circuits catch a temporary event that is not a true fault in the system; it is always a good idea to turn the control system off and back on again to see whether the fault clears by itself.

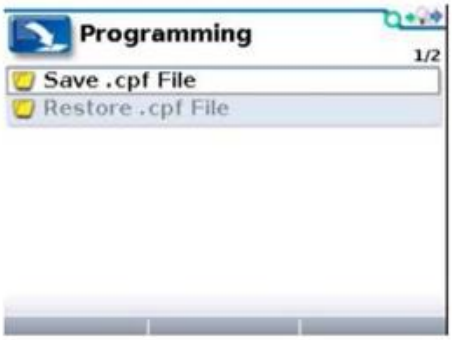
Fault History folder

This folder lists all the faults encountered since the Fault History was last cleared. You can clear the entire contents of this folder to allow a fresh Fault History to be started.

"Clear All" is used to empty the Fault History folder. This softkey appears only when the Fault History folder (or one of the faults within that folder) is highlighted.

PROGRAMMING MENU

In the Main Menu, highlight the Programming icon and press the "Select" softkey to go to the Programming menu. You can return to the Main Menu at any time by pressing the Main Menu key (.cpf file).



Save.cpf File

Using the Save .cpf File function in the Programming menu, you can make a backup of your present parameter settings. If you adjust the parameter values again, you can use "Save .cpf File" again to save that new collection of settings. You can have as many .cpf files as you'd like, each with a unique file name.

Restore.cpf File

The "Restore .cpf File" function allows you to select an earlier saved .cpf file to use in place of the present one. You will first choose whether to restore a file from the programmer's internal memory or from its SD card. After selecting which memory to use, you then select the .cpf file you want to restore by highlighting it. In this example, the desired file is in a folder named "CPF files" on the SD card.

After you highlight a .cpf file and choose "Restore," a pop-up screen will ask whether you want to enable Advanced Cloning ("yes"/"no"). This screen does not appear on User-level and Service-level programmers.

6. Handheld Unit with Electric Control of Jiachen

a. Function introduction

1. Function description

The Handheld Unit is a powerful and intuitive programming and diagnostic tool that can monitor and modify controller parameters online, allows users to save parameter files online, saves the parameter files to the Handheld Unit or an external USB storage device, and sends the edited parameter files to the motor controller when online. Fault diagnosis and troubleshooting tasks can be performed, which is convenient for users to analyze the cause of the fault. It is widely used in industrial vehicles of JIACHEN electronic control system.

2. Features

- With a 2.8-inch TFT color screen, the resolution is up to 320*240, and the display is delicate;
- Two AA batteries can be removed for easy replacement;
- USB interface can be connected to the PC to import and export files;
- 3 special function buttons correspond to the prompts at the bottom of the screen;
- Built-in anti-reverse connection circuit;

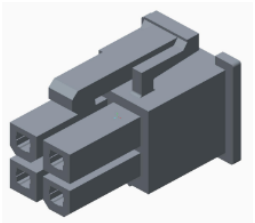
- Direct access to controller parameters and can be modified;

3. Technical parameters

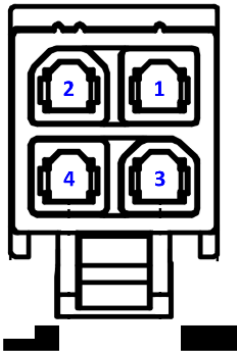
No.	parameter	value	unit
1	Rated operational voltage	12~96	VDC
2	Rated operational voltage	-20~70	℃
3	Storage temperature	-40~85	℃
4	Working humidity	95% RH max	RH
5	Degree of protection	IP51 on the front, IP40 on the back	-

4. Interface pin definition

The external power supply and communication interface of the Handheld Unit adopts the RJ45 network port, which is connected to the electric control through a spiral adapter cable, and the spiral wire interface is a Molex 4PIN connector;

Plug model	Plug picture	Pin model
Molex 4-pin connector, Mini-Fit Jr.™ (5557) series, 0039013048		0039000077 Or 39-00-0038

The schematic diagram of the interface pin number:

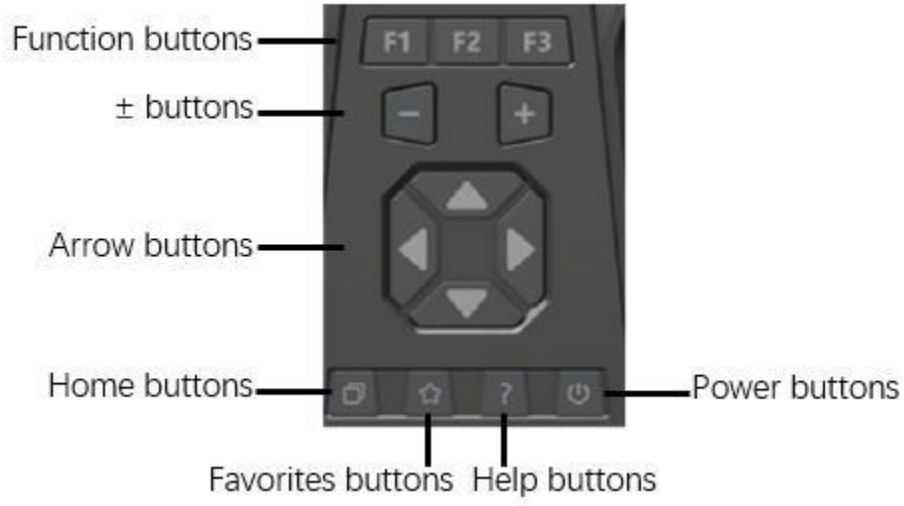


The interface pin definition:

Pin number	Description	Pin number	Description
1	CAN_L / RS232_RX	3	B-
2	CAN_H / RS232_TX	4	KSI

5. Button

The Handheld Unit uses silicone buttons, a total of 13 buttons, which are up, down, left, right, increase, decrease, F1~F3 function buttons, power button, favorites button, home button, and help button.



Function buttons: F1~F3 function buttons, Corresponds to the content at the bottom of the screen, operate the corresponding button according to the content;

Arrow buttons: Arrow buttons can switch up, down, left and right on the main interface; enter the application, the left key can also return to the previous menu item, and the right key can enter the next menu item（Same function in multi-level menu or file directory）;

+/- button: In the parameter modification interface, it is used to increase or decrease the parameter; in other interfaces, it is the parameter page turning function; the current value can be switched in the scrollable items, such as language selection, backlight brightness, etc.;

Power button: The power button can turn on or off the Handheld Unit;

Under AA battery power supply:

1) When the Handheld Unit is running, press the power button on any interface for 3s, the Handheld Unit will shut down;

2) After the Handheld Unit is turned off, press the power button for 1 second, and it will restart to run.

Home button: Press this button in the main interface to cycle through various applications. Press the main interface key in other interfaces to return to the main interface display.

b. Function description

1. Main interface menu

The main interface of the Handheld Unit includes 5 function button icons、USB connection status、 RS232 connection status and low battery indication. Operate the 4 direction buttons to switch the main interface function icons, the highlighted icon is the selected icon, press the home button to cycle through the function icons, press the confirmation key F3 corresponding to the function key to enter the application function sub-interface.

Main interface

Description of the main interface content

	Parameter name	Description	Remarks
1	Battery level	When the battery level is low, an empty battery icon appears;	
2	Communication mode	Display the current communication mode;	
3	System Information	Display product serial number, hardware version number, software version number;	
4	Parameter setting	View and modify the setting parameters of the electronic control;	
5	Parameter monitoring	View the monitoring parameters of the electric control;	
6	Fault information	View current faults and historical faults;	

7	System settings	Set the current backlight brightness, communication mode, and USB mode;	

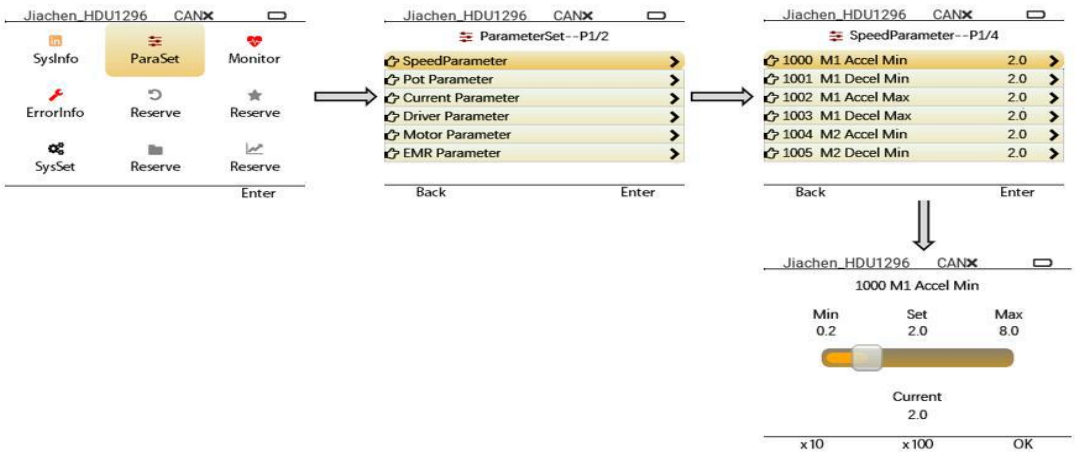
2.System Information

Select the "SysInfo" function icon in the main interface and press the "F3" key to enter the system information viewing sub-interface; this interface displays the product serial number, hardware version number, and software version number.

System Information Interface

P. Parameter setting

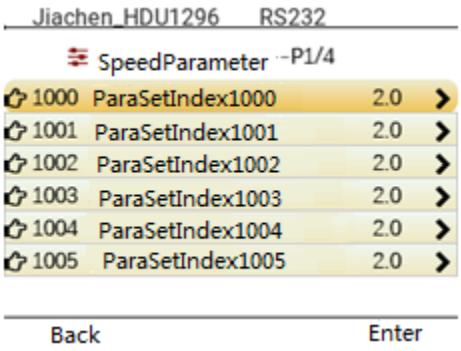
Select the "ParaSet" function icon in the main interface and press the "F3" key to enter the parameter setting sub-interface; Assigned according to the index address of the communication protocol; a total of 72 items of setting parameters; each page displays up to 6 parameter items; in the sub-interface, press the "right key" or "F3 key" to enter the next sub-menu; press the "left key" ", will return to the previous sub-menu, the up and down keys are used to select items; the ± key is used to turn pages, the "+ key" is used to turn pages down, and the "-key" is used to turn pages up.



Schematic diagram of parameter setting menu operation

After entering the parameter modification interface, as shown in the lower left corner of picture, use the “± key“ to modify the parameter value. Each time you press it, the parameter will increase or decrease by 1; if you increase or decrease by 10 each time, you can press the function key “F1“ When you press the “± key“ at the same time to modify; if you increase or decrease by 100 each time, you can press the ”± key“ at the same time to modify while pressing the function key ”F2”.

In the menu item selection page, the number "P1/4" in the upper right corner of the interface means that there are 4 pages in total, and the current page is the first page; "+ key" to scroll down, "- key" Turn pages up.



Parameter setting menu item selection page

ParaSetIndex1000 is acceleration rate of low section of normal walking;

ParaSetIndex1001 is deceleration rate of low section of normal walking;

ParaSetIndex1002 is acceleration rate of high section of normal walking;

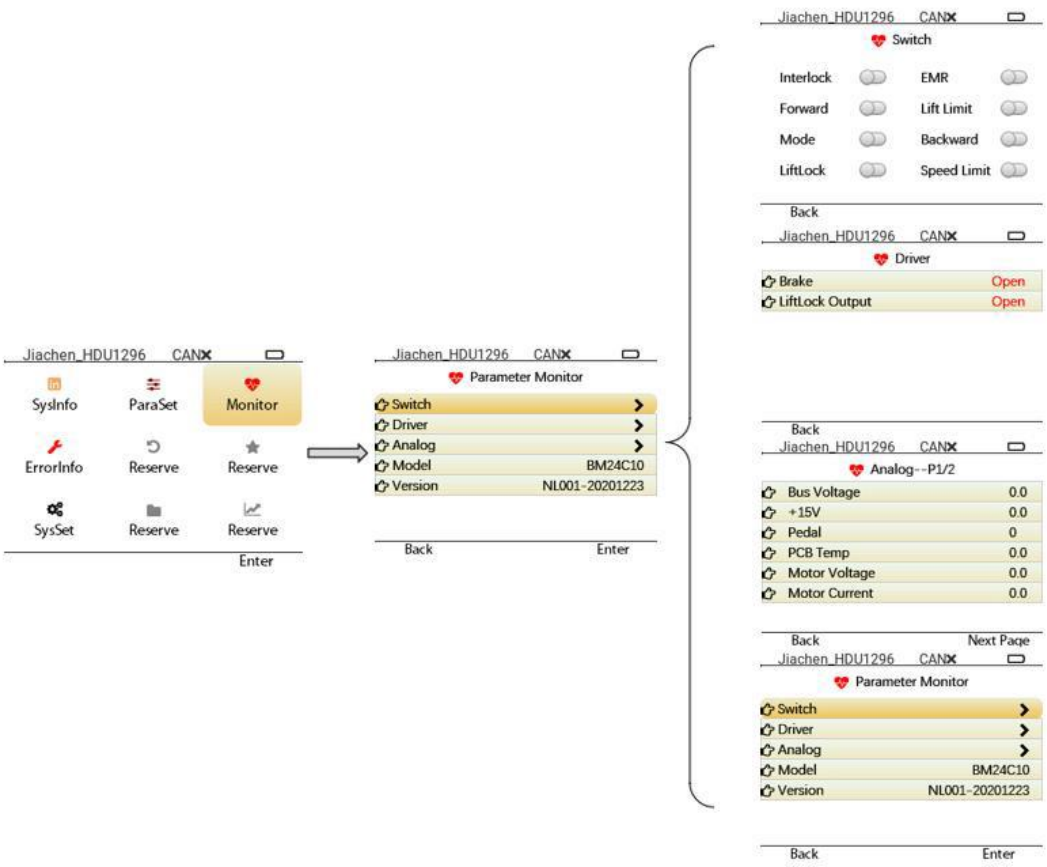
ParaSetIndex1003 is deceleration rate of high section of normal walking;

ParaSetIndex1004 is acceleration rate of low section of upright walking;

ParaSetIndex1005 is deceleration rate of low section of upright walking;

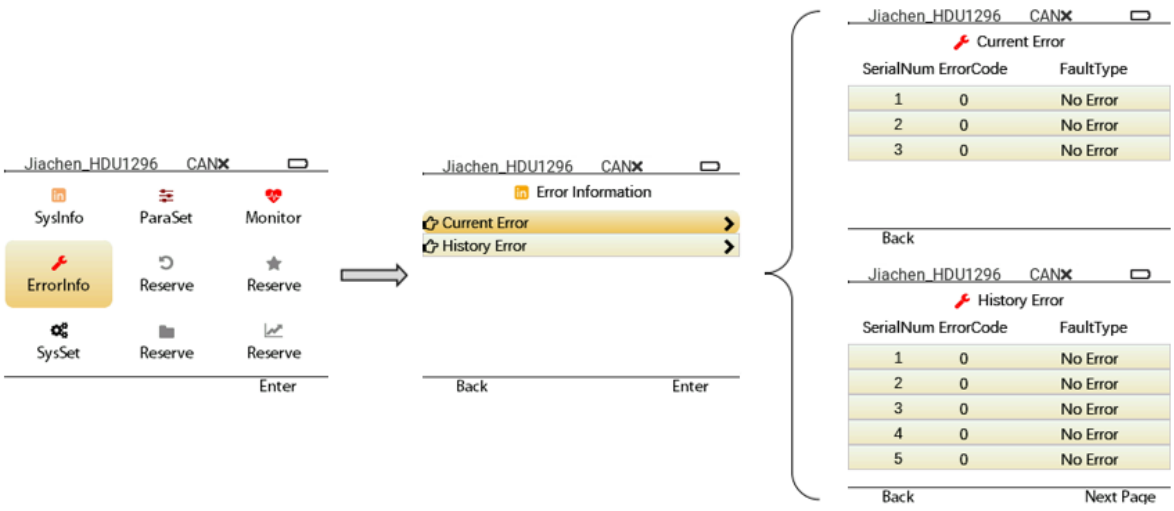
Q. Parameter monitoring

Select the "Monitor" function icon on the main interface. Parameter monitoring includes four types: switch detection, drive output detection, analog detection and program version number.



R. Fault information

Select the "ErrorInfo" function icon on the main interface, You can view the current faults and historical faults of the controller.



Error information interface

S. System Settings

Select the "SysSet" function icon in the main interface to set the current backlight brightness, communication mode (RS232 or CAN), USB mode and system language and other local settings.

a) Backlight brightness: adjust between 10~100, press the corresponding "+" and "-" keys, the value will increase or decrease correspondingly;

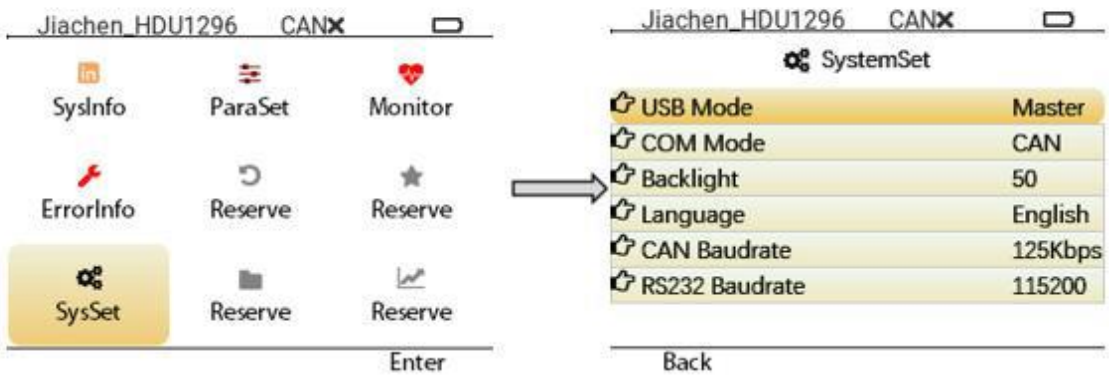
b) Communication mode: The communication mode can be set to RS232 or CAN communication mode. After the setting is successful, re-power on to set the parameters to be effective;;

c) USB mode: When set to Master mode, the Handheld Unit can recognize external USB storage devices, and the connection status of the external USB devices can be displayed in real time; when set to Slave mode, the Handheld Unit can be recognized as a storage device by the computer, and copy the files on the computer (the file name must be in English) to the internal Flash of the Handheld Unit;

d) Language setting: local language can be selected, the default is Chinese;

e) CAN bus rate setting: 125 (default), 250, 500kbps;

f) RS232 bus speed setting: 9600, 19200(default), 38400, 115200.



System setting interface

T. Mechanical dimensions

Unit: mm