NOBLELIFT

Service Manual

Electric Pallet Truck

PWB150-200

WARNING:

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

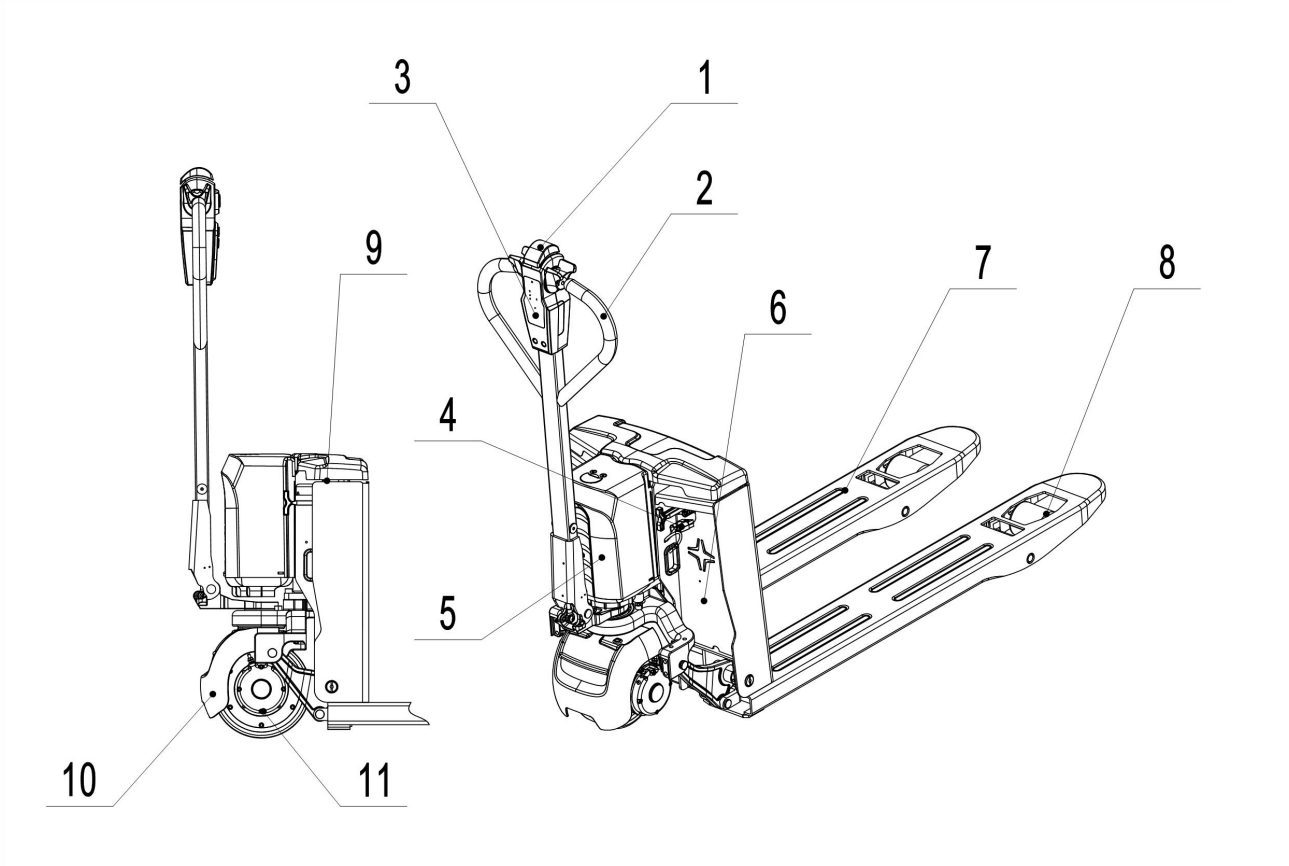
NOTE:

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

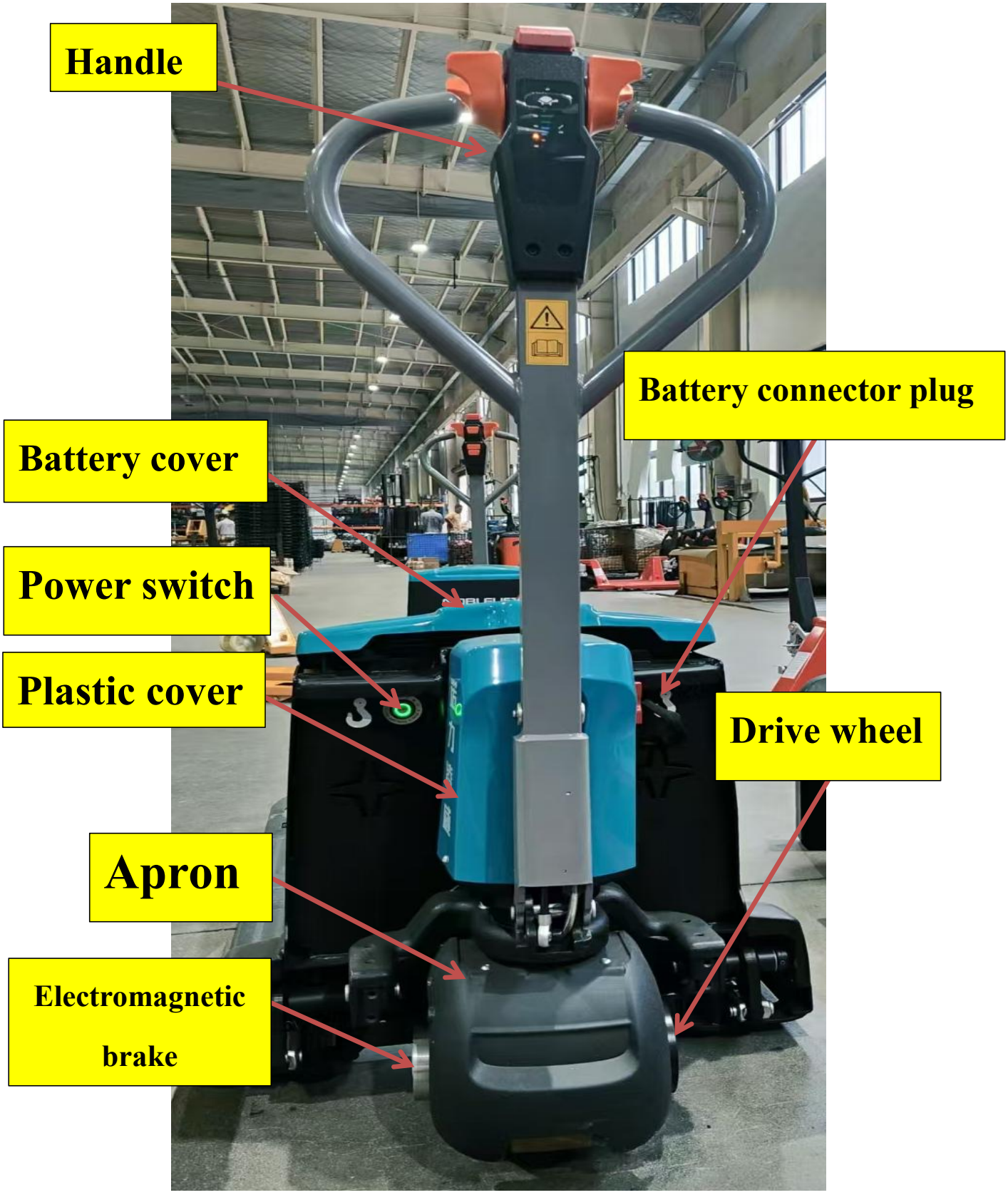
Catalog

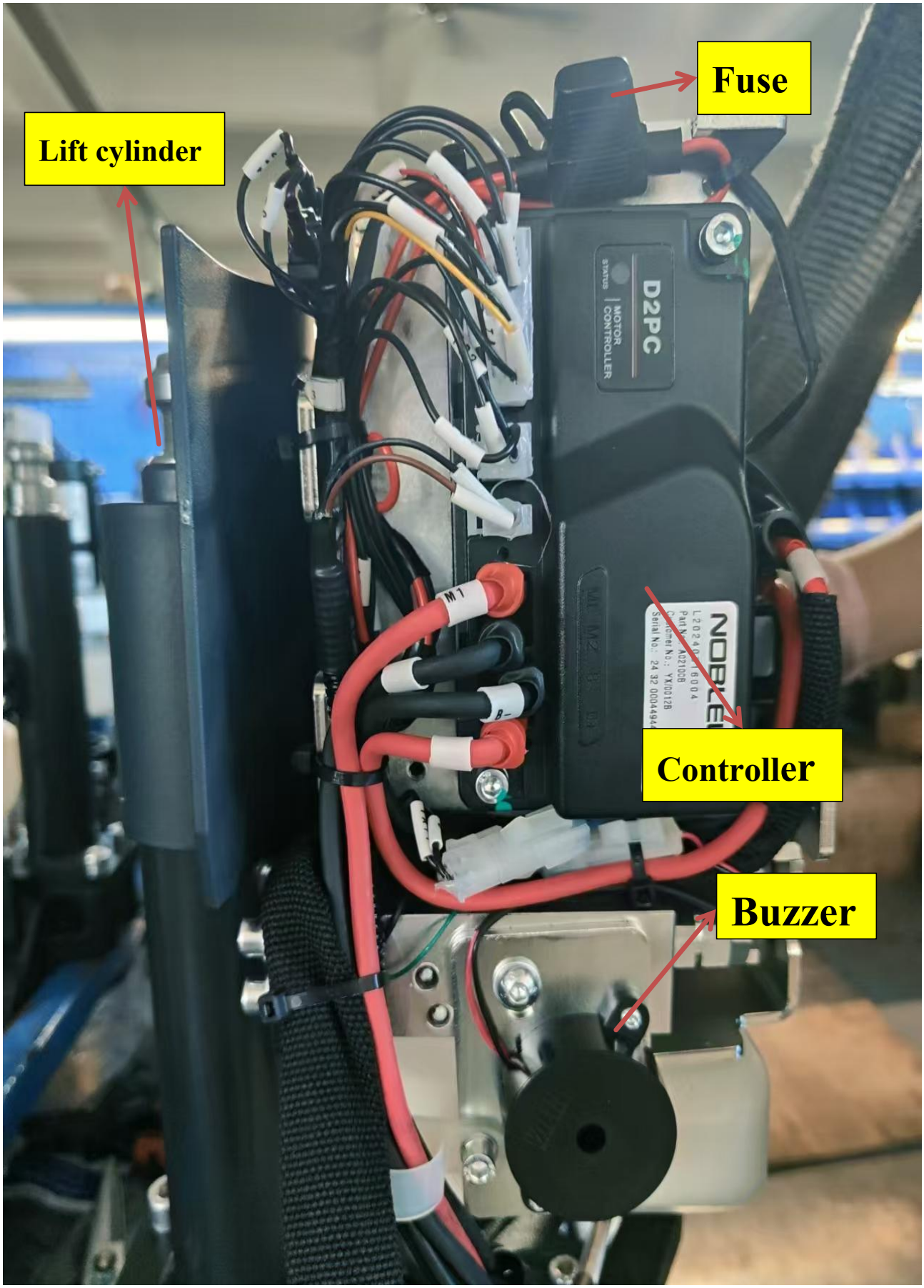
1. Overview of the product

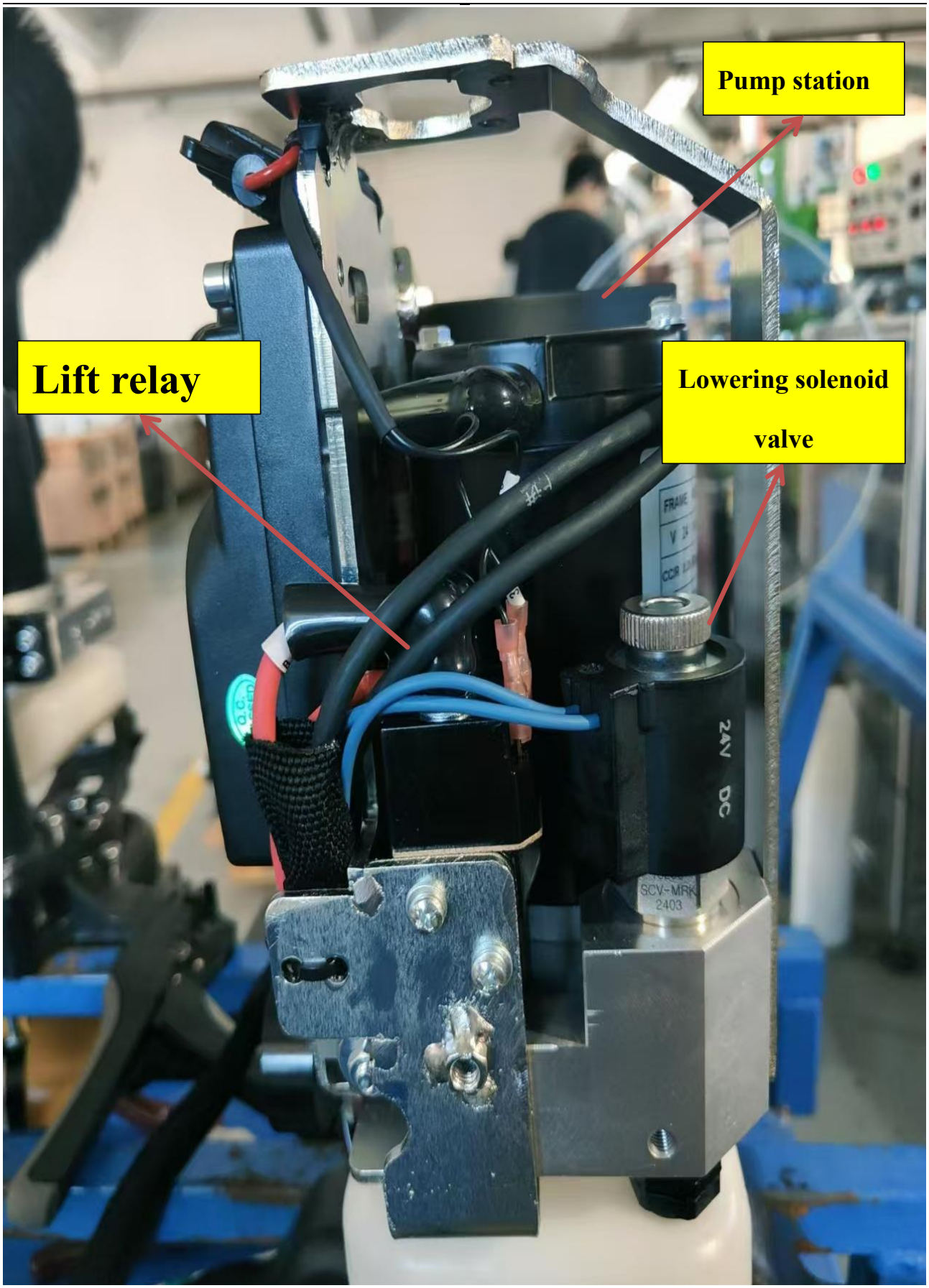
1.1. Overview of the main components



1. Belly switch
2. Tiller
3. Display
4. Battery connector plug
5. Plastic cover
6. Chassis
7. Fork
8. Load roller
9. Battery
10. Apron
11. Drive un


Handle
Battery connector plug
Battery cover
Power switch
Plastic cover
Drive wheel
Apron
Electromagnetic brake


Fuse
Lift cylinder
D2PC
STATUS
MOTOR CONTROLLER
Controller
Buzzer


Pump station
Lift relay
Lowering solenoid valve
24V DC
SCV-MRK
2403

1.2. Maintenance checklist

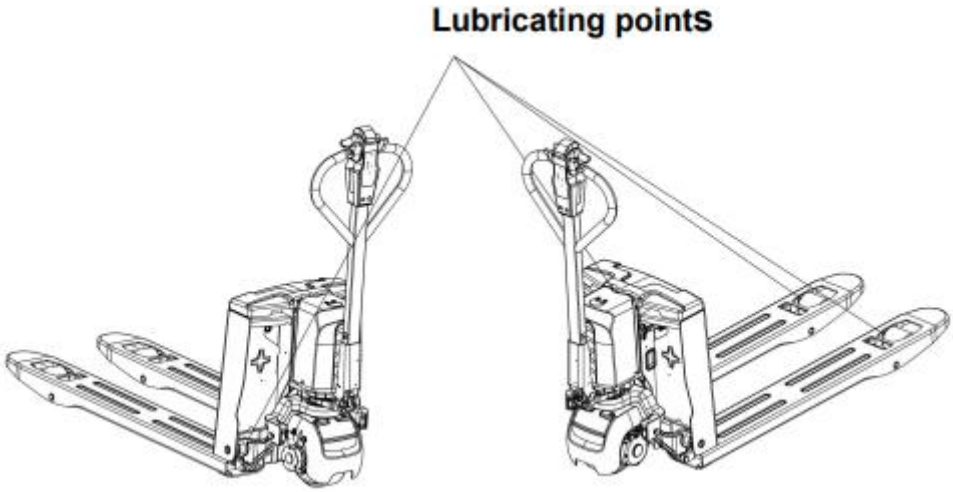
		Interval (Monthly)			
		1	3	6	12
Hydraulic system					
1	Check hydraulic cylinder and piston for damage noise and leakage		●		
2	Check the hydraulic joints for damage and leakage		●		
3	Inspect the hydraulic oil level, refill if necessary		●		
4	Replace the hydraulic oil (12 month or 1500 working hours)				●
5	Check and adjust 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 gear box for noise and leakage		●		
11	Inspect the wheels for deformation and damages		●		
12	Inspect the steering bearing				●
13	Inspect and lubricate the pivot points if necessary		●		
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		●		

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		●		
Battery					
27	Check the battery voltage		●		
28	Clean the terminals for corrosion and damages		●		
29	Check the battery housing for damages		●		
Charger					
30	Check the main power cable for damage			●	
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 if worn out.		●		
42	Carry out a test run	●			

1.3. Lubricating points

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

51825, standard grease.



a. Check and refill hydraulic oil

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

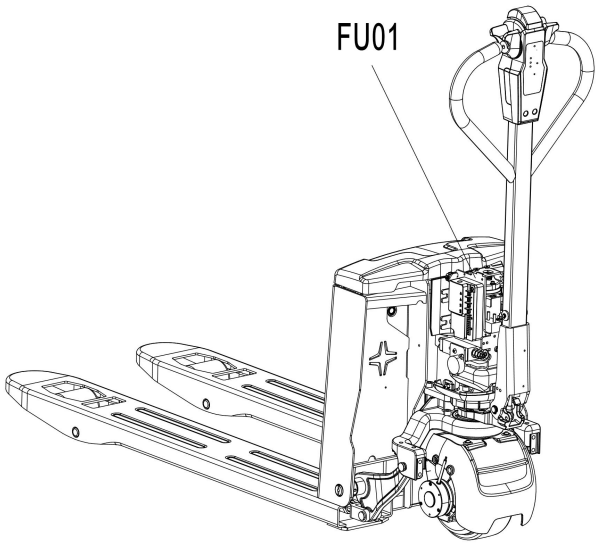
Environment temperature	–5℃~25℃	>25℃
Type	HVLP 32， DIN 51524	HLP 46， DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Amoun	0.4 L	

Waste material like oil, used batteries or other must be properly disposed and recycled according to the national regulations and if necessary brought to a recycling company.

The oil level in the oil tank should be between min and max marks with fully lowered forks.

If necessary add oil at the filling point.

1.4. Checking electrical fuse



	Specification
Fu 01	10A

2. TROUBLE SHOOTING

2.1. Common fault analysis

TROUBLE	TROUBLE	REPAIR
Load can't be lifted	Load weight too high	Lift only the max. capacity, mentioned on the ID-plate
	Battery low power	Charge the battery
	Lifting contactor failure	Check and contact with service support for replacement if necessary
	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 from 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 switch clockwise
	Tiller in the operating zone	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

2.2. Fault code reading

Fault code

When the fault code is generated, the four power indicators are long on, then the first power indicator flashes, counting, the fourth power indicator flashes, counting, the first power indicator counts times multiplied by ten plus the fourth power indicator counts times, it is the fault code.

2.3. Fault code analysis

a. PWB-150 Fault code list

Fault code	Fault name	Handle flashing code	Controller flashing code	Possible cause	Fault source
1	UpRight_Fault	2	54	1．When walking upright, the interlock switch is closed; 2．Upright walking: When the handle is upright, long press the turtle speed button for more than 2 seconds and the turtle speed button is not released, and then rotate the accelerator, the vehicle can walk;	Controller
2	Inertlock_Fault	3	42	1. The interlock switch is closed before starting 2. The direction and interlock operation sequence are wrong	Controller

				3. The interlock switch is turned off and then closed during operation	
3	Pedal_Fault	4	13	1. The accelerator is damaged 2. Handle analog value >4096 or <0	Controller
4	Precharge_Fault	6	21	1. The precharging fails 2. The precharging time is too long	Controller
5	MainOff_Fault	8	22	1. The main contactor is stuck or stuck 2. The main contactor drive is faulty	Controller
6	MainOn_Fault	9	23	Main contactor drive circuit is open	Controller
7	BrakeOff_Fault	10	25	Brake drive circuit short circuit	Controller
8	BATTERY DISCONNECT FAULT	12	27	1. The battery is not connected 2. The battery end is in poor contact	Controller
9	BrakeOn_Fault	13	26	1. The brake drive circuit is open 2. The brake coil is open 3. Maintenance mode is enabled	Controller
10	OutRange_15V	15	41	Internal 15V voltage >18 volts or <12 volts	Controller
11	M1Short_Fault	15	43	1.M1 bridge arm fault The MOSFET is damaged 2.External short circuit of motor line	Controller
12	M2Short_Fault	15	44	1. The M2 bridge arm is faulty. The MOSFET is damaged 2. External short circuit of motor line	Controller
13	MotorDisconnect_Fault	19	24	1. Motor is not connected 2. Motor M1,M2 circuit connection is not good	Controller
14	OverCurrent_Fault	20	16	The controller current is greater than the protection value	Controller
15	Controller_Temp_Fault	22	11	1. Temperature > 95℃ or < -40℃ 2. Vehicle overload 3. Operate in extremely harsh environments	Controller

				4. The electromagnetic brake is not released normally	
16	OverVoltage_Fault 1	25	14	The battery voltage is greater than 32V and less than 35V	Controller
17	OverVoltage_Fault 2	26	14	Battery voltage > 35V	Controller
18	UnderVoltage_Fault1	27	15	Battery voltage <17 volts	Controller
19	UnderVoltage_Fault2	28		Battery voltage <17 volts	Controller
20	EEprom_Fault	29	32	EEPROM read/write parameters are faulty	Controller
21	CAN_Fault	32	45	CAN communication failure	Handle/Controller
22	LiftOff_Fault	33	46	Relay drive circuit short circuit.	Controller
23	LiftOn_Fault	33	51	1. Open relay drive circuit. 2. The relay coil is open	Controller
24	LowerOff_Fault	34	52	Relay drive circuit short circuit.	Controller
25	LowerOn_Fault	34	53	1. Open relay drive circuit. 2. The relay coil is open	Controller
26	EMR_Fault	37	34	1. Before powering on the key switch, turn on the emergency reverse switch 2. If the emergency reverse logic is faulty, the throttle, interlock, or emergency reverse is not reset after the emergency reverse logic is performed.	Controller
27	BMS_PDO_Timeout_Fault	38	62	1. The handle BMS is damaged 2. The communication line from the handle to the controller is broken	Handle/Controller
28	Mode_fault	80		The turtle speed button detects closure before it is turned on.	Handle

29	lift_fault	81		The lifting button is detected to be pressed before the power is turned on.	Handle
30	Lower_fault	82		The lowering button is detected to be pressed before it is turned on.	Handle
31	BMS_Communi caton _Outage	83		1. The lithium battery BMS is damaged 2. The lithium-ion battery is disconnected from the handle 3. The communication module of the handle is damaged.	Lithium battery
32	Throttle_FAUL T	84		The accelerator detects that it is not in the median position before it is turned on.	Handle
33	Controller _Communicatio r_Outage	85	45	1. The controller communication module is damaged 2. The communication cable between the controller and the handle is disconnected. The communication module of the handle is damaged. 4. The handle does not match the controller.	Handle/Contr oller
34	Low_BDI	86	33	The battery is lower than the low battery setting value	Handle/Contr oller
35	Lift_System_Fai lure	87		Pump station output continuous operation, lifting system failure, possibly the handle lift button microswitch failure	Handle
36	Over_Votage	90		1. The charger may be overcharged battery 2. BMS has problems 3. The vehicle goes downhill for a long time, causing the feedback current to charge high voltage	Handle/Contr oller

b. PWB-200 Fault code list

Fault code	Fault name	Handle flashing code	Controller flashing code	Possible cause	Fault source

1	Power-on accelerator did not return to home	4	20	1. The handle handles the power-on self-check fault. See handle flashing 84. 2. When the controller is powered on, the accelerator signal is received to report the fault	Controller
2	Battery undervoltage	12	13	1. Battery voltage <36V 2.B+, B- loop connection is loose	Controller
3	The bus voltage is too low	12	17	1. Bus voltage <30V 2. The B+, B- loop is improperly connected	Controller
4	Power lock off protection	12	43	1. Electric lock voltage <30V 2. The electric lock cable is in poor contact	Controller
5	Battery overvoltage	13	12	1. Battery voltage >60V 2. The B+, B- loop is improperly connected	Controller
6	The bus voltage is too high	13	16	1. Bus voltage >60V 2. The B+, B- loop is improperly connected	Controller
7	Electronic overtemperature reduction	14	4	1. Electric control temperature >90℃ 2. Electric control overload 3. Brake not released, traction motor and encoder failure	Controller
8	Electronic temperature alarm	14	5	1. Electric control temperature >75℃ and <90℃ 2. Electric control overload 3. Brake not released, traction motor and encoder failure	Controller

9	The electronic control temperature sensor is disconnected	14	33	1. The electronic control temperature sensor is damaged 2. The electric control temperature harness is damaged	Controller
10	The electronic temperature sensor is short-circuited	14	34	1. The electronic control temperature sensor is damaged 2. The electric control temperature harness is damaged	Controller
11	Motor overtemperature reduction	15	3	1. Motor temperature >120℃ 2. Motor overload 3. The electromagnetic brake is not released 4. The motor temperature sensor is faulty	Controller
12	Motor temperature alarm	15	14	1. Motor temperature >100℃ and <120℃ 2. Motor overload 3. The electromagnetic brake is not released 4. The motor temperature sensor is faulty	Controller
13	The motor temperature sensor is disconnected	15	31	1. The motor temperature sensor is damaged 2. The motor temperature wiring harness is damaged	Controller
14	Motor temperature sensor is short-circuited	15	32	1. The motor temperature sensor is damaged 2. The motor temperature wiring harness is damaged	Controller

15	Loss of interlock in motion	21	21	1. The interlock switch is faulty, and this fault is not applied	Controller
16	The accelerator is in interlock preposition	21	22	1. The accelerator outputs before the interlock is triggered	Controller
17	Upright walk interlock setting error	21	49	1. The interlock switch is closed when walking upright; 2. Upright walking: When the handle is upright, press the turtle speed button for more than 2 seconds and the turtle speed button is not released, and then rotate the accelerator, the vehicle can walk;	Controller
18	Emergency reverse in interlock prefix	21	50	1. The emergency reverse button does not return 2. The emergency reverse function is abnormal	Controller
19	The bus contactor is disconnected	22	38	1. Open bus contactor drive loop	Controller
20	Busbar contactor bonding	22	39	1. The bus contactor is glued 2. The bus contactor drive is faulty	Controller
21	Motor stalling	23	1	1. Motor phase line is not connected 2. Electric control lack of phase 3. The motor load is too large 4. The encoder is faulty	Controller
22	Speed sensor fault	23	2	1. Virtual connection of encoder plug-in 2. The encoder board is damaged	Controller
23	Overspeed fault	23	25	1. The encoder is faulty 2. The magnetic ring is damaged 3. The sequence of phase wires is wrong	Controller
24	Motor W phase missing	24	51	The motor line is not connected or the	Controller

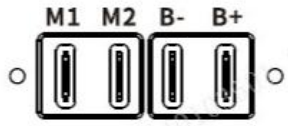
	phase			contact circuit is poor	
25	Motor V phase missing phase	24	52	The motor line is not connected or the contact circuit is poor	Controller
26	Motor U phase missing phase	24	53	The motor line is not connected or the contact circuit is poor	Controller
27	The brake is disconnected	25	40	1. The brake is faulty 2. The plug-in cable harness is disconnected	Controller
28	Power drive short-circuit fault	25	41	1. Brake/lifting relay/lowering relay/short circuit	Controller
29	Lifting output timeout	31	42	1. The lifting relay drive is faulty 2. The lift limit switch is faulty	Controller
30	Emergency reverse not reset	32	23	After the emergency reverse function is used, the accelerator, interlock, and emergency reverse switch are not reset	Controller
31	Power on emergency reverse does not reset	32	48	1.The emergency reverse button is not restored before power-on 2.The emergency reverse cable harness is disconnected	Controller
32	Lifting open circuit	33	54	The lifting relay coil or harness is disconnected	Controller
33	Lowering open circuit	35	55	The lowering relay coil or harness break	Controller
34	The handle CAN communication times out	42	44	The handle CAN communication is lost	Controller
35	Battery communication timeout	42	45	The BMS CAN communication is lost	Controller
36	CAN communication failure	42	46	CAN communication loss	Controller
37	Current sampling failure	43	28	Current sensor failure	Controller

38	U Phase overcurrent hardware protection	44	6	1. The phase line is short-circuited 2. Motor overload 3. The electric control is faulty	Controller
39	V Phase overcurrent hardware protection	44	7	1. The phase line is short-circuited 2. Motor overload 3. The electric control is faulty	Controller
40	W Phase overcurrent hardware protection	44	8	1.The phase line is short-circuited 2.Motor overload 3.The electric control is faulty	Controller
41	Bus overvoltage hardware protection	44	9	1.Bus voltage >60V 2.The B+, B- loop is improperly connected	Controller
42	Busbar overcurrent hardware protection	44	10	1.The phase line is short-circuited 2.B+ or B- short circuit 3.The electric control is faulty	Controller
43	Hardware protection	44	11	Hardware failure	Controller
44	Busbar overcurrent	44	18	1. The phase line is short-circuited 2. Motor overload 3. The electric control is faulty	Controller
45	Power-on interlock does not reset	45	47	1. The interlock switch is triggered before power-on 2. The interlock switch is faulty	Controller
46	Low battery	47	15	1. Battery voltage <40V 2.B+, B- loop connection is loose	Controller
47	EEPROM abnormal	83	26	The EEPROM reads and writes are faulty	Controller
48	Current limiting timeout		19	1. Motor overload 2. The electromagnetic brake is not released	Controller

49	Forward/rear rotation switch faulty		24	Not configured yet.	Controller
50	Charge inhibit		27	Charger not removed, this model is not configured.	Controller
51	Slow down timeout protection		29	Controller failure	Controller
52	Emergency brake		30	Not configured yet.	Controller
53	U-phase software overcurrent		35	Motor overload	Controller
54	V-phase software overcurrent		36	Motor overload	Controller
55	W-phase software overcurrent		37	Motor overload	Controller
56	12V power failure protection		56	The 12V power supply to the controller is abnormal	Controller
58	The turtle speed button is faulty	80		The turtle speed button detects closure before it is turned on.	Handle
59	Lifting switch faulty	81		The lifting button is detected to be pressed before the power is turned on.	Handle
60	Lowering switch faulty	82		The lowering button is detected to be pressed before it is turned on.	Handle
61	Accelerator fault	84		The accelerator detects that it is not in the median position before it is turned on.	Handle
62	Controller communication failure	85	44	1. The controller communication module is damaged 2. The communication cable between the controller and the handle is broken. 3. The communication module of the	Handle/Controller

				handle is damaged. 4. The handle does not match the controller.	
63	Lift system failure	87		1. Pumping station output continuous operation, lifting system failure 2. The microswitch of the handle lift button is faulty	Handle

2.4. Controller pin definition（PWB-150/D2PC）



M1: Motor+

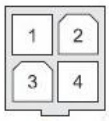
M2: Motor-

B- : Battery-

B+ : Battery+

The signal terminal contains three wiring terminals, including 14-pin, 4-pin, and 2-pin terminals. The interface definition of the wiring terminal and the corresponding connector models are as follows

J1



J2

J3

Model: Molex 3901-2140

J1-1: Pot wiper
J1-2: Pot high
J1-3: Driver 1
J1-4: Mode Switch
J1-5: Keyswitch input(KSI)
J1-6: Interlock Input
J1-7: CANL
J1-8: Pot low
J1-9: AUX Switch Input
J1-10:Forward Input
J1-11: Driver 2
J1-12: Reverse Input
J1-13: CANH
J1-14: Emergency reverse

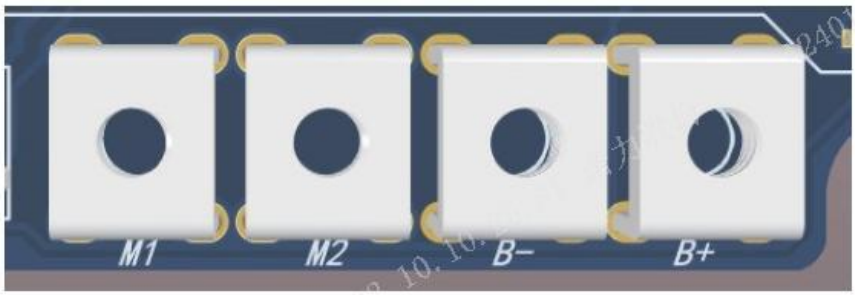
Model: Molex 3901-2040

J2-1: RX
J2-2: I/O GND
J2-3: TX / charge inhibit
J2-4: B+

Model: Molex 3901-2020

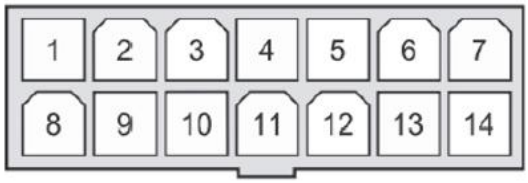
J3-1: Brake +
J3-2: Brake -

2.5. Controller pin definition（PWB-150/X16C）



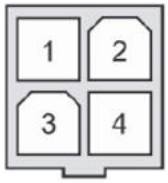
M1: motor+　　M2: motor -　　B-: battery -　　B+: battery +

The signal terminal has 3 terminals, which are 14 PIN, 4PIN and 2PIN. The interface definition of the terminal is as shown in the figure below:



J1

J1 Pin 1 POT Wiper 油门抽头侧
J1 Pin 2 POT Hi 油门高侧
J1 Pin 3 Driver 1 驱动器 1 举升锁止驱动
J1 Pin 4 Mode Switch 模式选择
J1 Pin 5 KSI 钥匙开关输入
J1 Pin 6 Interlock Input 互锁输入
J1 Pin 7 CAN L 控制器 CAN 通信低
J1 Pin 8 POT Low 油门低侧
J1 Pin 9 AUX Switch 辅助开关
J1 Pin 10 Forward Input 前进
J1 Pin 11 Driver 2 驱动器 2 下阀体驱动 /BDI 输出 / 喇叭驱动
J1 Pin 12 Reverse 后退
J1 Pin 13 CAN H 控制器 CAN 通信高
J1 Pin 14 Emergency Reverse 紧急反向



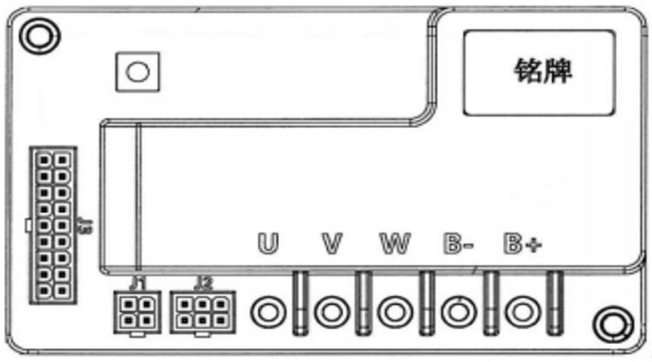
J2

J2 Pin 1 Rx 信号线
J2 Pin 2 I/O GND
J2 Pin 3 Tx/charge inhibitTx 信号线 / 充电禁行
J2 Pin 4 B+

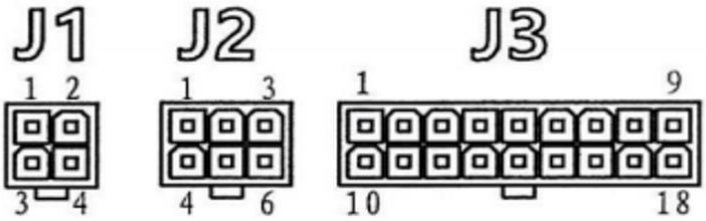
J3

J3 Pin 1 Brake+ 电刹 +
J3 Pin 2 Brake- 电刹 -

2.6. Controller pin definition（PWB-200/AZC100）



Pin signals of signal terminals J1, J2 and J3 are as follows:



Power interface	
Pin	Function
B+	Positive battery terminal
B-	Negative battery terminal
U	Phase line U
V	Phase line V
W	Phase line W

J1 pin definition	
Pin	Function
J1-1	Serial port RX
J1-2	Signal GND
J1-3	Serial port TX
J1-4	+12V output

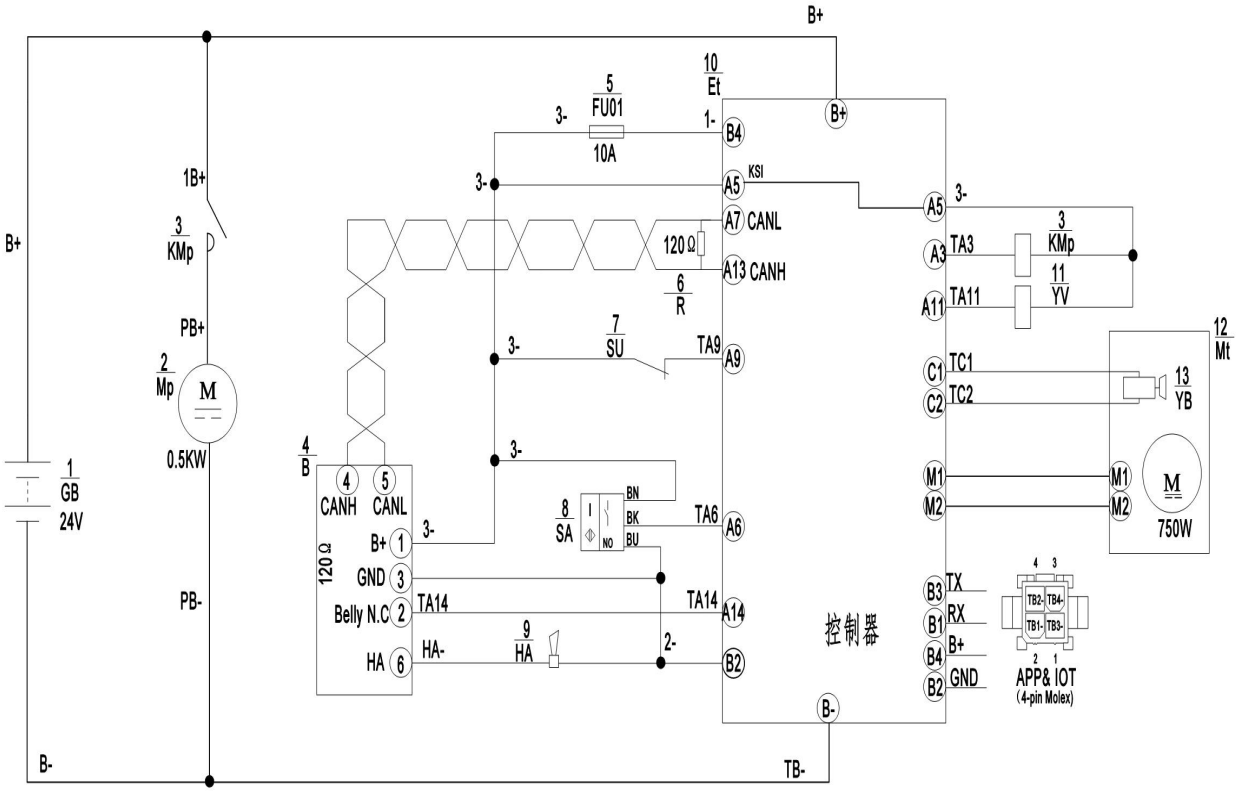
J2 pin definition

Pin	Function
J2-1	+5V output
J2-2	Encoder -U
J2-3	Encoder –V
J2-4	Encoder -W
J2-5	Signal GND
J2-6	Motor temperature

J3 pin definition	
Pin	Function
J3-1	Key switch
J3-2	Lowering valve output
J3-3	Interlock switch
J3-4	Emergency reversal
J3-5	NC
J3-6	485-A
J3-7	Accelerator
J3-8	Backward
J3-9	Lift limit
J3-10	Coil power supply
J3-11	Lift pump output
J3-12	Brake output
J3-13	Signal GND
J3-14	Lowering valve output
J3-15	Charge inhibit
J3-16	485-B
J3-17	Low battery
J3-18	Turn reduction

3. Wiring/Circuit diagram

3.1. Circuit diagram



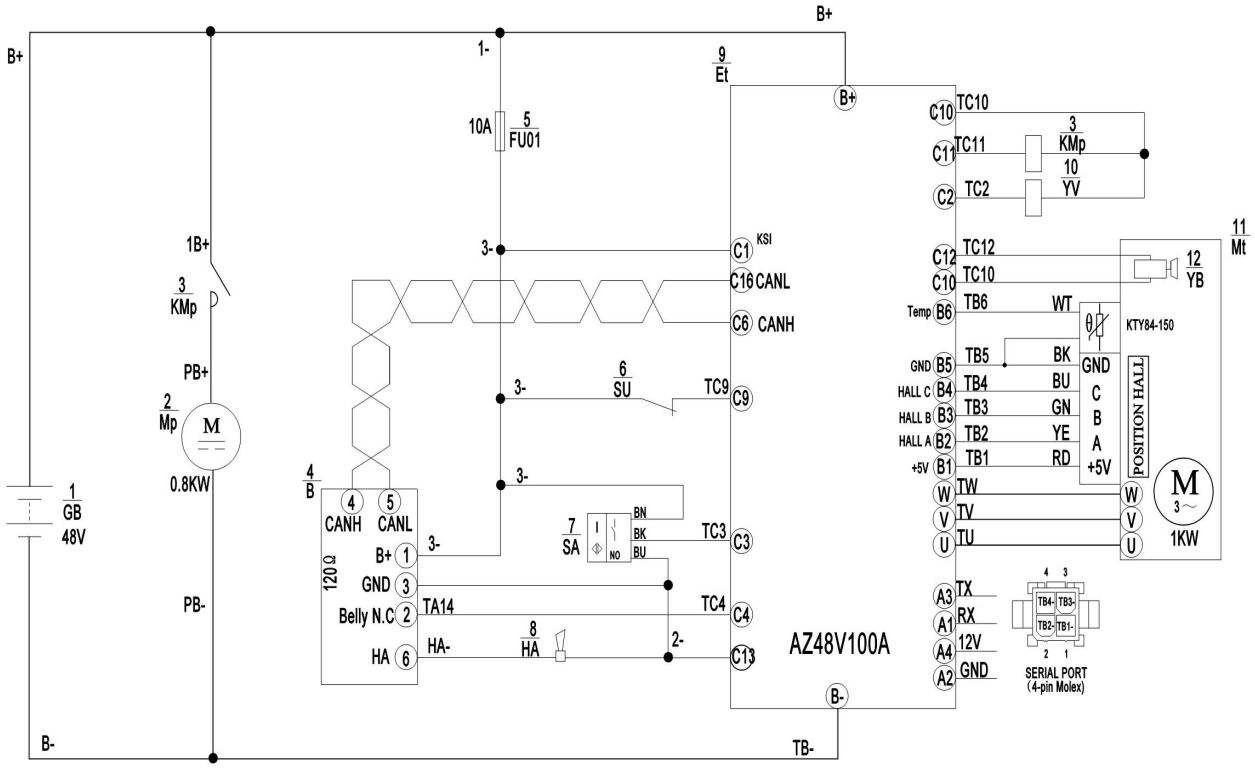
3.1.1. PWB-150

Symbol specification

Code	Name	Code	Name
GB	Battery	B	CAN Handle
SU	Microswitch	SA	Proximity switch
Mp	Pump station	Mt	Traction motor
KMp	Pump station contactor	YB	Electromagnetic brake
YV	Solenoid valve	FU01	10A Fuse

3.2. Circuit diagram

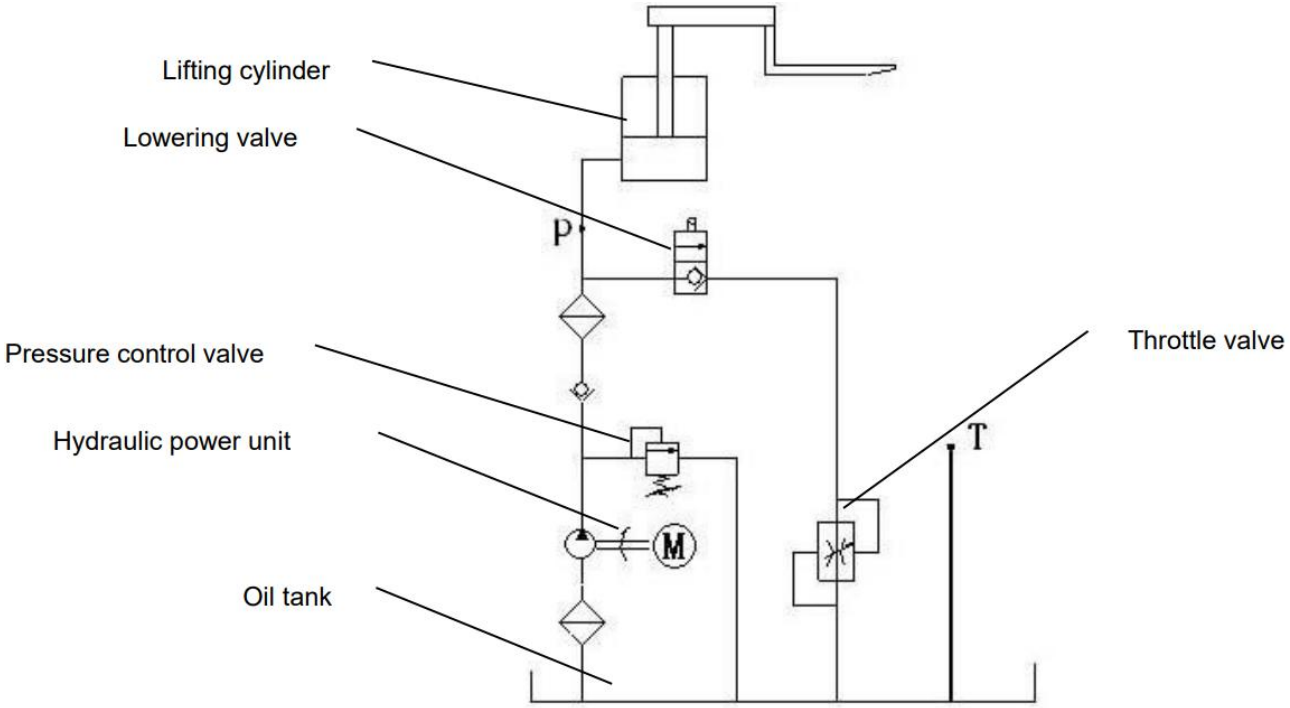
3.2.1. PWB-200



Symbol specification

Code	Name	Code	Name
GB	Battery	B	CAN Handle
SU	Microswitch	SA	Proximity switch
Mp	Pump station motor	Mt	Traction motor
KMp	Pump station contactor	YB	Electromagnetic brake
YV	Solenoid valve	FU01	10A wire harness fuse

3.3. Hydraulic circuit diagram



Appearance	**Smell**	**Condition**	**Result**
Clear and non-discoloration	Good	Good	Can use
Transparent Color	Good	Mix with other oils	Check viscosity, if qualified can continue to use
Color changes like milk	Good	Mixed with air and water	Separate water or replace hydraulic oil
The color turns dark brown	No good	Oxidation	Change hydraulic oil
The color is clear but with small black spots	Good	Mix with other particles	Use after filtration

4. Disassemble the main parts

4.1. Change the battery

Press the battery button to turn off the power

Remove the power connector

Grab the groove on the back and pull the battery up

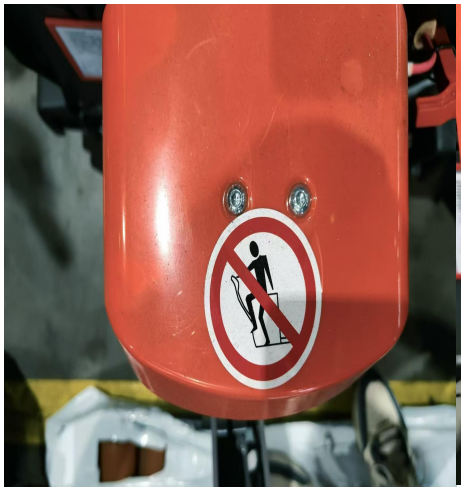
Differences between PWB-150 and PWB-200 batteries

PWB-150	PWB-200
The PWB-150 battery voltage is 24V, and the capacity is 20AH/40AH/60AH	**PWB-200 Battery The battery voltage is 48V and the capacity is 10AH, 20AH, or 40AH**
	
The port of the PWB-150 battery connector is red	**The port of the PWB-200 battery connector is blue**

4.2. Disassemble the covering piece

1. Remove motor protective cover

Use a 4mm Allen wrench to remove the two bolts on the motor protective cover, the two screws on the bottom and left side, and use a 3mm Allen wrench to remove the lower bolt and take out the motor protective cover



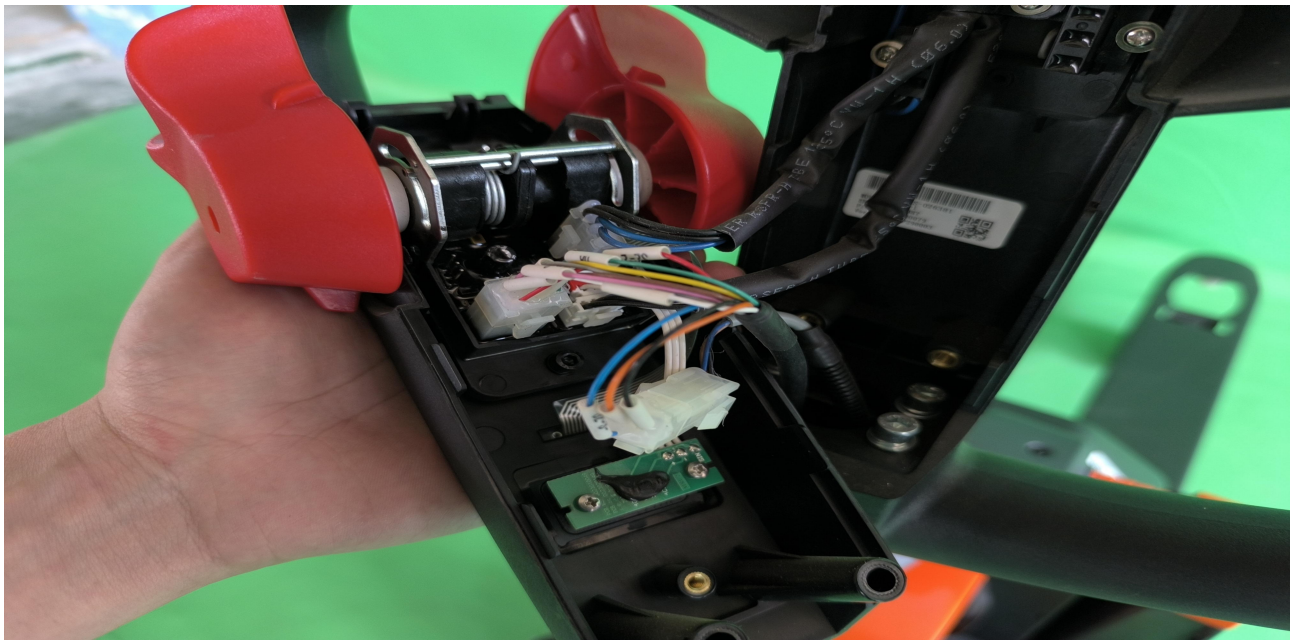
2. Remove drive wheel cover

Remove the two bolts on the left and right of the upper end of the drive cover using a 4mm hex key, and remove the drive wheel cover


4.3. Removal of handle assembly

Remove the two fastening bolts on the front panel of the handle using a 4mm hex key.

Remove the connector to remove the handle front cover



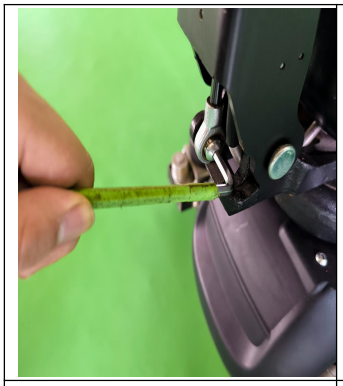
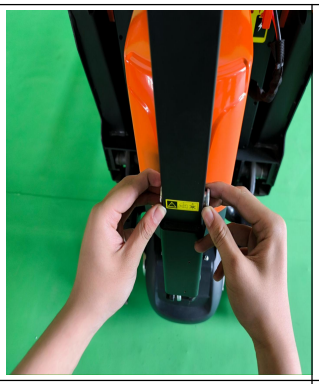
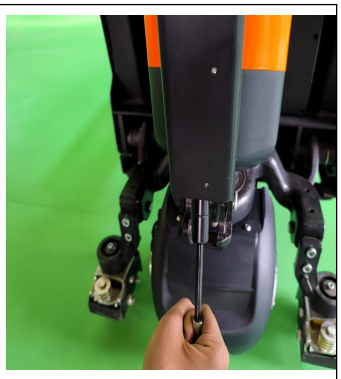
Remove the two bolts on the side of the rear cover of the handle using a 3mm hex key

Differences between PWB-150 and PWB-200 handles

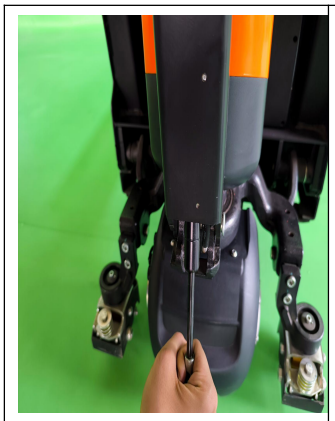
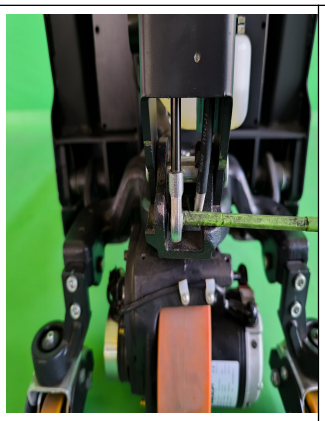
PWB-150	PWB-200
	
The PWB-150 handle operates at 24V	The PWB-200 handle operates at 48V

4.4. Disassembly of gas spring

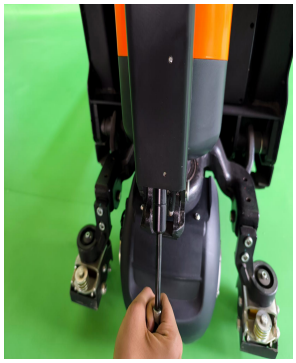
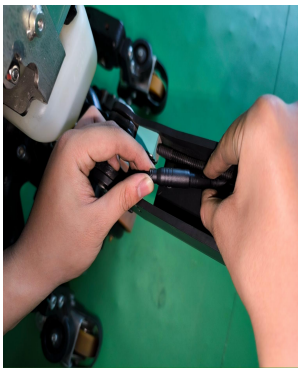
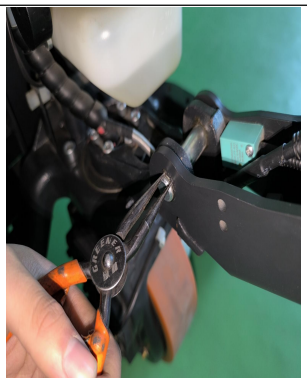
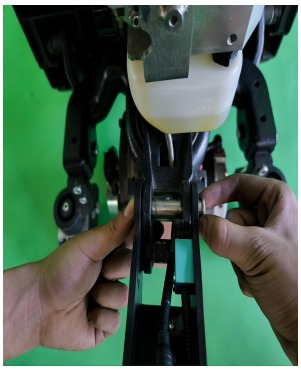
1. Removal of handle gas spring

			
Remove the lower end bolt of the gas spring with a 5mm hex socket	Remove the spring with a clamp on the upper pin of the circlip	The upper end pin can be removed after the circlip is removed	Remove the gas spring from inside the handle lever

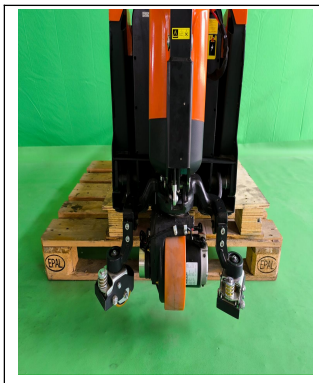
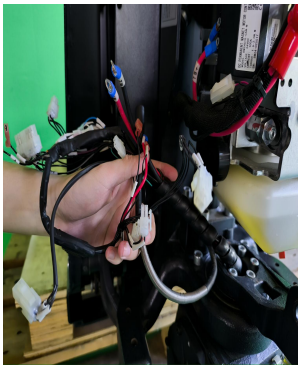
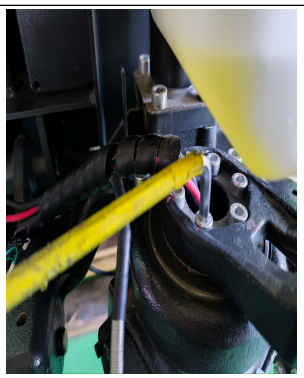
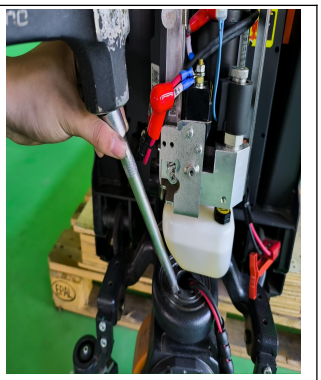
2. Handle gas spring mounting

			
The gas spring is inserted into the handle rod.	Insert the upper pin and install the circlip.	The hexagon is inserted into the lower bearing and screw hole, and lifted upward to make the two holes parallel.	Insert the flat iron at the bottom of the gas spring, lift the hole at the bottom of the fixed gas spring, and then add the screw.

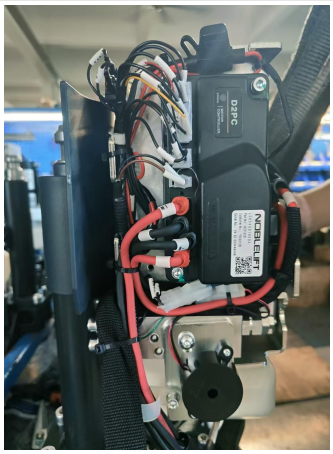
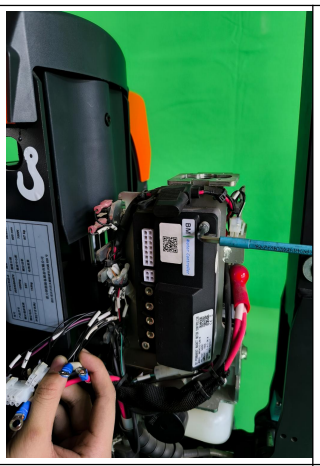
4.5. Removal of handle rod

			
Remove the gas spring	Pull out the handle transition connector	Remove the circlip at the lower end of the handle with circlip pliers	Pull out the pin and remove the handle rod

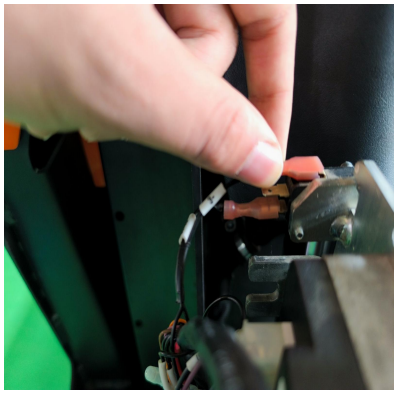
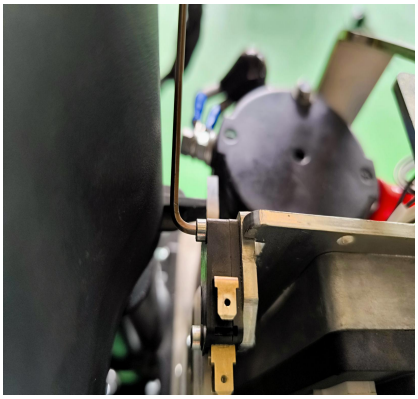
4.6. Removal of drive assembly

			
Use wooden blocks to lift the vehicle so that the drive wheels are suspended	Remove the drive wire and main control wire harness	Remove the six bolts on the bearing cover with a 6mm hex wrench. 1243 strength thread glue is required for the bolts	Tap the drive assembly to drop it and remove the assembly

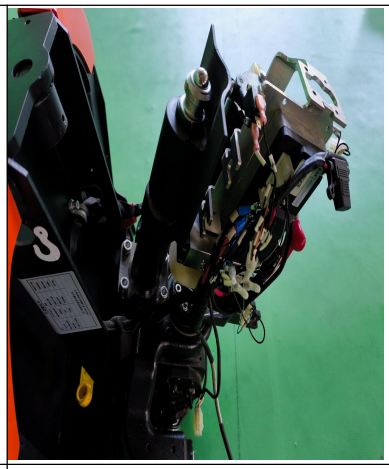
4.7. Disassembly of controller

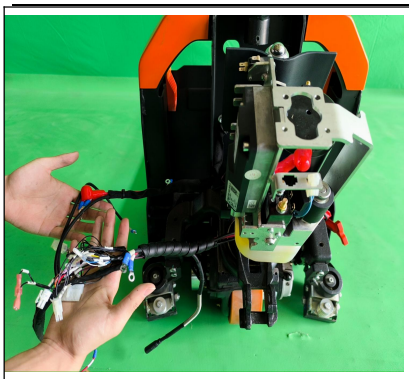
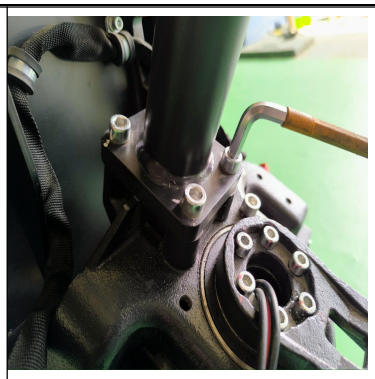
			
Before removing the controller, pay attention to the line order, the cable line from top to bottom is the positive electrode of the power supply, the negative electrode of the power supply, the negative electrode of the motor, and the positive electrode of the motor	Remove the connector and remove the control harness	Remove the two controller bolts using the 4mm hex socket to remove the controller	The picture shows PWB-150 electric control, first remove the line, and then remove the controller fixing bolts with 4mm hex, and then remove the controller

4.8. Disassembly of limit switch

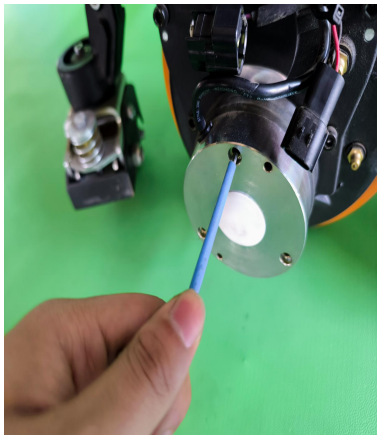
	
Remove the connector on the limit switch	Remove the two fixing bolts of the limit switch with the 2.5mm hex socket and remove the limit switch

4.9. Disassembly of the cylinder and pump station

		
Remove the cylinder head positioning bolts using a 5mm hex wrench	Power the vehicle and press the lowering button to drop the fork	Gently lift the frame, and when the piston rod is off the upper seat, tilt the back half back to place it

		
When the vehicle is powered off, remove all connectors on the pump station assembly (remember the line number and installation position, to correspond one by one)	Remove the connection bolts between the cylinder and the pump station with a 5mm hex, and then remove the pump station	Remove the four bolts fixing the cylinder base using the 8mm hex socket. Remove the cylinder immediately after removing the bolts

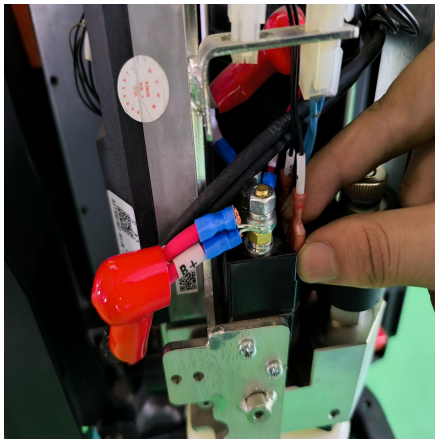
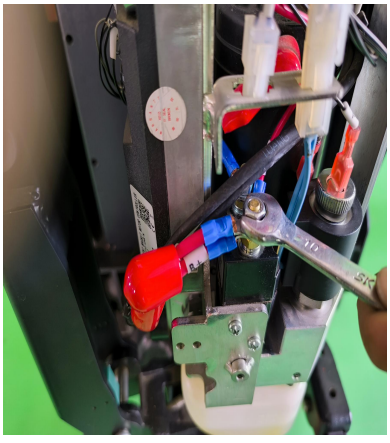
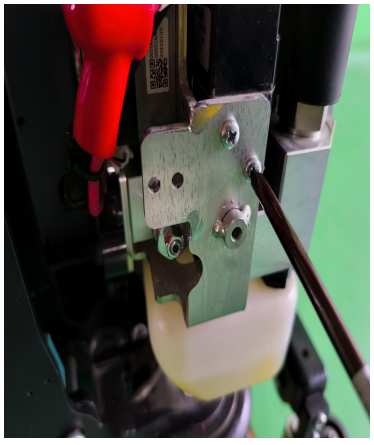
4.10. Disassembly of brake

	
Pull out the brake connector	Remove the three brake fixing bolts with a 3mm hex wrench, and then remove the brake

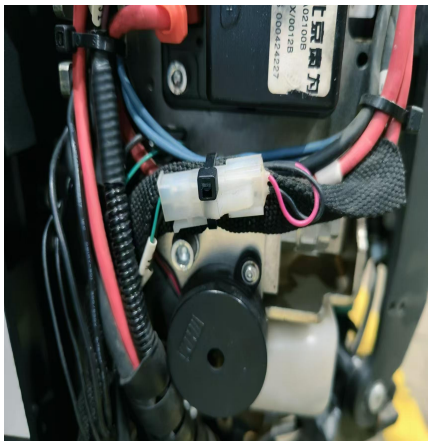
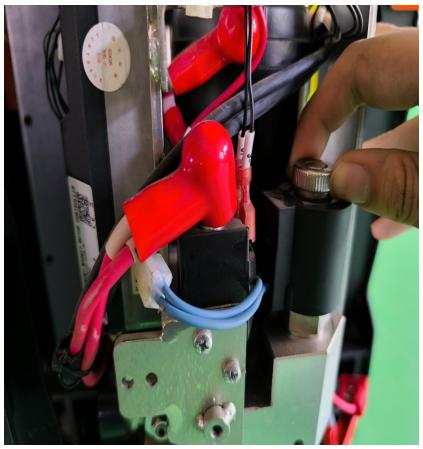
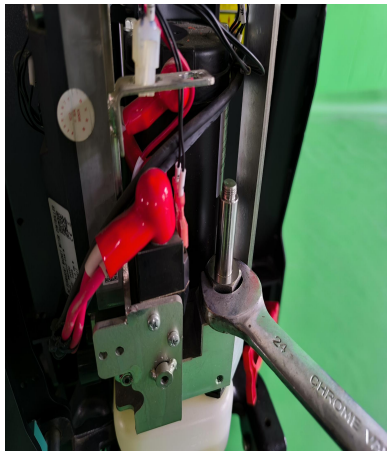
4.11. Change of drive rim

	
Open the junction box with a Phillips screwdriver and remove the nuts on the M1 and M2 terminals of the drive motor with a 10mm open end wrench	Use a 5mm hex socket to remove the six bolts fixing the drive wheel ring, that is, remove the wheel ring. Pay attention to the positioning holes and pins when installing the drive wheel ring Note: When the thickness of the PU rim is less than 1/3 of the new rim thickness, the new rim thickness is (13mm).

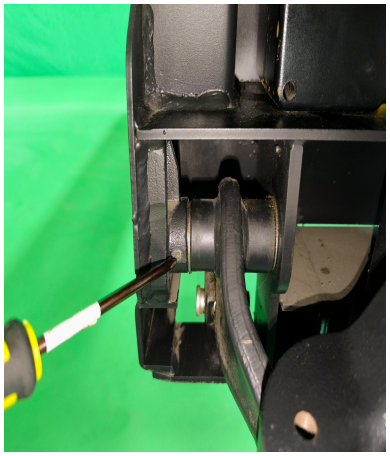
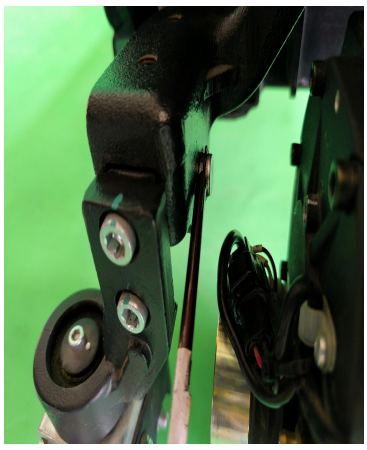
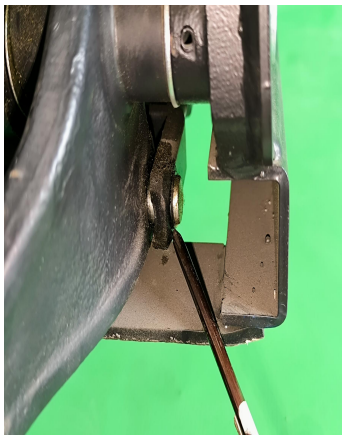
4.12. Disassembly of contactor

		
Remove the upper connector of the contactor	Remove the two nuts of the contactor pile head with a 10mm open end wrench	Remove the contactor by unscrewing the two fixing bolts with a Phillips screwdriver

4.13. Removal of lowering solenoid valve

		
Pull out the lowering solenoid coil plug	Unscrew the lowering solenoid valve nut and remove the solenoid coil	Use a 24mm wrench to unscrew the drop solenoid valve spool

4.14. Removal of the ring rod

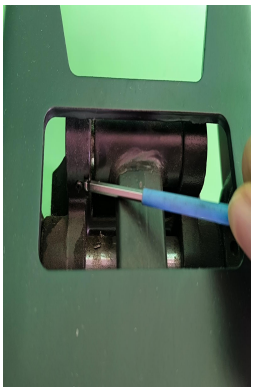
		

The pin can be pulled out by punching out the elastic pin where the ring rod is connected to the pin on both sides of the front frame. The elastic pin size here is 6*40	The pin at the joint of the ring bar and the rear frame should be removed and the pin should be pulled out	Use the circlip pliers to remove the circlip at the connection between the ring bar and the left and right push rods, and pull out the pin to remove the ring bar

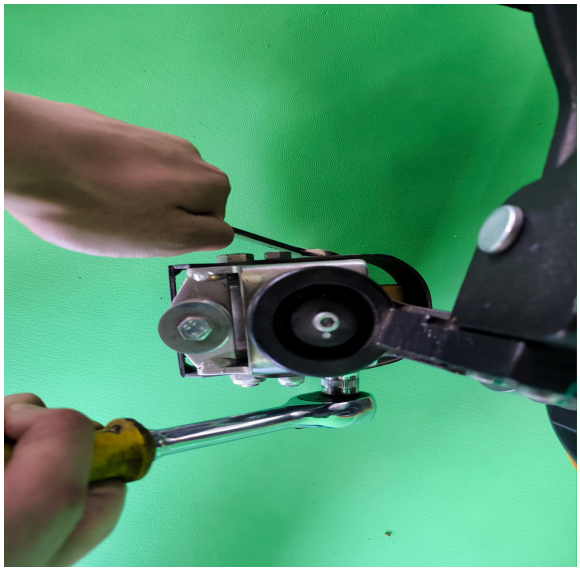
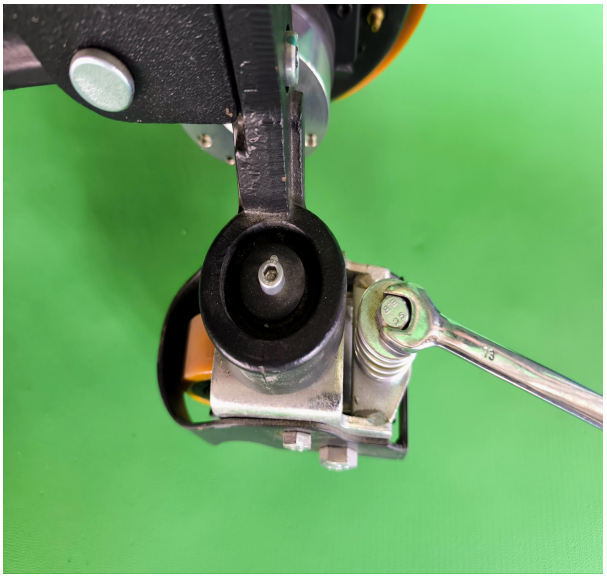
4.15. Replacement of bearing wheels

	
Punch out the four elastic pins on the triple plate	The bearing wheel can be replaced by knocking out the bearing wheel pin

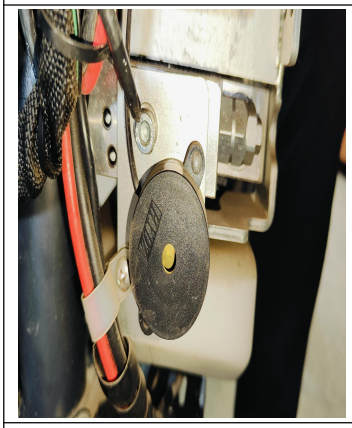
4.16. Disassembly of arm block

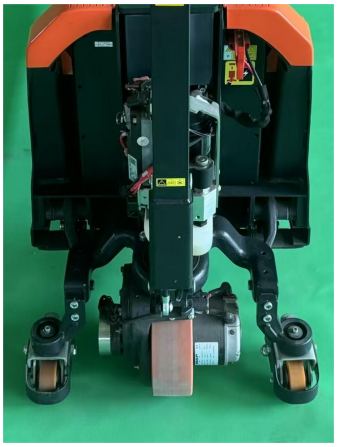
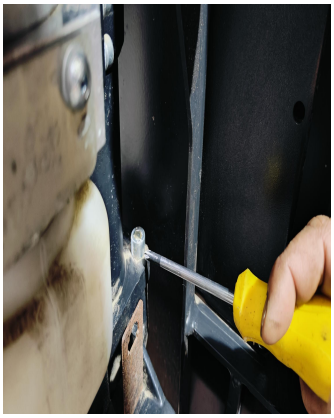
	
Use the punch to knock out the elastic pin at the connection between the lever block and the frame, and pull out the pin shaft	Use a punch to knock out the elastic pin at the joint of the lever block and the push rod, and pull out the pin shaft to remove the lever block

4.17. Caster wheel removal and pressure regulation (optional)

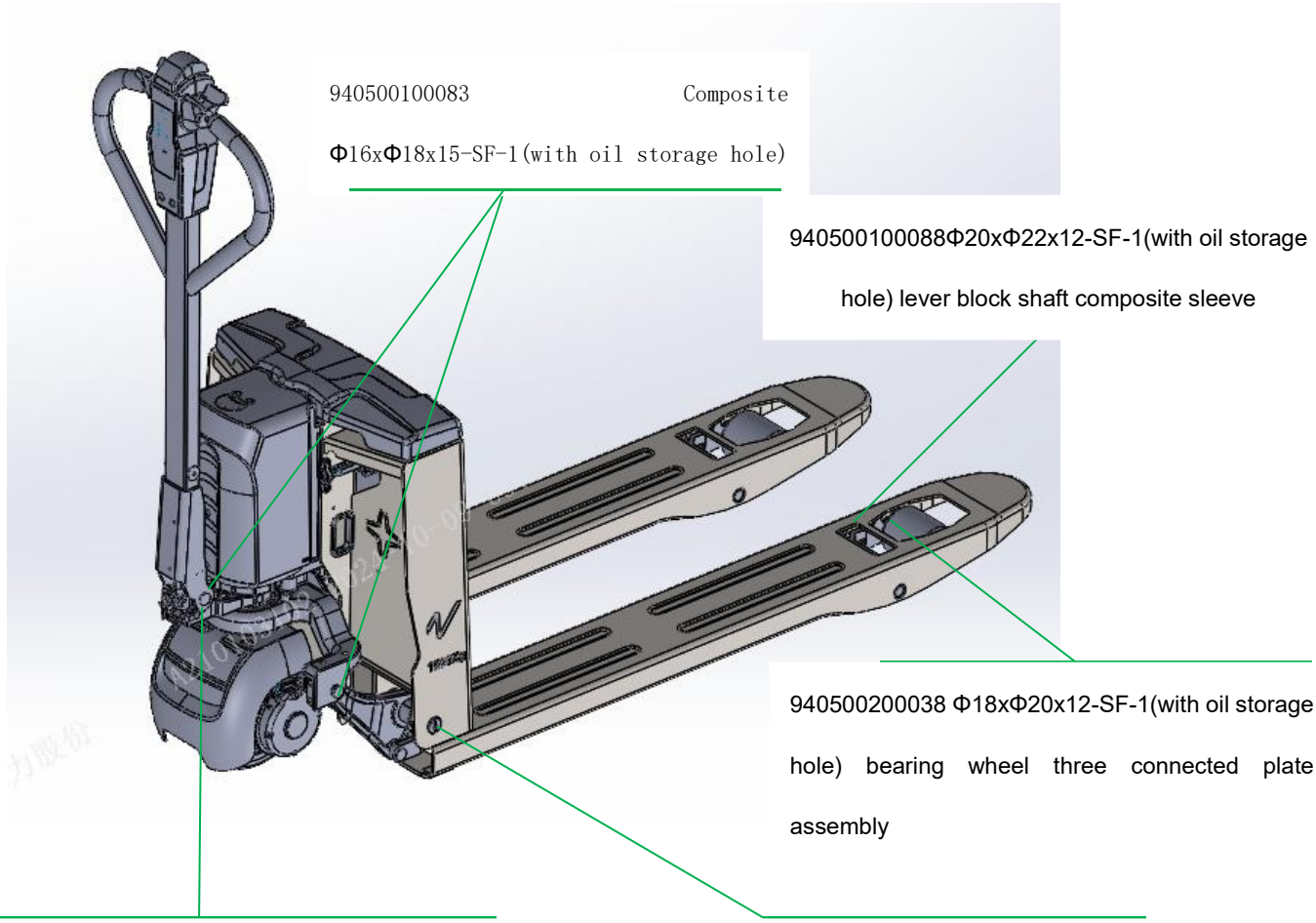
	
Remove one end nut with a 17mm wrench and a ratchet wrench, pull out the screw and remove the wheel ring	The pressure adjustment of the caster wheel frame requires only a 13mm wrench to rotate the screw as shown in the figure. Clockwise rotation is pressure and counterclockwise rotation is decompression

5. Torque requirements for main setting screws

Picture	Location	Fastener name	Tightening requirement
	Handle flange and drive unit	Screw M8	Torque **45-55N.m** Diagonal tightening
	Pump station and electric control bracket	Screw M6	Torque **6-10N.m** Diagonal tightening
	Pump station and cylinder	Screw M6	Torque **6-10N.m** Diagonal tightening;

	Push rod lock nut	**Screw M20*1.5**	Torque **130-140 N.m** Tighten diagonally in stages
	Caster wheel and drive wheel seat	**Screw M10**	Torque **45-55N.m** Diagonal tightening
	Controller and electric control bracket	**Screw M5**	Torque **4-6N.m** Diagonal tightening
	Frame and cylinder	**Screw M10**	Torque **45-55N.m** Diagonal tightening

6. Vehicle composite set specification diagram



7. DALA handheld Unit user manual（PWB-150/D2PC）

7.1. Interface introduction

Product renderings

Debugging System 13（DS13）Handheld debugging computer system (hereinafter referred to as DS13) is a powerful and easy to use portable programming and diagnosis tool, through the included CAN or serial communication cable directly connected to the motor controller or instrument, can quickly achieve parameter reading and writing, data monitoring, fault diagnosis, firmware upgrade and other functions of operation, and has USB master/slave mode. It can easily copy parameters and save files between multiple controllers to meet different application requirements and greatly improve the efficiency of field debugging.

Interface diagram

DS13 has three connection ports, DB9 connection port, USB Type-C, USB Type-A, respectively, with the motor controller, PC/ mobile phone, USB flash drive for data interaction, in addition, there is a battery box on the back of the DS13, can be used for battery power.

7.1.1. DB9 Connecting port

The DB9 connection port contains the serial port, CAN communication cable, and power supply cable. Connect the DS13 to the motor controller via the included serial port or CAN communication cable.

Note: The attached serial cable and CAN communication cable are connected to the motor controller using a double row of 2*2P 4.2mm pitch Molex connector plug-in 5557.

7.1.2. USB Type-C

Using the USB Type-C interface, the following functions can be achieved:

1. The DS13 can be connected to an Android mobile phone that supports OTG by using the attached USB Type-C adapter cable. After successful connection, the mobile phone will recognize DS13 as a removable external memory. In this case, you can transfer the power controller parameter file (.dala file), upgrade program file (.sc file), or other files stored in the mobile phone to the DS13 local storage, or transfer the.dala file or other files to the mobile phone.

USB Type-C port

2. DS13 can be connected to the computer using USB Type-C cable (Android phone charging cable). After successful connection, the computer will recognize DS13 as a removable disk

(USB flash drive), and then the ".dala file ", ".sc file "or other files stored in the computer can be transferred to the DS13 local storage. You can also transfer.dala files or other files to your computer.

USB Type-C port

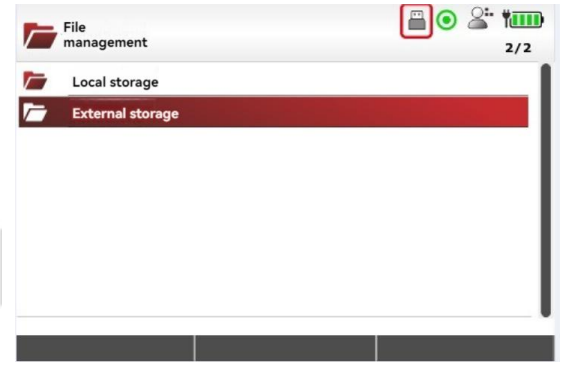
3. USB Type-C cable (Android phone charging cable) can be used to connect the DS13 to the charging bank, so that the charging bank or charging head can power the DS13 and perform offline operations, such as DS13 firmware upgrade and viewing.dala files.

USB Type-C port

7.1.3. USB Type-A

DS13 supports USB flash drive insertion. When the USB flash drive is successfully detected, the USB flash drive icon will be displayed in the top status bar. You can read the.dala file or.SC file in the USB flash drive and directly write the data in the.dala file or.SC file to the controller. You can also directly save the controller configuration parameters to the USB flash drive as a. In addition,

you can save the screenshot ".bmp file "to the USB flash drive. Through the file management module, the files in the U disk can be copied, pasted, deleted and moved. However, it is not possible to copy, paste, delete, or move between external storage (USB flash drive) and local storage.



USB Type-A port

Note：

1. When the power supply of the DS13 is powered by the controller, when the power supply capacity of the controller is too low, the DS13 will automatically enter the low-power mode. In this mode, the DS13 will not detect the USB flash drive, and the top status bar will not display the USB flash drive insertion prompt.

2. The USB flash drive supported by DS13 must have a capacity ≤32GB, and the file system of the USB flash drive must be formatted as a FAT32 file system. Before use, check whether the size of the U disk and the file system meet the requirements through the computer resource manager.

7.1.4. Battery interface

A slotted battery case on the back of the DS13 holds two type AA batteries, allowing the DS13 to operate offline when not connected to the controller. Although the battery can be used to power the DS13 when connected to the controller, it can quickly drain the battery when performing interface operations. Therefore, it is best to power the DS13 from a connected controller or via a USB Type-C interface, which can extend battery life.

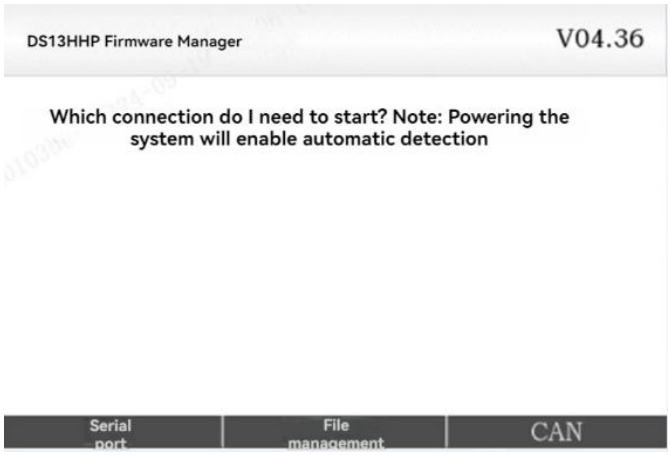
No.5 Battery box

Note: When using battery power and upgrading the DS13's own program, make sure that the AA battery is fully charged.

If the AA battery runs out and automatically shuts down during the upgrade process of the DS13 itself, the firmware will be lost and the DS13 will not be able to be used normally. You are advised to use the USB Type-C interface or controller for power supply when upgrading the DS13 program, and ensure reliable power supply during the upgrade to prevent accidents.

7.2. Start DS13

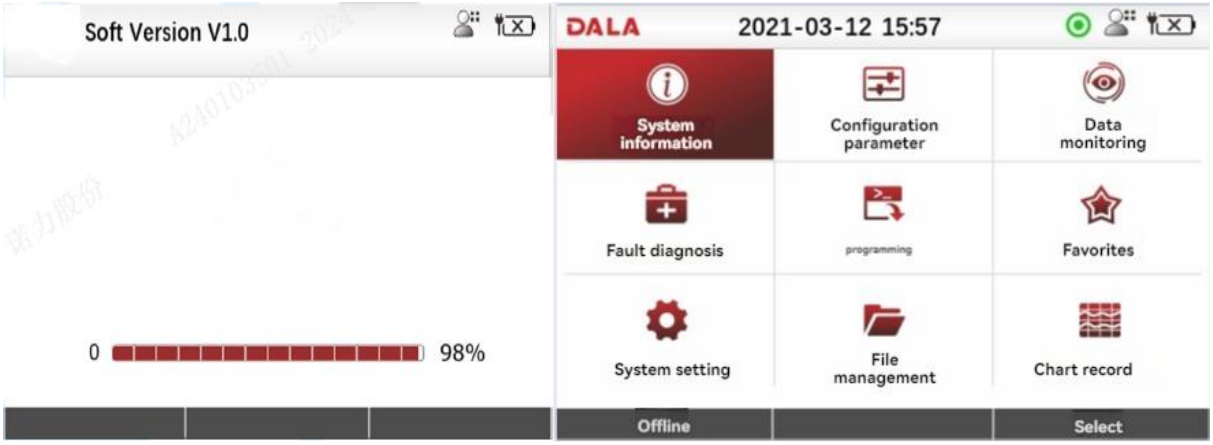
Connect the DS13 to the controller's communication port via the included communication cable. If the controller is powered on, the DS13 automatically starts and the initial screen is displayed.



DS13 Initial interface

If it is a serial port connection, DS13 will automatically match the baud rate of the controller

communication, without the user clicking the "serial" button. For CAN connection, the DS13 will automatically match the baud rate of controller communication only after the user clicks "CAN". When the baud rate is successfully matched, the loading screen is displayed automatically. When the loading progress reaches 100%, the main screen is displayed.



DS13 Load controller information

Instructions：

1. If the controller is loaded for the first time or connected for the first time after the controller parameter version is upgraded, the first loading takes a little longer because the controller cache file does not exist in the local storage. When the controller is successfully loaded, the information is read from the local cache file and the loading time is shortened. If the cache file is deleted, the next controller loading time will be longer.

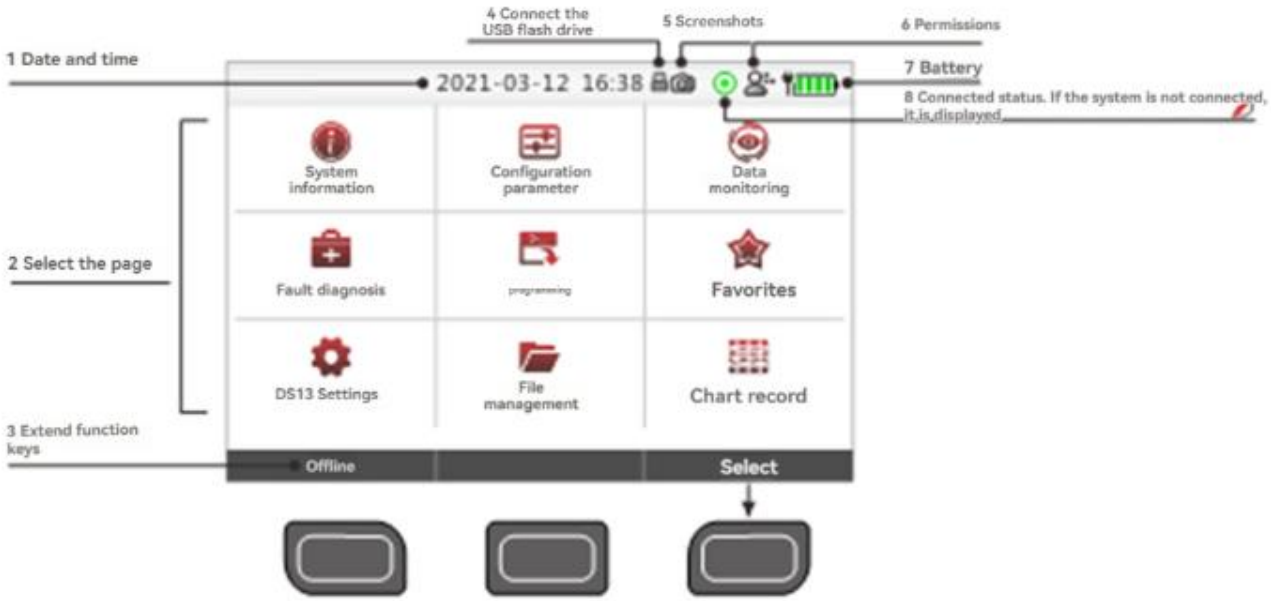
2. When the controller is used to power the DS13, if there is a sudden power failure, the DS13 will lose power even if the battery is installed.

3. If batteries are installed on the DS13 but the attached communication cable is not used to connect to the controller, press the on/off button to start the DS13. If the connection to the controller is restored, the DS13 will continue to operate on battery power and will not switch to controller power. If you need to switch to the controller power supply, shut down and restart.

4. When the DS13 is powered by the USB Type-C interface with the charging bank or charging head, the DS13 will start automatically. If the connection to the controller is restored, the DS13 will continue to be powered by the USB Type-C interface and will not switch to controller power. However, when the power supply is removed from the USB Type-C port, the power supply is automatically switched to the controller.

7.3. Display format

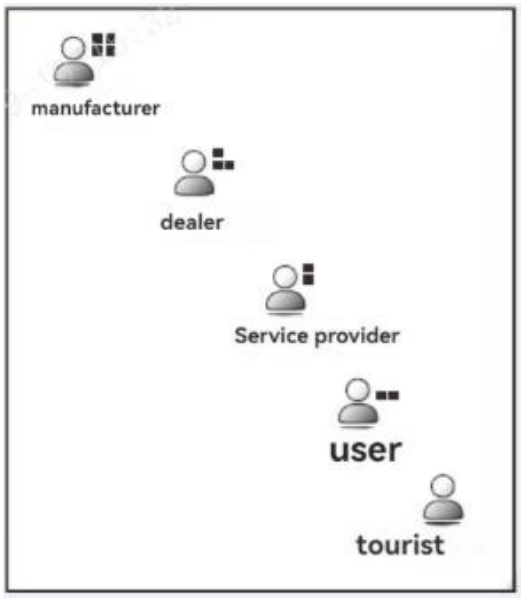
The main interface is arranged in the form of nine cells, the top is equipped with status bar information, you can view the date, USB flash drive connection, screenshots, battery status, permissions, etc. At the bottom is the function button bar for various functional operations.



Home page display format

7.4. Access authority

DS13 has five levels of access: Manufacturer, Distributor, service provider, user and visitor. Each permission has access to parameters below its level, but not above it.



DS13 Access authority

7.5. Key function

DS13 Key layout

The application can be quickly accessed through the buttons on the DS13 keyboard. The following table lists the buttons and their corresponding function descriptions.

Name	Icon	Function instruction
Soft key		Corresponding function buttons at the bottom of the interface. Different interfaces have different functions. When the bottom function button is displayed as the symbol ">>", it means that there are more options. Pressing ">>" will switch to another set of function options
Direction & OK key		Use the arrow keys to move items up, down, left, and right in the interface. In the "Configuration Parameters" application program, press the right arrow key to enter the next level menu or open the parameter detailed setting interface; Press the left arrow key to return to the previous menu
Power key		The DS13 can be turned on or off by pressing the power button. When connected to the controller using the included communication cable, the DS13 automatically starts after the controller is powered on without pressing the power button. Press and hold the power button for 2 seconds after powering on the DS13. A pop-up window will appear to confirm whether the DS13 is powered off. After pressing "Yes", the DS13 can be powered off. When the DS13 is powered through the USB Type-C interface, the power key is invalid. You can disconnect and power on only by removing and inserting the USB Type-C cable

Return key		The return key can be used to return to the previous menu or interface
Favorite key		Favorites key. In any interface, press this key to enter the Favorites application program
Screenshots		Press the power button and the soft key in the upper left corner at the same time to take a screenshot and save the current screen content in the.bmp file format.
Home		Home key. In any screen, press this key to return to the home screen. On the home screen, press this key to iterate through each application
Help		This key is used to view specific help text

7.6. Home page and applications

The home page contains 9 applications: System Information, configuration parameters, data monitoring, troubleshooting, programming, Favorites, System Settings, File management, ICONS & Records.

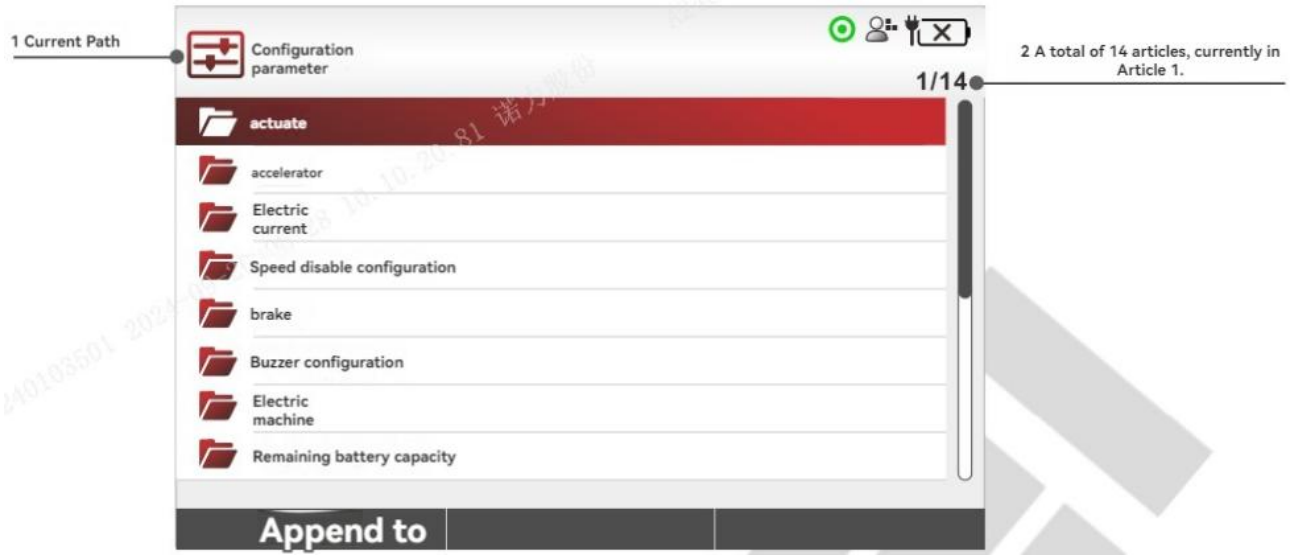
DS13 Home page

7.6.1. Application program

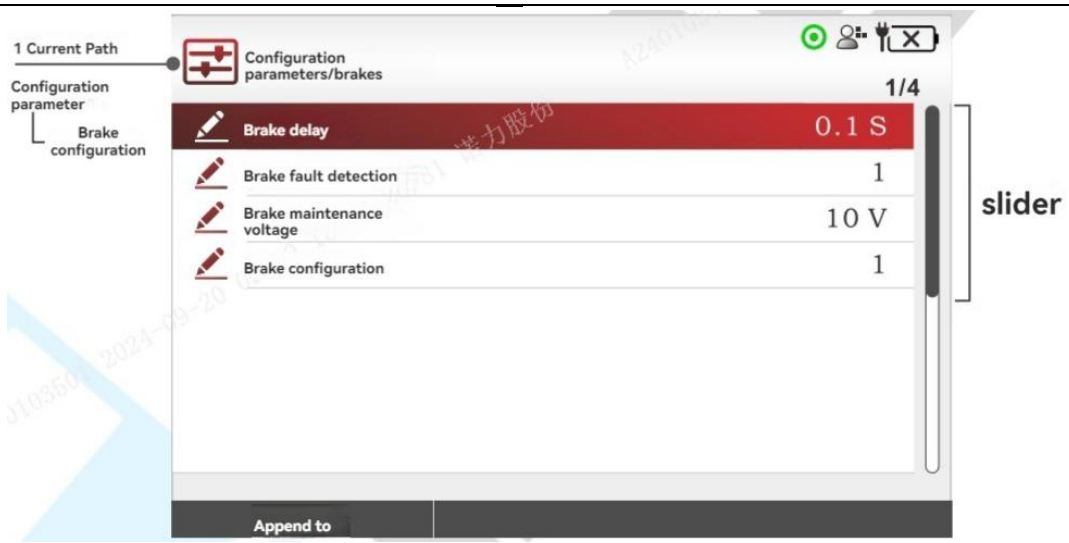
The application is presented as a multilevel menu list, and the user can press the right arrow key to enter the submenu list and the left arrow key to return to the menu list of the previous level.

When you switch through the multilevel menu, the top status bar displays the current application-level directory. If you select any application, its root menu directory is displayed. The top status bar displays the name of the application, indicating that it is currently the root directory. When switching between multilevel menus, if the number of menu level directory characters exceeds the top status bar display area, DS13 will automatically start with "..." to represent.

The slider area on the right side of the interface displays the relative position of the currently selected menu item in the current hierarchy. Under the current menu directory, the first entry will be indicated as "1/X" and the last entry will be indicated as "X/X", where the "X" represents the total number of entries under the current menu directory.



Application level directory



Application slider indication

If you press the home key to exit the application and then enter the application, if "Remember the last view" in "System Settings" is set to "Off", the first entry is displayed by default. If it is set to "On", it will jump directly to the entry location at the time of the last exit.

For example: in the example above, if Remember Last View is set to On, the next time the Configure Parameters application is selected, it will select the Display Delay parameter.

Note: If DS13 is turned off (for example, if the controller is restarted or the communication cable is unplugged), the last stored entry location is lost. Even if Remember Last View is set to On, a new Remember Last View will start every time you reboot.

7.6.2. Application entry

Each entry in the application is represented by one of the following ICONS.

Icon	Designation
	Indicates that this entry is a system information parameter for the controller.
	Indicates that the entry is a folder entry, you can press the right arrow key to enter the next level menu.
	Indicates that the entry is editable and can be modified. Press the OK key Enter the edit and modify state, press the up and down arrow keys to modify the data.
	Indicates that a function parameter is executed. Press the right arrow key to perform the function.
	Indicates that the entry is a file in the file manager.
	Indicates that the entry is read-only and cannot be modified.

7.6.3. Nine applications

The following table lists nine applications that can be used for programming controllers, which are described in detail in the corresponding section.

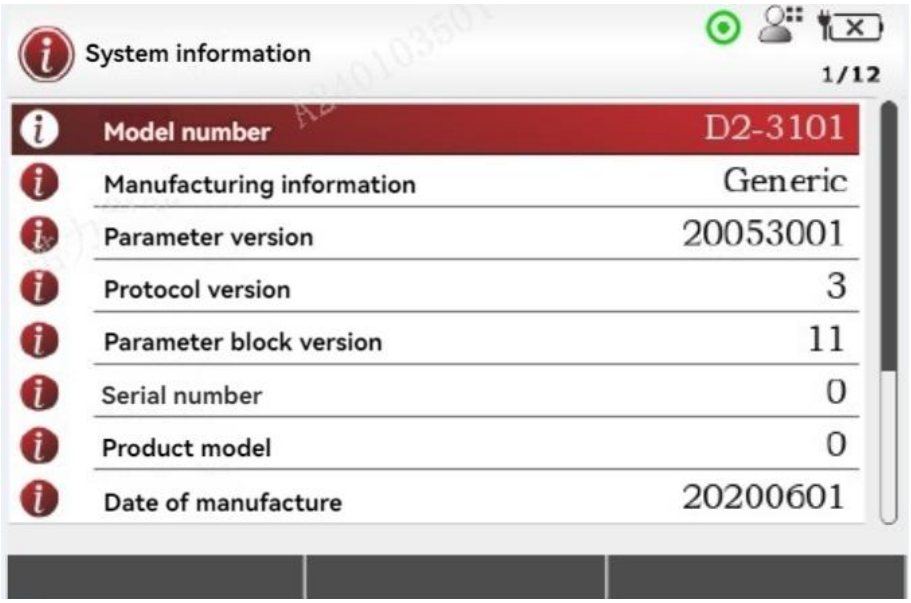
Icon	Name	Function description
	System information	Chapter 4
	Configuration parameter	Chapter 5
	Data monitoring	Chapter 6
	Fault diagnosis	Chapter 7
	programming	Chapter 8
	Favorites	Chapter 9
	System setting	Chapter 10
	File management	Chapter 11
	Chart record	Chapter 12

7.7. System information

System information application

After the DS13 loads the controller data, the System Info application is selected by default on the home screen. The System Information application can view controller system information, such as controller model, serial number, production date, and software/firmware/hardware version.

On the home screen, select the System Info icon and press the Select or OK key to enter the application. You can press the home key, back key, or left arrow key to return to the home screen.



System information parameter

7.8. Configuration parameter

Configure the parameter application

The Configure Parameters application can view and modify all configurable parameters of the controller. You are advised to refer to the controller user manual to learn about the parameters and setting data. The displayed parameter entries depend on the controller model and the access level of the DS13. Different controllers or different access levels will display different parameters. Some controllers may not operate as described in this chapter.

On the home screen, select the "Configuration Parameters" icon, and then press "Select" or "OK" to access the application. Press the home key, back key, or left arrow key to return to the home screen.

Note: Changes to controller parameters using the Configuration Parameters application take effect immediately. Modifying controller parameters may cause an error

Respond to vehicle speed, acceleration, deceleration, dynamic stability and braking.

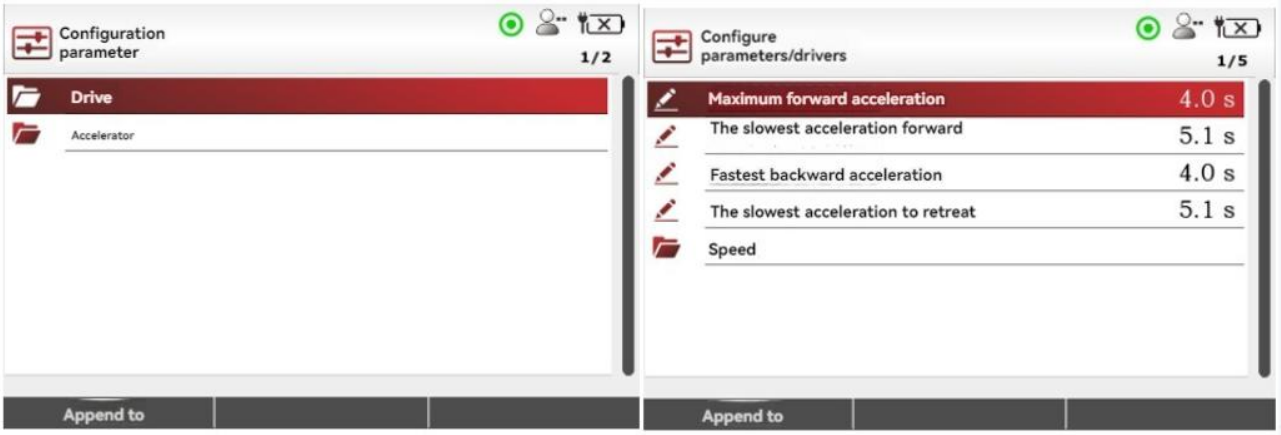
If the controller parameters are modified incorrectly or beyond the safety limits established by the vehicle manufacturer, a dangerous situation may arise.

Only the vehicle manufacturer, authorized service agent or dealer can modify the parameters of the controller.

7.8.1. Parameter structure

Select and enter the "Configuration Parameters" application, its root menu directory is displayed, and the top status bar displays the application name, indicating that the current root directory. When switching between multilevel menus, if the number of menu level directory characters exceeds the top status bar display area, DS13 will automatically start with "..." to indicate.

The slider area on the right side of the interface displays the relative position of the currently selected menu item in the current hierarchy. Under the current menu directory, the first entry will be indicated as "1/X" and the last entry will be indicated as "X/X", where the "X" represents the total number of entries under the current menu directory. The following two examples show the Driver menu directory and location for the controller.



The Driver menu of the controller

 ：Represents an editable parameter.

 ：Represents a folder parameter with a submenu.

If you press the home key to exit the application and then enter the application, if "Remember the last view" in "System Settings" is set to "off", the first entry is displayed by default. If it is set to "On", it will jump directly to the entry location when you last quit.

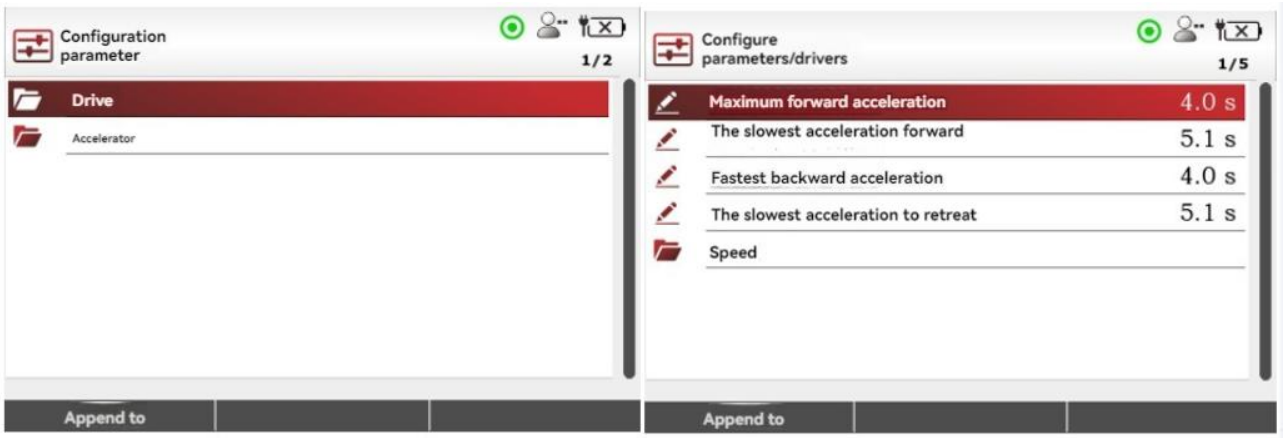
Note: If the DS13 is turned off (for example, the controller is restarted or the communication cable is unplugged), the last stored

The entry location will be lost. Even if Remember Last View is set to On, a new Remember Last View will start every time you reboot.

7.8.2. Adjust/edit parameters

Select and enter the "Configuration Parameters" application, its root menu directory is displayed, and the top status bar displays the application name, indicating that the current root directory. When switching between multilevel menus, if the number of menu level directory characters exceeds the top status bar display area, DS13 will automatically start with "..." to indicate.

The slider area on the right side of the interface displays the relative position of the currently selected menu item in the current hierarchy. Under the current menu directory, the first entry will be indicated as "1/X" and the last entry will be indicated as "X/X", where the "X" represents the total number of entries under the current menu directory. The following two examples show the Driver menu directory and location for the controller.



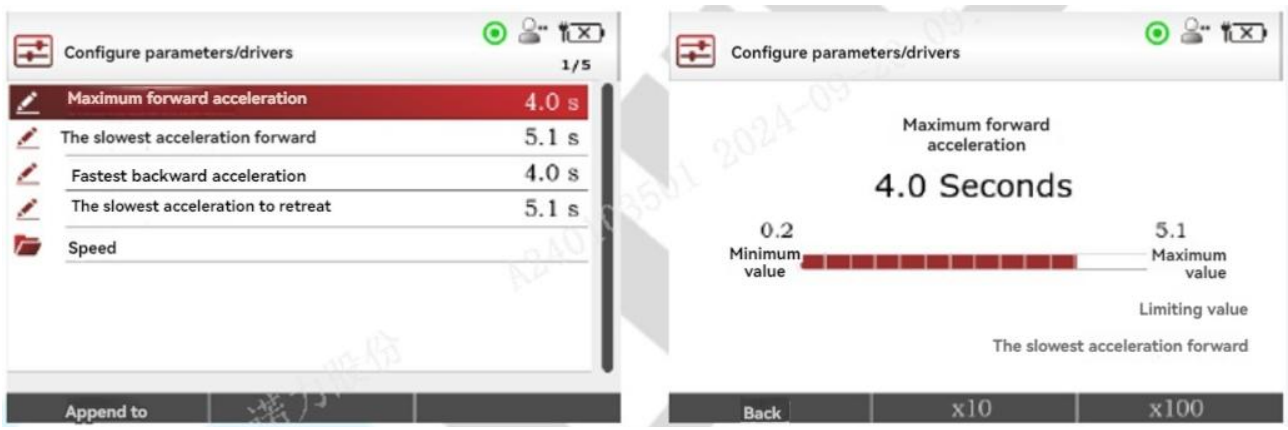
The Driver menu of the controller

Function key bar at the bottom press "x10" and "x100" to change the parameter modification interval, multiplied by 10 times and 100 times respectively. If you press the x10 or x100 key, the background color of the key turns to dark red, indicating that the parameter modification interval is set to 10 times or 100 times. When you press the up and down arrow keys to modify parameter data, the parameters are modified at a 10 times or 100 times modification interval. When you press the x10 or x100 button again, the background color of the key changes back to dark gray, and the

parameter modification interval is restored to the default interval.

For example, as shown in Figure 5.3, the default change interval for the parameter "Fastest acceleration forward" is 0.1s. Press the arrow key to change the parameter data from 8.0s to 7.9s. If you press the "x10" button, the change interval will change to 1.0s. If you press the arrow key, the parameter data will change from 8.0s to 7.0s. If you press the "x100" button, the modification interval will be changed to 10.0s, and if you press the arrow key, the parameter data will be changed from 8.0s to 0.0s (because the minimum value of the parameter is 0.0s, it should be set to -2.0s, but it will be limited to 0.0s); If you need to modify data to a large extent, you are advised to press x10 or x100 before modifying parameter data to improve parameter modification efficiency.

After selecting an item, you can also press the right arrow key to open a detailed Settings screen, which displays the parameter name, current value, and setting range. On this screen, you can directly use x10 or x100 with the up and down arrow keys to change the parameter value, and the change takes effect immediately. Press the OK key, left arrow key, and Back key to return to the menu directory of the previous level.



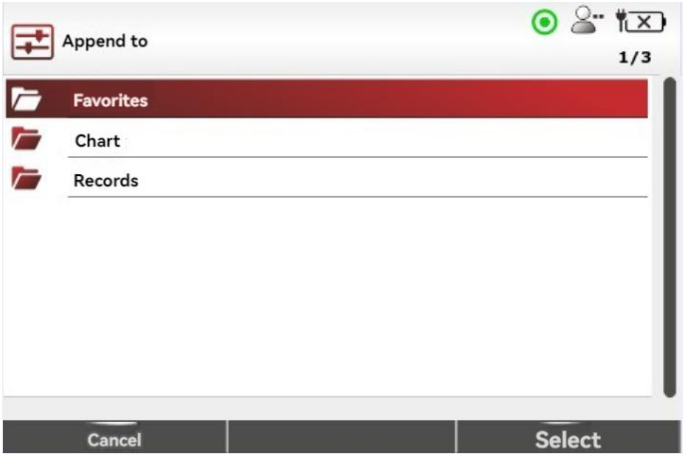
The configuration parameters are set in detail

7.8.3. Soft key description

Set parameters Soft key

Append to

The Add To soft key allows you to add selected items to Favorites, Charts, or Records for easy data observation. For folder entries, you can only add them to Favorites.



Set parameters on the Add To page

Select	Select the location you want to add, such as Favorites, Charts, or Records.
Append	Adds the entry to the selected location.
Complete	Finish adding the entry to the specified location. When you press Done, it will automatically jump back to the configuration parameter The selected entry location.
Cancel	Cancels adding an entry to the specified location.
Delete	Delete an entry that has been added to Favorites, Charts, or Records. About adding to these For deleting locations, see Chapter 9, "Favorites" and Chapter 12, "Chart Records."
Move up Move down	When an entry is added to Favorites, Charts, or Records, you can change the entry in Favorites, Charts, or Records. Chart or Record shows the location of the entry. For moving up and down in these positions, See Chapter 9, "Favorites," and Chapter 12, "Chart Records."
New folder	You can create a new folder in Favorites, Charts, or Records to hold the items you want to add. For creating folders in these locations, see Chapter 9, "Favorites," Chapter 12 "Chart record".

7.9. Data monitoring

Data monitoring application

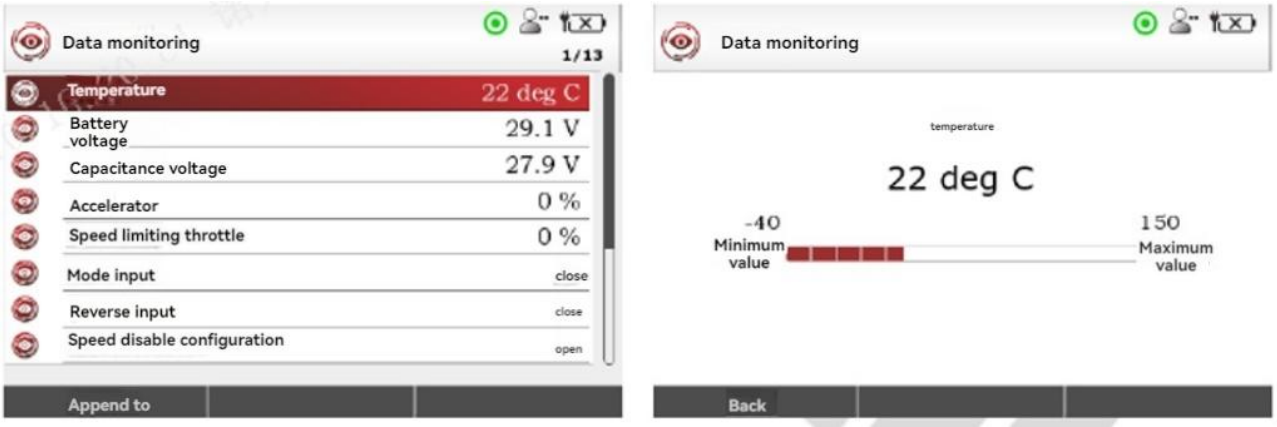
The Data Monitoring application allows you to view all controller monitoring parameters in real time. You are advised to refer to the controller user manual to learn about the monitoring parameters and their meanings. The monitoring parameters displayed depend on the controller model and the access level of the DS13. Different controllers or different access levels may display different parameters. On the home screen, select the "Data Monitoring" icon, and then press "Check" or "OK" to access the application. Press the home key, back key, or left arrow key to return to the home screen.

"Data monitoring" applications are useful in vehicle or system debugging and troubleshooting. You can use the Add To soft key to add monitoring parameters to the Favorites, Charts & Records applications. The procedure is the same as the procedure for "Add to" in the "Configuration Parameters" application.

Data monitoring is added to the page

Like the Configuration Parameters application, the Data Monitoring application follows a multi-layer menu path display structure, and the right slider area also uses an "X/X" format to indicate the location of selected items in the menu.

Select an item in "Data monitoring", press the right arrow key to open a parameter details interface, including the display range of the parameter and the current real-time data value of the parameter. Unlike the "Configuration Parameters" application, after the "Data monitoring" application entry is selected, you cannot press the "OK" key to enter the editing and modification state, because the parameters in the "Data monitoring" application are read-only parameters.

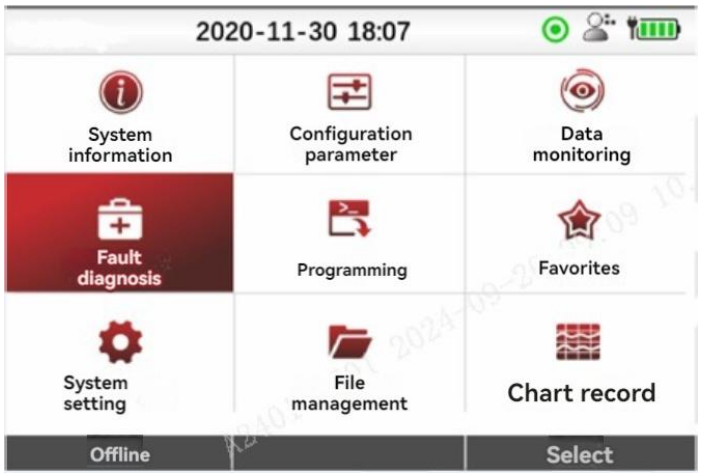


Data monitoring menu

7.9.1. Soft key description

Each monitor parameter entry can be added to Favorites, Charts, or Records using the Add To feature. The procedure is the same as the procedure for "Add to" in the "Configuration Parameters" application.

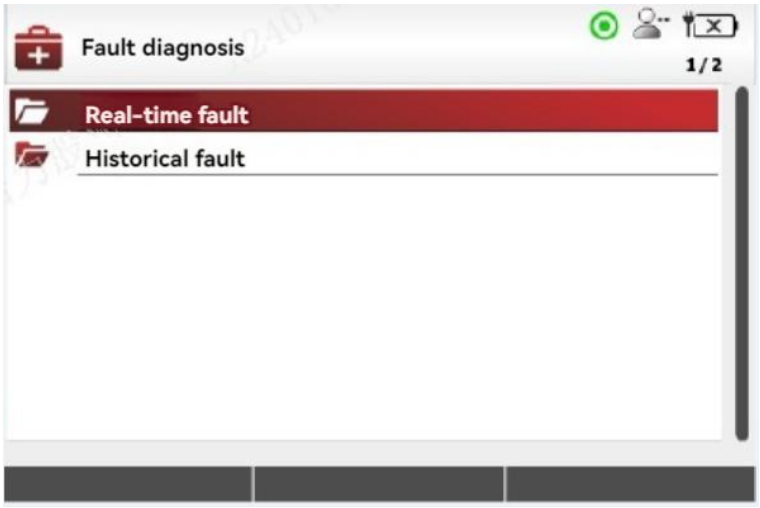
7.10. Fault diagnosis



Troubleshooting application

The "Troubleshooting" application is useful when troubleshooting a vehicle or debugging a system, including "Live faults" and "historical faults." Real-time Faults indicates the faults in the current controller power-on status. When the controller is powered off, the faults may disappear. History Faults reads all faults that have occurred in the controller since the last history fault was cleared. Note that the troubleshooting application reads the fault information stored on controllers. Some controllers may not store the fault information to the storage unit. Therefore, it may fail to read the historical fault information stored on controllers.

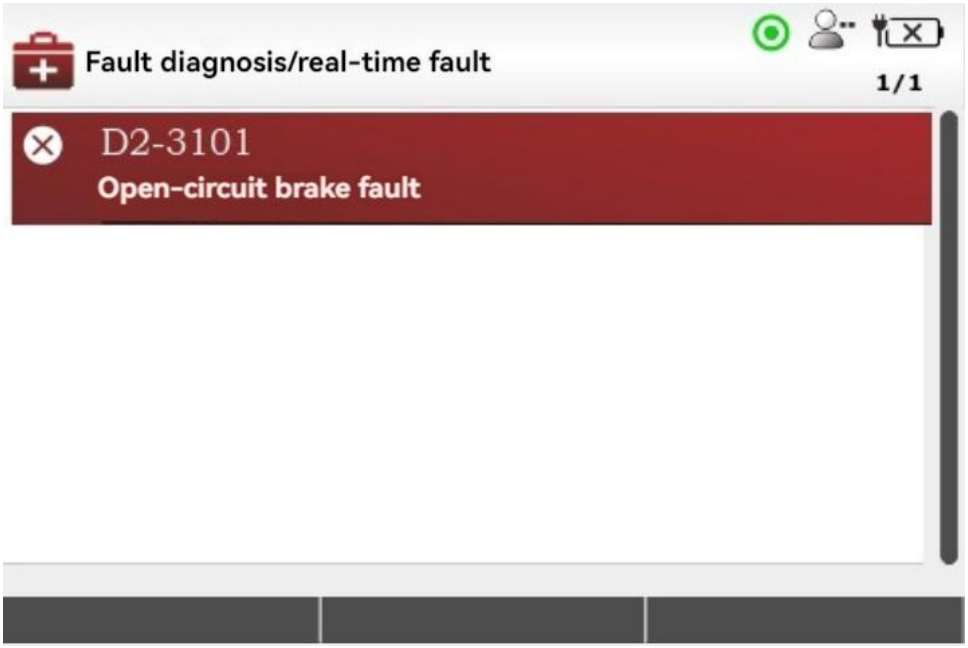
On the home screen, select the Troubleshooting icon, and then press the "Check" or "OK" key to access the application. Press the home key, back key, or left arrow key to return to the home screen.



Real-time faults and historical faults

7.10.1. Real-time fault

All real-time faults are displayed in the list in chronological order The "troubleshooting" application reads the fault information continuously in real-time, as long as the fault exists, it will be displayed in the real-time fault list, and only when the fault is cleared, the fault entry will disappear.



Real-time fault

1/3 in the upper right corner of the preceding figure indicates that the first fault is selected. The first line of each fault entry indicates the controller model to which it is connected.

7.11. Programming

Programming application

The ‘Program’ application contains three options: "Save as dala file", "Load dala file", and "Firmware Upgrade". There is no soft key button at the bottom of the screen. To access the appropriate subroutine, press the "OK" key or the right arrow key directly.

Programming application subroutines

The "Save as dala file" subroutine can export all parameters in the controller as a parameter file (".dala "file), and the parameter file can be saved in the DS13 local memory (16MB) and transferred to a computer or mobile phone via USB cable, or saved directly to a USB flash drive.

The "Load dala file" subroutine can download and write the parameters (".dala "file) to the controller, and the parameter file can be transferred to the DS13 local memory (16MB) via a USB cable, or stored directly on a USB flash drive.

The "Firmware Upgrade" subroutine can upgrade the power controller program (.sc file), and can also store (.sc file) in the DS13 local storage or on a USB flash drive.

Note: The.dala file stored in the DS13 local storage or USB flash drive can be opened and viewed using the DS13 offline mode.

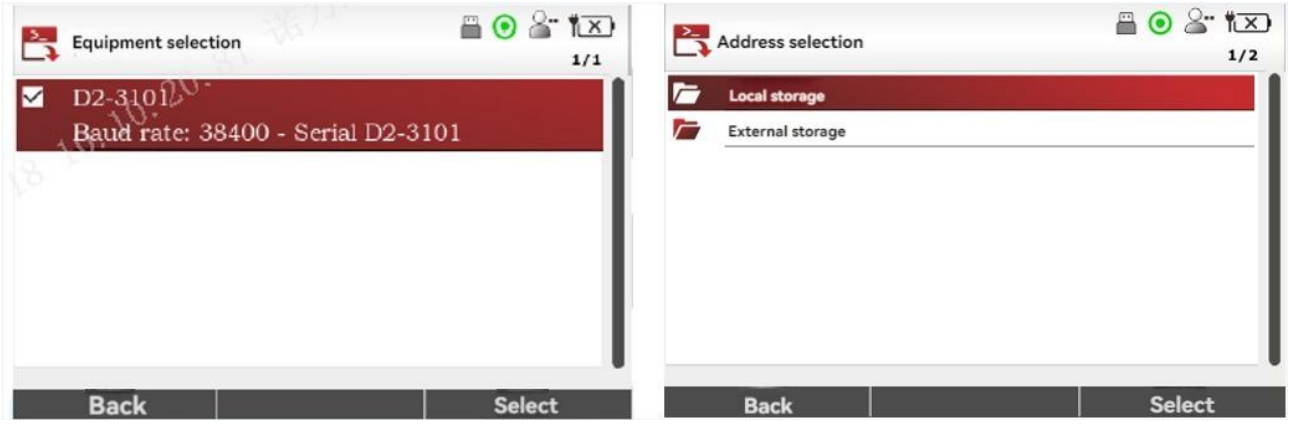
From the home screen, select the Programming icon, and then press the "Check" or "OK" key to access the application. Press the home key, back key, or left arrow key to return to the home screen.

7.11.1. Save as a dala file

The "Save as dala file" subroutine can save the parameters in the controller as a parameter file (".dala "file). This operation will save all the parameters of the controller, even those that are not accessible at the DS13 access level. When parameter data is changed using the Configuration Parameters application, each new value overwrites its previous value, so the.dala file will always keep the latest parameter data values.

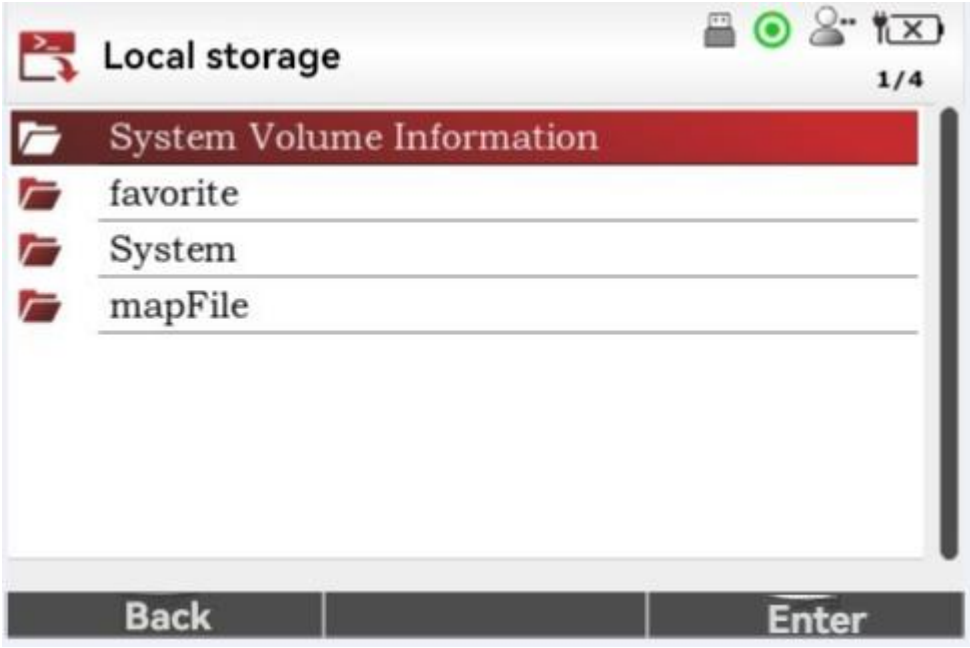
After selecting the item "Save as dala file", press the "OK" key or the right arrow key, the interface of controller model to save as dala file is displayed. By default, there is only one connected controller device, but in some applications with CAN communication connection, several controllers can be listed to select the corresponding controller model.

After you press the OK key or the right arrow key to determine the controller model, the Save as dala file address selection screen will be displayed, which can be stored in local storage (DS13 internal 16MB memory) or external storage (USB flash drive). If no USB flash drive is inserted, only the local storage is displayed. (Note: The storage is on local storage or external storage. The following steps are the same.)



Select device and address

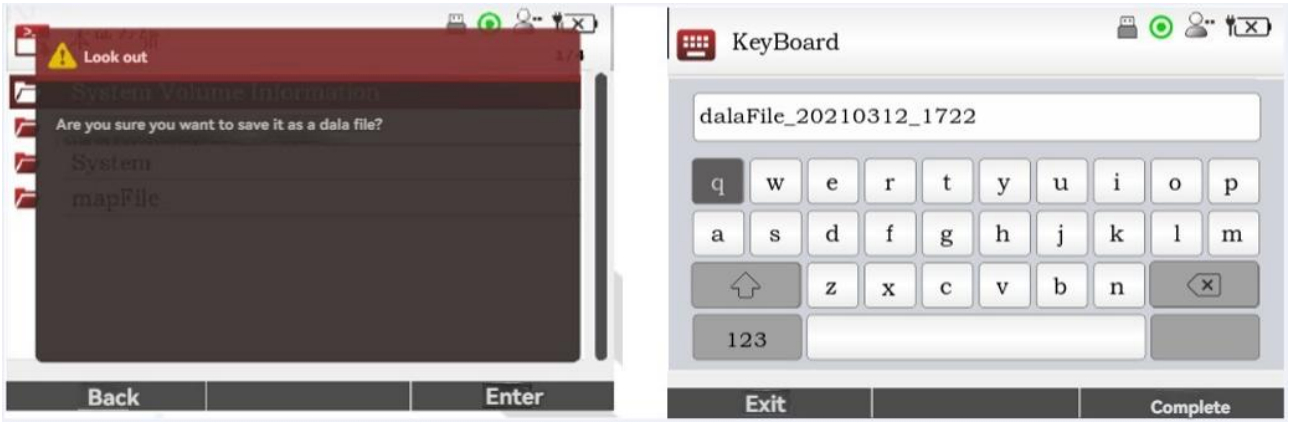
After you press the OK key or the right arrow key to determine the storage location, the corresponding storage location directory is displayed. You can press the OK key or the right arrow key to save the storage to any folder.



Local storage directory

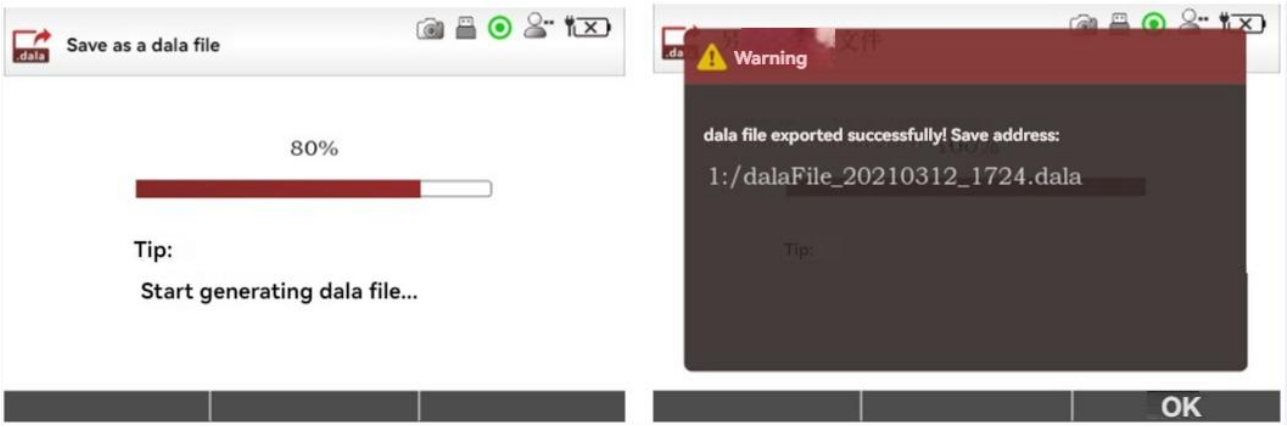
Note: The DS13 file system supports only English characters. Therefore, if the file path or file name in the local storage or USB flash drive contains Chinese characters, it will be displayed as?? This is normal and does not affect file reading. The file name saved as a dala file also supports only English characters.

Press Select (soft key in the upper right corner), and the dialog box "OK to save the dala file" is displayed. After clicking OK, the keyboard operation interface will be displayed, which is to name the dala file to be saved. The default file name of DS13 takes "dalafile+ date" as the file name. Users can directly click the "Finish" software to enter the next step, or modify the default file name by operating the keyboard through the arrow keys and "OK" key (For specific operations on keyboard operations, please refer to Chapter 13 Keyboard). In addition, the text of "Save as" in "System Settings" can also be selected as "none" to cancel the default file name, and manually enter the file name each time.



Enter file name

Note: To save a dala file, you must ask the user to enter the file name. If you do not enter the file name, the "Input characters cannot be empty!" is displayed. Hint. After entering the file name, click "Finish" to start saving the parameter data in the controller to the instruction location. When the saving progress is complete, the system prompts you to save the dala file path. In this case, you can view the newly saved dala file in the File Management application.



The dala file is being generated

If the user chooses to save to local storage, it can be connected to the computer through the USB Type-C conversion cable (Android phone charging cable), the computer will recognize the DS13 as a removable disk, and the user can transfer the saved dala file to the computer through the "Copy", "Paste", "cut" and other tools provided in the computer Explorer. It can also be connected to an Android phone via the included USB Type-C adapter cable, which also recognizes the DS13 as a removable disk, and the user can also transfer dala files to the phone through the file management tool "copy", "paste", "cut", etc.

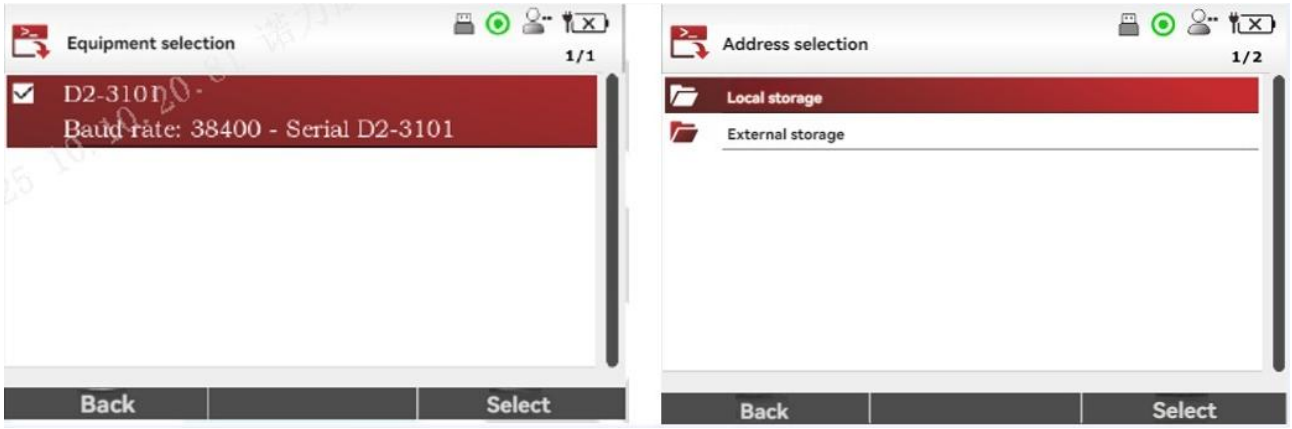
It should be noted that the DS13 local storage capacity is 16MB, please pay attention to the remaining storage space. If the remaining storage space is insufficient, please use DS13 file management (see Chapter 11 File Management) or connect to your phone or computer to delete files to free up storage space.

7.11.2. Loading the dala file

The "Load dala file" subroutine can write and save parameter data in the dala file to the target controller. After the dala file is loaded, all parameters in the target controller, including those that cannot be accessed by the DS13 access level, will be updated to the parameter data values in the dala file. You are advised to load the dala file under the guidance of the OEM, distributor, or support engineer.

Note: The model name and configuration parameter version of the target controller must match the model and configuration parameter version saved in the.dala file. Otherwise, parameter data may be incorrect, causing the controller to fail to run properly.

After selecting the item "Load dala file", press the "OK" key or the right arrow key, and the interface of the target controller model to load dala file will pop up. By default, there is only one connected controller device, but in some applications with CAN communication connection, several controllers can be listed for selection, and users can select the corresponding controller model according to their needs.

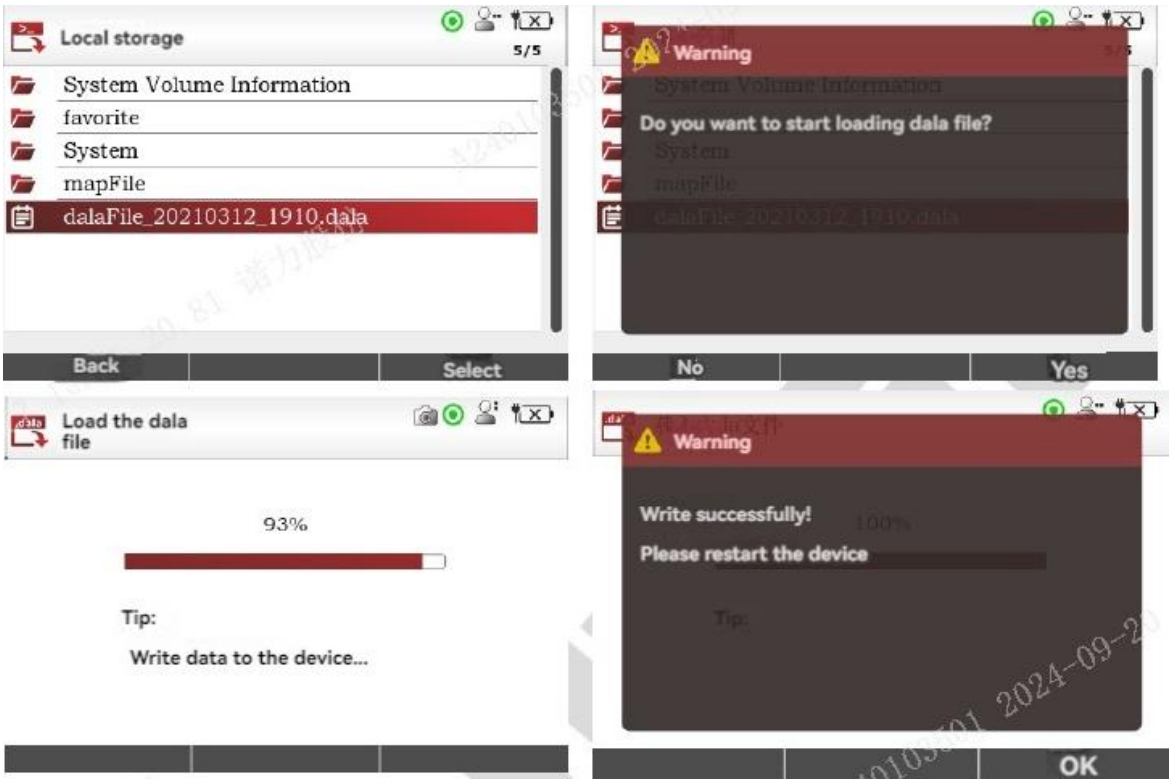


Select device and address

After you press the "OK" key or the right arrow key to determine the controller model, the interface for selecting the address of the dala file will appear. The interface can choose to load the dala file from local storage (internal 16MB memory of DS13) or external storage (USB flash drive). If no USB flash drive is inserted, only the local storage is displayed. (Note: To load dala files from local or external storage, follow the same steps.)

Note: When you choose to load from local storage, you need to connect to your computer or mobile phone via USB cable to transfer dala files to local storage.

Press the "OK" key or the right arrow key to determine the loading location, that is, the corresponding loading location directory. Press arrow keys to confirm the dala file to be loaded, and press Select (soft key in the upper right corner). The dialog box "Confirm to load dala file" is displayed. Click OK to start writing dala file parameters to the target controller. After the loading progress is complete, the message "Write successfully, please restart the device!" is displayed. , restart the controller.

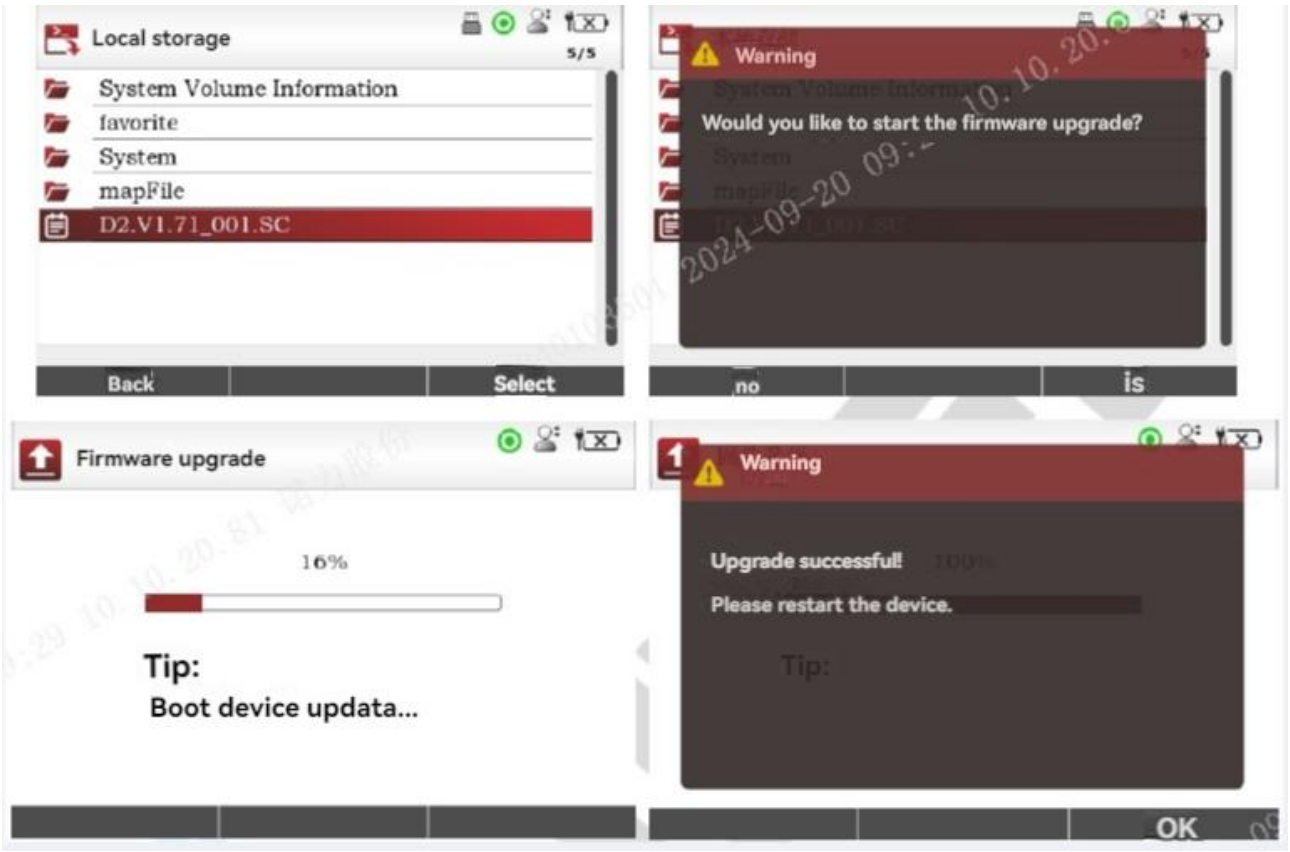


Loading the dala file

Note: The loading process may take several minutes, during which the controller must be kept powered on, and the DS13 must be kept connected to the controller. If the dala file is loaded through a USB flash drive, the USB flash drive must be unplugged. If a power failure, communication disconnection, or USB flash drive is removed occurs during the loading, controller parameters will be lost or incorrect. You need to load dala again until the data is successfully written.

7.11.3. Firmware update

The "Firmware Update" subroutine can upgrade the program of the power motor controller. The upgrade file format is ".sc "file. The operation for selecting the.SC file is the same as that for selecting the dala file when loading dala file. After the.SC file is selected, Confirm the upgrade is displayed, and the firmware upgrade process starts. When the upgrade completed, please restart the device is displayed, the firmware upgrade process starts. If the upgrade is successful, restart the controller.



Firmware upgrade

Attention:

1. The upgrade does not check whether the.SC file matches the controller model. Therefore, manually check whether the.SC file matches the controller model. Do not upgrade the.SC file that does not match the controller to the controller. Otherwise, the controller may become unavailable.

2. The upgrade may take several minutes. During this period, the controller must be powered on and the communication between the DS13 and the controller must be maintained. If the upgrade is performed using a USB flash drive, ensure that the USB flash drive is not removed. If a power failure, communication disconnection, or USB flash drive is removed during the upgrade, the controller may become unavailable.

If the fault occurs, contact technical after-sales service engineers.

7.12. Favorites

Favorites

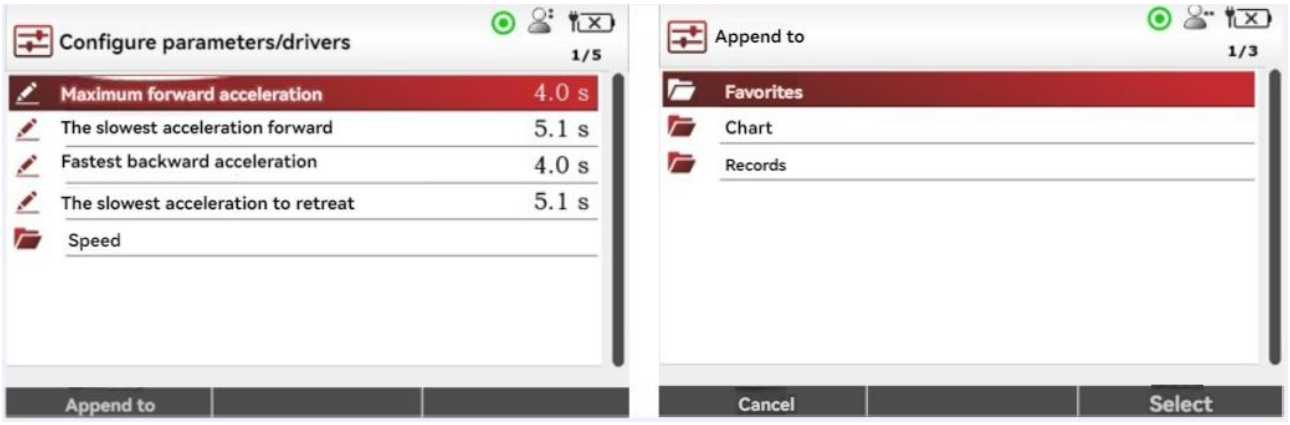
The Favorites application builds custom parameter sets and monitor variables without having to open and browse multiple Configure Parameters and Monitor Parameters menus at a time, making it easy to view or modify the parameters and monitor variables that the controller focuses on. You can add parameters that need to be adjusted frequently and monitoring variables that need to be checked periodically to the Favorites folder. On the home screen, select Favorites or press Favorites on any screen to access the Favorites folder and view related parameters and monitoring variables. Parameters and monitoring variables added to the favorites folder cannot be renamed or modified.

Making parameter data changes in the Favorites application is the same as making changes in the Configure Parameters application. Favorites allows the user to add an entire folder, and all the items inside the folder are added together. The items added to the favorites folder match the corresponding controller model. If the controller model does not match, the favorites folder will not be displayed. For example, when the D2 controller is connected, the specified items are added to the favorites folder, and the D2S controller is connected, the specified items will not be displayed in the favorites folder.

On the home screen, select the Favorites icon and press the Select or OK key to go to the application, or on any screen, press the Favorites soft key to go to the application directly. Press the home key, back key, or left arrow key to return to the home screen.

7.12.1. Add new entry

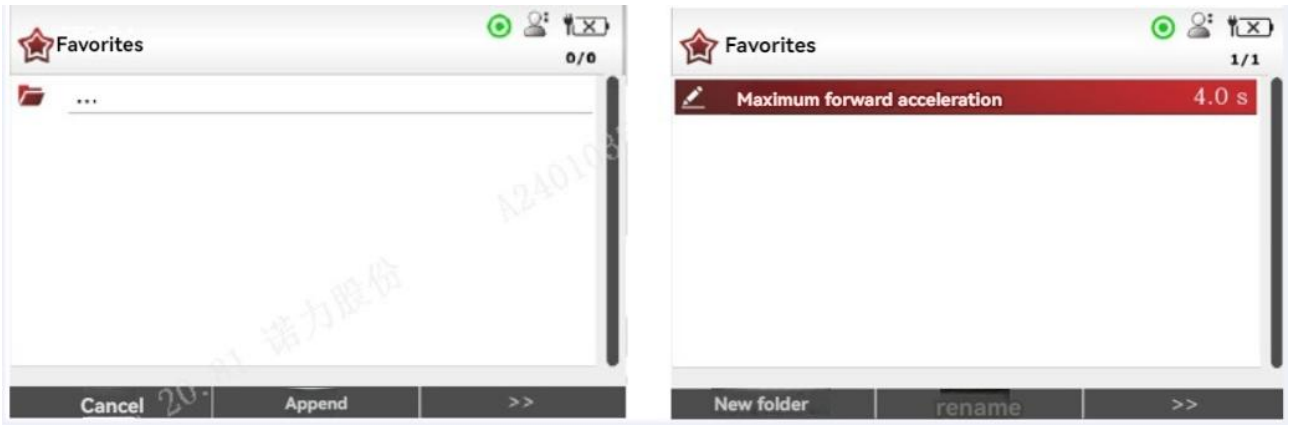
To add a new entry to Favorites, go to the Configuration Parameters or Data Monitoring application, select the parameter or monitoring variable entry to be added, and then select the Add To soft key. The Add To page prompts you to select a location to add to, including Favorites, Charts, and Records. If the items to be added are in a folder, they can only be added to Favorites.



Add to Favorites

Select Favorites and press the OK key, right arrow key, or Select soft key to open the Favorites menu and a series of new function keys.

Press the soft key Add to add a new entry to the current directory of the Favorites. If there are already multiple menu folder entries under the Favorites, you can press the arrow keys and the right arrow key to enter the specified folder entry, and then press the "Add" key, and the new entry will be added to the folder of the instruction.



Add to Favorites

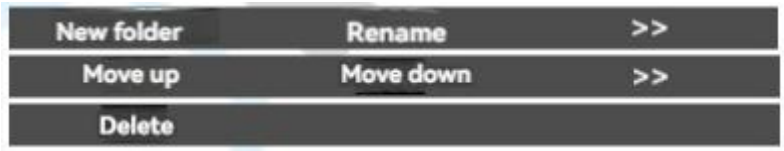
To add a new entry to a new folder, press the ">>" soft key to switch to the "New Folder" soft key option. Press the soft key "New Folder" to display the keyboard interface. Press the arrow keys and "OK" key to enter the name of the new folder, and click "Finish" to create the folder successfully. Press the "OK" key or the right arrow key to enter the folder, then press the ">>" soft key to return to the "Add" software option, click the "Add" soft key, new items will be added to the newly created folder.

Press the soft key Finish. The operation is complete. The screen will automatically return to the selected Add to Favorites parameter or monitor variable entry in the Config Parameters or Data Monitoring application.

Add parameters to a new folder under Favorites

Press "Cancel" to cancel the add to Favorites operation, the interface will automatically return to the "Configuration Parameters" or "Data monitoring" application, the selected Add to Favorites parameters or monitoring variables entry.

7.12.2. Soft key usage



Favorites soft key

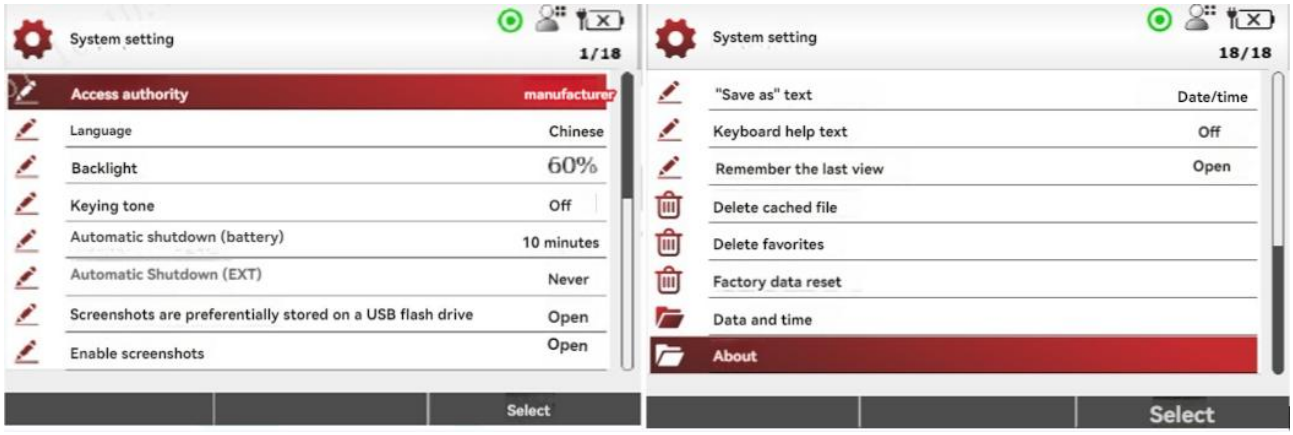
Soft key name	Instructions
>>	Indicates that more functional soft key options are available. You can switch to the next functional soft key option.
New folder	Allows users to create a new folder in the current directory. DS13 supports a maximum of 10 new folders, each folder can hold a maximum of 50 entries.
Move up/down	Allows the user to move the relative position of the selected item in the current directory.
Delete	The entry will be deleted directly. Press "Delete" button will not pop up a prompt confirmation window, please confirm in advance before deleting.
Rename	This parameter takes effect only for newly created folder entries. For configuration parameter entries or monitoring variable entries, or folder entries added from Configuration Parameter or Data Monitoring, this parameter is gray and cannot be clicked.

If the selected item is a configuration parameter item, press the OK key to enter the editing mode, and press the up and down arrow keys to modify the parameter data.

7.13. System setting

System information application

The "System Settings" application allows you to set the functional parameters and operations of the DS13 itself, independent of the connected controller Settings, and contains 18 Settings entries.



System information item

On the Home page, select the System Settings icon, and then press the Select or OK key to enter the application. Press the home screen key, return key, or left arrow key to return to the home screen.

7.13.1. Access authority

You can set the access permission level of the DS13, advanced access permission, you can view more advanced parameters of the controller, the richer the parameter list menu displayed in the "Configuration Parameters" and "Data Monitoring" applications.

Permissions (from highest to lowest) are manufacturer, distributor, service, user, and tourist, and users can only set permissions lower than their level. The default access permission is manufacturer permission.

7.13.2. Language

English and Chinese are supported. The default language is Chinese.

7.13.3. Backlight

DS13 LCD screen backlight brightness can be set. The value ranges from 20% to 100%, and the adjustment increments are 5%. The default setting is 60%.

When the DS13 is powered by AA battery, the maximum LCD screen brightness is set to 40%. When the key is not operated for 30 seconds, the LCD screen brightness is automatically reduced to 25% to prolong the battery power supply time.

7.13.4. Automatic shutdown (battery)

When the DS13 uses AA battery power supply, the DS13 can be set to automatically shut down after a period of no operation of the key. The automatic shutdown (battery) time can be set to 5, 10, 20, 30, and 60 minutes. The default is 10 minutes. The shorter the setting time, the longer the battery supply time.

7.13.5. Automatic Shutdown (EXT)

When the DS13 is powered by the controller, the DS13 can automatically shut down after the key is not operated for a period of time. The automatic shutdown (EXT) time can be set to 15, 30, 60, 120 minutes or never, with the default setting being never.

7.13.6. Screenshot are preferentially stored on a USB flash drive

If you set this parameter to Open, after inserting a USB flash drive, screenshots are automatically preferently stored on the USB flash drive to save local storage space. The default setting is On.

7.13.7. Enable screenshots

When set to Open, press the power button + upper left soft key to start the screenshot. The screenshot operation lasts about 30 seconds. If this parameter is set to Off, the screenshot function is disabled. The default setting is On.

7.13.8. Log and plot scanning time

Set the sample rate for the recording and plotting functions. The Settings range from 500 milliseconds to 60 seconds. The default setting is 500 milliseconds.

7.13.9. Only empty batteries are displayed

Set to "On" and the battery icon will always be displayed in the top status bar. If it is set to Off, the battery icon is displayed only when the AA battery is depleted. The default setting is On.

7.13.10. "Save as" text

If you set the default file name of Save as dalafile to Date/Time, the keyboard screen will be displayed during the Save as dalafile operation, and the default file name will be automatically filled in dalafile+ Datetime format. If this parameter is set to None, the keyboard screen is displayed. By default, the file name field is blank. Default setting is "Date/Time".

7.13.11. Remember the last view

When the setting is "Open", if you press the "Home Screen" key to exit the "Configuration Parameters" or "Data Monitoring" application, the next time you enter the application from the home screen, the last selected item will be directly located.

When set to "Off", entering the "Configuration Parameters" or "Data Monitoring" application from the main screen will always select the first item in the current menu list. The default setting is On.

Note: If the DS13 is turned off (for example, if the controller is restarted or the communication cable is unplugged), the last one is stored

The entry location will be lost. Even if Remember Last View is set to On, a new Remember Last View will start every time you reboot.

7.13.12. Delete cached file

Check "Delete cache files" and press "Check", the right arrow key, or the "OK" key to delete all parameter files loaded from the controller, not just the currently connected controller cache files. Deleting the cache file frees up local storage space, but it takes longer to load the controller parameter file on the next connection.

7.13.13. Delete favorites

Select Delete Favorites and press Select, the right arrow key, or the OK key. All favorites of the controller will be deleted and take effect only after the controller is restarted.

7.13.14. Factory data reset

Select "Delete Favorites", press "Select", right arrow key or "OK" key, the prompt "Confirm whether to restore factory Settings" will pop up, click "OK" will restore all items set by the system

to factory default values, and delete cache files and favorites files at the same time.。

7.13.15. Data and time

This folder contains the following eight items.

"Top display Date Time" : Set to "On", the date and time will be displayed in the top status bar of the main screen. If this parameter is set to Off, the date and time are not displayed. 12 hour /24 hour: Select a time display format. Date Format: The year can appear in either the first or last digit. The month can appear before or after a day. Year, Month, Day, Hour, minute: The date and time in the local time zone can be set. After adjusting these Settings, selecting the "Home Screen" button will display the selected date and time in the home screen, with seconds starting at 00.

7.13.16. About

Contains DS13 version information, such as main program version, data version, hardware version, bootstrap version, etc.

7.14. File management

File management application

"File Management" application for managing local storage and USB flash drive files. You can browse the local storage and USB flash drive file directories, and perform file operations on the

files, such as "copy", "paste", "move", "delete", and so on.

Note: "Copy", "paste", "move" is only carried out inside the memory, and cannot be copied, pasted, deleted, or moved between external storage (USB flash drive) and local storage. To achieve data transfer between the USB flash drive and local storage, please connect to the computer through the USB cable, transfer the data to the computer or mobile phone, and then data transfer.

On the home screen, select the File Management icon, and then press the Select or OK key to enter the application. Press the home key, back key, or left arrow key to return to the home screen.

7.15. Soft key usage

Soft key for file management

Name	Instructions
Copy	Copy the selected entry. After you press Copy, the function key option changes to Paste or Cancel. Canceling terminates the copy operation.
Paste	Paste the copied entry into the selected location.
Move	Moves the selected item (file or folder) to another folder. After pressing the Move key,. The function key option changes to "Insert" or "Cancel ", canceling will terminate the move operation.
Insert	Insert an entry to move it to a new location.
Delete	If you want to delete the selected item, a message will be displayed asking you whether to delete it.

7.16. Charts & Records

Chart & record application

The Chart & Record application contains the Chart subroutine and the Record subroutine.

The "Chart" subroutine allows users to add monitoring variables, and graphically draw the curve of monitoring variables over time, which is convenient for users to debug and test the vehicle, and can save the diagram using the screen; The "Record" subroutine allows users to add monitoring variables and record the data changes of monitoring variables over time in the format of ".csv ". You can also transfer the ".csv "file to a computer and use the EXCEL program on the computer to view the curve of variable changes over time.

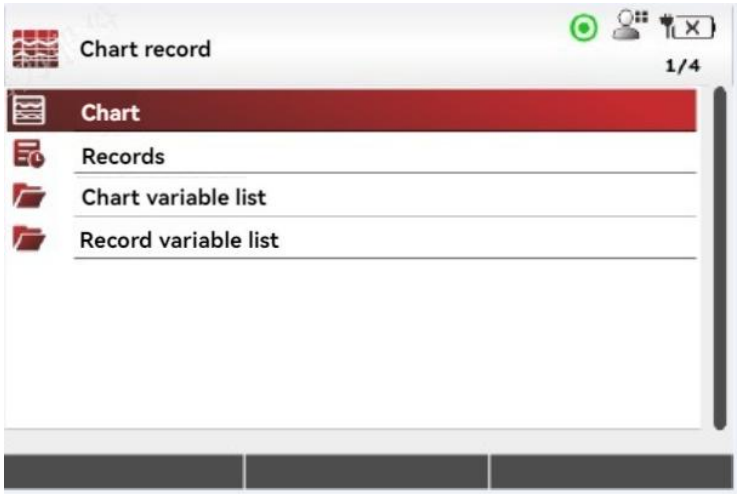


Chart & record subroutine

On the Home page, select the Chart & Record icon, and then press the Check or OK key to enter the application. Press the home key, back key, or left arrow key to return to the home screen.

7.16.1. Add charts and record variables

To add a new entry to Charts or Records, first go to the Configuration Parameters or Data Monitoring application, select the parameter or monitoring variable entry to be added, and then select the Add To soft key. The Add To page prompts you to select a location to add to, including Favorites, Charts, and Records.

Select "Chart" or "Record" and press the "OK" key, right arrow key, or "Check" soft key to open the "Chart" or "Record" menu and a series of new function keys.

Press the "Add" soft key to add a new entry to the current directory of the "Charts" or "Records" program. Unlike the "Favorites" application, the "Charts" or "records" does not allow the user to create a new folder, only to add it to its root directory.

Press the soft key "Finish" to add the operation to "Chart" or "Record". The interface will automatically return to the selected parameter or monitoring variable entry added to Chart or Record in the Configuration Parameters or Data Monitoring application.

Add chart variable

Press "Cancel" to cancel the add to "Chart" or "Record" operation, and the interface will

automatically return to the selected Add to "Chart" or "Record" parameter or monitoring variable entry in the "Configuration Parameters" or "Data monitoring" application.

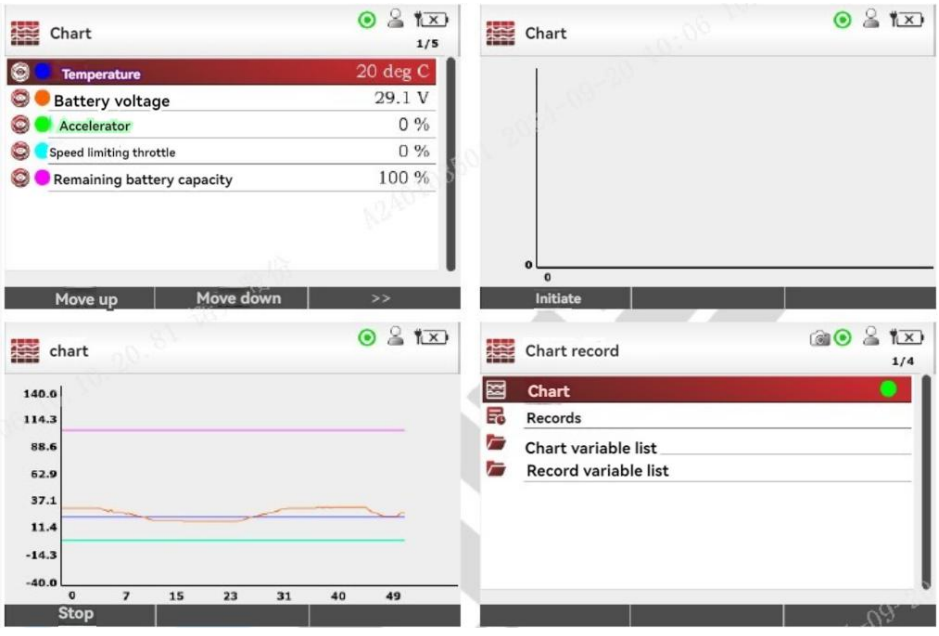
Note: A maximum of 5 entries can be added in the "Chart Variable List" and a maximum of 8 entries can be added in the "Log Variable List". If the number of entries exceeds the limit, the message "Cannot add more variables, please delete existing parameters first" will be displayed. Select the item and press "Delete" to delete it.

The user can set the sampling interval of the chart and record subroutine, the smaller the sampling interval, the more sampling points, which can be set in the system Settings.

7.16.2. Drawing

Select the "Chart" entry and press the "OK" key or the right arrow key to open the drawing program. If no chart list variable is added, the prompt "Please add a parameter to the chart list first!" will be displayed.

Press the "Start" key to start the drawing curve. When the drawn data curve reaches the right side of the screen, the entire drawing screen will be refreshed and the drawing will continue from the left side. After the drawing starts, you can press the left arrow key or the "back key" to exit the drawing interface, and a green circle will flash to the right of the "Chart" entry, indicating that the drawing curve is still in progress.



Drawing program

To stop the drawing program, go to the Chart entry again and press the Stop key to end the drawing.

In the drawing program, when there are multiple curves drawn, each curve will be distinguished by a different color, due to the interface size limit, each color curve represents the parameter or monitoring variable name, will not be displayed in the drawing program. To see the variables corresponding to the color curve, press the left arrow key or the "Back key" to go back to the previous menu, and press the right arrow or the "OK" key to go to the "Chart Variable List." The colored circle next to each entry in the list shows the curve color that will be used in the plot for that item. The colors are arranged in a fixed order. If the entry uses a specific color, use the "Move up" and "Move down" keys to adjust the color.

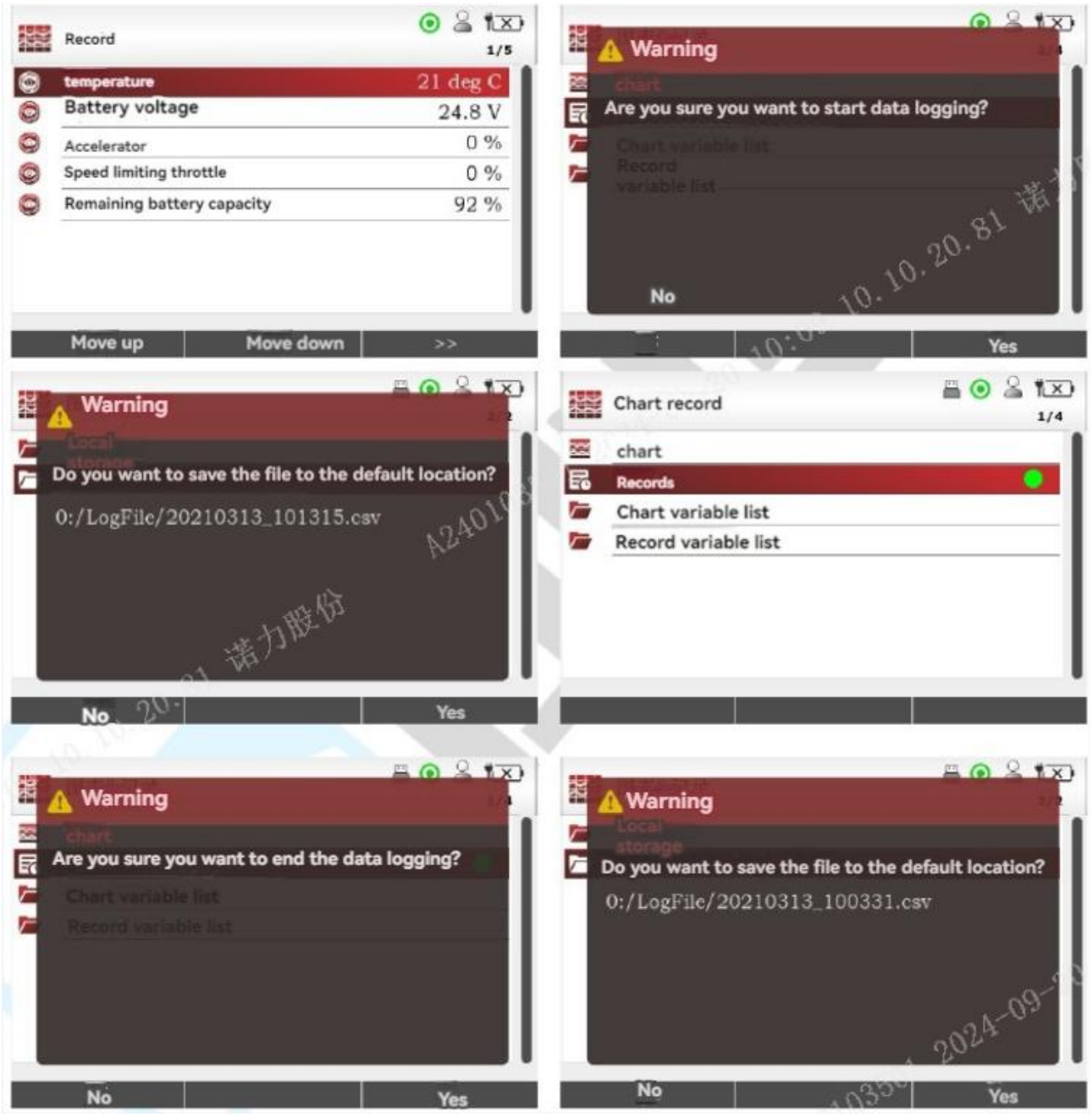
Use the Screenshot application to save the drawing image. The screenshots will be saved to the local storage or USB flash drive. The saved screenshots file (.bmp file) cannot be opened using DS13, and must be connected to the computer or mobile phone through the USB cable for viewing.

7.16.3. Recording

Select the "record" entry, press the "OK" key or the right arrow key to open the record record program, if the record list variable is not added, it will prompt "Please add a parameter to the record list first!" . At first, a prompt window will pop up, confirm whether to start, click "yes", will pop up the save record (.csv) file directory interface, select the local storage or USB flash drive, pop up the prompt window, confirm the save path, click "yes", start recording data.

When you start recording, a green circle will flash to the right of the Record entry, indicating that the record logger is running. In this case, the user can switch to another page.

To stop the logging program, select the "logging" entry again and press the "OK" key or the right arrow key to end the logging. By default, the.csv file is named after the time in the LogFile folder of the selected storage disk folder. You can view the file Management application. The saved record record (.csv) file cannot be opened using DS13 and must be viewed by connecting to a computer or mobile phone via a USB cable.

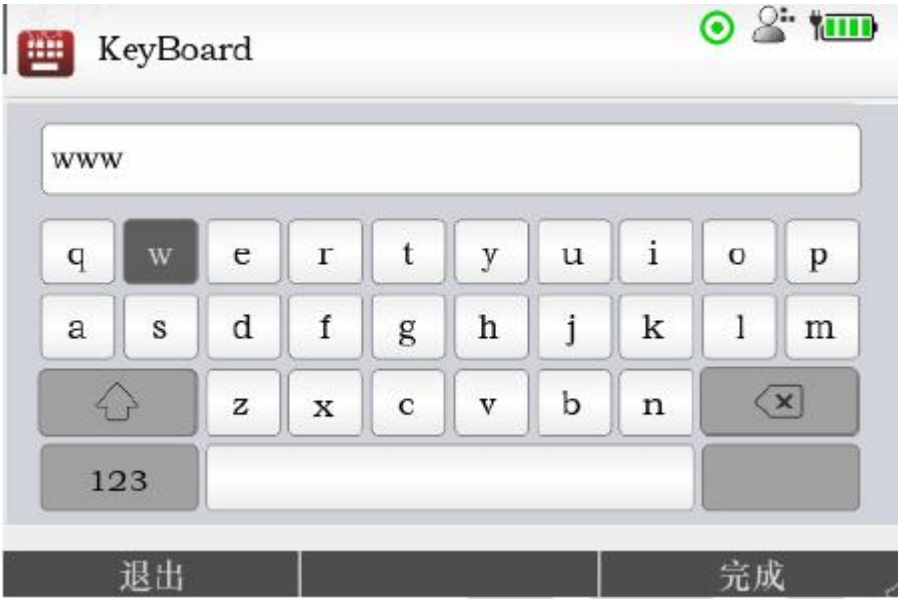


Recording program

In the Record Variable List, parameters can be selected and their values changed following the same process described in the parameter application. Select parameters and press the "OK" key or the right arrow key to open the detailed Settings screen.

Adjust the parameters, and then use the left arrow keys to return to the Drawing Variables List. The change takes effect immediately and updates any other places where the parameter is displayed.

7.17. Keyboard



Keyboard operation

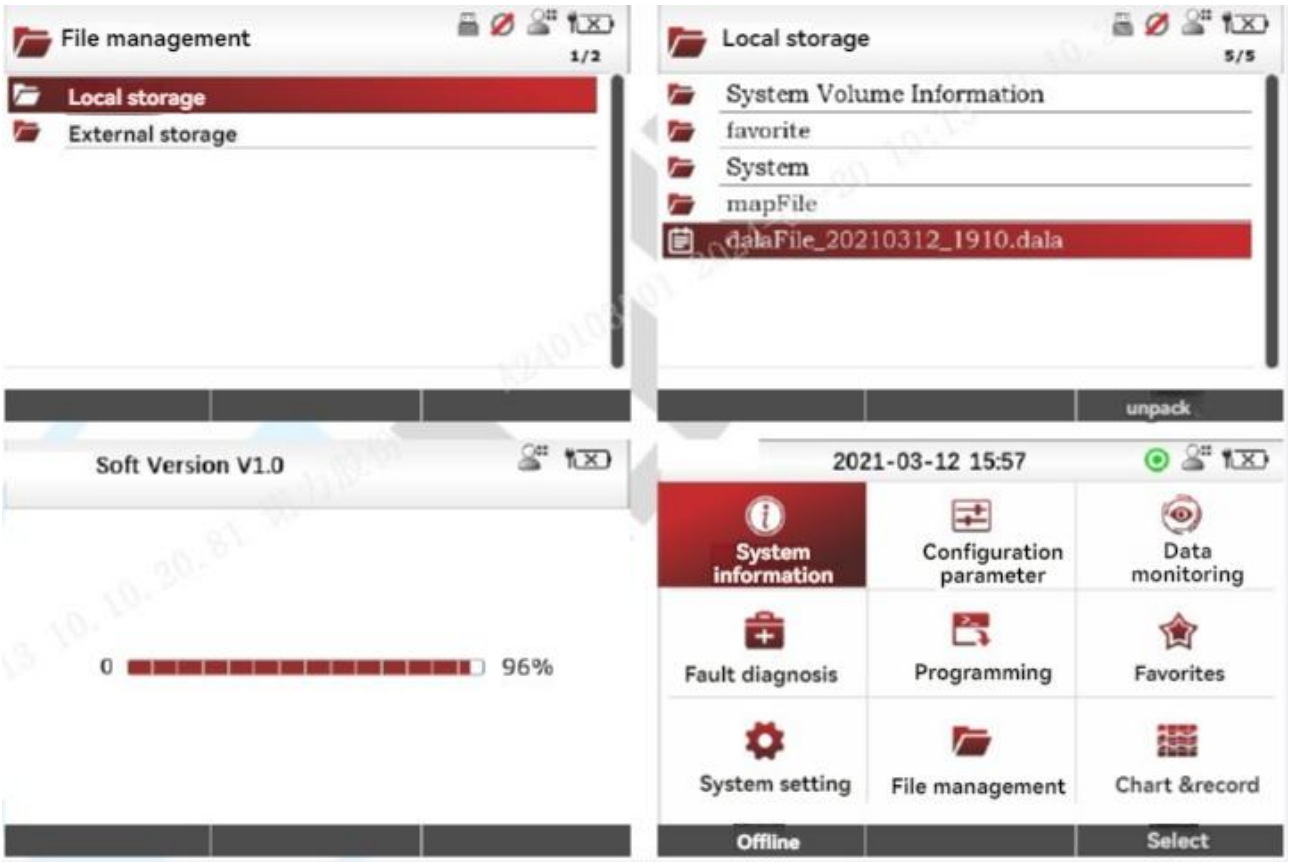
"Program" and "Favorites" applications, you can create new files/folders or rename folders, when the operation will pop up the keyboard interface to enter characters. The style of the keyboard interface, similar to the style of the PC keyboard, uses the arrow keys to move over the keyboard buttons, and uses the "OK" key to select the buttons. The arrow keys move repeatedly. For example, if the selected character a is selected, press the left arrow key to select the character m. Select the middle character "q" and press the up arrow key to select a number button.

Symbolic name	Icon	Instructions
Character switch button	⇧	When in the letter keyboard, press the "OK" key to "ABC->abc" and "." Switch between abc->ABC"; When in the number and symbol keyboard,. Press the "OK" key to display all numbers and symbols.
Character delete button	⌫	Delete the entered characters.
Number button	123	Indicates that you can switch to number and symbol keyboards. Press the "OK" key for numeric symbols. Switch between and alphabet keyboard.
Letter button	ABC	Indicates that you can switch to the letter keyboard.

7.18. Off-line mode

In offline mode, you can open the.dala file on the local storage device or USB flash drive offline when the controller is not connected. After the file is successfully loaded, you can view the parameter data values in the.dala file, modify the parameter data, and save the file to the same or new. When DS13 connects to the controller again, these files can be downloaded to the controller. After successfully loading to the offline main interface, the DS13 can also be set up.

To enter the offline mode, do not connect the DS13 communication cable to the controller, and use the AA battery or USB Type-C cable to connect to the charging bank for power supply. In this case, you can press the "File Management" key on the initial screen to open the local storage or USB flash drive storage directory, and select the.dala file to be loaded. Press the "Open" key, the loading progress bar will appear, the loading is complete, that is, the main interface of the nine Gong grid in offline mode. In the status bar at the top of the main interface, the connection status icon is displayed, indicating that the controller is not connected offline. The main screen in offline mode cannot run the Charts & Records application, the icon is gray.



Offline mode interface

On the offline mode main screen, you can enter the Configuration Parameter application to view configuration parameter information. You can adjust or edit configuration parameter entries in the same way as adjusting or editing configuration parameters in online connection mode. For details, see Section 5.2 Adjusting/Editing Parameters.

The only difference is that in online connection mode, parameter modification will be immediately sent to the controller and take effect immediately, while in offline mode, parameter modification will not be sent to the controller, but a temporary cache will be created. When the modification is returned to the offline main interface, the "Save" key will appear in the bottom function key area to remind the user whether to save, click "Save". The temporarily cached data is written back to the dala file.

7.19. Service and support

DS13 can handle the following types of files. Here, in alphabetical order by extension.

.CSV	Record the data file of the logger, which can be opened on a PC using the spreadsheet software Excel.
.dala	Controller parameter file. These files contain Settings for tunable parameters. You can use "Save as dala file" under the "Programming" application Create the parameter file of the controller, you can also use the "load dala file" to store the parameter file locally or on the USB disk The download is written to the controller.
.SC	Upgrade file. Contains firmware files for the upgrade controller and firmware files for the upgrade DS13 itself.

Content	Parameter
Display screen	3.5 "color IPS LCD
Input voltage range	9~55V
Input power	1W
Communication interface	UART / CAN
Upgrade	Support USB flash drive upgrade
Storage capacity	16MB
Battery connection	Support (AA battery *2)
Operating temperature range	-20~50℃
Storage temperature range	-40~85℃
Weight	0.23kg