

A Series

Pallet Jack

CBD15-WS CBD15-WS-I CBD20-WD CBD20-WD-I

OPERATION AND MAINTENANCE

MANUAL



HANGCHA GROUP CO., LTD. March 2023

Preface

Thank you for purchasing this mini pallet jack manufactured by HANGCHA GROUP CO., LTD.

The mini pallet jack is a new product developed by HANGCHA GROUP CO., LTD for the warehousing and logistics industry. With the latest brushed DC driving technology, it features stable performance, easy operation, high safety and reliability and low maintenance costs. It is the perfect tool for handling pallets in warehouses, supermarkets, workshops and courtyards.

Please read this manual thoroughly to understand how to use and maintain the pallet jack safely.

Refer to Part I of this manual which describes the safe operation and preventive maintenance to understand how to use the pallet jack properly; and refer to Part II for the structure, working principles and maintenance of the pallet jack. In order to ensure safety and make full use of the performance of the pallet jack you have purchased, the operators and maintenance personnel concerned must read this manual thoroughly before using it.

Some contents in this manual may be different from your pallet jack due to continuous design updates and product improvements.

For any queries, please contact the sales company or agent of HANGCHA GROUP CO., LTD.

C March 2023, HANGCHA GROUP CO., LTD.

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Part I: Operation and Maintenance

1 Instructions for use

1.1 Overview

The pallet jack in this manual is only intended for lifting/lowering or handling cargo.

Users must operate and maintain the pallet jack according to this manual. Do not use the pallet jack for purposes not mentioned in this manual as it may cause personal injury or even death, or cause damage to the pallet jack and other property.

1.2 Operation rules

- Pick up and arrange cargo in pallets.
- Transport the cargo in pallets.
- Do not carry people.
- Do not overload.
- Do not push or pull the cargo.
- Do not use multiple pallet jacks on the same cargo.

1.3 Application environments

 The pallet jack is only to be used in specific areas such as factory plants, tourist attractions and amusement parks, etc.

The pallet jack can only be used on solid and flat ground with sufficient load-bearing capacity.

 $-\,$ The pallet picker can only be used on driving roads with good visibility and the permission of the operator.

- The pallet picker should be used within the specified rated load.
- The mean ambient temperature under continuous operation conditions is +25 °C.
- − The maximum short term ambient temperature (\leq 1h) is +40°C.
- The minimum ambient temperature under normal indoor conditions is +5°C.
- The minimum ambient temperature under normal outdoor conditions is -20°C.
- Altitude ≤ 2000m.
- The maximum gradeability when driving with a full load is 6%.

- Do not drive laterally or diagonally when going uphill. When driving uphill with goods, the forklift must move forward; when going downhill, it must move backward.

📥 Warning

• Do not use this mini pallet jack in explosion-proof places.

• When this forklift is used in extreme environments, e.g. cold stores, additional special equipment must be installed with the permission of the manufacturer.

• In strong winds, it is safer not to carry out high lifting operations to avoid goods falling or the vehicle overturning.

1.4 Obligations and responsibilities of the User

In this manual, the pallet jack User refers to any natural or legal person who directly uses or appoints another person to use the pallet jack. In special cases such as leasing or renting, the pallet jack User refers to the party who assumes the specified operational obligations according to the terms of the contract between the pallet jack owner and the user.

The pallet jack User must ensure that the pallet jack is used only for the specified purpose and that any hazard that may risk the life and health of the user or a third party should be eliminated in a timely manner. In addition, the pallet jack User must strictly observe accident prevention regulations, other

technical safety regulations, and guidelines for the operation, maintenance and repair of the pallet jack. The pallet jack User must ensure that all operators read and fully understand the content in this manual.

Failure to comply with this manual will automatically void our warranty. We are also not responsible for any damage or losses caused by the user and/or third parties who perform unauthorized operations on the truck without our permission.

1.5 Installation of attachments or modification of the pallet jack

No private modification of the mini pallet jack is allowed without the authorization of the manufacturer. If it is necessary to install or add additional devices that affect or add new functions to the mini pallet stacker, prior written consent must be obtained from the manufacturer. Depending on the actual situation, the approval and consent of the local authorities may also be required.

Any modification or refit of the vehicle that affects its performance, such as the rated capacity, stability, or safety is not permitted without prior written approval of the original manufacturer, its authorized representative, or its successor. The aforementioned modifications include modifications or refit of the braking, steering and visibility devices, and the addition of removable attachments. When the manufacturer or its successor approves any modifications to the pallet stacker, its nameplate, signs/labels, identification and user's manual should also be modified accordingly.

Only if the original manufacturer is no longer in the pallet jack industry and no other enterprise has taken over the business is the user is allowed to make modifications to the pallet jack, but the user should comply with the following rules:

a) Entrust engineers specialized in industrial pallet jack's safety for the design, test and execution of the modification or refit.

b) Keep a permanent record of the design, test and execution of the modification or refit.

c) Modified its nameplate, signs/labels, identification and user's manual accordingly.

d) Fix a permanent and visible sign on the pallet jack, which states that it has been modified or refitted and indicates the date of modification or refit and the name & address of the organization that completed the work.

2 Pallet jack introductions

2.1 Overview

This manual introduces the mini pallet jack, which is suitable for use in places with relatively low work intensity for less than 1 hour of continuous work duration.

Users can get the rated load and other related information from the product model.

Model	Meaning
CBD	Pallet jack
15/20	Rated load x100kg



2.2 Functions

Pallet jack body

- The body is small and compact with a simple and streamlined structure.
- Manufactured using steel plate stamping processes, it is strong and durable.

Driving system

- It features a gear-type driving mechanism with a compact structure and high power.
- It is equipped with a permanent magnet drive motor with excellent performance.
- It also features a high-performance electromagnetic brake.

Electrical system

- 24V/48V Electrical system.
- Equipped with a domestic permanent magnet control system with excellent control performance and high

efficiency & stability.

Comfortable

- With a reliable, simple and attractive domestic control handle, all operations can be easily done with one

hand.

- It is also equipped with a charger and a maintenance-free colloidal battery, and it is easy to operate.
- It is small, portable, and easy to operate. With an upright walking function, it can work in a very small space,

for example a container.

- The standard fork height is 80mm, the guiding device makes it more convenient to enter

and exit the pallet (including closed pallets).

- The battery can be removed from the front for easy replacement.

Reliable

- With a dedicated three-pivot design and a side support system, it is safe and reliable.
- Its optimized lifting rod system works smoothly and reliably.

- The whole system adopts high quality connectors, and all wires and cables are fully protected, which greatly

improves the reliability of the electrical system.

- Its world-class hydraulic power unit features low noise and vibration, with steady and reliable lifting and

lowering actions.

- Non-contact proximity switches are used as the interlocks, and are very reliable.

Safe

- With a release brake, reverse brake and three types of emergency brake, the pallet stacker is very safe to use.
- Its ramp anti-roll function ensures safe operation on ramps.

 The emergency reverse button on the end of the handle prevents the driver from injury when driving backwards.

It is equipped with an electronic lifting limit protection, which prevents an impact when the top of the lifting range is reached, protecting the motor and the cargo.

Maintenance

- The pallet jack is equipped with a built-in charger and a maintenance-free battery. Thus, no maintenance is

required.

- The power display prompts the user to recharge on time.

 The machine hood can be opened very easily and the components can be seen at a glance, which makes the maintenance of the whole machine very convenient.

- All rotating shafts are equipped with lubricated sleeves, for ease of maintenance and a long service life.

2.3 Key parts



Number	Name	S/N	Name
1	Control lever	9	Load-bearing wheel
2	Instrument	10	Fork
3	Switch lock (with keys)	11	Front cover (with batteries inside)
4	Control lever	12	Cable clamp
5	Lifting cylinder	13	Battery charging plug (with a charger inside)
6	Wheel cover	14	Machine hood
7	Driving wheel	15	Emergency power-off switch
8	Charging indicator light (on charger)		

2.4 Display and controls



Code	Display/Control Part	Function
2	Instrument	Displays the current battery level and truck fault code. Analyzes the cause of the fault based on the fault code.
3	Switch lock (with keys)	To connect or disconnect the electric circuit. When the driver leaves the pallet jack, pull the key out of the lock switch to ensure that the pallet jack cannot be started accidentally.
4	Control lever	Controls the steering and braking
8	Charging indicator light (on charger)	Indicates the charging state of the in-built charger Flashing red light: charging in progress. Constant green light: fully charged or battery to be connected. Flashing yellow light: battery faults.
13	Battery charging plug (with a charger inside)	Insert the plug into an electrical socket to charge the battery.
15	Emergency power-off switch	Powers off and stops all electrical actions. Powers off the pallet jack for braking.
16	Upright walking button	Press the button, and the pallet jack will move with the control lever upright.
17	Lowering button	Lowers the load-carrying parts.
18	Lifting button	Lifts the load-carrying parts.
19	Horn button	Press the horn button and it will sound an alarm.
20	Driving switch	Controls the driving direction and speed.
21	Anti-collision button	Press the anti-collision button and the pallet jack will drive away from the operator. Protects the operator from being injured in an emergency.

2.4.1 Display

Dashboard [2]

It is used to display the battery capacity.

Displays the battery charge state with a 10 bar LED indicator. One bar on the LED display is equivalent to 10% battery capacity. As the battery capacity decreases, the 10 bars on the LED display will light up from right to left.

Charge the battery when the battery level is less than 3 bars.

Fully Charged

Charge Required

Low Battery





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A black LED bar flashes to indicate that the forklift is starting to run on reserve energy (30% of battery capacity). If the battery capacity falls below 2 bars (20%, low charging state), the two black LEDs flash and the lifting function is locked, and it can only be used again when the battery capacity is restored to 2 bars (20%) or more.

2.5 Technical data in standard configuration

The technical data given below lists the parameters of the pallet jack in standard configuration. Our company reserves the right to make technical changes and additions.

Lead-acid	Model	Parameter	Tahle
Leau-aciu	would	rarameter	Table

	Model		CBD15-WD	CBD20-WD
	Operation mode		Walk-type	Walk-type
Para mete	Rated loading capacity	Q (kg)	1500	2000
r	Load center distance	c(mm)	600	600
	Wheelbase (Lifting and lowering)	y(mm)	1175/1248	1175/1248
Weig ht	Net weight (including the battery)	kg	220	225
	Tire material		Polyurethane	Polyurethane
	Tire size - driving wheel number	mm	Ф210×70	Ф210×70
Wh	Tire size-front wheel	mm	Ф80×64	Ф80×64
eels ar	Wheel number		1×/4	1×2/4
nd tire:	Wheel track-front	b10 (mm)		410
0	Wheel track-rear	b11 (mm)	400	400
	Lift height	h3 (mm)	120	120
	Min. height of forks	h13 (mm)	80	80
	Overall length	L1 (mm)	1700	1700
	Overall width	b1 (mm)	590	590
	Fork	s×e×L (mm)	50×160×1150	50×160×1150
Dime	Fork width	b5 (mm)	560/680	560/680
nsion	Clearance of the middle part to ground	m2(mm)	30	30
	Min. right angle aisle width 1,000×1,200 (1,200 straddle forks)	Ast (mm)	1553①②	1553①②
	Min. right angle aisle width 800×1,200 (1,200 along forks)	Ast (mm)	1753①③	1753①③
	Minimum turning radius	Wa (mm)	1374①	1374①
	Driving speed (full-load/no-load)	km/h	4.5/4.8	4.5/4.8
Perfo	Lifting speed (full-load/no-load)	mm/s	45/55	45/55
rman ce	Lowering speed (full-load/no-load)	mm/s	60/40	60/40
	Max. gradeability (full-load/no-load)	%	6 / 16	6 / 16
•	Hand brake		Electromagneti c brake	Electromagneti c brake

Motor	Driving motor power	kW	0.75	0.9
and	Power of the lifting motor	kW	0.8	0.8
battery	Battery pack voltage/capacitance	V/Ah	2×12/85	4×12/48
•	Battery weight	kg	24x2	13.2x4
	Controller model		D2C Direct Current (DC)	PVM48S Direct Current (DC)

Note: 1) The forks are lowered by +76mm.

2) +631mm according to VDI2198 standard;

3) +323mm according to VDI2198 standard;

Lithium-ion Model Parameter Table

	Model		CBD15-WD- I	CBD20-WD- I
Para mete r	Operation mode		Walk-type	Walk-type
	Rated loading capacity	Q (kg)	1500	2000
	Load center distance	c(mm)	600	600
	Wheelbase (Lifting and lowering)	y(mm)	1175/1248	1175/1248
Weig ht	Net weight (including the battery)	kg	181	186
	Tire material		Polyurethane	Polyurethane
	Tire size - driving wheel number	mm	Ф210×70	Ф210×70
Wh	Tire size-front wheel	mm	Ф80×64	Ф80×64
eels ar	Wheel number		1×/4	1×2/4
nd tires	Wheel track-front	b10 (mm)		410
0,	Wheel track-rear	b11 (mm)	400	400
	Lift height	h3 (mm)	120	120
	Min. height of forks	h13 (mm)	80	80
	Overall length	L1 (mm)	1700	1700
	Overall width	b1 (mm)	590	590
	Fork	s×e×L (mm)	50×160×1150	50×160×1150
Dimo	Fork width	b5 (mm)	560/680	560/680
Dime nsion s	Clearance of the middle part to ground	m2(mm)	30	30
	Min. right angle aisle width 1,000×1,200 (1,200 straddle forks)	Ast (mm)	1553①②	1553①②
	Min. right angle aisle width 800×1,200 (1,200 along forks)	Ast (mm)	1753①③	1753①③
	Minimum turning radius	Wa (mm)	1374①	1374①

Perfo	Driving speed (full-load/no-load)	km/h	4.5/4.8	4.5/4.8
	Lifting speed (full-load/no-load)	mm/s	45/55	45/55
rman ce	Lowering speed (full-load/no-load)	mm/s	60/40	60/40
	Max. gradeability (full-load/no-load)	%	6/16	6/16
	Hand brake		Electromagneti c brake	Electromagneti c brake
Motor	Driving motor power	kW	0.75	0.9
and	Power of the lifting motor	kW	0.8	0.8
battery	Battery pack voltage/capacitance	V/Ah	2×12⁄40	4×12/20
•	Battery weight	kg	9	10
	Controller model		D2C Direct Current (DC)	PVM48S Direct Current (DC)

Note: 1) The forks are lowered by +76mm.

2) +631mm according to VDI2198 standard;

3) +323mm according to VDI2198 standard;





2.0t Mini Jack Structure Diagram



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2.6 Product labels and warning signs

The labels and warning signs, such as the product nameplate, load curve sign and warning labels, must be clear and visible. If not, they should be replaced. The following figure shows the approximate positions for various marks. Please become familiar with the labels and signs before operating the pallet jack.



S/N	Name
25	Product nameplate: The rated lifting capacity shown on the nameplate is the maximum weight of the load that can be handled by the pallet jack under the conditions on the nameplate. Any changes to the pallet jack or its devices will change the rated lifting capacity.
26	Lifting label: tie-down points for handling the pallet jack with a crane.
27	Manufacturer label
28	Charging indication label
29	Key switch label: "OFF" means the switch is off; "ON" means the switch is on.
30	Emergency power-off label: press this button to power off the pallet jack in an emergency.
31	Product series and tonnage label: rated lifting weight: 1.5/2t
32	Upright walking label
39	Power off before charging!

3 Safety rules

1) Only trained and approved operators can operate the forklift truck.



2) Operators must wear helmets, work shoes and uniforms.







4) Do not modify or refit the pallet jack without the manufacturer's permission.

5) The pallet jack is not suitable for use in flammable and explosive working places.

6) Oil/fluid leakage, deformation and looseness should be regularly checked, otherwise, the service life of the truck will be reduced; in severe cases, it may cause an accident.

– Ensure that "safety critical parts" are replaced in regular checks.

Wipe off oil, grease and water on the control lever.

– No smoking, sparks or flames near to the lithium-ion battery during inspection.

– Take care to avoid burning yourself when checking the motor or controller.

7) The controller is equipped with an accumulator. Do not touch the position between B+ and B- to prevent an electric shock. In order to check or clean the controller, please power off first, and then a load device (such as contactor coil, horn or light) should be connected between B+ and B- to discharge the capacitor inside the controller.



8) In the event of any faults, the operator should stop the pallet jack immediately, hang the "Danger" or "Fault" sign, pull out the key and report to the management, the forklift can only be used after the fault is eliminated.

— In the event of a sudden fault when lifting cargo or driving on gradients, causing leakage of storage battery electrolyte or hydraulic fluid, personnel should be organized to carry out battery repairing.



9) Explosive gas will be generated in the lithium battery, so no flames should be close to the battery. Keep tools away from the poles of the lithium-ion battery, to prevent sparks or short circuits.



10) The driving route for pallet jacks must be a solid and flat concrete road or similar roads suitable for operation. Pre-inspect the ground conditions of the work site. Tidy up the workplace, remove obstacles, sweep away debris and sand, and wipe off oil and water stains. 11) Overloading is strictly prohibited!

12) Before starting, honk the horn and make sure no one is around the pallet jack.

13) Cargo must be aligned with the center of the forks; when cargo is not aligned, or when the pallet jack turns or crosses uneven surfaces, the cargo may easily fall off. The possibility of rollover is also increased.



14) Do not drive fast, and avoid sudden turning or Drivers and managers should be familiar with the braking.

15) Do not drive the pallet jack when the forks are in the high position.

16) When driver's line of sight is obstructed by highly stacked cargo, a guide should give instructions for handling or the driver should reverse the pallet jack so the cargo is behind.

17) Do not drive the pallet jack on the road, only use it in designated places suitable for its small wheels.

18) Do not put your head, hands, feet or body under the forks. Do not stand on the forks.

19) Do not put your head, hands, feet and body into the space between the frame and the lifting assembly. If you get trapped there is a risk of

serious injury or death. Do not put your head, hands and feet into the space between the forks and the lower link mechanism.



20) Keep the cargo ahead when driving uphill. Do not turn on ramps. Otherwise there is a risk of rollover. Do not operate on the ramp.

21) When the pallet jack is powered off, the brake will be applied so it must not be towed.

22) Please operate the pallet jack according to the instructions in this manual and the signs on the pallet jack. Check labels, signs and marks, and replace them if they are damaged or missing.

23) The workplace should be provided with a fire extinguisher. The user can also equip the pallet jack with a fire extinguisher.

position and usage method of the fire extinguishers.



24) Do not flush the inside of pallet jack with water, the pallet jack should not be exposed to rain.

25) Before dismantling or repairing, the battery must be unplugged.

4 Lifting, fixing and transportation of vehicles

The pallet jacks are short-distance handling tools for workplaces, and are not suitable for long-distance driving.

If it is required to transport the pallet jack, please place it on a truck, trailer or another long-distance

transportation vehicle with a lifting device or handling platform for transportation.

4.1 Lifting

Handling with a crane

🛦 warning

• Only a crane with adequate load-carrying capacity can be used for lifting the pallet jack (see the product nameplate for the weight of the pallet jack).

• Do not stand under the pallet jack when lifting it.

• Lift or lower slowly to avoid collisions or accidents.

Operating steps:

- Park the pallet jack according to rules and regulations.

- Fasten the lifting tools at the designated tie-down points, and ensure that the pallet jack will not fall down in any situation and no part of it will be touched while lifting.

– Handle the pallet jack with a crane and put it in position.



4.2 Fixing during transportation

The pallet jack must be securely fixed when it is transported with a crane or trailer to prevent accidental movement.

Operating steps:

- Park the pallet jack according to rules and regulations.
- Fasten the tension belt to the pallet jack and then the tie-down clamp on the transportation vehicle.
- Place wedges under the wheels to prevent accidental movement if necessary.
- Tension the belt with the tightening device.





- The truck or trailer must have tie-down clamps.
- Secure the pallet jack with wedges.
- Belts or tie-down belts must be strong enough.

4.3 Transportation

The pallet jacks are short-distance handling tools for workplaces, and are not suitable for long-distance driving. If it is required to transport the pallet jack, please place it on a truck, trailer or another long-distance transportation vehicle with a lifting device or handling platform for transportation. Prior to transportation, fasten the pallet jack on the transportation vehicle with belts and place wedges under the wheels to prevent the pallet jack moving on the vehicle.



How to transport a damaged mini pallet jack

The brake of this pallet jack is engaged by default. Thus when it has any faults or cannot be moved due to any damage, please do not tow it, proper transportation vehicles should be used.



Warning

• Do not move or tow a damaged truck on the ground or it will damage the braking system.

5 Battery

This forklift is fitted with 24V two 12V/85A-h and four 12V48 A-h maintenance free gel batteries. The battery's service life will be optimum at an ambient temperature of 25°C-30°C. The battery capacity will be reduced at relatively low temperatures and its service life will be shortened at relatively high temperatures. Each 24V

battery weighs about 24kg, and each 48V battery weighs about 13.2kg.

5.1 Battery usage procedures

- Before charging, check the cable connector and plug for any visible damage.

- The battery charging area should be fully ventilated.
- During charging, do not smoke or use open flames around the battery.
- Do not place inflammables or work tools which may cause sparks within at least 2m around the pallet jack to be charged.
- Fire extinguishers should be provided in the charging space.
- Do not place metal objects on the battery.

- If the battery has been used for more than 4 years it should be replaced. Do not use old and new batteries together.

- Do not overload it, or use it in high humidity environments or on steep gradients.
- Do not reverse the battery polarity during charging, or it may destroy the battery.

- After the battery expires, please sent it to the recycling station for further treatment, rather than dispose of it at will.

5.2 Battery maintenance

- There is no need to maintain the battery with water during normal use.

- Regularly check the battery for any damage or leakage and clean its surface.

- Regularly check whether the battery connections are secured to avoid sparks or short-circuit of its positive and negative poles.

 Always keep the battery upright, not upside down, and ensure the mounting is secure and free from vibration and pressure. In addition, keep the battery protected from violent vibration, collisions and friction.

- The maximum starting current of the pallet jack should not exceed 1.25 times the rated battery capacity. For example, the maximum current of a 85A·h battery should not exceed 105A. Avoid over-current, otherwise the vehicle mileage and battery life will be shortened.

- The compatibility of the charger and battery has a great impact on the performance and service life of the battery, so the user should select a high-quality charger with the same parameters as those of the original charger in the event of replacement.

– Avoid over-discharging, overcharging or under-charging, as it will damage the battery. If possible, charge the battery in time, and do not continue driving when the battery capacity is low; the normal discharging capacity should be 50% of the battery capacity, generally not more than 80%.

– The battery must be charged before storage, and it is recommended to charge it once a week when the pallet jack is not in use.

– The standard ambient temperature for the battery is 25°C, and it is normal for the endurance to reduce when

the temperature drops. The battery capacity will be reduced by about 1% when the temperature drops by 1°C,

so it is better to avoid using the battery at ambient temperatures below 10°C.

- The ambient temperature when charging should be within the range of $-5^{\circ}C^{+40}$, keep the space well ventilated during charging. In winter, the battery should be charged at room temperature to ensure that it is fully charged.

- The battery is a consumable item, after a great number of charging-discharging cycles, its capacity will gradually decline, causing a gradual reduction in endurance, which is a normal phenomenon.

5.3 Battery charging

The pallet jack battery is discharged during operation and over-discharge must be avoided. The battery

should be charged promptly after the pallet jack has been in operation.



5.3.1 Power input

- Input voltage: 100Vac 240Vac
- Input frequency: 50Hz 60Hz
- Input current: 1.5A/220Vac, 3A/110Vac

5.3.2 Battery charging steps

- Park the truck according to rules and regulations.
- Pull the battery charging plug (13) and the cable clamp (12) out of the machine hood (14).
- Insert the battery charging plug (13) into the applicable power socket.

 Charge the battery, the charging process is completed when the charging indicator light (8) turns on (green light).

Flashing red light: charging in progress. Constant green light: fully charged.

Constant yellow light: battery abnormality alarm. Flashing yellow light: battery abnormality.

- Remove the charging plug (13) from the power socket and fasten it to the machine hood (14) together with the cable clamp (12).

• When less than 3 bars light up on the LED indicator, please charge the battery, otherwise it may be damaged and no warranty will be provided.

• During charging, the pallet jack walking function is disabled.

• It is better not to interrupt the charging process until the battery is fully charged.

5.3.3 Supplemental charging

The charger is constructed to allow continued charging of a partially charged battery while using.



5.4 Battery replacement

Operating steps:

- Park the truck according to rules and regulations.
- Unscrew the screws (33) and remove the front cover (11).
- Remove the battery positive and negative pole wiring.
- Pull out the batteries from the front separately (35)

Assemble a new battery reversing the steps mentioned above. Ensure the correct mounting position and

wiring of the battery. Check whether the wiring is correct and secure



A Warning

- Take care to avoid injury as the battery is very heavy.
- The disposal of used batteries must comply with local environmental regulations.

• When replacing a battery, ensure that the specifications, size and weight of the battery are the same as the original.

6 Breaking-in of a new pallet jack

The pallet jack should be operated under low load in the initial stages after it is put into use, especially within the first 100 h, and the following requirements should be met.

- Over-discharge of the new battery in the initial application stage must be prevented.
- The prescribed preventive maintenance should be performed.
- Fast running, sudden stops and sharp turns should be avoided.
- The actual load capacity should be 70% to 80% of the rated load capacity.
- Regularly check and tighten the joint fasteners during the breaking-in period.
- After breaking-in, change the hydraulic oil.

7 Operation7.1 Checks before operation

In order to operate the pallet jack safely and keep it in good condition, a thorough check must be made before it is started.

1) Check oil/fluid leakage

Check the pallet jack while it is parked on the ground for any leakage of hydraulic oil.

2) Check the forks

Check the forks for any cracks or deformation.

3) Check the wheels

Check the wheels for any cracks, damage or abnormal wear. Check the wheel fasteners for any looseness. Check the wheels for any wires or ropes wrapped on them.



4) Forks and link mechanism

Check the left and right forks and link mechanism for any cracks, abnormal actions, or wear of the moving joints.

5) Check the hydraulic oil

Remove the machine hood, check the hydraulic oil level to see whether it is within the specified range and add more if necessary.





Check whether the battery is fixed firmly and reliably.

Check whether the two terminal wires are loose or damaged, in which case adjustment or replacement is required.



7) Display

Check whether the display works normally.

8) Lifting/lowering button

Press the lifting button to check the lifting action of the forks. Press the lowering button to check the lowering action of the forks. Check the lifting system for any noises.

9) Driving forward/backward

Depress the control wheel to tilt it, gradually press the acceleration control button with your thumb away from your body and check the pallet jack drives forwards; gradually press the acceleration control button with your thumb towards your body and check the pallet jack drives backwards.

10) Brake system

Drive the pallet jack forward or backward slowly, push the control wheel forward to make it vertical or depress it downward to make it horizontal, and check the pallet jack slows down.

11) Steering system

Operate the control wheel to make the pallet jack walk to the left and right three times and check whether the steering system operates normally.

12) Horn

Honk the horn to check its sound.

13) Visual inspection

Carry out a visual inspection on the pallet jack and check

for any dirt, corrosion or paint peeling.

14) Others

Check for any noises, loose cables or loose fasteners. Check for any leakage

7.2 Start

Operating steps:

- Check and make sure all functions are normal before operation.
- Pull up the emergency stop switch (15).

– Insert the key into the switch lock (3) and rotate it clockwise to the "ON" position. Check the display for the battery level.

The pallet jack is ready for working.



7.3 Operation

The driver stands at the front side of the pallet jack, holds the control lever, operates the driving switch with their thumb, and guides the pallet jack walking forward with their line of sight towards the travel direction. The driver can also push the pallet jack forward by holding the control lever with both hands.



- Do not stop the pallet jack on a ramp.
- Slow down and always be prepared for braking when driving downhill.
- Drive the pallet jack on the specified route.
- Keep the ground clean to avoid skidding.

Slowing down

- Slowly release your thumb, the direction and speed control buttons will automatically snap back

and the vehicle speed will be reduced.

7.4 Brake

Remove your thumb from the direction and speed control buttons and move the lever to the brake position (B1 or B2) or the vertical position for further braking.

Caution

• Find the cause and clear the fault if the lever moves slowly or fails to automatically enter the brake position after it is released and then engaged in the brake position. Replace the compression spring if necessary.

7.5 Steering

- Hold the control lever with two hands placed on its left and right part respectively, depress it to its tilt position, and move the control lever to the left or right for steering.

Move the control lever to the left to make the pallet jack turn left.

Move the control lever to the right to make the pallet jack turn right.

7.6 Parking

- Gradually remove your thumb from the direction and speed control buttons to slow down.
- Push the control lever to its original vertical position.
- Lower the forks to the bottom.

- Rotate the key switch to "OFF", press the emergency power-off switch, pull the key out and keep it safe.

Turn it up.
7.7 Cargo loading

Operating steps:

Approach the cargo carefully.



- Adjust the fork height to insert the forks into the pallets as much as possible.
- Lift the cargo by several centimeters and check whether the cargo is secured.



- Drive the pallet jack slowly.
- Lower the cargo to the bottom.

7.8 Cargo unloading

Operating steps:

- Drive the pallet jack to the place to unload the cargo.
- Lift the cargo to the designated height.
- Drive forward, put the cargo on the unloading position and stop the pallet jack.
- Make sure the forks are right above the unloading position, slowly lower the forks.



- Reverse and take the forks out of the cargo.



- Lower the forks to the specified position.

7.9 Parking rules

Operating steps:

- Park the pallet jack at the designated place.
- Lower the forks to the bottom.

Rotate the key switch anticlockwise
 the "OFF" position and pull it out of 1
 switch lock (3).

- Press the emergency stop button (15).

This completes the pallet jack parking process.



8. Long-term storage of pallet jacks

8.1 Long-term storage

- Check the overall condition of the vehicle, in particular check whether the tires are damaged.
- Check for any leakage of hydraulic oil.
- Apply lubricating grease.

- Check whether the joint surface of the cylinder piston rod is loose and whether the surface of the piston rod is scratched. Apply anti-rust oil to exposed parts such as the piston rod and shafts that may rust.

- Cover the whole pallet jack.
- Charge the pallet jack fully at least monthly.

8.2. Operation of the pallet jack after long-term storage

- Remove the anti-rust oil from the exposed parts.
- Clear away the foreign matter and water in the hydraulic oil tank.
- Charge the battery, mount it on the pallet jack and connect the battery leads.

- Conduct an overall check and inspection on the pallet jack before starting. Check its functions including starting, running, speed reduction, steering, braking and parking, etc.

9 Maintenance

9.1 Maintenance overview

It is necessary to perform regular checks and maintenance to keep the performance of the pallet jack at optimum.

 Checks and maintenance are often neglected, so it is better to find the problems early and solve them in time.

- Use the spare parts from HANGCHA GROUP CO., LTD.
- When changing or adding oil, do not use oil which is not the same as the original.

 The waste oil and fluid and the old lithium-ion battery should be disposed of in accordance with the local laws and regulations, rather than disposed of at will.

- Develop a comprehensive maintenance and repair plan.
- Complete records should be made after each maintenance and repair.
- Only trained and approved service personnel can repair the pallet jack.

Caution

• Smoke and fire are strictly prohibited.

• Turn off the key switch and press the emergency power-off switch before maintenance. (Except for fault diagnosis).

- Use compressed air to clean the electrical parts, rather than water.
- Do not put your hands, feet or any part of your body into the lifting assembly.
- The maintenance should be done ahead of schedule when the operation environment is severe.

9.2 Regular Maintenance Schedule

The maintenance cycle stated in the maintenance checklist is only applicable for trucks working in single-shift systems and normal operating conditions. The maintenance cycle should be shortened if the operating conditions are severe, e.g. dusty, large temperature fluctuations, or working in shifts.

Check the maintenance checklist below for each specific maintenance item and cycle. The specific definitions of the maintenance cycle are described as follows.

- D= Once every 8 working hours (or daily)
- W= Once every 40 working hours or weekly at least
- M= Once every 250 working hours or every one and a half months at least
- T= Once every 500 working hours or trimonthly at least
- S= Once every 1,000 working hours or semiannually at least
- Y= Once every 2,000 working hours or annually at least
- = Standard maintenance cycle

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o = Cold store maintenance cycle (additional to standard maintenance cycle)

Batte	ery	D		М	т	S	Y
1	Battery level	•					
2	Check the wiring terminals for any looseness	•					
3	Check the wiring for any looseness	•					
4	Check the battery surface cleanliness		•				
5	5 Check whether it is kept safe from smoke or flames						
Cont	roller	D	w	М	т	s	Y
1	Check the contacts for any wear				٠		
2	Check whether the mechanical motion of the contactor is abnormal				•		
3	Check whether the inching switch works normally		•				
4	Check whether the connections between the motor, battery and power unit are in good condition				•		

 in good condition
 •

 Check whether the fault diagnosis system of the controller is normal (first 2 years)

Mote	or	D	w	М	т	s	Y
1	Clean the motor enclosure			•			
2	Clean and replace the bearings						•
3	Check the carbon brushes and rectifiers for any wear; check whether the spring force is normal			•			
4	Check whether the wiring is correct and secure			•			
5	Clear away the carbon powder in the commutator slot and on its surface				•		
Gear	Gearbox				т	s	Y
1	Any noise	•					
2	Check for any leakage	٠					
3	3 Apply more lubricating grease				0	•	
Brak	Brake				т	S	Y
1	Check the brake	٠					
2	2 Check the air gap of the electromagnetic brake					•	
Steer	ing	D	w	м	т	s	Y
1	Check whether the steering system works normally, e.g. smooth steering without any noises.	•					
2	Check the reset function of the control lever.	٠					
3	3 Apply grease to the steering system bearings.					•	
Whe	Wheels			м	т	S	Y
1	Check whether the wheels are fixed properly.	•					
2	Check the wheels for any wear or damage.	•					

Elect	trical system	D	w	м	т	s	Y
1	Check the display and operating parts.	•					
2	Check the inching switch and sensor.	•					
3	Check whether the fuse rating is correct.			•			
4	Check the electrical circuit for any damage. Check the cable connection.		•				
5	Check the emergency stop switch.	•					

Hydr	Hydraulic system			м	т	S	Y
1	Check the functions of the hydraulic system.	•					
2	Check the hydraulic fittings, hoses or tubes for any looseness, leakage or damage.	•					
3	Check the cylinder and piston rod for any damage, leakage or looseness.		•				
4	Check the hydraulic oil level and add more if necessary.			•			
5	Check the emergency lowering function.				•		
6	Check the relief valve and adjust it if necessary.					•	
7	Change the hydraulic oil					0	٠
8	Clean the hydraulic oil filter					0	•

Note: The 2.0t mini pallet jack is not equipped with carbon brushes, thus it requires no carbon brush maintenance.

9.3 Dismounting/mounting the machine hood

Dismounting the machine hood

Operating steps:

- Park the truck according to rules and regulations.
- Unscrew the bolts (36) fastening the machine hood.
- Lift the machine hood (14) up.
- Remove the cable clamp (12) and the battery charging plug (13) from the machine hood (14).

This completes the dismounting process. The mounting process is a reverse of the dismounting process.





• Be careful! Your hands may be hurt in the dismounting/mounting process.

9.4 Dismounting/mounting the wheel cover

Dismounting the wheel cover

Operating steps:

– Unscrew the bolts (37) on the wheel cover (6) and remove it.

This completes the dismounting process. The mounting process is a reverse of the dismounting process.



A Warning

• Be careful! Your hands may be hurt in the dismounting/mounting process.

9.5 Oil and lubrication



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Replenishing hydraulic oil

Lubricating surface

Code	Name	Model/Code	Remarks
A	Hydraulic oil	Normal environments: L - HM32 Severely cold and refrigeration environments: L - HV32	Hydraulic system (0.7L)
С	Grease	3# general purpose automotive lithium grease	Filling port and lubricating surface

🛆 Caution

• The hydraulic oil to be added must be filtered and the hydraulic oil level after filling must not exceed the top line marked in the tank.

9.6 Checking the safety devices

Operating steps:

- Make preparations for the maintenance.
- Remove the machine hood.
- Check the fuse ratings (38) and replace them if necessary.



Number	Name	Function	Parameter
38	Fuse	Main control circuit	100A

Part II: Structure, Principle and Maintenance

1 Driving assembly

1.1 Parameters

Speed reduction ratio of the transmission			24.7	24.7
Max. torque of wheel rim		N∙m	172.3	197.48
Max. load cap	acity of wheels	kg	800	800
	Rated voltage	V	24	48
	Rated power	kW	0.75	0.9
	Rated current	А	36	24
	Rated rotational speed	r/min	2650	2950
Driving	Work mode		S2=60min	S2=60min
motor	Insulation class		F	F
	Protection class		IP44	IP44
	Ambient temperature	°C	- 10~+40	- 10~+40
	Service life of motor brush	h	≥1200	
	Rated voltage	V	24	48
	Rated power	W	23	28
Electromagn	Rated braking torque	N∙m	8	8
etic brake	Rated air gap	mm	0. 15~0.30	0. 15~0.30
	Pre-tension torque for mounting screws	N∙m	2.8	2.8

1.2 Precautions for installation and use

- Clear away the seal oil on the surface of the pallet jack before installation. Do not damage or disassemble the pallet jack.

 Do not knock or damage the mounting surface and exposed gears, to avoid affecting the installation and operation accuracy.

- Normal oil working temperature: \leq 70°C.

- The driving wheel is a maintenance-free device, apply an appropriate amount of lubricating grease when replacing the driving wheel or bearings.

Phenomenon	Causes	Troubleshooting
	Excessive gear clearance	Adjust
Gear noise during running	Lack of lubrication grease	Apply more grease
	Excessive gear wear	Replace
.	Damage in turntable roller bearing	Replace
Noises during turning	Lack of lubrication grease in turntable roller bearing	Lubricate it with grease
	Loose or damaged inching switch	Tighten or replace
	Excessive braking clearance	Adjust
Braking fault or failure	Excessive brake disc wear	Replace
	Brakes loose	Tighten them
	Damage in circuit	Repair

1.3 Faults and troubleshooting

1.4 Driving motor

1.5t Mini Pallet Jack Structure Diagram

2.0t Mini Pallet Jack









Precautions for use

- Keep the motor surroundings clean and dry and do not place other objects inside or outside the motor.
- Do not overload.
- Do not expose the motor to strong magnetic objects.
- Adopt the correct input voltage level.
- Stop the pallet jack immediately for inspection if any abnormal smell comes from the motor during use.
- The wiring cable between the motor and the controller should be as short as possible.

– Immediately power off and stop the pallet jack for inspection in case of any leakage, a sudden drop in revolving speed, violent vibration, abnormally loud sound, overheating and fumes, or sparks/fumes in the electrical contacts.

- Frequently check the motor for any overheating.
- Frequently check the motor wiring plug for any looseness, sparks/fumes, or degradation in the cable

insulation layer.

Use and maintenance

The stator parts are adjusted before delivery, and the neutral position of the motor brush is adjusted on the

factory test bench, so the user must not dismantle and make adjustments arbitrarily.

- Check whether the armature is rotating smoothly and if there is evidence of rubbing.
- Check whether the output line (or terminal) of the motor is wired correctly and securely.
- The 24V drive motor brush should slide freely in the brush box.
- Check whether the commutator is clean, and if necessary, clear the slots and the carbon powder on the

surface of commutator with a soft and fluffy clean white cloth. If there is any dirty grease on its surface, please clean it with a white cloth immersed with alcohol (carry out cleaning when parked).

Check all fasteners for any looseness.

The 24V brush carrier must be fastened and reliable, without any looseness. If it is necessary to rotate or disassemble the brush carrier, alignment marks should be made first and then the bolts can be unscrewed. Tighten the bolts against the marks when resetting the brush carrier to keep the brush in the original neutral position.

- Coil insulation resistance should be checked periodically and should not be lower than the specified value when it is close to the working temperature, otherwise the coil should be dried.

- Open the motor cover periodically to check whether the internal parts are intact and the working condition of the commutation part is normal.

- Brush off mud, sand and other dirt on the housing frequently to avoid poor heat dissipation.
- Check the motor at least once every six months and carry out the following steps:

a. Check the motor surface and clean away the dirt on it.

b. Clean or replace the bearing, and listen carefully to check the bearing for abnormal sounds during running.

c. Check the brush wear, and replace the brush if necessary (required for 24V, not required for 48V).

Brush replacement(24V)

Replace the motor brush with a new one of the same models as the original in case of severe wear or damage. The new motor brush should be closely fitted to the commutator and the contact surface area between them should be more than 75%.

Unscrew the four fastening bolts of the motor cover.

– Remove the motor cover and replace the brush (the figure shows the exact carbon brush fixing method).





Note: During the brush replacement, polish the brush with 00# fine abrasive cloth.

After polishing the brush with abrasive cloth and clearing the brush commutator, the motor should run at a reduced speed under load until the working surface of the brush becomes shiny.



Hall sensor replacement (48V)

I. Use a Phillips screwdriver to unscrew the 4 screws on the protective hood



III. Use a Phillips screwdriver to unscrew the 2 screws fixing the circuit board

II. Use a flat bar tool to pry out the protective hood as shown in the figure below.



IV. Use a flat bar tool to pry out the circuit board as shown in the figure below.







Be careful not to move the three screws that hold the black mount in place.

V. Place a new sensor into the mount and tighten the 2 fixing screws



VI. Reassemble the protective hood and tighten the 4 fixing screws.



Note: If the black mount moves, it will affect the sensor position, and a slight offset will cause motor problems, such as excessive current, severe temperature rise, and a larger difference between the forward and reverse speeds, etc.; a large offset will cause the motor to stop rotating and emit strange noises.

If the sensor position is offset and there is no special instrument available, perform adjustment based on the motor no-load current, with location between the power supply to the controller being the current sampling position; during the adjustment process, keep the motor in the working state, slowly rotate the sensor in the

circumferential direction, at the same time, observe the current variation, when the current reaches the minimum value (turning clockwise and counterclockwise both increase the current), fix it with a screw to complete the adjustment; this adjustment method will produce some deviation, so the vehicle's forward and reverse speeds will be slightly off.

Fault diagnosis

Fault	Causes		
All copper sheets become black.	Incorrect brush pressure (24V drive)		
	Short-circuit in commutator bars		
Commutator bars become black in a	Short-circuit in armature coils		
specific order.	Poor soldering between the commutator bars and armature coils or open circuit		
	Center line displacement of commutator		
not in a specific order.	Uneven or eccentric commutator surface		
	Motor vibration		
	Excessive clearance between the brushes and the box		
	Excessive clearance between the brush box and the commutator surface		
Wear, discoloring or damage in motor brushes (24V drive)	Extruded mica sheet in the commutator		
	Poor brush materials		
	Wrong brush model		
	Motor overload		
	Dirty commutator		
	Uneven or eccentric commutator		
	Extruded mica sheet or some commutator bars		
	Badly polished brushes		
Big sparks (24V drive)	Insufficient brush pressure		
	Wrong brush model		
	Stuck brushes in the brush box		
	Looseness or vibration in the brush carrier		
	Wrong arrangement of magnetic poles		
	Big sparks in brushes		
Motor brushes and braids become hot (24V	Bad contact between the brush and flexible conductor		
drive)	Excessively small flexible conductor coil		

Noises in motor brushes (24V drive)	Uneven commutator surface	
	Bearing damage	
Vibration, noise (48V drive)	Motor shaft wear	
	Hall element failure	
	Poor signal cable connector contact	
Failure to start properly (48V drive)	Poor Hall signals due to faulty soldering	
	Motor internal coil burned out	
	Circuit board position offset	
High operating current and low torque (48V	Circuit board position offset	
drive)	Motor internal coil partially burned	

1.5 Electromagnetic brake

A spring-loaded electromagnetic brake is used in this mini pallet jack. The electromagnetic brake is a single disc brake with dual friction surfaces. By means of several pressure springs, a strong braking torque can be generated in the power-off state, and the brake is released by electromagnetic effect.



Mounting screws for brake
 Stator
 Friction brake disc
 Sleeve
 Friction disc
 Anti-dust ring
 Diagram of Electromagnetic Brake Components

1.5.1 Working principle

The motor shaft (9) is connected to the sleeve (4) by a flat key; and the sleeve (4) is connected to the friction brake disc (3) by a spline key. When the stator (11) is powered off, the force generated by the pressure spring (10) will act on the armature (8), and tightly clamp the friction brake disc (3) whose rotation is driven by the motor shaft between the armature (8) and the cover (5), to produce a braking torque. At this time, an air gap "Z" is generated between the armature and the stator. Release the brake: Supply DC power to the stator, the generated magnetic field attracts the armature (8) to move toward the stator, the pressure spring (10) will be compressed while the armature is moving, and the friction brake disc (3) is released.



- 1. Mounting screws
- 3. Friction brake disc
- 4. Sleeve
- 5. Friction disc
- 6. Anti-dust ring
- 7. Hollow screws
- 8. Armature
- 9. Motor shaft
- 10. Pressure spring
- 11. Stator
- 12. Mounting screws for friction disc
- Z. Air gap
- Fig. 2-4 Diagram of Electromagnetic Brake Structure

1.5.2 Brake mounting

Place the flat key (13) into the key-way of the motor shaft (9), fit the sleeve (4) to the shaft (9) and fasten it with the inner circlip (14).

- Mount the friction disc (5) onto the motor end cover with three mounting screws (12).
- Fit the friction brake disc (3) to the shaft sleeve.
- Mount the stator (2) to the friction disc (5) with three mounting screws (1).

Note: Remove the three rubber pads for transportation safety from the stator before mounting.

- Use a torque wrench (15) to fasten the three mounting screws (1) and check the air gap "Z" with a feeler gauge (16).
- Fit the anti-dust ring (6).
- Connect the brake wiring.











• There must not be any damage in the conductor outer layer to avoid circuit faults.

• Do not machine the positioning surfaces or holes of the motor, to avoid affecting the excitation circuit.

• Do not use excessive force when mounting on the motor shaft, do not damage the friction surface, or the mounting holes and surfaces, engage the sleeve to the shaft and fasten it with an axial circlip.

• Measure the DC voltage of the brake and compare the measured value with the data given on the nameplate. A deviation of no more than 10% is allowed.

• Keep the brake free from dirt during mounting and use.



1.5.3 Maintenance

- If the mini pallet jack is used in a high temperature environment for a long time, anti-rust measures should be taken to protect the contacting surfaces from rusting.

- Do not directly touch the friction surface which should be free from grease and dirt, otherwise the maximum braking torque will not be reached.

Normal ambient temperature is -10°C to +40°C.

– Please check regularly. Check items: check whether the switch works normally; check for noises; check for abnormal heating; check the friction part and rotating part for any foreign objects or greasy dirt; check whether the clearance of the friction part is correct; and check whether the excitation voltage is normal.

1.5.4 Brake air gap adjustment

The rated air gap - "Z" will increase due to wear. To ensure that the brake has sufficient braking torque, the air gap must be readjusted before the air gap reaches its maximum. The air gap can be adjusted several times. When the thickness of the friction brake disc reaches the minimum allowable value (see the Specification Table below), the friction brake disc must be replaced. When the air gap exceeds the maximum value, it may lead to brake release failure, burned friction brake disc, reduced braking force or holding force, increased noise, or even major accidents. Therefore, the air gap must be checked and readjusted regularly when the pallet stacker is powered off.

When the brake is powered-off, adjust the air gap between the stator (1) and armature (2) to the rated value "Z" by adjusting the 3 hollow screws (8) and the mounting screws (9) with a feeler gauge, and ensure that the air gap in all directions is the same.

Rated	Rated	Rated	Rated Air	Rotor Thickness	Pre-tension torque for
Voltage	Power	Torque	Gap(mm)	(mm)	mounting screws
(V)	W	(Nm)			(Nm)
24	23	8	0.15~0.30	6(+0/ - 0.03)	2.8
48	28	8	0.15~0.30	6(+0/ - 0.03)	2.8

Specification Table

When the brake is powered-off, adjust the air gap between the stator (11) and armature (8) to the rated value "Z" by adjusting the three mounting screws (1) and the hollow screws (7) with a feeler gauge, and ensure that the air gap in all directions is the same. Adjustment steps:

- Loosen the mounting screw (1) with an Allen wrench.
- Adjust the hollow screws (7) with a wrench.
- Tighten the three brake mounting screws (1).
- Check whether the brake air gap "Z" meets the requirements with a feeler gauge.

 Adjust the three mounting screws and the hollow screws as shown in the figure to adjust the air gap "Z", and tl



Under normal working conditions, the air gap should be adjusted for the first time after the brake has worked for 1,500 to 2,000 hours, and then semi-annually thereafter. Under severe working conditions, such as frequent braking and repeated emergency braking, the first air gap adjustment interval should be shortened.

Phenomenon	Causes	Troubleshooting		
	No power	Supply power		
	Excessively low excitation voltage	Check and adjust the voltage		
Brake failure	Incorrect air gap	Adjust it		
	Disconnection of stator coil	Replace the stator		
	Contaminated with greasy dirt or foreign objects	Clear away the foreign objects		
	Switch is connected to the AC circuit	Connect the switch to the DC circuit after rectification		
Long braking time	Incorrect air gap	Adjust it		
	Contaminated with greasy dirt or foreign objects	Clear away the foreign objects		
	Unstable operation in preliminary stage	Break in for a period of time		
Slipping	Contaminated with greasy dirt or foreign objects	Clear away the foreign objects		
	Excessive load	Reduce the load or replace it with a new one with a larger load capacity		
	Excessive load change	Adjust the peak load or replace it with a new one with a larger load capacity		
	Excessively high excitation voltage	Check and adjust the voltage		
	Clutch or motor interferes with the brake	Check the control circuit and eliminate interference		
High temperature	High ambient temperature	Increase ventilation		
	High operating frequency	Reduce to correct frequency		
	Excessive load	Reduce the load		
	Eliminate the noise based on the requirements for the product use environment	Noise-free design		
Excessive noise	Contaminated with foreign objects	Clear away the foreign objects		
	Improper mounting	Replace mounting surface or shaft		
	Excessive rotational inertia or dynamic imbalance	Reduce the rotational inertia or dynamic unbalance		

1.5.5 Common faults and troubleshooting

2 Hydraulic system

2.1 1.5t Mini Pallet Jack Hydraulic Schematic Diagram





2.2	Hydraulic system f	ault diagnosis and	troubleshooting
		0	0

Fault		Possible causes	Troubleshooting
No oil from oil pump		Low oil level in the tank	Fill it with oil to the specified level
		Clogged strainer	Clean the oil pipeline and tank, change the dirty hydraulic oil
Low oil pressure from the pump		Bearing wear: damage in retainer ring or O-ring	Replace the faulty parts
		Improper adjustment of safety valve	Raise the pressure with the assistance of a pressure gauge
		Air in oil pump	Fill the tank with hydraulic oil and operate the oil pump until no air bubbles are visible in the tank.
Noise from the oil pump		Cavitation caused by a clogged strainer	Adjust or replace the hose and clean the strainer
		Cavitation caused by high hydraulic oil viscosity	Replace with new hydraulic oil with a viscosity applicable for the running speed of oil pump, and start operation only when the oil temperature is normal.
		Air bubbles in the high-pressure oil	Check the causes of the air bubbles first, and then take preventative measures
Forks	The gear pump works	Clogged or damaged oil circuit	Repair or replace
fail	The gear pump does not	Loose or damaged inching switch for lifting	Re-tighten or replace
to lift	work	Faults in motor or circuit	Check and repair
Forks do not lower		Clogged or damaged electromagnetic valve	Repair or replace
The pressure of the safety valve is unstable or not adjusted properly		Pressure adjusting screw is loose	Re-adjust the pressure and tighten the screw
		The pressure adjusting spring is deformed or damaged	Replace
		Worn or stuck safety valve spool	Replace or re-assemble after disassembly and cleaning
		The pump does not work	Check and repair the pump

3 Electrical system

3.1 1.5t Mini Pallet Jack Electrical Schematic Diagram



Electrical Schematic Diagram of 2.0t Mini Pallet Jack



3.2 Traction motor controller

3.2.1 Maintenance

Do not repair the controller accessories. Do not disassemble, repair, or otherwise alter the controller. This may

damage the controller and void the warranty.

It is recommended that the controller should always be kept clean and dry and that diagnostic history files should be checked and cleared regularly.

Cleaning

Regular cleaning of the outer surface of the controller can help prevent corrosion or other electrical control

faults caused by dirt, dust or chemical substances which exist in the working environment and in the battery

power supply system.

Pay attention to safety before operating a battery mini pallet jack. Safety measures include, but are not limited

to, proper training, wearing goggles, not wearing loose clothes and jewelry.

Conduct maintenance by following the cleaning steps below. Never use a pressure washer to clean the controller.

Remove the battery to power off.

- Connect a load (such as contactor coil or horn) between the controller B+ and B- terminals to discharge the capacitor inside the controller.

- Remove any dirt and corrosion from the power and signal terminals. Wipe the controller with a wet

cloth and dry the controller before connecting the battery. Do not expose the controller to water under pressure.

Make sure the wiring is correct and secured.

A WARNING

- Water exposure is prohibited!
- Operation with electricity is prohibited!
- Reverse polarity is prohibited!
- Motor short circuit is prohibited!

3.2.2 Fault diagnosis

In the event of any fault in the pallet jack, and if it is confirmed that it is not a wiring error or a mechanical fault, the user can try to remove the fault by turning the key switch on. If this fails, please turn the key switch off and check whether the connector is wired correctly or has any dirt or damage. If it does, please repair and clean it, then reconnect it and turn the key switch on.

The controller provides diagnostic information to help technicians remove the faults caused by problems in the driving system. The fault information is obtained by means of the fault digital code to display the fault status; the fault information is resolved based on the information provided by the digital code and by analyzing the source of the information.

Diagnosis with fault status digital code

During normal operation, if there are no faults then no fault codes will flash on the handle display. If the controller detects a fault, the handle's display will flash with a fault code until the fault is cleared by troubleshooting.

Refer to the fault diagnosis table (Table 3) for possible causes of various faults. Faults are listed in numerical order.

Programmer diagnostics

The programmer can provide complete diagnostic information in easy-to-understand language. Faults are displayed on the Fault/Diagnostic Menu, and status is shown on the handle LCD.

Troubleshooting

When a fault is detected, the response can range from restoring current to completely cutting off the drive,

depending on the severity of the fault.

A numeric code is used for the fault code. For example, code "02" - Interlock throttle operation timing fault (interlock switch and throttle operation sequence error) - is displayed as follows:



1.5t mini pallet jack fault code

Fault Code	Meaning	Causes
00	Low battery	1. Battery voltage lower than 17V 2. Poor controller and battery wiring
01	Oil pump operation sequence error	Pump switch pressed before turning key switch on
02	Interlock switch and throttle operation sequence error	Errors in input sequence setting of key switch, interlock, direction switch.
03	Forward and reverse travel signal operation logic error	Errors in input sequence setting of key switch, interlock, direction switch.
04	Acceleration signal failure	HPD (Forward and Reverse Travel Signal) malfunction did not recover for 10S
05	Accelerator fault	1. Accelerator input disconnected or short-circuited; 2. Accelerator damaged; 3. Accelerator type misconfigured.
06	Controller pre-charge failure	 Electromagnetic brake drive short circuit; 2. Pre-charge circuit damage; 3. Power M0SFET damage
07	Main contactor coil or drive port fault	1. Internal relay driving failure; 2. Host electrical coil disconnection
08	Internal main contactor stuck	 Internal relay driving connection failure; 2. Host relay electrical coil open circuit
09	Controller internal contactor fault	 Internal contactor connection failure; Internal relay electrical coil open circuit
10	Electromagnetic brake coil open circuit or drive port failure	1. Battery brake coil open circuit; 2. Electromagnetic brake drive open circuit
11	Motor over-temperature fault	 Motor stall protection 2. Configured Boost Current, Boost Time and Main Current as well as Max Current and Cutback Gain matching under Motor; 3. Excessive Load
12	Battery connection open circuit	1. Poor battery cable contact 2. Emergency stop disconnect; 3. Battery not connected
13	Electromagnetic brake coil short circuit or drive port failure	 Electromagnetic brake drive open circuit; 2. Electromagnetic brake coil short circuit
14	Electrical control current sensor fault	 Abnormal configuration of controller parameters; Controller overcurrent
15	Electrical control hardware fault	 Motor short circuit or motor wire short circuit; Controller failure
16	Electrical control software fault	Software parameter mismatching
17	Electrical control parameter error	1. Controller internal parameter fault
18	Motor wiring short circuit	1. Motor short circuit; 2. Controller MOS tube failure
19	Motor open circuit	1. Poor contact of motor wire M1/M2; 2. Worn motor brushes
20	Electrical control current fault	 Controller overcurrent; 2. Controller MOS tube damage; 3. Motor short circuit
21	Excessive motor load, running high-temperature mode	 Motor stall protection ; 2. Configured Boost Current, Boost Time and Main Current as well as Max Current and Cutback Gain matching under Motor; 3. Excessive Load
22	Electrical control over-temperature fault	 Controller temperature >105°C; 2. Excessive load; 3. Poor heat dissipation conditions; 4. Temperature sensor failure
23	Electrical control low-temperature fault	1. Controller working below -10°C; 2. Temperature sensor failure
24	Excessive electrical control load, running high-temperature mode	 Temperature >80°C; Vehicle load overload; Controller not effectively dissipating heat; Electromagnetic brake not released; Temperature sensor failure
25	Electronically controlled overvoltage power reduction	 Battery voltage is greater than 31V; 2. Vehicle operated while charger is connected; 3. Poor wiring between controller and battery
26	Severe electronically controlled overvoltage power reduction	 Battery not connected; 2. Poor battery wiring; 3. Excessive charging voltage; 4. BMS protection disconnected
27	Electronically controlled undervoltage power reduction	 Battery voltage lower than 17V ; 2. Poor wiring between controller and battery
28	Severe battery undervoltage	1. Battery voltage less than 14V; 2. Battery disconnected
29	Electrical control parameter error	1. Controller internal parameter fault
30	Connection timeout for CAN bus nodes except the electronic control	1. No BMS message frames on the CAN bus;
32	Connection timeout for electrical control CAN bus nodes	1. No electrical control message frames on the CAN bus;
33	Oil pump contactor drive port failure	 Oil pump contactor drive short circuit; Oil pump contactor coil open circuit
34	Electromagnetic valve coil drive port failure	1. Lifting electromagnetic valve drive short circuit; 2. Lifting electromagnetic valve coil open circuit

36	Connection timeout for battery BMS CAN bus	No BMS message frames on the CAN bus;
37	Emergency reverse operation sequence error	 Emergency reverse (belly button) switch pressed before turning on the key or interlock switch
80	When unlocked, the handle operates in the upright walking position.	1. When the interlock is unlocked, the handle operates in the upright walking position; 2. 2. Parameter configuration error
81	When unlocked, the handle lifting button is in the closed position	 Lifting button closed when the interlock is unlocked; 2. Parameter configuration error
82	When unlocked, the handle lowering button is in the closed position	 Lifting button closed when the interlock is unlocked; 2. Parameter configuration error
83	No power message or power message timeout after handle unlocking	No power message on CAN bus
84	When unlocked, the throttle was not at zero position.	1. Accelerator signal displayed before unlocking
85	No ECU communication after handle unlocking	 No message frame from the controller on the CAN bus; 2. Controller starting failure; 3. CAN bus disconnected; 4. Handle communication abnormal

2.0t mini pallet jack fault code

Fault Code	Meaning	Causes
1	Feedback over speed	1. Controller fault
2	Core operating error	1. Controller fault
3-7	Reserved	
8	Speed sensor missing	No speed feedback detected
9	Speed sensor direction error	Hall sensor ABC and motor UVW direction or phase are not balanced
11	2-minute maximum motor current protection	Motor current continues to exceed the maximum current for more than 2 minutes
12	Controller overcurrent	 Motor short circuit; 2. Hall sensor ABC and motor UVW direction or phase are not balanced; 3. Motor parameter P15 weak magnetic base speed setting error; 4. Controller failure
13	Bus charging fault	1. Bus charging timeout
14	Main contactor connection fault	Controller internal contactor abnormal
15	DRIVERI connecting fault	Check whether the DRIVERI connection is normal
16	Severe battery undervoltage	 Check the battery level; 2. Controller battery voltage level setting error
17	Severe battery overvoltage	1. Check the battery voltage; 2. Controller battery voltage level setting error
18	Severe power board over-temperature	Controller protection and suspension
19	Reserved	
20	Accelerator/brake pedal input abnormal	Accelerator pedal or brake pedal input signal abnormal
21	Reserved	
22	5V output fault	1.Motor encoder short circuit; 2.Other 5V external device short circuit; 3.Controller failure
23	MACID detection failure	1. Controller CAN network ID number abnormally repeated
24	Main contactor driver fault	1. Controller internal contactor abnormal
25	Power module failure	1. Controller fault
26	CAN node missing	 The controller is configured in parameter P1 and the interlock check is enabled in parameter P2, but the corresponding module is not found in actual operation.
29	Controller internal temperature measurement circuit abnormal	Controller fault
31	Slight battery undervoltage	1. Low battery capacity
32	Slight power board over-temperature	1. Due to mild overheating
33	Power board under-temperature	1 Extremely low ambient temperature
34	Slight motor over-temperature	1. Reduce load

35	Reserved	
36	Drive 2 connection fault	1. Check Drive 2 connection.
37	Drive 3 connection fault	1. Check Drive 3 connection.
38	EEPROM read/write parameter error	1. Controller fault
39	Parameter overrun error	1. Parameter setting fault
40	Operation sequence error	1. Parameter setting fault
41	20% load capacity alarm	1. Charge
42	15% load capacity alarm	1. Charge
43	Alarm not matched	The match enable parameter is set, but the match is not completed.

Date	Maintenance content	Maintenance personnel



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