



X Series

Electric

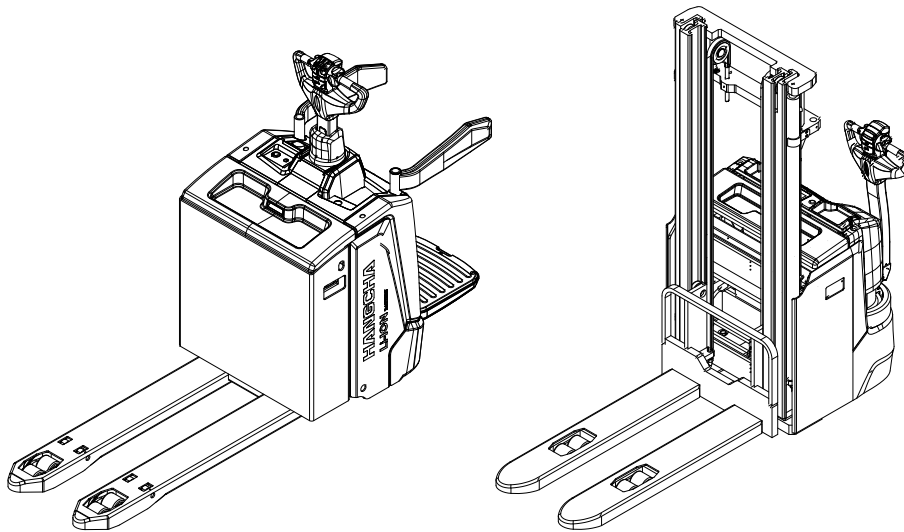
Pallet Jack

Pallet Stacker

CBD20/30-XT1-SI
CBD20/30-XT1S-SI

CDD12/14/16/20-XT1-SI
CDD12/14/16/20-XT1S-SI

OPERATION AND MAINTENANCE MANUAL



Original Instruction

HANGCHA GROUP CO., LTD.

10/2023

Preface

Thank you for purchasing this X-series pallet jack/stacker manufactured by HANGCHA GROUP CO., LTD.

The X-series pallet jack/stacker is a new product developed by us for the warehouse logistics industry. It incorporates a 48V PMSM system, new control handle and human-machine interface dashboard, and features low power consumption, energy conservation and high efficiency. The size and design has been optimized compared with the A series models to greatly improve the operation efficiency, and there are multiple working modes and states for use in different working environments, so it is an ideal tool for handling and stacking cargo on pallets in places such as warehouses, supermarkets and workshops.

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

Refer to Part I of this manual which describes the safe operation and preventive maintenance to understand how to use the truck properly; and refer to Part II for the structure, working principles and maintenance of the truck. In order to ensure safety and make full use of the performance of the truck 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 truck due to continuous design updates and product improvements.

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

Model	Truck controller	Traction Controller	Steering controller	Oil pump controller
CBD20-XT1S-SI	SFV300	SFP1180	SFP1040-E	\
CBD30-XT1S-SI				
CBD20-XT1-SI	SFV300	SFP1180	SFP1040-E	
CBD30-XT1-SI				
CDD12-XT1S-SI	SFV300	SFP1180	SFP1040-E	PMS2-A-0425T
CDD14-XT1S-SI				
CDD16-XT1S-SI				
CDD20-XT1S-SI				
CDD12-XT1S-SI	SFV300	SFP1180	SFP1040-E	PMS2-A-0425T
CDD14-XT1S-SI				
CDD16-XT1S-SI				
CDD20-XT1S-SI				

Contents

I. INTRODUCTION	1
1.1 OVERVIEW	1
1.2 APPLICATION ENVIRONMENTS AND CONDITIONS	2
1.3 PRECAUTIONS FOR USING TRUCKS DEDICATED FOR COLD STORAGE WAREHOUSES	4
1.4 OBLIGATIONS AND RESPONSIBILITIES OF THE USER	4
1.5 ATTACHMENT INSTALLATION OR TRUCK MODIFICATION	5
1.6 APPEARANCE AND MAIN PARTS	6
1.7 DESCRIPTION OF DISPLAY AND CONTROL PARTS	8
1.8 FORK ADJUSTMENT AND REPLACEMENT	12
1.9 TABLE OF MAIN TECHNICAL PERFORMANCE PARAMETERS	14
1.12 PRODUCT LABELS AND WARNING SIGNS	17
1.13 FORKLIFT TRUCK STRUCTURE AND STABILITY	19
II. SAFETY RULES	22
III. OPERATION AND SAFETY PRECAUTIONS FOR THE LITHIUM-ION BATTERY	26
IV. LIFTING, TRANSPORTATION AND TOWING	30
4.1 LIFTING	30
4.2 TRANSPORTATION	31
V. LITHIUM-ION BATTERY	33
5.1 INSTRUCTIONS FOR SAFETY	33
5.2 INSTRUCTIONS FOR INSTALLATION	33
5.3 COMMON TERMS FOR LITHIUM-ION POWER BATTERIES	34
5.4 INSTRUCTIONS FOR USE	34
5.5 DAILY MAINTENANCE	35
5.6 EMERGENCY PLAN	35
5.7 SIZE/WEIGHT	36
5.8. CHARGING THE LITHIUM-ION BATTERY	38
5.9 LITHIUM-ION BATTERY REPLACEMENT	41
VI. INSTRUCTIONS FOR OPERATION	44
6.1 BREAKING-IN OF NEW FORKLIFT TRUCKS	44
6.2 CHECKS BEFORE OPERATION AND ADJUSTMENT	44
6.3 STARTING	46
6.4 OPERATION	47
6.5 BRAKING	48
6.6 STEERING	49

6.7 CARGO LOADING	49
6.8 CARGO TRANSPORTATION	51
6.9 CARGO UNLOADING.....	51
6.10 SAFE PARKING	54
6.11 LONG-TERM PARKING AND STORAGE.....	55
VII. MAINTENANCE.....	56
7.1 MAINTENANCE OVERVIEW.....	56
7.2 REGULAR MAINTENANCE SCHEDULE	57
7.3 REGULAR REPLACEMENT OF KEY SAFETY PARTS	64
7.4 OIL AND LUBRICATION	65
7.5 REPLACEMENT OF THE DRIVING WHEELS	69
7.6 REPLACEMENT OF THE LOAD-BEARING WHEELS.....	70
7.7 CHECKS AND MAINTENANCE OF THE CONTROL SYSTEM ASSEMBLY	71
7.8. OPEN THE HOOD.....	73
7.9 INSTALL THE BACKREST	73
7.9 TABLE FOR TIGHTENING TORQUE FOR BOLTS	74
8 USE, INSTALLATION AND SAFETY RULES FOR ATTACHMENTS	75
8.1. INSTALLATION OF ATTACHMENTS	75
8.2. USE OF ATTACHMENTS	76
8.3 CHECKS AND MAINTENANCE OF THE ATTACHMENTS	77
9 RELEVANT SAFETY DIRECTIVE OR STANDARD (CE)	78

I. Introduction

1.1 Overview



High efficiency

- The truck incorporates a high efficiency 48V PMSM system.
- This is the first time in this industry a VCU has been applied on a pallet truck and we are pioneering the core technology.
- Compared with previous trucks, it features lower energy consumption and improved energy conversion efficiency.
- Its size, design and operation efficiency have been greatly improved.
- There are multiple working modes and states for use in different working environments.

Ergonomics

- It is also equipped with a newly designed control handle to optimize operation comfort. With the modular handle design, all components can be replaced individually.
- In the standard configuration, it can be started by entering the password or swiping the card (optional). The keypad has undergone 1 million test cycles, and it can be replaced separately.
- It also has adequate space for storage.
- It also provides a USB external power supply.
- With a 2.8-inch true color screen, the dashboard can display all kinds of working parameters and fault codes (with text interpretation), so there is no need to refer to the manual.

Safety and reliability

- The truck's main parts (guardrail cover, footboard assembly, frame side cover and main cover) are one-piece metal stamped parts which are strong enough to withstand external impacts.
- It is equipped with a limit switch attached to the handle to avoid accidental touching during the operation.
- It is also equipped with torsion bar auxiliary wheels, and together with the damper, the stability of the truck is greatly improved.

Maintenance

- When the one-piece rear cover is opened, all parts can be seen at a glance, facilitating maintenance.

Simplified dashboard panel design (only two pieces), so it is easy to assembly them together.

1.2 Application environments and conditions

Application environments and special conditions:

- The truck is only to be used in specific areas such as factory plants, tourist attractions and amusement parks, etc.
- The truck can only be used on solid and flat ground with sufficient load-carrying capacity (to protect the truck operation and lifting).
- Due to the small wheel diameter, a roll-over may occur when the truck travels across bumps or potholes, so the truck should not be used in these conditions.
- The truck can only be used on driving roads with a good view and the permission of the operator.
- The truck should be used within the specified rated load.
- The maximum gradeability when driving with a full load is 6%.
- When carrying goods uphill, keep the goods ahead; when carrying goods downhill, keep the operator ahead. Do not drive laterally or diagonally when going uphill.

Please make sure to read the safety rules in the manual, these rules have an important impact on your personal safety and the safety of the people and goods on the premises.



Warning

- **Do not use this forklift truck in explosion-proof places.**

The following normal climatic conditions should be met when the truck is in operation:

- Mean ambient temperature under continuous operation conditions: +25°C;
- The maximum short term ambient temperature (≤1h): +40°C;
- Minimum ambient temperature under normal indoor conditions: +5°C;
- Minimum ambient temperature under normal outdoor conditions: -20°C;
- Altitude: ≤2000m.

The following requirements should be met when the truck is working in a cold storage warehouse.

The truck must be operated within the specified continuous working duration based on the various

classes of cold storage warehouses. Our current recommended working hours are described as follows.

- **Continuous working time in a cold storage warehouse above -18°C must be no more than 2 hours.**
- **Continuous working time in refrigeration storage at -30°C to -18°C must be no more than 15 minutes per hour.**



Warning

- **Do not use this truck in explosion-proof places.**
- **Do not charge the lithium-ion battery when the ambient temperature is lower than 0°C.**

1.3 Precautions for using trucks dedicated for cold storage warehouses

- Use special oil for cold storage warehouses, and regularly maintain and change it.
- Trucks dedicated for cold storage warehouses should not be stopped and parked in the cold storage warehouses, or it may damage the hydraulic and electrical systems.
- Carry out hydraulic and walking actions to raise the temperature of each part before it enters the cold storage warehouse.
- If any water condenses on the surface of the truck after it leaves the cold storage warehouse, do not enter the warehouse again until after it has fully dried.
- Shorten the maintenance cycle of lubrication points to prevent premature wear.
- The battery should not be idle for a long time after discharging, recharge it in time and maintain high electrolyte specific gravity to prevent it from freezing.
- Use multiple trucks for cooperative operations to improve the working efficiency in the cold storage warehouse.
- If the truck breaks down in the cold storage warehouse, it must be moved out as soon as possible and repaired in the buffer zone or maintenance area.

1.4 Obligations and responsibilities of the User

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

The Truck User must ensure that the truck 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 Truck User must strictly observe accident prevention regulations, other technical safety regulations, and guidelines for the operation, maintenance and repair of the truck. The Truck 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 Attachment installation or truck modification

Any truck modification by the user is not permitted without the authorization of the manufacturer.

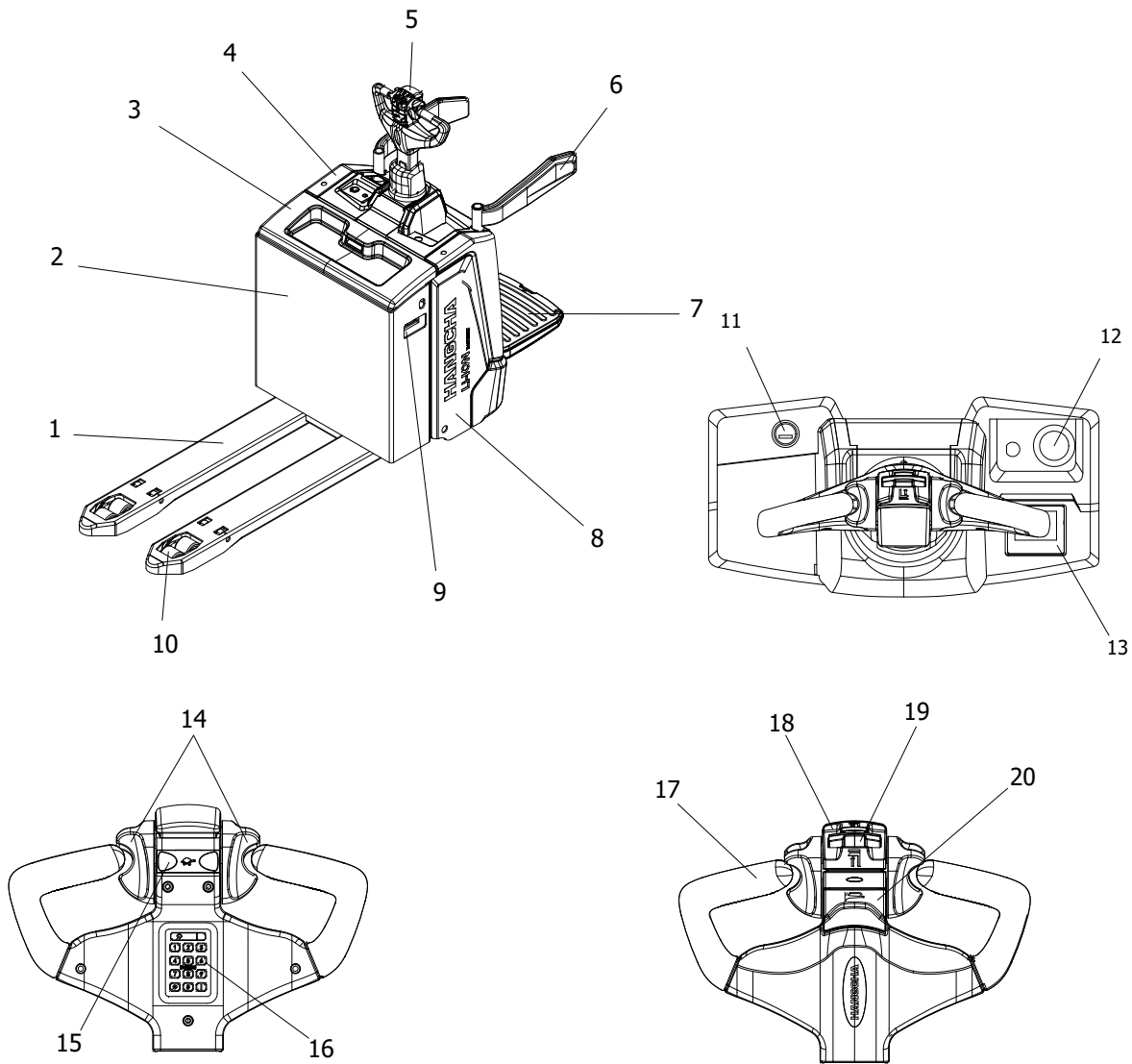
If it is necessary to install or add additional devices that affect or add new functions to the truck, prior written consent must be obtained from the manufacturer. Depending on the actual situation, the approval and consent of the local authorities may also be required.

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 systems, and the addition of removable attachments. When the manufacturer or its successor approves any modifications to the truck, its nameplate, signs/labels, identification and user's manual should also be modified accordingly.

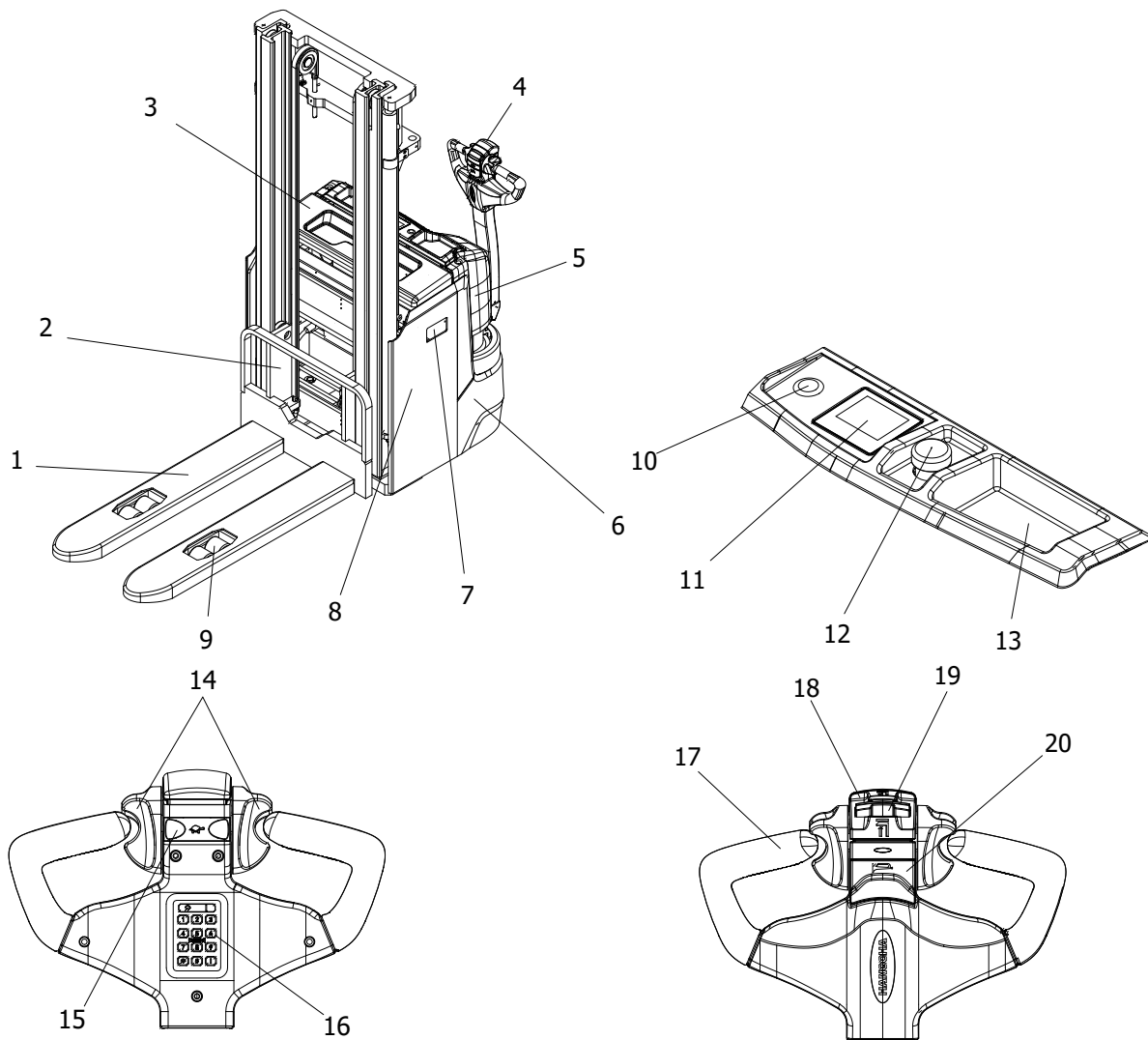
Only when the original manufacturer is no longer in the forklift truck industry with no successor is the user then allowed to make modifications to the truck, but the user should comply with the following rules:

- a) Entrust engineers specialized in industrial vehicle safety for the design, test and execution of the truck modification or refit.
- b) Keep a permanent record of the design, test and execution of the truck modification or refit.
- c) Modified its nameplate, signs/labels, identification and user's manual accordingly.
- d) Fix a permanent and visible sign on the truck, 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.

1.6 Appearance and main parts



- | | | | | |
|---------------------|---------------------------|-----------------------|--------------------------------|---------------------------|
| 1. Chassis | 2. Front frame | 3. Battery case cover | 4. Display panel | 5. Control handle |
| 6. Guardrail | 7. Footboard | 8. Rear frame | 9. Charging port | 10. Load-carrying wheel |
| 11. USB port | 12. Emergency stop button | 13. Dashboard | 14. Acceleration toggle switch | 15. Tortoise speed button |
| 16. Password keypad | 17. Handle | 18. Belly switch | 19. Lifting/lowering switch | 20. Horn button |

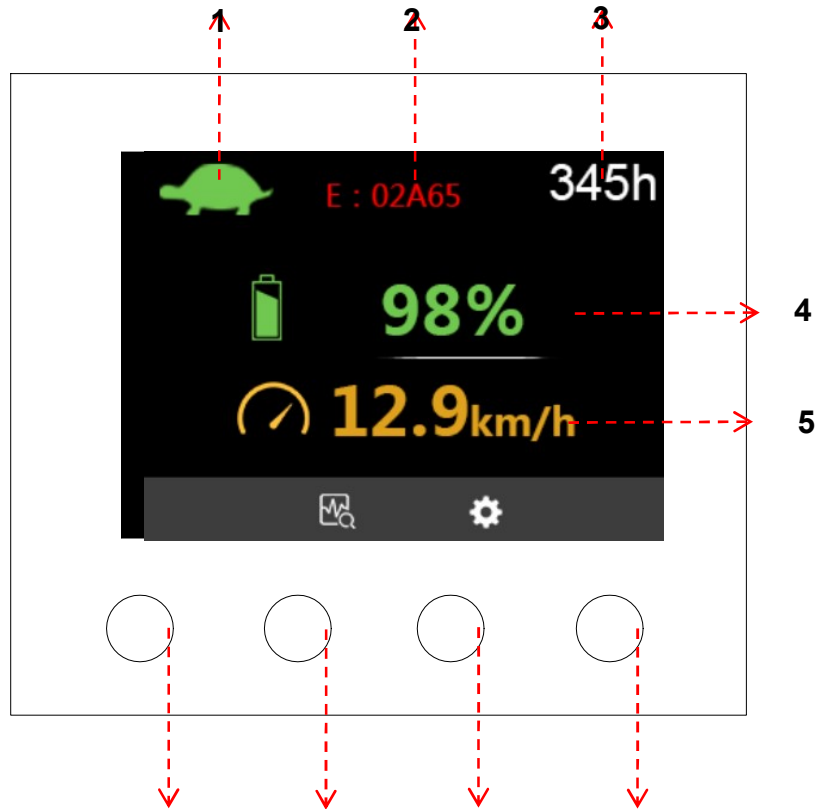


- | | | | | |
|---------------------|---------------------------|-----------------------|--------------------------------|---------------------------|
| 1. Fork | 2. Mast | 3. Battery case cover | 4. Control handle | 5. Upper hood |
| 6. Lower hood | 7. Charging port | 8. Frame | 9. Load-carrying wheel | 10. USB port |
| 11. Dashboard | 12. Emergency stop button | 13. Storage space | 14. Acceleration toggle switch | 15. Tortoise speed button |
| 16. Password keypad | 17. Handle | 18. Belly switch | 19. Lifting/lowering switch | 20. Horn button |

1.7 Description of display and control parts

1.7.1 D28C Dashboard

The D28C intelligent dashboard can display all kinds of working parameters and fault codes (with text interpretation), thus there is no need to refer to the manual.



1. Running state	2. Fault code	3. Running hours	4. Battery level	5. Speed
6. Homepage button	7. Fault description button	8. Reserved button	9. Setting button	

Button functions on the homepage:

Button 6: It is used for switching between Mode S and Mode P (switching to the tortoise speed mode by operating the handle).

Button 7: It is used for switching between the fault description, truck monitoring and parameter setting pages.

Button 8: It is used for switching to the reserved page (no functional definition temporarily)

Button 9: It is used for switching to the system setting page.

Mode S, Mode P and tortoise speed mode:

Mode S: Use button 1 on the homepage of dashboard for switching, and the letter "S" will be displayed on the panel; in this mode, the truck runs at maximum driving speed and lifting speed; and note that it is not possible to switch to this mode from tortoise speed mode.

Mode P: Use button 1 on the homepage of dashboard for switching, and the letter "P" will be displayed on the panel; in this mode, the truck runs at normal driving speed and lifting speed, but for the pallet jack the lifting speed is consistent with that in Mode S; and note that it is not possible to switch to this mode from the tortoise speed mode.

Tortoise speed mode: This mode can only be selected by using the handle and it is not possible to switch to Mode S/P from this mode; the truck can only travel at limited speed in this mode (usually 3km/h); but the lifting/lowering speed is the same as that in other modes.

Password input page:



Five-digit password: the default password is "*****".

Definition of the Buttons 6-9 on the password input page:

Button 6: Digit increase by one, cycle from 0-9

Button 7: Cursor right, shift back to the first digit from the last one

Button 8: Confirm

Button 9: Return

Setting steps:

1. Select the key parameter on the monitoring page.
2. Enter the parameter setting page.

Parameter setting page:



There are two setting items (local settings and other settings) on this page.

1. On the local settings page, the user can set the system language (Chinese/English)
2. On the other settings page, the user can set the administrator password, check the software version and so on.

Access method: Press Button 9 on the homepage and enter the password (default password: *****).

Fault description page:



On this page, select the fault description item to enter the relevant page. If there is a single fault, it will be visible directly; if there are multiple faults they will be cycled.

Access method: Press Button 7 on the homepage.

Control handle:



The control handle is used to control the traveling direction of the truck (forward/backward) and the lifting or lowering of the fork; it also has the emergency brake button and horn button; and is also equipped with a power-on password keypad (optional card or cover).

Horn button:



The horn button is on the front side of the handle, and when pressed it will emit a buzzing sound to remind the people and trucks nearby to take care.

Driving switch:



The driving switches are on the two sides of the handle top and they are used to control the truck direction (forward or backward). Push the driving switches forward (upward) to make the truck travel forward; and release them to stop the truck. Push the driving switches backward (downward) to make the truck travel backward; and release them to stop the truck.

! Caution

- The direction and speed control button will return after being released and the truck will stop. Thus, do not remove your thumb during the operation.



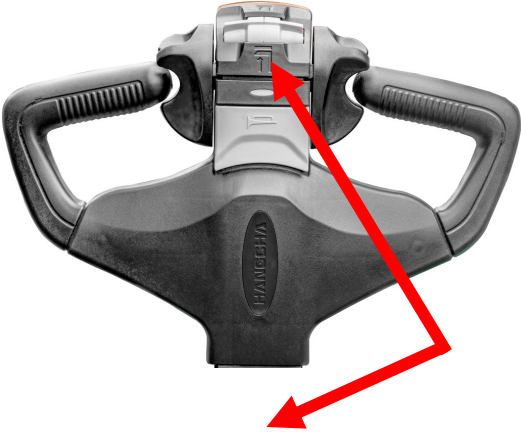
The lifting/lowering button is on the middle top of the handle as shown in the figure and there is a proportional control function for selection. Cargo lifting: Press and hold the button backward (away from the horn button) to make the forks lift the cargo. Cargo lowering: Press and hold the button forward (close to the horn button) to make the forks lower the cargo.

Tortoise speed button:

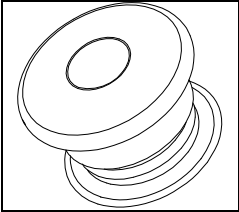


The tortoise speed button is on the back cover of the handle and the truck will run in tortoise speed mode once it is pressed.

Lifting/lowering button:



Emergency stop button



In case of emergency, press this button to cut off the main power supply.

! Caution

- Do not use the emergency stop button instead of the key switch.

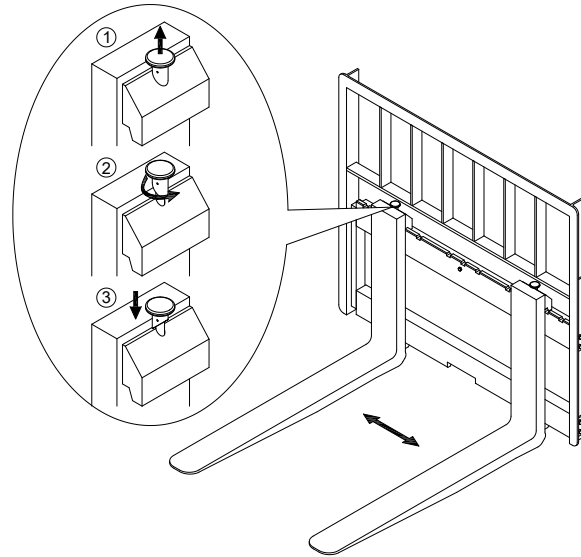
1.8 Fork adjustment and replacement

Adjusting fork spacing

In order to ensure the operational safety of the picking process, the spacing of the forks needs to be adjusted to the right position according to the size of the load pallet before the picking operation.

Operating steps:

- Pull up the fork stop dowel and rotate it by 180° in any direction to release the lock of the fork.
- Adjust the position of the fork symmetrically to both ends based on the center line of the fork arm carrier.
- After the fork clearance is adjusted, pull up the fork stop dowel, and rotate it back to the initial position, and then slightly move the fork left and right to ensure that the fork stop dowel is in the card slot of the fork arm carrier.



This completes the fork clearance adjustment.



Caution

- **The fork stop dowel must be locked (in the card slot of the fork arm carrier), if it is not locked, the fork can easily move while driving the forklift truck, and the cargo may fall.**
- **Be careful to prevent fingers from being clamped when adjusting a fork.**

Fork disassembly/assembly



Caution

- **There is an opening on the lower beam of the fork arm carrier for loading and unloading forks.**
- **Do not fasten the fork in the open position of the fork arm carrier to prevent the fork from falling off from the open position.**
- **There is a bolt in the middle of the upper beam to prevent the fork from working there.**

If the bolt is damaged, it should be replaced as soon as possible.

Disassembly of forks:

When the fork needs to be replaced, unscrew the fixing bolt in the middle of the fork arm carrier, move the fork to the opening in the middle of the cross-beam of the fork arm carrier, and then tilt forward and lower the fork until the fork is free from the fork arm carrier, then move the vehicle back.

Installation of the fork:

Place the forks on the ground against the truck, lower the fork arm to the bottom, drive the truck slowly, align the upper and lower slots of the forks with the upper and lower beams and gaps of the fork arm, lift the fork arm slowly, and adjust the position of the forks.

1.9 Table of main technical performance parameters

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

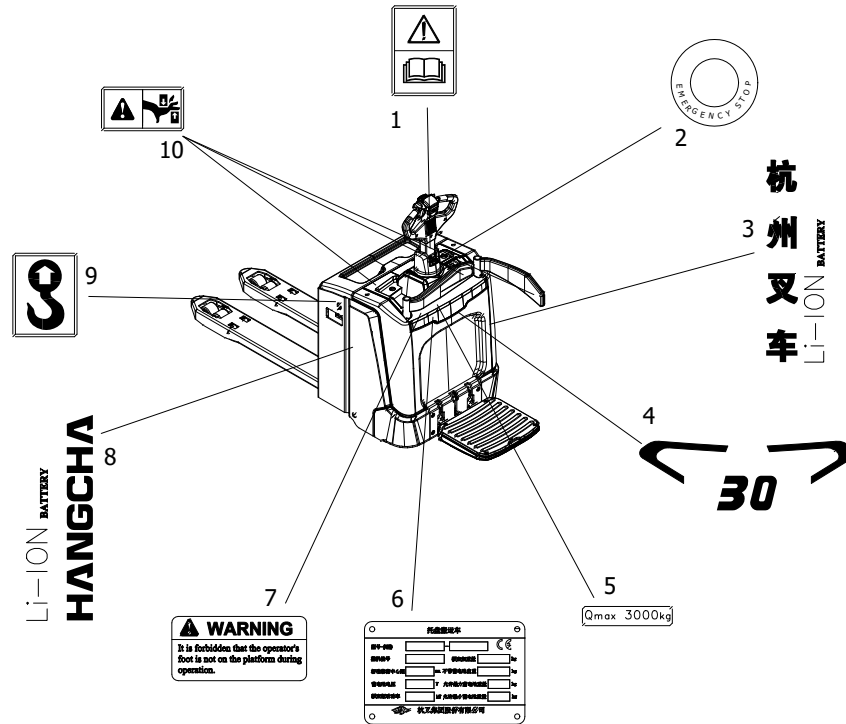
Parameter	1.1	Manufacturer		HANGCHA X-series	HANGCHA X-series
	1.2	Model		CBD20-XT1S-SI	CBD30-XT1S-SI
	1.5	Rated load-carrying capacity	Q (t)	2000	3000
	1.6	Load center distance	c (mm)	600	600
	1.8	Carrying distance	x(mm)	912/980	912/980
	1.9	Wheelbase (lifting/lowering)	y(mm)	1364/1432	1364/1432
Weight	2.1.1	Weight (including the battery)	(kg)	610	610
Wheels	3.1	Tire material		Polyurethane	Polyurethane
	3.2	Driving wheel size	(mm)	Ø250×80	Ø250×80
	3.3	Load-bearing wheel size	(mm)	Ø83×80	Ø83×80
	3.4	Auxiliary wheel size	(mm)	Ø125×50	Ø125×50
	3.5	Wheel number	(mm)	1x +2/4	1x +2/4
	3.6	Wheel track (driving wheels)	b10 (mm)	505	505
	3.7	Wheel track (Load-bearing)	b11 (mm)	370	370
Dimensions	4.4	Lift height	h3 (mm)	125	125
	4.15	Ground clearance of forks	h13 (mm)	85	85
	4.19	Overall length	l1 (mm)	1854	1854
	4.20	Overall length	l2 (mm)	704	704
	4.21	Overall width	b1/b2 (mm)	770	770
	4.22	Fork	s/e/l(mm)	60/170/1150	60/170/1150
	4.25	Fork width	b5 (mm)	540/680	540/680
	4.32	Ground clearance of forks	m2 (mm)	23	23
	4.34.1	Right angle aisle (1000×1200)	Ast(mm)	2064 (2502) Note 1	2064 (2502) Note 1
	4.34.2	Right angle aisle (800×1200)	Ast(mm)	2114 (2552) Note 2	2114 (2552) Note 2
4.35	Turning radius	Wa(mm)	1695 (2132)	1695 (2132)	
Clutch	5.1	Driving speed	(km/h)	9.5/12.5	7.5/12.5
	5.2	Lifting speed	(m/s)	0.05/0.067	0.037/0.055
	5.3	Lowering speed	(m/s)	0.063/0.063	0.051/0.051
	5.8	Gradeability	(%)	10/16	6/16
Motor & battery	6.1	Traction motor power (S2,	(kW)	2.2	2.2
	6.2	Power of the lifting motor	(kW)	2.2	2.2
	6.4	Lithium-ion battery	(V)/(Ah)	48/105	48/105
	6.4.1	Optional lithium-ion battery	(V)/(Ah)	48/125	48/125
	8.1	Driving type		PM synchronous	PM synchronous
Note 1: As per VDI2198 standard + 430mm Note 2: As per VDI2198 standard + 236mm					

Parameter	1.1	Manufacturer		HANGCHA X-series	HANGCHA X-series
	1.2	Model		CDD12-XT1S-SI	CDD14-XT1S-SI
	1.5	Rated load-carrying capacity	Q (t)	1200	1400
	1.6	Load center distance	c (mm)	600	600
	1.8	Carrying distance	x(mm)	700	700
	1.9	Wheelbase	y(mm)	1296	1331
Weight	2.1.1	Weight (including the battery)	(kg)	1200	1220
Wheels	3.1	Tire material		Polyurethane	Polyurethane
	3.2	Driving wheel size	(mm)	Ø250×80	Ø250×80
	3.3	Load-bearing wheel size	(mm)	Ø83×80	Ø83×80
	3.4	Auxiliary wheel size	(mm)	Ø125×50	Ø125×50
	3.5	Wheel number	(mm)	1x +1/4	1x +1/4
	3.6	Wheel track (driving wheels)	b10 (mm)	516	516
	3.7	Wheel track (Load-bearing)	b11 (mm)	385	385
Dimensions	4.4	Lift height	h3 (mm)	2700	2700
	4.15	Ground clearance of forks	h13 (mm)	90	90
	4.19	Overall length	l1 (mm)	1987	2019
	4.20	Overall length	l2 (mm)	834 Note 3	869 Note 3
	4.21	Overall width	b1/b2 (mm)	800	800
	4.22	Fork	s/e/l(mm)	60/185/1150	60/185/1150
	4.25	Fork width	b5 (mm)	570/680	570/680
	4.32	Ground clearance of forks	m2 (mm)	25	25
	4.34.1	Right angle aisle (1000×1200)	Ast(mm)	2201 (2632) Note 1	2236 (2667) Note 1
	4.34.2	Right angle aisle (800×1200)	Ast(mm)	2251 (2682) Note 2	2286 (2717) Note 2
	4.35	Turning radius	Wa(mm)	1551 (1982)	1586 (2017)
Clutch	5.1	Driving speed	(km/h)	9/11	9/11
	5.2	Lifting speed	(m/s)	0.225/0.47	0.195/0.4
	5.3	Lowering speed	(m/s)	0.45/0.4	0.45/0.4
	5.8	Gradeability	(%)	10/16	10/16
Motor & battery	6.1	Traction motor power (S2,	(kW)	2.2	2.2
	6.2	Power of the lifting motor	(kW)	4.2	4.2
	6.4	Lithium-ion battery	(V)/(Ah)	48/105	48/105
	6.4.1	Optional lithium-ion battery	(V)/(Ah)	48/125	48/125
	8.1	Driving type		PM synchronous	PM synchronous
<p>Note 1: As per VDI2198 standard + +220mm Note 2: As per VDI2198 standard + +140mm Note 3: Full-free triplex mast + 21mm</p>					

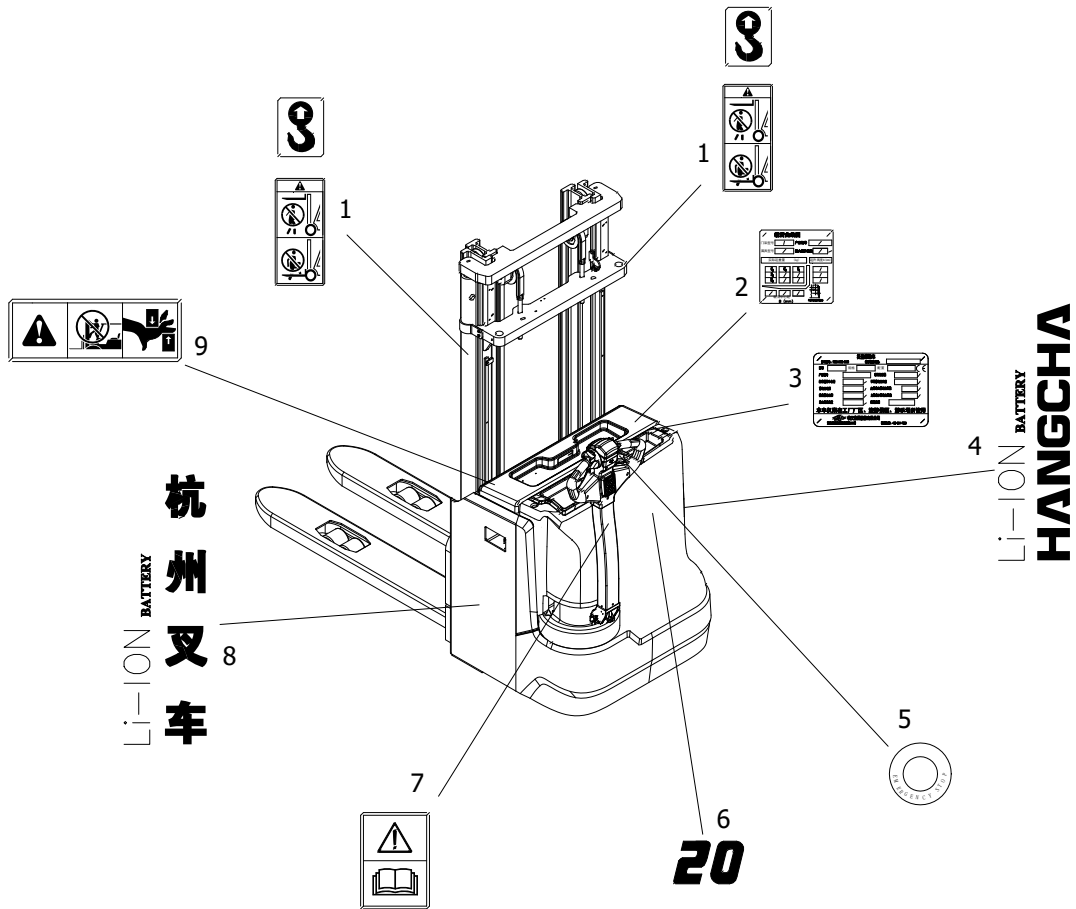
Parameter	1.1	Manufacturer		HANGCHA X-series	HANGCHA X-series
	1.2	Model		CDD16-XT1S-SI	CDD20-XT1S-SI
	1.5	Rated load-carrying capacity	Q (t)	1600	2000
	1.6	Load center distance	c (mm)	600	600
	1.8	Carrying distance	x(mm)	700	700
	1.9	Wheelbase	y(mm)	1331	1331
Weight	2.1.1	Weight (including the battery)	(kg)	1230	1260
Wheels	3.1	Tire material		Polyurethane	Polyurethane
	3.2	Driving wheel size	(mm)	Ø250×80	Ø250×80
	3.3	Load-bearing wheel size	(mm)	Ø83×80	Ø83×80
	3.4	Auxiliary wheel size	(mm)	Ø125×50	Ø125×50
	3.5	Wheel number	(mm)	1x +1/4	1x +1/4
	3.6	Wheel track (driving wheels)	b10 (mm)	516	516
	3.7	Wheel track (Load-bearing)	b11 (mm)	385	385
Dimensions	4.4	Lift height	h3 (mm)	2700	2700
	4.15	Ground clearance of forks	h13 (mm)	90	90
	4.19	Overall length	l1 (mm)	2019	2019
	4.20	Overall length	l2 (mm)	869 Note 3	869 Note 3
	4.21	Overall width	b1/b2 (mm)	800	800
	4.22	Fork	s/e/l(mm)	60/185/1150	65/185/1150
	4.25	Fork width	b5 (mm)	570/680	570/680
	4.32	Ground clearance of forks	m2 (mm)	25	25
	4.34.1	Right angle aisle (1000×1200)	Ast(mm)	2236 (2667) Note 1	2236 (2667) Note 1
	4.34.2	Right angle aisle (800×1200)	Ast(mm)	2286 (2717) Note 2	2286 (2717) Note 2
	4.35	Turning radius	Wa(mm)	1586 (2017)	1586 (2017)
Clutch	5.1	Driving speed	(km/h)	9/11	8/10
	5.2	Lifting speed	(m/s)	0.18/0.4	0.16/0.34
	5.3	Lowering speed	(m/s)	0.45/0.4	0.5/0.4
	5.8	Gradeability	(%)	8/16	8/16
Motor & battery	6.1	Traction motor power (S2,	(kW)	2.2	2.2
	6.2	Power of the lifting motor	(kW)	4.2	4.2
	6.4	Lithium-ion battery	(V)/(Ah)	48/105	48/105
	6.4.1	Optional lithium-ion battery	(V)/(Ah)	48/125	48/125
	8.1	Driving type		PM synchronous	PM synchronous
<p>Note 1: As per VDI2198 standard + +220mm Note 2: As per VDI2198 standard + +140mm Note 3: Full-free triplex mast + 21mm</p>					

1.12 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 signs. Please become familiar with the labels and signs before operating the truck.




S/N	Name
1	Safety instruction label: The driver must read the OPERATION AND MAINTENANCE MANUAL before operating the truck, otherwise he/she may be subject to danger.
2	Emergency power-off switch label
3	Lithium-ion battery manufacturer logo
4	Tonnage label and tire tread label
5	Max. lifting capacity label: The truck can lift a maximum cargo of xxxx kg.
6	Product nameplate: Basic information of the truck
7	Warning label: The operator must not leave the truck during the operation.
8	Lithium-ion battery manufacturer logo
9	Lifting label: Indicating the positions of eye bolt holes/tie-down points.
10	Hazard label: Beware of hand jamming when the mast is moving.



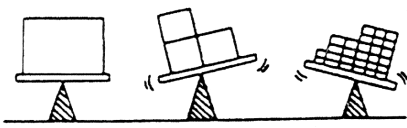
S/N	Name
1	Tie-down point label and mast warning label: Do not pass through or stay under the forks during operation.
2	Load curve chart label
3	Product nameplate: Basic information of the truck
4	Lithium-ion battery manufacturer logo
5	Emergency power-off switch label
6	Tonnage label
7	Safety instruction label: The driver must read the OPERATION AND MAINTENANCE MANUAL before operating the truck, or otherwise he/she may be subject to danger.
8	Lithium-ion battery manufacturer logo
9	Hazard label: Beware of hand jamming when the mast is moving.








1.13 Forklift truck structure and stability


Prevent the truck from rolling over! Be aware that the truck stability is very important to safe operation.

 Caution	Load center	
--	--------------------	--

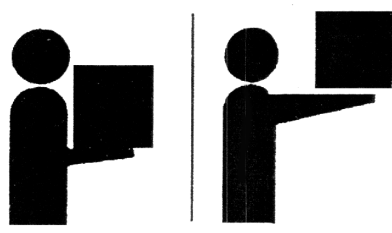
The load profiles handled by the truck vary; in order to evaluate the truck stability, it is very important to identify the load center in different shapes from boxes to boards and rectangular objects.



 Warning Do not jump out of the truck if it starts to roll over. The truck will roll over much faster than you can jump out of the truck. You should extend your feet and keep your hands on the steering wheel firmly to hold you in the cab.					
 Warning	 Fasten the safety belt properly Follow these instructions in case of a roll-over	 Lean in the opposite direction	 Hold on tight to the steering wheel	 Support yourself with both legs	 Do not jump out

 Caution	Maximum load and load center distance	
--	--	--

The horizontal distance between the center of gravity of the load on a fork and the load backrest of the fork or the front surface of the fork (whichever is smaller) is called the load center distance. The maximum load refers to the maximum load that the fork can bear at the standard load center distance. The relationship between the maximum load and the load center distance is shown on the Loading Capacity Chart of the forklift truck. If the load center distance moves towards the front fork, the overall center of gravity will move forward, thus the load has to be reduced.





Caution

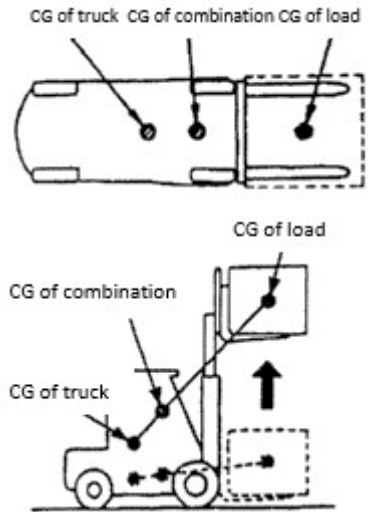
Center of gravity and stability

The truck's center of gravity depends on the combined center of gravity of the truck and the load. When the forklift truck is unloaded, the center of gravity remains unchanged; when it is loaded, the center of gravity is formed by the combined center of gravity of the forklift truck and the load.

The center of gravity of the load is determined by whether the mast is tilted forward or backward or whether it is lifted or lowered, thus the combined center of gravity can change.

The combined center of gravity of the truck is determined by the following factors:

- Load magnitude, weight and shape;
- Lift height
- Tilt angle of the mast;
- Tire inflation pressure;
- Acceleration, deceleration and turning radius;
- Road conditions and road tilt angle;
- Attachment type.

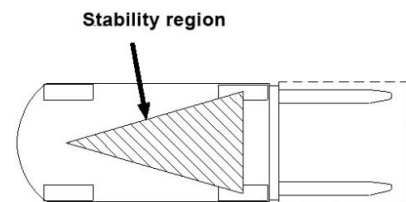


Caution

Stable region of center of gravity

In order to make the forklift truck stable, the combined center of gravity has to be within the triangle formed by contact point of the front left and right tires and the midpoint of the rear axle.

If the combined center of gravity is on the rear axle, the two front tires will form a fulcrum and the forklift truck will tilt forward. If the combined center of gravity moves out of the stable center of gravity triangle, the forklift truck will roll over in the direction towards the combined center of gravity.





Caution

Loading Capacity Chart

The chart shows the relationship between the location of the load center distance and the maximum load. Check whether the load and the load center distance are within the allowable range of the Loading Capacity Chart before loading. If the load shape is complicated, the heaviest part should be placed in the center of the fork and close to the load backrest.

RATED CAPACITIES AND LOAD CENTER GRAPH

Mast Model Product No.

Attachment Model Maximum Lift Height mm

Actual load lifting capacity (kg) Lift Height A (mm)

G_3	G_2	G_1	G
F_3	F_2	F_1	F
E_3	E_2	E_1	E

Load center distance B (mm)

Mast load capacity in vertical



Caution

Speed and acceleration

A static object should remain static without an external force. Similarly, a moving object continues to move at the same speed without an external force, which is referred to as inertia.

Due to inertia, when the forklift truck starts to move forward, a force acts backwards; when the truck stops, a force acts forward.

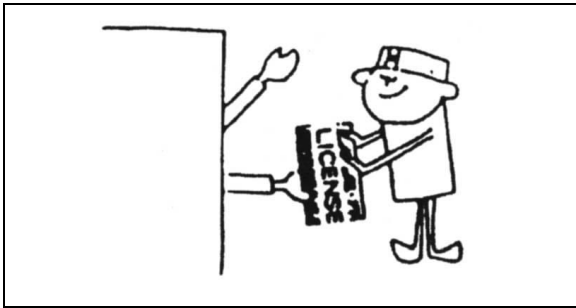
It is dangerous to suddenly apply the brake, because the forklift truck will roll over or the load will slide when a large force acts forward.

When the truck turns, a centrifugal force will be applied outwards from the turning center. The truck can be pulled out and rolled over by the force.

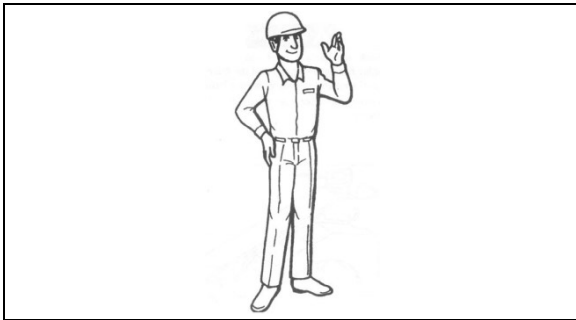
The left and right stability regions are small, thus the truck should slow down to avoid rolling over when turning. If the truck carries a high load and the overall center of gravity is high, the truck may easily tilt forward, to the left or to the right.

II. Safety rules

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



2. Operators must wear helmets, work shoes and clothes.



3. Do not carry people!



4. Do not modify or refit the truck without the manufacturer's permission.

5. The truck is not suitable for use in flammable and explosive working places.

6. Oil/water leakage, deformation and looseness should be regularly checked; otherwise, the service life of truck will be shortened; 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 baseplate, footboard and control handle.

- 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, bulb or resistance) 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 truck immediately, hang the "Danger" or "Fault" sign, pull out the key and report to the management. The truck should not be used until all faults are eliminated.

- In the event of a sudden fault when lifting cargo or driving on gradients, causing leakage of storage battery electrolyte or hydraulic oil and brake fluid, personnel should be organized for repair immediately.

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

sparks or a short circuit.

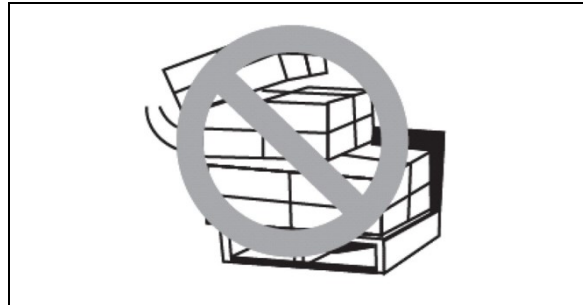


10. The driving route for trucks must be a solid and flat concrete road or similar roads suitable for truck operation. Pre-inspect the ground conditions of the work site. Tidy up the workplace, remove obstacles, sweep away debris and sand, and wipe off oil and water stains.

11. Overloading is strictly prohibited! Before operation, the operator should be familiar with the curve chart on the load curve sign, which indicates the relationship between the rated load and the load center distance.

12. Before starting, sound the horn and make sure no one is around the truck.

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



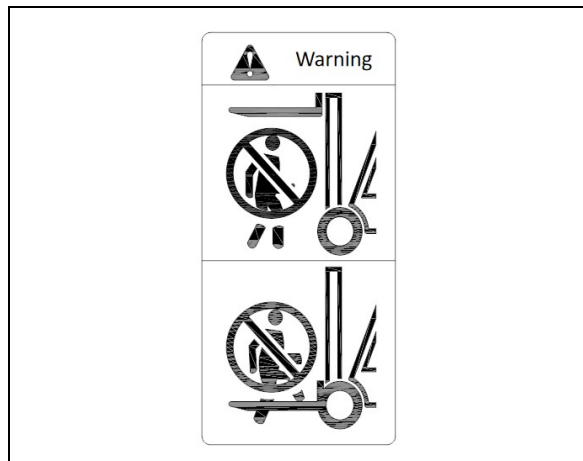
14. Do not drive fast, and avoid sudden turning or braking.

15. Do not drive the truck 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 truck so the cargo is behind.

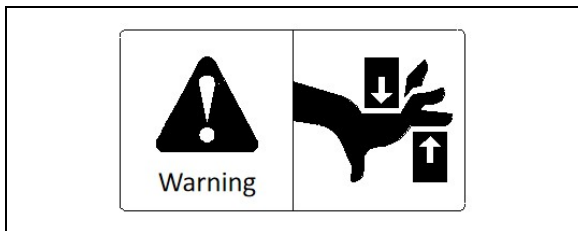
17. Do not drive the truck on the road, only use it in designated stacking places suitable for its small wheels.

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. Do not use the truck in sandstorms, snow, lightning, rain, wind and other bad weather conditions. In particular, when the wind speed is more than 5m/s, it is better not to use the truck.

– The climate conditions the truck is designed for: temperature: -5°C to 40°C; wind speed: no more than 5m/s; relative air humidity: no more than 90% (temperature: 20°C). Altitude ≤ 2,000m.

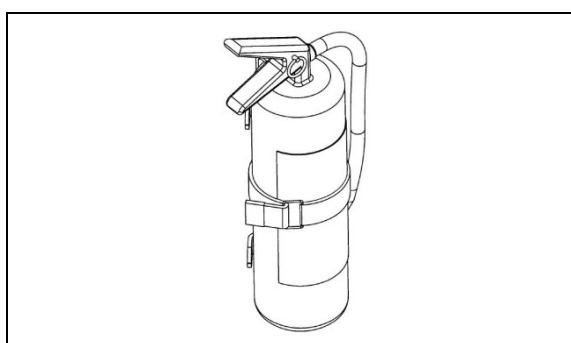
22. When the truck is powered off, the brake will be applied, so it must not be towed.

23. For stand-up trucks, the user should stand on the footboard steadily with both hands holding the handle tight. The truck should turn at speeds below 3km/h.

24. There are warnings and operation methods on the labels. Please operate the

truck according to the instructions in this manual and the signs on the truck. Check labels, signs and marks, and replace them if they are damaged or missing.

25. The workplace should be provided with fire extinguishers. The truck can also be equipped with a fire extinguisher by the user. Drivers and managers should be familiar with the position and usage method of the fire extinguishers.



26. Use a pallet when handling small objects and do not place them on the forks directly.

27. Do not flush the inside of truck with water, the truck should not be exposed to rain.

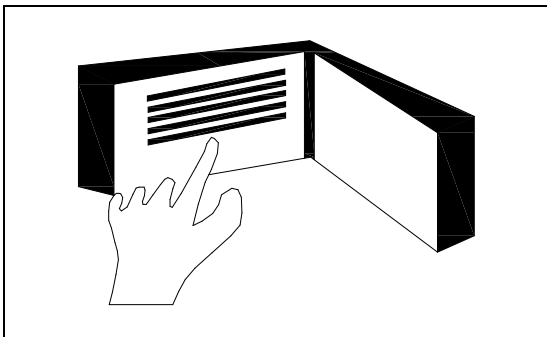
28. The battery must be unplugged before dismantling or repairing.

29. Only if the original manufacturer is no longer in the truck industry and no other enterprise specializing in this industry has taken over the business, is the user allowed to make modifications or refits to the truck, but the user should comply with the following rules:

– Entrust engineers specialized in

industrial truck safety for the design, test and execution of the modification or refit.

- Keep a permanent record of the design, test and execution of the truck modification or refit.
- Modified its nameplate, signs/labels, identification and user's manual accordingly.
- Fix a permanent and visible sign on the truck, 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.



III. Operation and safety precautions for the lithium-ion battery

- 1) Users need to create a record file for the lithium-ion battery to assist with carrying out battery maintenance.
- 2) The new battery must not be discharged or used until it is fully charged.
- 3) There is a dedicated charger for the lithium-ion battery. Do not charge the battery with any other chargers to avoid damaging the battery.
- 4) Do not open the lithium-ion battery case cover for maintenance. If there are any faults in the battery, promptly contact the manufacturer.
- 5) Do not use the battery if its level is low. To prolong the service life of the battery, the discharging capacity should not exceed 80% of the rated battery capacity. Whether it is partially discharged or completely discharged, the battery should be charged immediately.
- 6) Do not operate trucks equipped with a lithium-ion battery in an environment where the ambient temperature is higher than 60°C. Stop charging the lithium-ion battery when the ambient temperature is lower than 0°C.
- 7) Do not discharge the battery below the cut-off voltage and charge it promptly after discharge. Overcharging should be avoided.
- 8) During the battery inspection and maintenance, the operator must wear work clothes and insulated gloves, and must not wear watches, metal bracelets, necklaces and other jewelry. The electrolyte inside the battery is highly corrosive, so the operator must wear protective equipment.
- 9) Do not short circuit the positive and negative terminals of the battery under any circumstances, and prevent any metal or other conductive objects other than the battery post bolts and conductive band from touching the positive and negative terminals of the battery.
- 10) Do not knock, throw or step on the battery, heat the battery, or throw the battery into water.
- 11) Reverse charging of the battery is strictly prohibited. Reverse charging can cause the battery voltage drop to zero and the battery will have to be scrapped.
- 12) If the battery emits any unpleasant odor or heat, changes color, or exhibits any deformation or abnormal phenomenon during use, storage or charging, the battery should be immediately removed from the device or charger and kept out of service. Please contact the relevant technical department or after-sales service department of the manufacturer for treatment.
- 13) If there is any oxidation on the battery posts, wipe them with a dry cloth and polish with fine

abrasive paper before use, otherwise it may lead to poor contact and functional failure.

14) Do not use or place the battery next to high temperature sources, hazardous or dangerous materials, such as fires, heaters, corrosive chemicals, dangerous machinery and equipment, etc.

When the battery is stored and not in service, it should be placed in a cool and dry environment.

15) Do not immerse the battery in water or other conductive liquids, to avoid personal injury or property loss.

16) Do not use the batteries in high-intensity electrostatic fields or magnetic fields, otherwise the battery safety protection device may be damaged, causing safety hazards.

17) Do not use this battery in series or parallel with other models or types of batteries; do not connect the complete power system containing the lithium-ion battery protection circuit board or battery management system in series or parallel; and contact the relevant technical department of our company to obtain the correct technical support.

18) Children and other people who are not familiar with the safe use of lithium-ion batteries should not use them.

19) Do not disassemble, extrude, puncture or store the battery at high temperature. Protect the battery from any severe vibration, external impact or falling.

20) Do not charge the battery without a reasonable charging protection device (e.g. lithium-ion battery protection circuit board, battery management system) or using charging devices (e.g. charger, DC power supply) not approved by the battery manufacturer.

21) If there is a large amount of dust, metal filings or other foreign objects on the top cover and posts of the battery pack, use compressed air to clean them promptly, rather than water or a wet cloth.

22) Avoid splashing water or other conductive materials on the battery top cover and posts during charging or discharging, for example, do not use or operate the battery in heavy rain.

23) If a conductor accidentally comes into contact with both the positive and negative posts of a single cell or the battery, it will cause a short circuit. Be sure to disconnect the short circuit in the shortest possible time.

24) If the battery is subjected to a destructive impact a large amount of stored energy will be released instantly, in which case the operator should use a dry powder fire extinguisher to cool it down.

25) If the battery is giving off smoke or burning, the operator should evacuate the people at site and immediately spray it with water or immerse it in water.

- 26) Hazards from a burning or smoky battery: LFP batteries may leak/evaporate or decompose and release flammable electrolytes at 150°C if they are used improperly or affected by a severe environment. Hydrogen fluoride (HF) and phosphorus oxide may be generated when the battery is burning, and the LIPF6 and water in the electrolyte will undergo a chemical reaction and produce fluoride and carbon dioxide.
- 27) Fire extinguishing media: Spray a smoky or burning battery with water or immerse it in water. Class D, CO₂, dry powder or foam extinguishers can also be used.
- 28) Ingestion: In the event of ingestion of any battery electrolyte, it may result in throat or respiratory infection, the patient should drink plenty of water and seek immediate medical attention. Do not use emetics. Make sure the mucus is not blocking the respiratory tract and do not feed an unconscious person.
- 29) Eye exposure: The battery electrolyte is irritating to the eyes. In case of an accidental eye exposure, do not rub your eyes, just rinse immediately with plenty of clean water for at least 15 minutes, and if necessary, go to a hospital immediately for treatment, or otherwise the eyes will be injured.
- 30) Skin exposure: The battery electrolyte may cause skin infection. In the event of accidental skin exposure, immediately take off the stained clothes and wash the exposed skin with plenty of water and soap for at least 15 minutes, but do not apply unguent.
- 31) Inhalation: In the event of any leakage or breakage of the battery, its internal compositions may cause mucus and edema in the respiratory tract; in case of accidental inhalation, immediately go to a place with fresh air and ventilate the contaminated area. If necessary, oxygen therapy or artificial respiration can be provided.
- 32) Special protective articles: Use breathing apparatus to avoid inhaling irritating gases. Wear protective clothing or use other devices to avoid exposure to battery electrolyte.

Daily maintenance of the lithium-ion battery

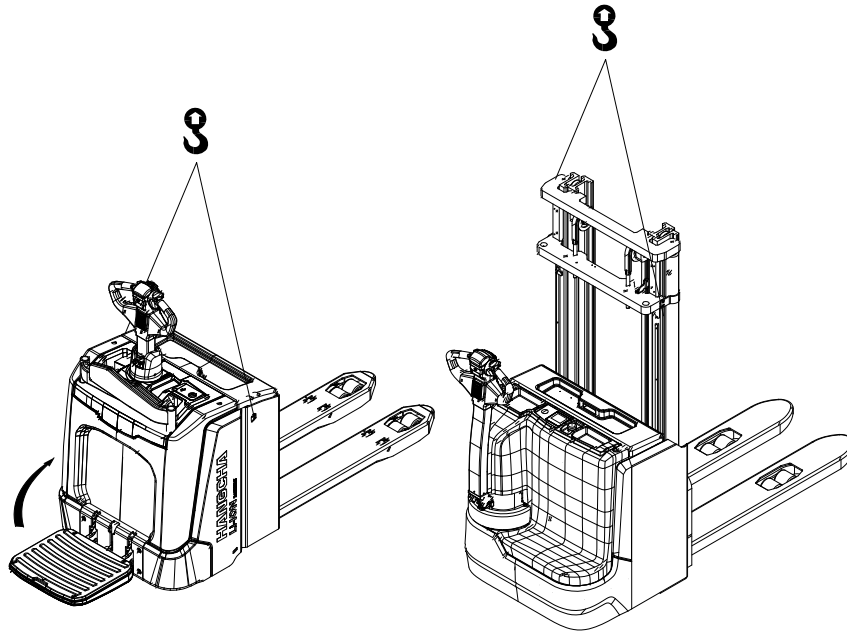
Daily	1. Check the battery for any deformation, oxidation and paint removal on its surface, offset mounting, or any damage to the battery box, etc.
Weekly	1. Use a dry cloth or compressed air to clean the lithium-ion battery and charger.
Monthly	1. Check whether there is any water or foreign matter in the plug or socket and check them for any rust or scorching.
	2. Check the cable for any damage and check the connectors for any looseness.
	3. Check whether there are any cracks, deformation, lumps and other abnormalities in the battery case.
Storage of the lithium-ion battery	1. Store the battery in a clean, dry and well ventilated indoor environment at an ambient temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and a relative humidity of not more than 75%. Do
	2. Charge the battery once a month.
	3. The positive and negative terminals of the battery case should be wrapped with high-voltage insulating sleeves or other insulating materials to ensure that no metal parts are exposed, to avoid a short circuit. Ensure that the diagnostic port is free of dust and wrapped or covered properly.

- 1) The battery should be charged immediately after each discharge. Estimate the charging or discharging time of the battery based on the actual power consumption of the battery or battery pack, and check whether there are abnormalities in the battery or battery pack at the end of charging or discharging, for example, voltage differences.
- 2) The battery charging process should be always monitored by professional staff and the plug and socket should be properly connected during charging to ensure that the charger works normally. If there is any abnormality, it must be repaired before charging.
- 3) Check the battery voltage, temperature and voltage difference displayed on the BMS screen before charging or discharging to ensure that all values are within the normal range.
- 4) If there is a large amount of dust, metal filings or other foreign objects on the top cover and posts of the battery pack, use compressed air to clean them promptly, rather than water or a wet cloth.
- 5) Avoid splashing water or other conductive materials on the battery top cover and posts during charging or discharging, for example, do not use or operate the battery in heavy rain.
- 6) For better performance, contact the manufacturer every six months for a battery performance check and equalization charge by the manufacturer's technical personnel. Failure to perform this test may reduce the lithium battery's working life.

IV. Lifting, transportation and towing

4.1 Lifting

Tie the steel rope on the tie-down points at both ends of the frame or mast firmly, and then lift the truck with a lifting device. (For stand-up trucks, the guardrails and footboard should be folded up first.)



Warning

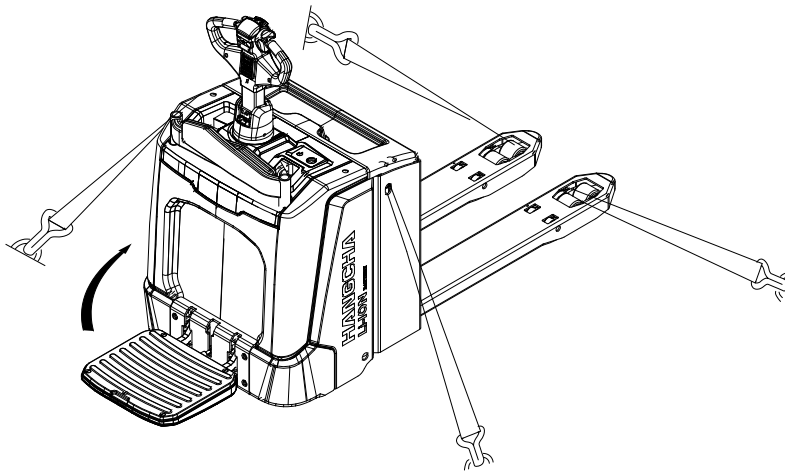
- Only lifting tools with sufficient loading capacity can be used.
- When installing the lifting tools, you must be careful to ensure that the tools will not touch the components or overhead guard of the forklift truck during the lifting process.
- Do not stand under the truck when lifting it.
- The truck or trailer must have tie-down clamps.
- Secure the truck with wedges.
- Belts or tie-down belts must be strong enough.

4.2 Transportation

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

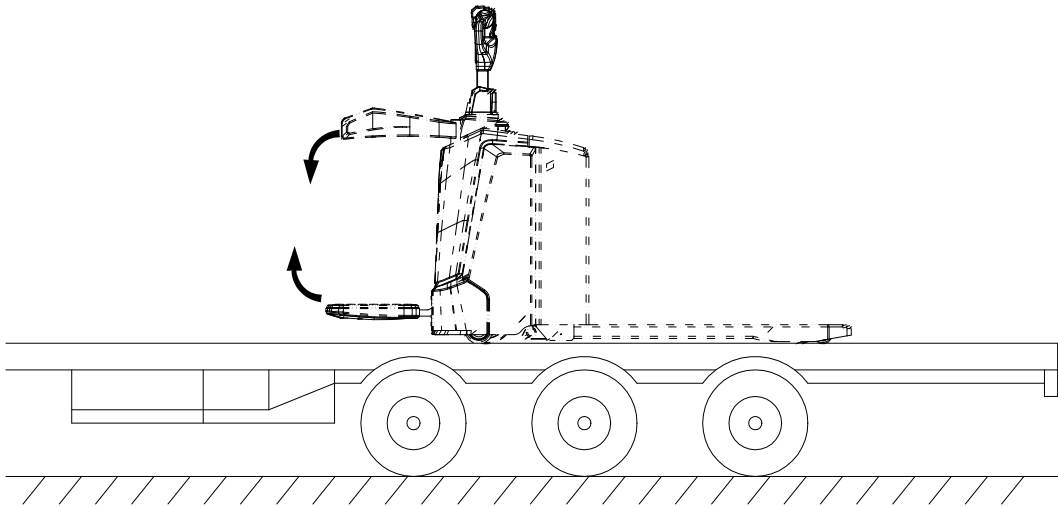
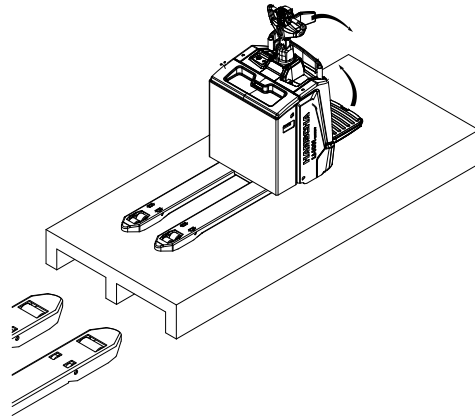
Operating steps:

- Park the pallet jack/stacker safely on a truck or trailer and then press the emergency stop switch. For stand-up trucks, the guardrails and footboard should be folded up first.
- Fasten the tension belt to the frame fastening points and pallet/forks, and then tighten the tension belt with a tightening device.
- Secure the front and rear wheels with suitable wedge blocks



Transportation of a damaged truck

The brake of this truck is engaged by default. Thus, when it has any faults or cannot be moved due to any damage, please do not tow it when the driving wheels are on the ground. The truck can be transported on a pallet or towed with the driving wheels off the ground.



Warning

- When the truck is being fastened, effective measures must be taken for the specific situation to ensure transportation safety.
- The forklift truck must be correctly secured when it is transported with a truck or trailer.
- Use wedges to secure the truck to prevent accidental movement.
- Only tension or fastening belts with adequate nominal strength can be used to fasten the forklift truck.

V. Lithium-ion battery

5.1 Instructions for safety

1.1 Do not touch the positive and negative terminals of the battery box with your hands at the same time to prevent an electric shock.



1.2 Maintenance personnel must have an electrician license issued by the State Administration of Work Safety and should not conduct maintenance without the ENERO maintenance authorization.



1.3 Wear insulating gloves when operating and maintaining the battery system, metal jewelry such as watches should not be worn.



1.4 When cleaning the truck, do not directly flush the battery system to protect the battery system from malfunctions caused by water ingress.



5.2 Instructions for installation

2.1 Installation personnel should have a relevant license for installation, be provided with labor protection, and pay attention to safety. Before installing the battery system, make sure that the low-voltage plug-in of the battery system is disconnected from the truck. When connecting the high-voltage system, pay attention to safety protection to prevent an electric shock during installation. During the installation of the battery system, the battery should be mechanically lifted and slowly installed into the battery compartment of the truck, do not crush or damage the battery case and external cables. During the installation of the battery system, avoid high-voltage reverse connection or short circuits, etc. To remove the battery system from the truck, make sure that the truck is powered off and the high-voltage cable and low-voltage connectors are disconnected from the truck.

2.2 Post-installation inspection: after the battery system is installed, check the battery system stop pins and fixing bolts to confirm that they meet the battery system installation requirements. Check that the high-voltage cable and low-voltage plug-in are connected correctly and securely. Turn the key switch to the "ON" position, the relay

should engage normally with no battery alarm. If there is a battery fault alarm, cut off the power immediately and notify our after-sales service center for a solution.

5.3 Common terms for lithium-ion power batteries

3.1 Battery system

The battery system is an energy storage device that typically includes one or more battery modules, battery management systems, thermal management systems, high/low voltage wires, connectors, and structural components.

3.2 SOC

The "State Of Charge" (SOC) of a battery is a measurement of how much energy is remaining (percent).

3.3 Rated voltage

It is an approximate value used to indicate the battery voltage.

3.4 Rated capacity

Under the specified conditions, the electric capacity provided by the fully charged battery, which is indicated by the manufacturer.

3.5 Over-discharge

The state when the battery voltage is below the discharge cutoff voltage, and it usually refers to the discharge state after the battery is fully discharged.

3.6 Overcharge

It can be usually regarded as the overcharge state when the battery voltage is higher than the maximum charging voltage.

3.7 Explosion: The battery housing is broken and solid material is flushed out of the battery with an explosive sound.

3.8 Fire: Open fire comes out of the battery shell.

3.9 Leakage: The internal composition of the battery (electrolyte or other substances) leak out of the battery.

3.10 CAN communication: Control Area Network.

5.4 Instructions for use

4.1 Battery working temperature: -28°C to 55°C ; allowable charging temperature: 0°C to 55°C ; allowable discharging temperature: -28°C to 55°C ; storage temperature: -28°C to 55°C .

4.2 Check before use and make sure there is no battery system alarm message on the dashboard after the ignition key switch is turned off. Please check the remaining battery capacity before use. It is recommended to use the truck when the battery SOC is within the range of 50% - 100%. It is recommended not to use the truck when the battery SOC is below 30%. Please charge the battery as soon as possible.

4.3 Charge the battery promptly when the battery system's SOC is below 20%. Please use the special charging device designated by the manufacturer. In case of a fault alarm during charging, both the battery system and charger will stop charging and the fault information will be displayed on the charger. The charging place should be dry and ventilated, with no flammable and explosive

materials. The battery system should be fully charged once a week.

4.4 Before long-term storage, confirm that the battery level is not less than 50% of the rated capacity. Charge the battery every three months for maintenance, i.e. fully charge the battery. When the battery has been stored for more than three months, before using, please confirm whether there is a fault alarm in the power battery system. If so, please contact our after-sales service center for maintenance. Keep the storage place dry and well-ventilated and away from heat sources.



- When the ambient temperature is low, the charging time of the battery system will be extended, which is a normal phenomenon. The battery management system will automatically adjust the charging time with the temperature change to ensure the best performance.

5.5 Daily maintenance

5.1 Battery case maintenance: Check the outer case of the battery system for foreign objects, obvious deformation, rust and corrosion and other abnormalities.

5.2 Charging port maintenance: In the power-off state, check whether there are any damage, foreign objects, rust and corrosion and other abnormalities in the charging port.

5.3 Plug-in maintenance: In the power-off state, check for looseness, damage and other

abnormalities in the plug-in components.

5.4 State detection: Observe the battery system voltage, temperature and other state information on the charger display while charging to ensure that all parameters are in the normal range.

5.6 Emergency plan

6.1 Severe abnormalities: During use, users should be familiar with safety precautions and should not carry out inappropriate operations to avoid improper use of the battery (e.g. overcharge, over-discharge, short circuit, extrusion, puncture, overheating and high current discharge, etc.). In the charging and use process, the power battery system may develop abnormalities: the temperature of battery system or parts rises sharply; or abnormal smell or smoke from the battery system.

6.2 Emergency plan:

6.2.1 Users should quickly leave the truck and call the emergency services.

6.2.2 Carry out the following operations, if possible, provided that personal safety can be guaranteed:

a. If there is any smoke or burning in the external wiring harness, use a carbon dioxide or dry powder fire extinguisher for fire-fighting.

b. If there is any smoke from the battery, use a high-pressure water gun for fire-fighting at a distance.

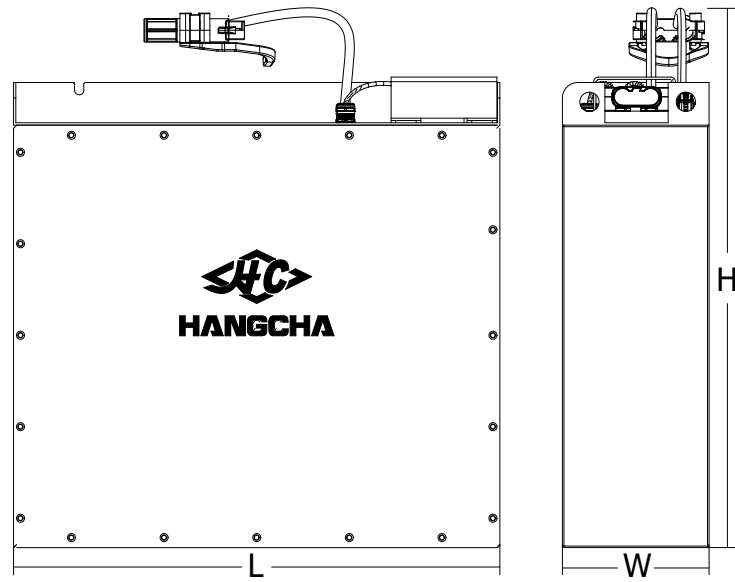
c. If the user inadvertently inhales smoke, please leave the area and seek medical attention as soon as possible.

6.2.3 Contact the truck dealer for professional advice.

5.7 Size/Weight

Item		CBD20-XT1S-SI	CBD30-XTIS-SI	CBD20-XT1-SI	CBD30-XTI-SI
Length (L)	mm	630	630	630	630
Width (W)	mm	190	190	190	190
Height (H)	mm	607	607	605	605
Allowable min. weight	kg	60	60	60	60
Allowable max. weight	kg	220	240	220	240

Item		CDD12-XT1S-SI CDD14-XT1S-SI CDD16-XT1S-SI CDD20-XT1S-SI	CDD12-XT1-SI CDD14-XT1-SI CDD16-XT1-SI CDD20-XT1-SI
Length (L)	mm	630	630
Width (W)	mm	190	190
Height (H)	mm	607	605
Allowable min. weight	kg	60	60
Allowable max. weight	kg	220	220

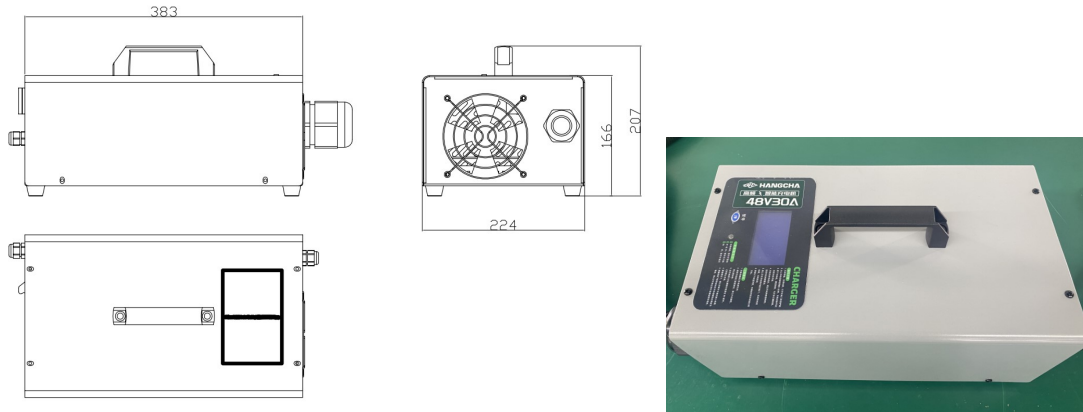


Warning

The weight and size of the battery have a great influence on the stability and load-carrying capacity of the truck operation.

When installing or replacing the battery, attention should be paid to the fixed position of the battery on the truck, and the battery weight must be within the battery weight range specified on the nameplate.

5.8. Charging the lithium-ion battery



Charger size



Three-pin plug 16A



REMA connector



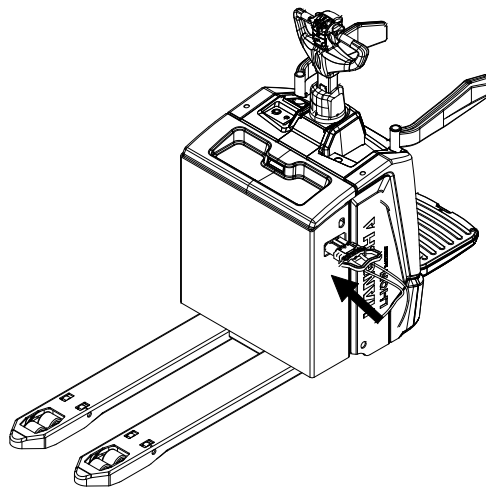
Caution

- The working voltage and current of certain devices inside this charger are very high, and in order to ensure personal safety, the following regulations should be observed at all times:
 1. a. Only personnel who have received training on the charger and have sufficient knowledge of the charger should be responsible for its installation. During installation, the safety regulations as stated above and local safety regulations should always be observed.
 2. The system voltage may reach 320Vdc or 475Vac, which is dangerous to humans, proper insulation should be provided during the installation and operation for personal safety.
 3. Ensure that the power system is not energized during any operations inside the power supply system cabinet. The mains input and battery power of the power supply system must be cut off.
 4. Keep the power supply equipment in a locked room, lock the cabinet, and entrust a responsible person to keep the key.

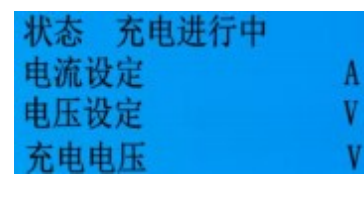
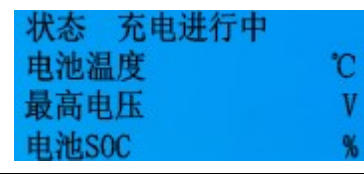
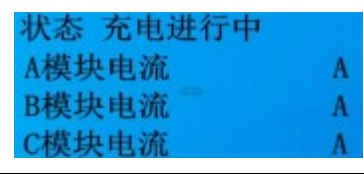
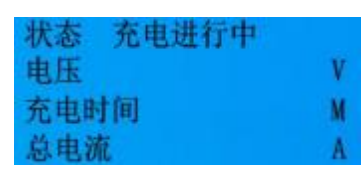

Charging steps:

1. Move and park the truck near the charger. Make sure the plug and your hands are dry before operating.
2. Inspect the charger before charging to ensure correct wiring and no faults or abnormalities.
3. Confirm the battery voltage and capacity match the charger. (Refer to charger specs and battery specs).
4. Before charging, connect the charger output plug to the truck battery socket, and then connect the charger input plug to the power socket. (Open the battery case cover upward for the truck with no side holes.)
5. If there are no faults, the charger will receive the charging command (including charging voltage, charging current, start-up instructions, etc.) from the truck BMS. and automatically start charging the battery, and the indicator light will blink.
6. If an error occurs during charging, press "Pause" to stop charging until the fault is resolved.
7. After the battery is fully charged, the charger will automatically stop charging and the indicator light will be on.
8. After charging is complete the indicator light stays on and the screen displays charging completed. Disconnect the charger's AC circuit breaker, unplug the AC input connector, and then unplug the battery connector.
9. Truck application

Note: If the truck needs to be used before charging is complete, press "Pause" to stop charging and then disconnect the plugs. Improper operation can damage the battery or charger, or lead to other risks.



During charging, the indicator light blinks. The display sequentially shows the following 4 screens:

 <p>状态 充电进行中 电流设定 A 电压设定 V 充电电压 V</p>	<p>Current settings: Current set value sent by battery BMS to charger Voltage settings: Voltage set value sent by battery BMS to charger Charging voltage: Battery current voltage value</p>
 <p>状态 充电进行中 电池温度 ℃ 最高电压 V 电池SOC %</p>	<p>Battery temperature: Battery temperature during charging Max. voltage: Highest single cell voltage in battery pack Battery SOC: Battery's current SOC value</p>
 <p>状态 充电进行中 A模块电流 A B模块电流 A C模块电流 A</p>	<p>Module A current: Charger module A output current value Module B current: Charger module B output current value Module C current: Charger module C output current value</p>
 <p>状态 充电进行中 电压 V 充电时间 M 总电流 A</p>	<p>Voltage: Battery current voltage value Charging time: Accumulated charging time Total current: Charger max output current value when operating</p>
	<p>Pause button: Press it to pause the charging; and press it again to restart charging. Indicator: It will light up continuously when the battery is fully charged; it will flash in the charging process; and it will not light up when it is in the standby state.</p>

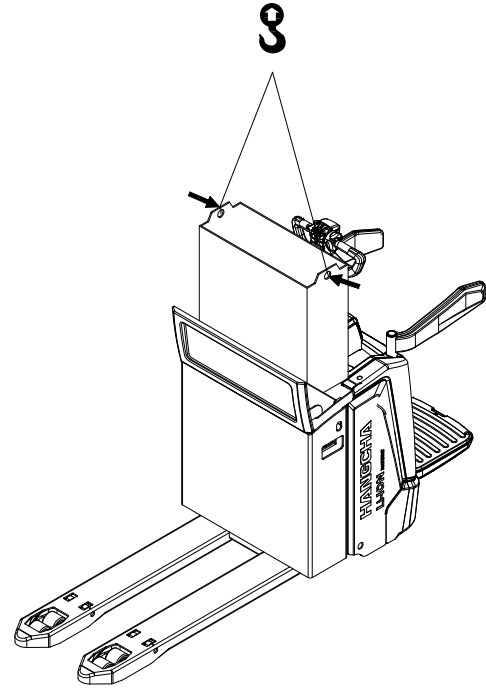
Regular maintenance and inspection of the charger

1. Check for damage on the input and output cables (inspect before charging or use);
2. Check for damage on the charger output plug (inspect before charging or use);
3. Promptly replace the relevant parts if damage is found (inspect before charging or use);
4. Regularly clear away dust and other foreign objects from the charger air inlet and outlet (inspect monthly);
5. Check whether the charger input circuit breaker is working normally; Contact the dealer promptly if any faults are found;
6. Disconnect input power before finding out the cause of a fault, and unplug the charging AC input connector to avoid an electric shock.

5.9 Lithium-ion battery replacement

Operating steps:

- Park the truck according to rules and regulations.
- Open the battery case cover.
- Disconnect the battery charging plug from the truck socket, and place the battery charging plug and cable inside the battery case to ensure that the cable will not be scratched when the battery is taken out.
- Unscrew the flat head screws and remove the mounting block.
- Hang and fasten the lifting tool on the two eyelets on the battery case.
- Use a lifting device to lift the battery case vertically out of the frame.



Install the battery reversing the steps mentioned above and ensure the installation position and wiring are correct.



Warning

- Take care to avoid any injury as the battery case is very heavy.
- Make sure that the lifting capacity of the crane is greater than the battery weight.
- The disposal of used batteries must comply with local environmental regulations.
- Before replacing, please check the voltage, capacity, battery case size and weight of the battery pack. Ensure that the specifications, size and weight of the battery are the same as the original.

Precautions for use and maintenance of lithium-ion batteries

Precautions:

1. The lithium-ion battery should be charged immediately after each discharge to prevent low battery level.
2. Do not place the battery pack next to high temperature heat sources, such as fires, heaters and other heating equipment.
3. Do not use the battery in high-intensity electrostatic fields or magnetic fields, as this may damage the battery safety protection device and cause safety hazards.
4. Do not use the battery pack in high temperatures (direct sunlight) for a long time, otherwise it may cause battery overheating, functional failure or shortened service life.
5. Do not operate trucks equipped with lithium-ion batteries in an environment where the ambient temperature exceeds 55°C. When the ambient temperature is below -25°C, the truck should not be operated until the battery system is heated to above -10°C;
6. Do not disassemble the battery case under any circumstances.
7. Do not drop or knock the battery pack.
8. Do not short circuit the positive and negative poles of the battery pack or place any foreign objects and tools on the lithium-ion battery to prevent short circuits.
9. To prevent water ingress and ensure the safety of the battery pack, do not directly wash the battery case. Do not use battery packs of different brands, different capacities or different types together.
10. The battery pack should be stored in a cool and dry place without direct sunlight.

Maintenance instructions:

1. Without the manufacturer's permission, do not change the battery's ex-factory parameter settings.
2. Do not plug or unplug the electricity supply if it is necessary to interrupt or suspend the charging process, to avoid arcing or any damage to the charging socket.
3. The charging process takes longer at temperatures below 0°C compared to normal temperatures.
4. If the battery is not used for a long time, it needs to be charged and discharged once a month, optimal SOC range for battery storage: 50%-80%. **Common battery faults and troubleshooting**

Undervoltage when fully charged

1. The battery has been idle for a long time and has not been maintained in accordance with the provisions. Troubleshooting: Charge the battery.
2. The battery has suffered a severe impact, which caused damage to the battery case or a smell of electrolyte in the battery pack. Troubleshooting: Generally, this fault is not covered by the maintenance scope. It is necessary to figure out whether the fault is in the output circuit or the battery prior to any maintenance. First of all, disassemble the battery case, check the P+/C+ and P-/C- wires or solder joints of the battery pack for any damage, and if so, please replace them. Check the battery smell. If there is an

irritating electrolyte smell, it indicates that there is a leakage in the battery and a voltage test for each battery pack should be performed. If the voltage of one battery pack is very low and very different to that of the other battery packs, please contact the battery manufacturer for replacement.

3. Insufficient battery capacity. Troubleshooting: Carry out 3-5 charge-discharge cycles for the battery.

The battery is fully charged (as shown on the charger), but the voltage is zero or low.

1. The battery is disconnected. Troubleshooting: Disassemble the battery and check for wire disconnection or missing solder joints. Clear the fault if necessary.

2. The protection board does not work. Troubleshooting: Check the wiring of the protection board or any missing solder joints; otherwise, check the voltage between B+ and B- and the voltage between P+ and P-, if there is a great difference between them, it means that the protection board is damaged. It is necessary to thoroughly test the protection board, and if it fails to pass the test, please replace it.

Battery voltage instability

1. Defective soldering. Troubleshooting: Test the internal resistance of the battery with an internal resistance tester. If the value exceeds the specified value, there may be incorrectly soldered joints in the battery, please carry out correct soldering after disassembling the battery.

2. The protection board is abnormal. Troubleshooting: Replace the protection board.

3. Poor contact with terminals or connectors. Troubleshooting: Replace the terminals or connectors.

The battery can be charged normally but cannot be discharged normally, or can be discharged normally but cannot be charged normally.

1. The protection board is damaged. Troubleshooting: Replace the protection board.

Emergency plan

1. Severe abnormalities: During use, users should be familiar with safety precautions and should not carry out improper operations to avoid improper use of the battery (e.g. overcharge, over-discharge, short circuit, extrusion, puncture, overheating and high current discharge, etc.). During charging and use, the following abnormalities may occur in the battery system:

a. The battery system or parts temperature rises sharply.

b. Abnormal smell from any part of the battery system.

c. Smoke and fire in any part of the battery system.

2. Emergency measures in the event of smoke and fire in the battery system: In the event of any smoke or fire in the battery system during use, the following emergency measures should be taken immediately:

a. Stop the truck and power off.

b. All personnel at site should quickly leave the truck and call the fire station.

c. Use water-based fire extinguishers to put out the smoke or fire provided that personal safety is not put at risk.

d. Notify our company as soon as possible to get further support.

VI. Instructions for operation

6.1 Breaking-in of new forklift trucks

The truck 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 made.
- 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.

6.2 Checks before operation and adjustment

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

1) Oil/fluid leakage

Check the truck while it is parked on the ground for any leakage of hydraulic oil, gear oil, or electrolyte.

2) Forks

Check the forks for any cracks or deformation.

3) Front/rear wheels and balance 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, wear of the moving joints.

5) Hydraulic oil

Remove the machine hood and check the hydraulic oil tank fluid level to see whether it is within the specified range. If the oil level is insufficient, add more into the reservoir.

6) Battery inspection

Check if the plate is firmly mounted. 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.

Check the lithium-ion battery for any leakage of waste fluid.

Connect the battery plug and turn the key switch on.

7) Dashboard

See the Dashboard section.

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 handle to tilt it, gradually press the acceleration control button with your thumb away from your body and check the truck travels forward normally; gradually press the acceleration control button with your thumb towards your body and check the truck reverses normally.

10) Braking system

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

11) Steering system

Operate the control handle to make the truck move to the left and right three times and check the steering system operates normally.

12) Horn

Honk the horn to check its sound.

13) Visual inspection

Carry out a visual inspection on the truck and check for any dirt, corrosion or paint peeling.

14) Others

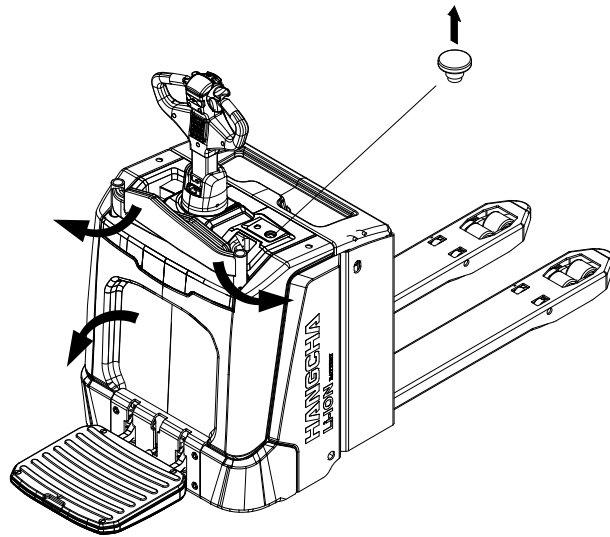
Check for any noises, loose cables or loose fasteners.

6.3 Starting

Operating steps:

- Pull up the emergency stop switch.
- Input the password from the keypad and then start the truck.
- For a stand-up truck, the user should stand on the footboard to operate the truck, and the footboard and guardrail should be unfolded first.

The dashboard displays the current battery capacity at the end of the self-inspection and the vehicle starts up.



Caution

- Pre-operation checks should be carried out before the truck is put into use.

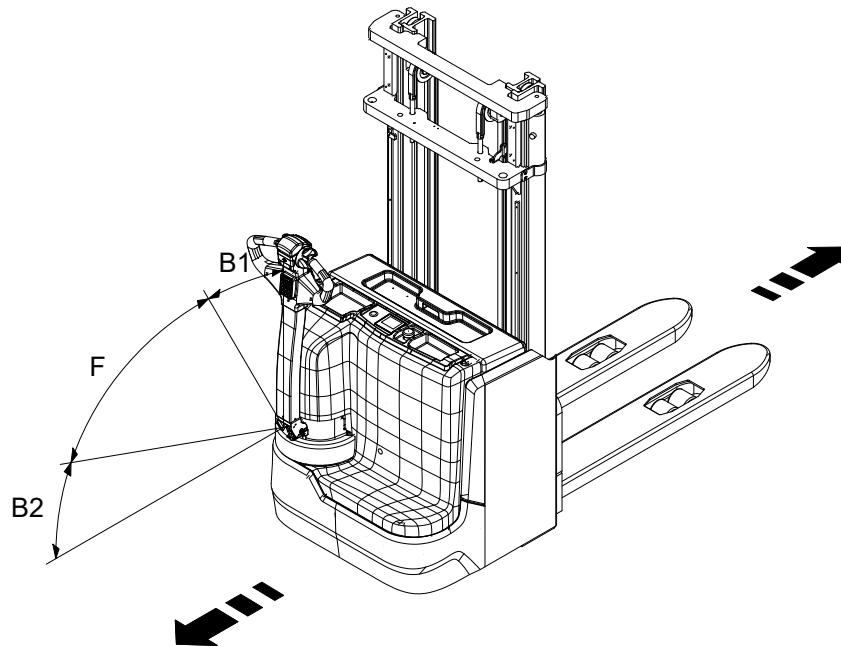
6.4 Operation

The driver stands at the front side of the truck, holds the control handle, operates the driving switches with their thumb, and guides the truck walking forward with their line of sight towards the travel direction. The driver can also push the truck forward by holding the control handle with both hands. (For the stand-up truck, the driver should unfold the footboard first, step on it, push the control handle downward to the driving mode, adjust the handle angle to the desired position, and then control the truck speed with the direction and speed control buttons. The vehicle speed is controlled by the driving button rotation angle, so the maximum vehicle speed is achieved by rotating the button to its maximum angle. Please refer to the pedestrian truck content for other information.)



Caution

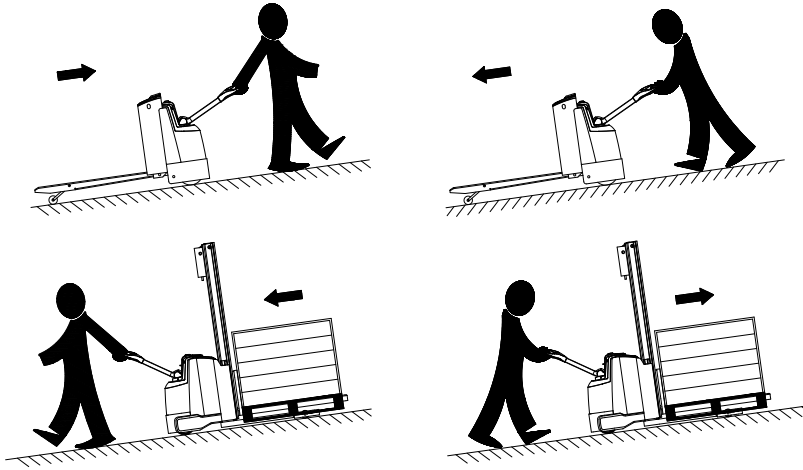
- Operators must wear protective boots.
- When entering a narrow space, for example, an elevator, the forks should enter first.
- Keep the ground clean and clear away oil, water or other dirt that may cause skidding.



As shown in the figure above, for the stand-up truck, when the handle is placed in the “B1/B2” block, the truck will be braked; when the handle is placed in the “F” block, the truck will travel.

Ramp driving

When the truck goes uphill or downhill unloaded, keep the forks facing downhill; when it goes uphill or downhill with a load, keep the forks facing uphill.



Warning

- Do not turn or drive diagonally on ramps.
- Do not stop the truck on a ramp.
- Slow down and always be prepared for braking when driving downhill.
- Drive the truck 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.

6.5 Braking

Remove your thumb from the direction and speed control buttons and engage the control handle to the brake position or the vertical position for further braking.



Caution

- Find the cause and clear the fault if the control handle moves slowly or fails to automatically enter the brake position after the control handle is released and then engaged in the brake position. Replace the pressure spring if necessary.

6.6 Steering

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

Move the control handle to the left to make the truck turn left.

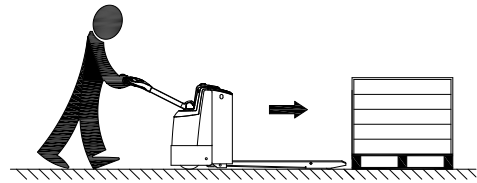
Move the control handle to the right to make the truck turn right.

Note: The speed is automatically reduced when the truck is steering.

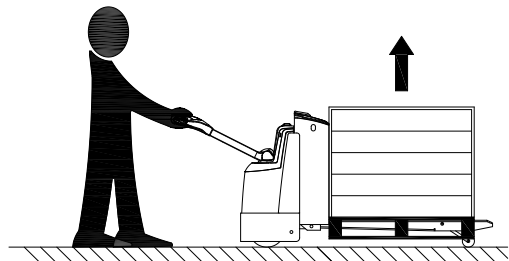
6.7 Cargo loading

Pallet jack

- Approach the cargo carefully.



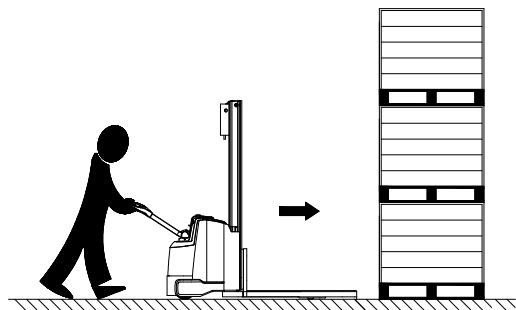
- Adjust the fork height to insert the forks into the pallet as far as possible.
- Lift the cargo by several centimeters and check whether the cargo is secured.



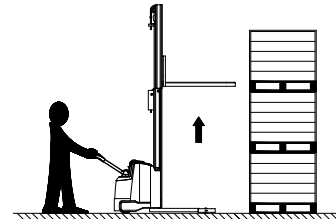
- Drive the truck slowly.

Pallet stacker

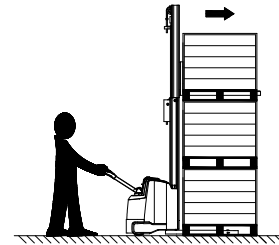
- Approach the cargo carefully.



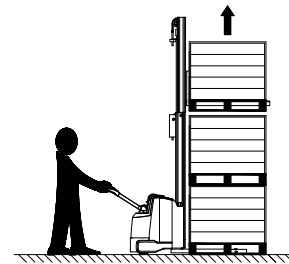
- Adjust the fork height and align it with the pallet.



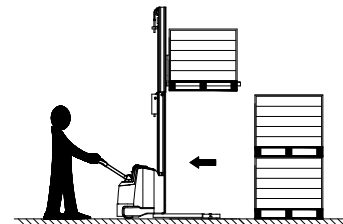
- Drive forward and insert the forks into the pallets as much as possible.



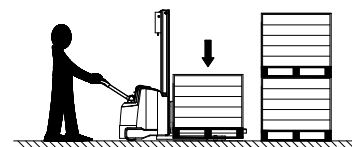
- Lift the cargo by 5-10cm and check whether the cargo is secured.



- Drive the truck slowly.



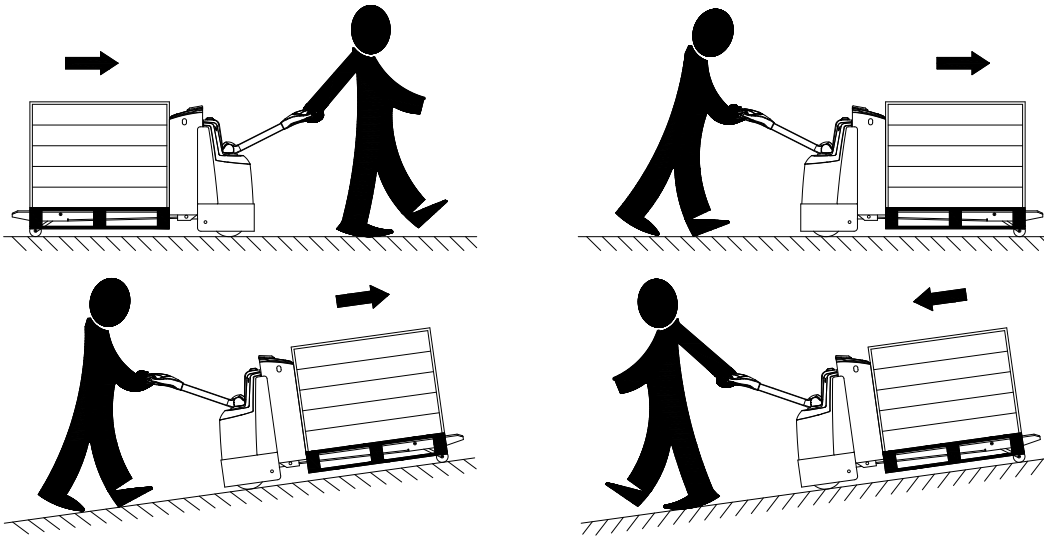
- Lower the cargo to the bottom.



6.8 Cargo transportation

Operating steps:

- Control the vehicle speed according to the driving route and the transported cargo.
- Accelerate and brake the vehicle smoothly and try to maintain a constant speed.
- Pay attention to other people and vehicles at intersections and aisles.
- Guidance from other operators should be provided if the view is obstructed.



Caution

- When driving uphill with goods, the truck must move forward; when going downhill, it must reverse.
- Do not drive across slopes or turn around on slopes.

6.9 Cargo unloading

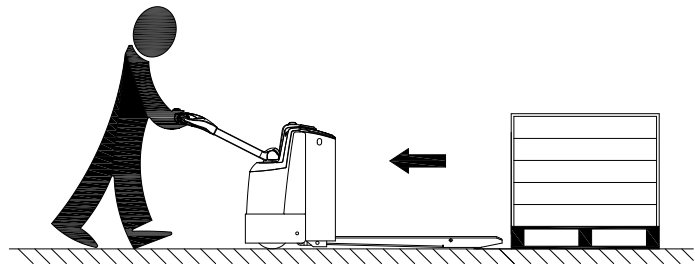
Pallet jack

Operating steps:

- Drive the truck 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 truck.
- 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.

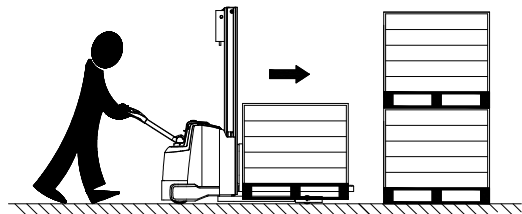


Caution

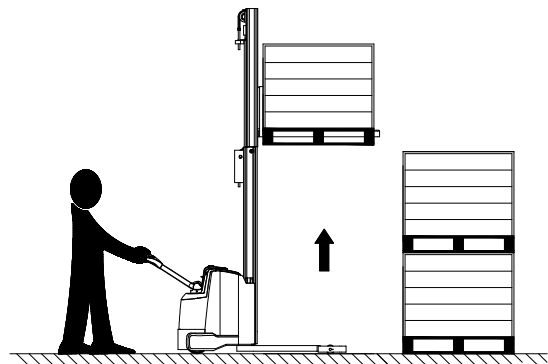
- Do not operate too suddenly when lowering the load, to protect the load or vehicle from being damaged.

Pallet stacker

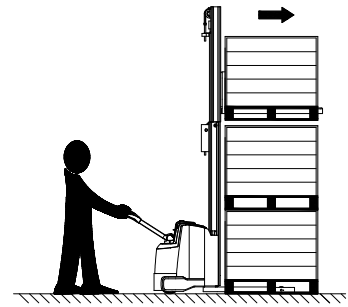
- Drive the truck to the place to unload the cargo.



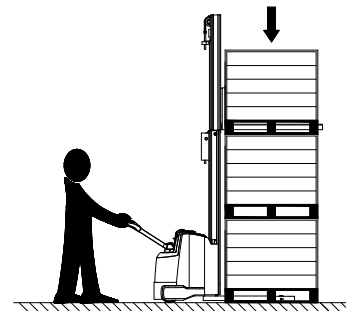
- Lift the cargo to the designated height.



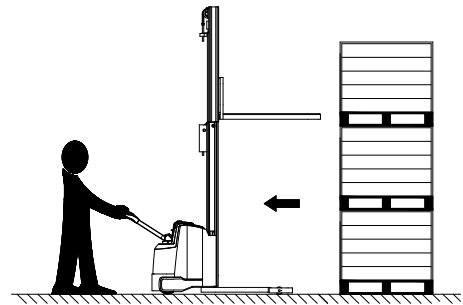
- Drive forward, put the cargo on the unloading position and stop the truck.



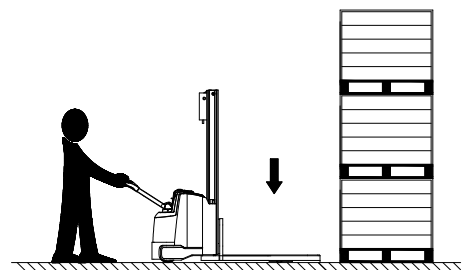
- Make sure the forks are right above the unloading position, slowly lower the forks.



- Reverse and take the forks out of the cargo.



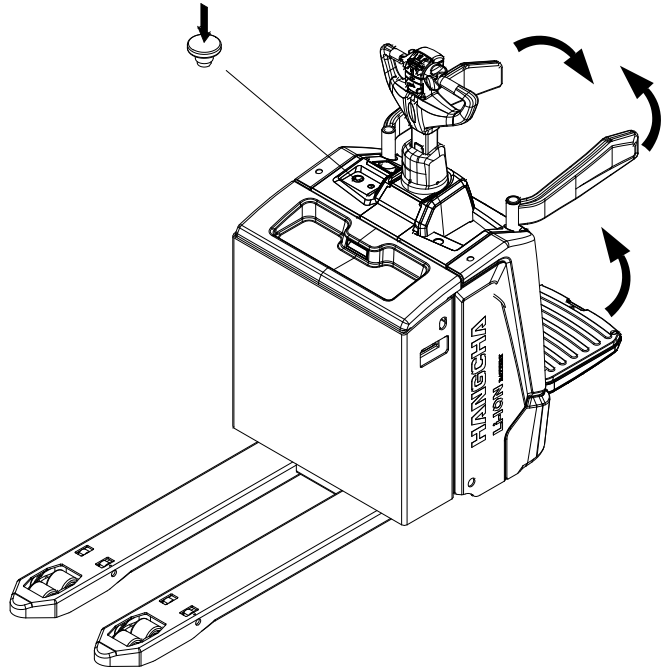
- Lower the forks to the specified position.



6.10 Safe parking

At the end of the daily operation, the truck needs to be parked in accordance with the following steps.

- Park the truck at the designated place.
- Lower the forks to the bottom.
- Press the emergency stop switch.
- Fold the footboard and guardrail.



6.11 Long-term parking and storage

Long-term storage

If you intend to keep the truck out of service for an extended period of time (more than one month), park the truck according to the following steps.

- Park the truck in a well-ventilated, dry room out of direct sunlight. It is also important to avoid large temperature fluctuations, and to avoid exposure to significant moisture, dust, corrosive gases, etc.
- Unplug the battery.
- Check the overall condition of the vehicle, in particular check whether the tires are damaged.
- Check for any leakage of gear oil, hydraulic oil or electrolyte.
- Apply lubricating grease.
- Check the specific gravity and level of electrolyte once a month.
- An equalization charge should be made monthly.
- To prevent rusting of the bearings and other parts, please run the vehicle every 6 months to observe if the vehicle works smoothly and if there are any abnormal sounds.
- For unpainted machined surfaces, please apply a rust inhibitor every 6 months.
- Cover the whole truck.

Truck operation after long-term storage

- Remove rust inhibitor from exposed parts.
- Clear away the foreign matter and water in the hydraulic oil tank.
- Charge the battery, fit it on the truck and connect the battery leads.

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

VII. Maintenance

Careful and thorough maintenance keeps the truck in good working condition. Ensure the truck safety, that is, ensure your work and personal safety.

7.1 Maintenance overview

- It is necessary to perform regular checks and maintenance to keep the performance of the forklift truck 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 waste fluid from the lithium-ion battery should be disposed of in accordance with the local environmental protection laws and regulations, rather than dumped at will.
- Develop a comprehensive maintenance and repair plan.
- Complete records should be made after each maintenance and repair.
- Do not repair trucks without training.



Caution

- **Smoke and fire are strictly prohibited.**
- **Before servicing, turn off the key switch, press the emergency stop switch and disconnect the battery plug. (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 the schedule when the operation environment is severe.**

7.2 Regular maintenance schedule

D = Once every 8 working hours (or daily)

W = Once every 40 working hours (or weekly)

M = Once every 166 working hours (or monthly)

T = Once every 500 working hours (or trimonthly)

S = Once every 1,000 working hours (or semi-annually)

○ — Check, correction, adjustment

× — Replacement

Battery

Maint enanc	Maintenance Content	Tools	D	W	M	T	S
Batte ry	Battery level		○	○	○	○	○
	Check the wiring terminals for any looseness		○	○	○	○	○
	Check the wiring for any looseness		○	○	○	○	○
	Check the battery surface cleanliness			○	○	○	○
	Check whether there are any tools on the battery surface.		○	○	○	○	○
	Check whether the vent cap is mounted and well ventilated.				○	○	○
	Check whether it is kept safe from smoke and flames			○	○	○	○

Controller

Maint enanc	Maintenance Content	Tools	D	W	M	T	S
Contr oller	Check the contacts for any wear					○	○
	Check whether the mechanical motion of the contactor is abnormal					○	○

·	Check whether the interlock micro switch works normally			○	○	○	○
·	Check whether the connections between the motor, battery and power unit are in good condition					○	○

Motor

Maint enanc	Maintenance Content	Tools	D	W	M	T	S
DC · motor ·	Clean the motor enclosure			○	○	○	○
	Clean and replace the bearings						○
	Check the carbon brushes and rectifiers for any wear and replace them if necessary; check whether the spring force is normal				○	○/x	○/x
	Check whether the wiring is correct and secure				○	○	○
	Clear away the carbon powder in the commutator slot and on its surface					○	○
AC · motor ·	Clean the motor enclosure			○	○	○	○
	Clean and replace the bearings						○
	Check for any abnormal vibration or noises and check whether the base is fixed securely.				○	○/x	○/x
	Check whether the wiring is correct and secure				○	○	○
	Check the temperature and current.				○		○

Transmission system

Maint enanc	Maintenance Content	Tools	D	W	M	T	S
Reduc tion gear box	Check for any noises.		○	○	○	○	○
	Check for any leakage		○	○	○	○	○
	Apply more lubricating grease						Every two years
Steeri ng · mech anism ·	Check the bearing lubrication			○	○	○	○
	Check whether the steering mechanism works normally.		○	○	○	○	○
	Check for any noises.		○	○	○	○	○
	Check the steering angle of the control handle		○	○	○	○	○

Lift assembly

Maintenance	Maintenance Content	Tools	D	W	M	T	S
Chain and chain wheels	Check the chain tension and check for any deformation, damage or rust.		○	○	○	○	○
	Lubricate the chain				○	○	○
	Check the chain wheel for any deformation or damage				○	○	○
	Check the chain wheel gear for any looseness				○	○	○
	Lubricate the pins and shafts.				○	○	○
Lifting cylinder	Check the piston rod, the thread and joint for any looseness, deformation or damage.	Inspection hammer	○	○	○	○	○
	Check the operating condition		○	○	○	○	○
	Check for any leakage		○	○	○	○	○
	Check the fastening bolts of the lifting cylinder for any looseness.					○	○
Mast, and fork arm carrier	Check the welded part between the inner/outer mast and beam for any cracks or damage				○	○	○
	Check the inner/outer mast for any poor welding, cracks or damage				○	○	○
	Check the fork arm for any poor welding, cracks or damage				○	○	○
	Check the roller for any looseness				○	○	○
	Check the roller, roller shaft and welded part for any cracks or damage				○	○	○
Forks	Check the forks for any damage, deformation or wear				○	○	○
	Check the welded part of the hook at the root of forks for any cracks or wear				○	○	○

Hydraulic system

Maintenance Content	Tools	D	W	M	T	S	
Hydraulic oil tank	Check the oil level or change it		○	○	After 166h for the first change	○	×
	Clean the oil absorption filter						○
	Clear away any foreign objects						○
Electromagnetic valve	Check for any clogging or any stuck or damaged return spring				○	○	○
	Check the wiring terminals for any looseness				○	○	○
Relief valve	Oil leakage		○	○	○	○	○
	Check the operating condition of the safety valve.				○	○	○
	Measure the safety valve pressure	Oil pressure gauge					○
Pipeline joint	Check for any leakage, looseness, fracture, deformation or damage				○	○	○
	Replace the pipe						× 1-2 years
Hydraulic pump	Check the hydraulic pump for any leakage or noise		○	○	○	○	○
	Check the driving gear of the hydraulic pump for any wear and tear						○
Lift micro switch	Check whether the micro switch works normally				○	○	○
	Check the micro switch for any looseness or damage.				○	○	○

Wheels (driving wheel, auxiliary wheel and load-bearing wheels)

Maintenanc	Maintenance Content	Tools	D	W	M	T	S
Wheels	Check for any wear or cracks	Visual inspection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Check whether the screws are tightened well. If not, retighten them.			<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Check the wheels for any wrapped ropes or foreign objects.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Braking system

Maintenance Content	Tools	D	W	M	T	S
Check the truck brakes when the control handle is in the horizontal or vertical position.		○	○	○	○	○
Check the micro switch for any looseness or damage.				○	○	○
Check whether it is secured.				○	○	○
Check its surface for any uneven wear.					○	○
Check the clearance between discs and adjust it if necessary.					○	○
Check whether the brake works normally.		○	○	○	○	○

Others

Maintenance Item	Maintenance Content	Tools	D	W	M	T	S
Wires	Check the wire harness for any damage or looseness.			○	○	○	○
	Check for any looseness in circuit connections				○	○	○
Emergency power-off switch	Check the operating condition		○	○	○	○	○
Direction and speed control button	Check the operating condition		○	○	○	○	○
Lifting/lowering switch	Check the operating condition		○	○	○	○	○
Horn	Check the operating and installation condition		○	○	○	○	○
Dashboard	Check whether it works normally		○	○	○	○	○
Footboard [stand-up type only]	Check the footboard action		○	○	○	○	○

7.3 Regular replacement of key safety parts

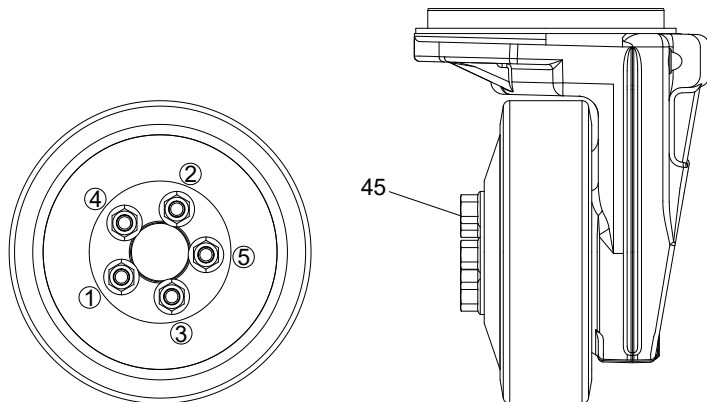
- It is difficult to find damage to certain parts through regular maintenance, thus in order to improve safety, the user should regularly replace the parts listed in the table below.
- If the replacement time is not reached and any abnormality is found in these parts, the defective parts should be replaced immediately.

Key Safety Part Name	Service life (Years)
High-pressure rubber hose and flexible tube for the hydraulic system	1
Wheel connecting shaft	1
Sleeves and bushing for the truck	Semi-annually (6 months)

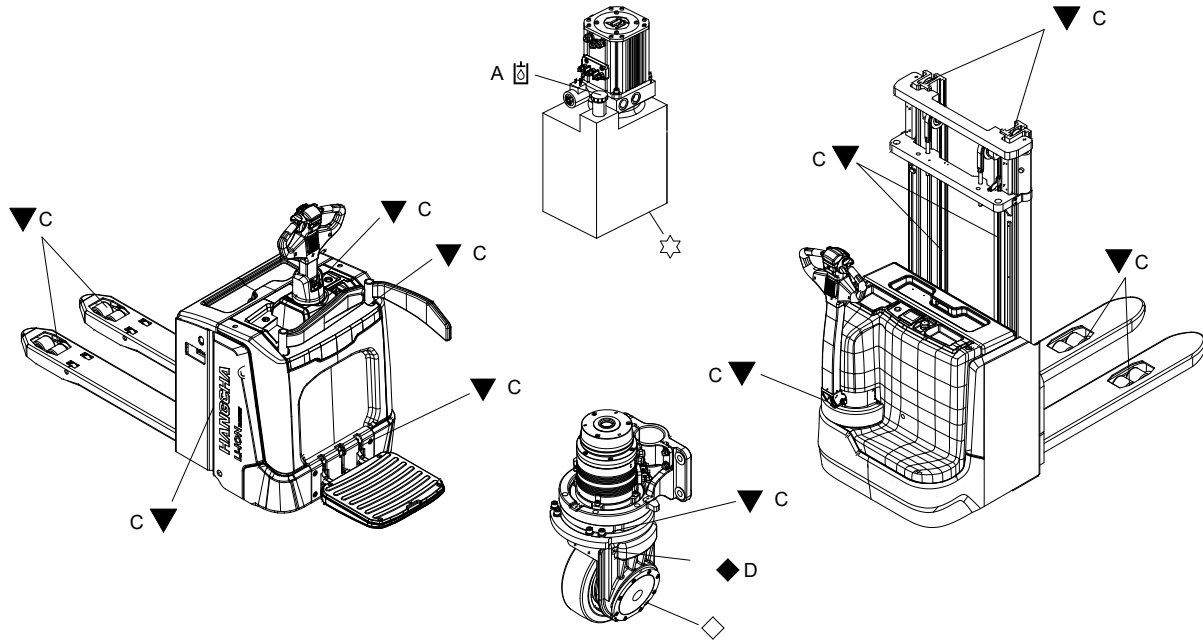
Tighten the wheel nuts

Retighten the wheel nuts after breaking-in. Check and tighten the wheel nuts regularly.

- Tighten the wheel nuts (45) with a torque wrench in the specified order.
- First, tighten them with a torque of 10N.m.
- Then, tighten them with a torque of 80N.m.



7.4 Oil and lubrication



Fault Code	Name	Spec.	Remarks
A	Hydraulic oil	General environments: L - HM32 Severely cold environments: L - HV32	Hydraulic oil tank
B	Gear oil	GL-5 85 W/90	Transmission
C	Grease	3# general purpose automotive lithium grease	Filling port and lubricating surface

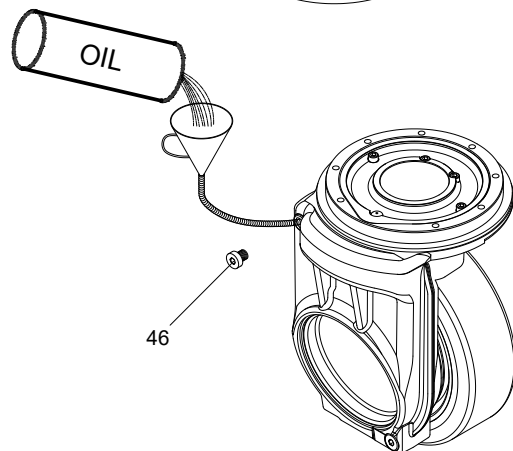
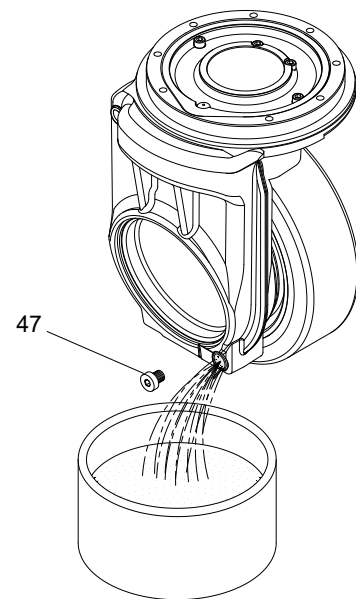
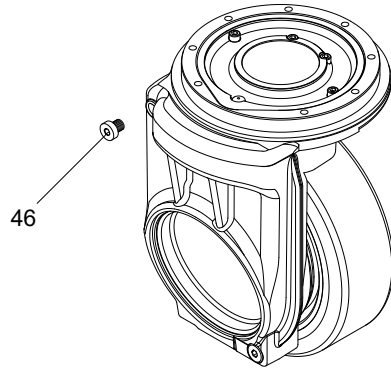
Gear oil change

- Park the truck on flat and solid ground.
- Wipe the oil filling plug and drain plug clean.
- Unscrew the drain plug (46).
- Put a suitable container under the oil drain plug (47), unscrew the oil drain plug (47) and drain the oil into the container.
- After the oil is drained from the transmission, screw in the oil drain plug (47).
- Add the specified gear oil (GL-5 85W/90) into the oil filling port. Oil can be added with the aid of a funnel and hose for ease of operation. **In principle, fill the oil reservoir with gear oil until it submerges the gears and reaches up to the filling port to prevent the gear oil spilling out.**
- Screw in the oil filling plug (46) and wipe off any oil residue on the transmission surface.



Warning

- The waste oil and fluid should be disposed of in accordance with the national laws and regulations, rather than dumped at will.



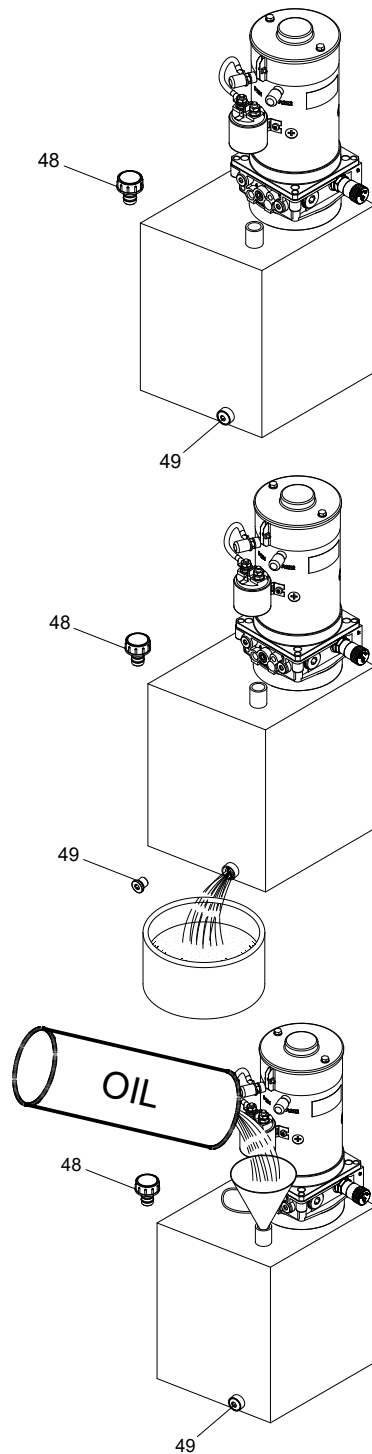
Hydraulic oil change

- Park the truck on flat and solid ground.
- Wipe the oil filling plug and drain plug clean.
- Unscrew the drain plug (48).
- Put a suitable container under the oil drain plug (49), unscrew the oil drain plug (49) and drain the oil into the container.
- After the oil is drained from the transmission, screw in the oil drain plug (49).
- Add the specified gear oil (L-HM32) into the oil filling port to the allowable scale line. Oil can be added with the aid of a funnel and hose for ease of operation.
- Screw in the oil filling plug (48) and wipe off any oil residue on the transmission surface.



Warning

- The waste oil and fluid should be disposed of in accordance with the national laws and regulations, rather than dumped at will.



Lubrication of the mast

In accordance with regular maintenance and lubrication charts, the inner and outer mast rails should be lubricated regularly.

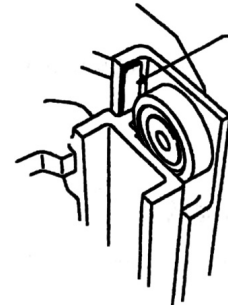
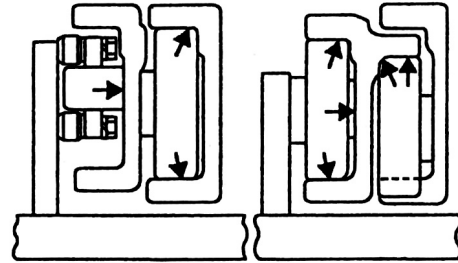
The lubrication cycle should be changed according to the operating conditions. In the busy months of operation, the lubrication cycle should be shortened.

In order to ease the truck operation, apply a layer of grease to the contact surface of the lifting guide wheel and the inner & outer mast.



Warning

When applying grease, park the truck on a flat road and press the emergency stop switch. Prevent your hands and body from being caught when applying grease, and take care to avoid falling when lubricating at height.



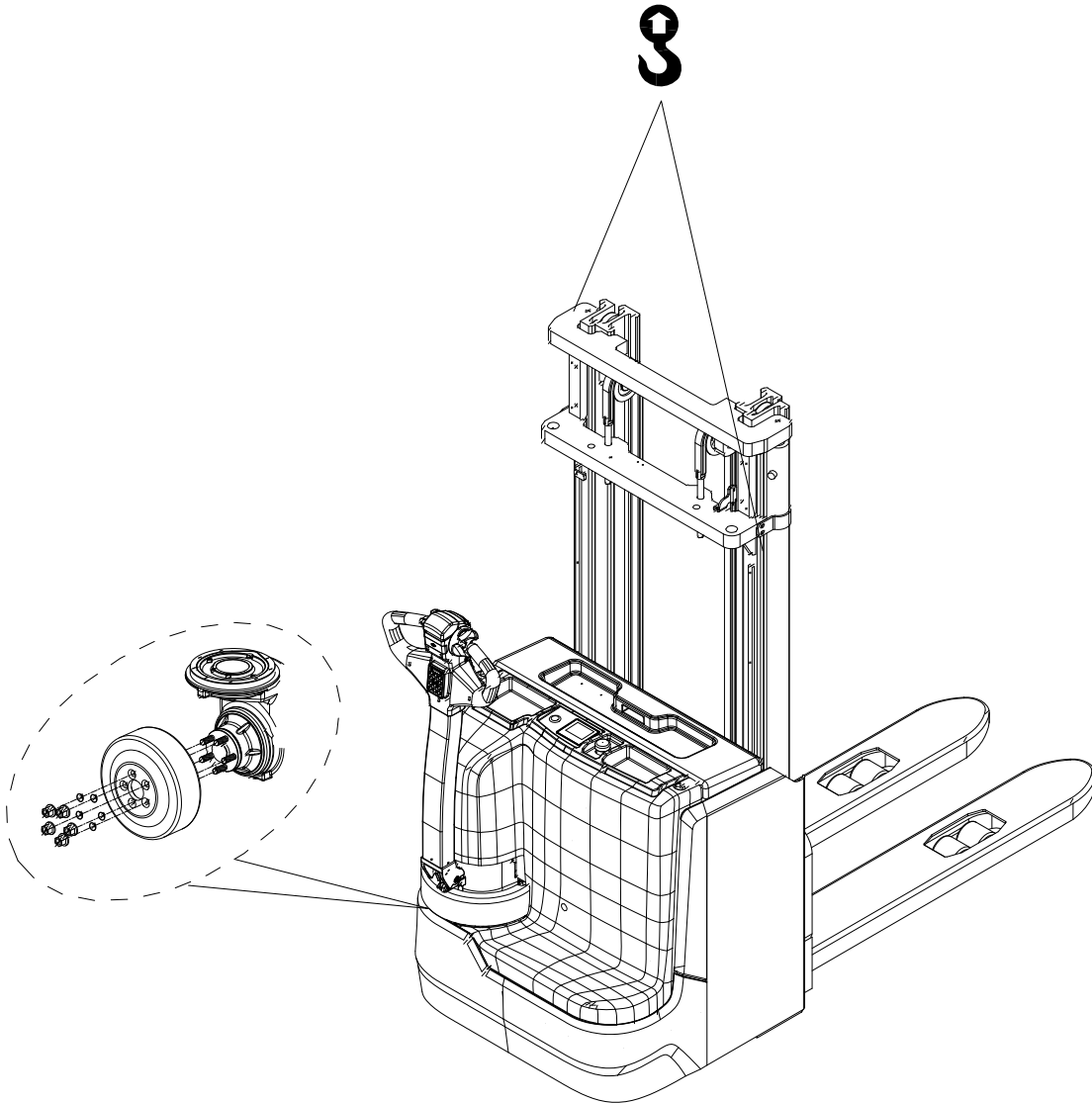
Chain lubrication

Spray the chain directly with chain spray or take a brush with engine oil and apply it to both sides of the chain.

7.5 Replacement of the driving wheels

Operating steps:

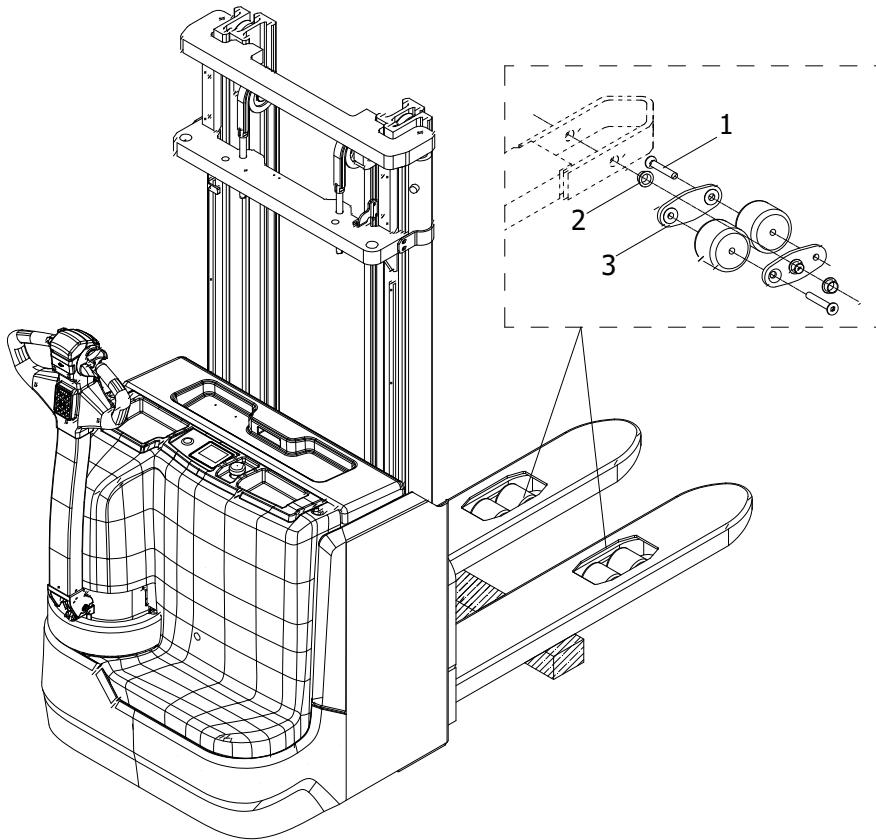
- Use a lifting device to lift the truck to a certain height (see the section “Truck Lifting”).
- As shown in the following figure, remove the driving wheels in sequence.
- Replace the worn driving wheels and then fit them in a process in reverse of the disassembly process.
- Tighten the wheel nuts (see the section “Tighten the wheel nuts”).



7.6 Replacement of the load-bearing wheels

Operating steps:

- Lift the forks to the specified height.
- Lift the support leg for the load-bearing wheels to a certain height and then place wooden blocks under them.
- As shown in the following figure, remove fasteners for both load-bearing wheels in sequence.
- Replace the worn load-bearing wheels and then fit them in a process in reverse of the disassembly process.

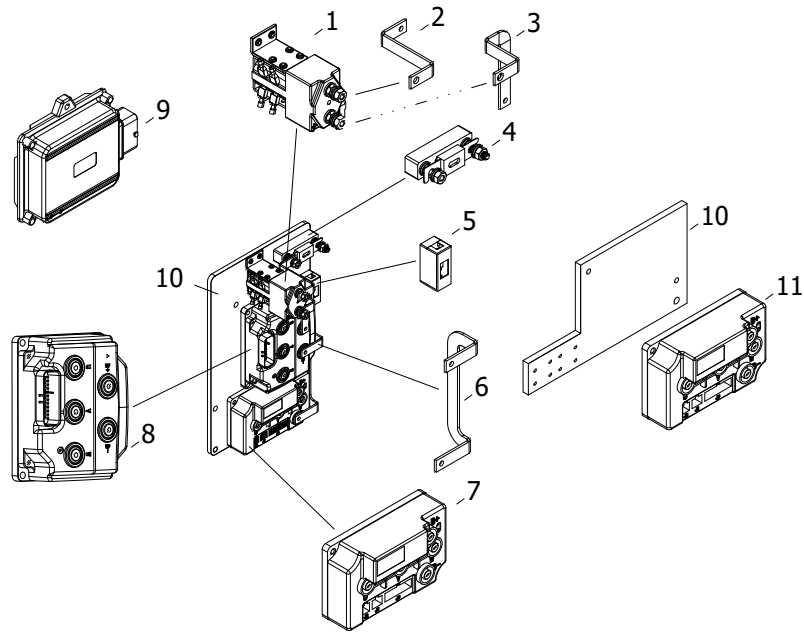


7.7 Checks and maintenance of the control system assembly

Operating steps:

1. Park the truck safely according to rules and regulations.
2. Open the hood and unplug the battery plug.

Check, replace and adjust components of the control system assemblies when they are exposed.



S/N	Name	Control Circuit
1	Contactor	
2	Copper busbar for the contactor	
3	B+ copper busbar	/
4	Fuse	/
5	Contactor	/
6	B- copper busbar	
7	Controller	To control the steering motor (not applicable for some truck types)
8	Controller	To control the oil pump motor
9	VCU controller	
10	Controller mounting plate	
11	Controller	To control the driving motor



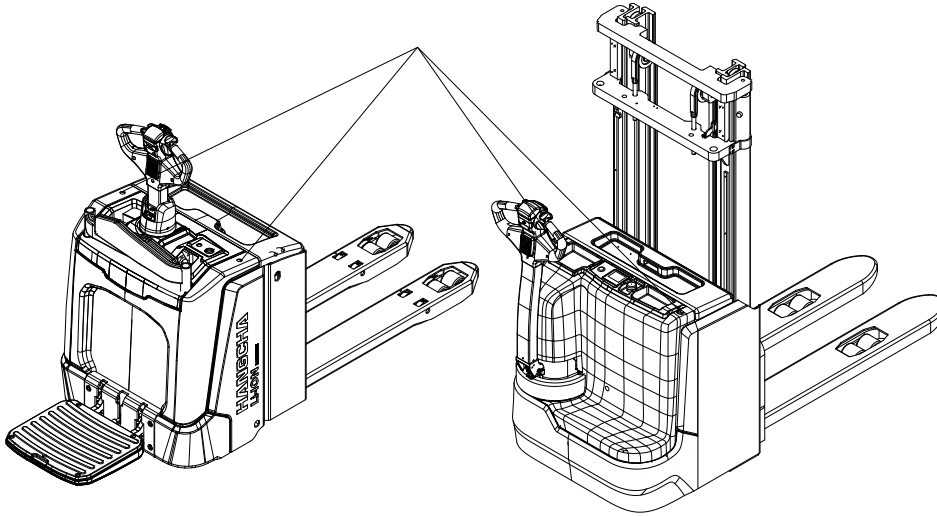
Caution

- Unplug the battery before any operations on the electrical system of the forklift truck.
- 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 a resistor or bulb) should be connected between B+ and B- to discharge the capacitor inside the controller.
- Take off the metal trim before any operations on the electrical system of the forklift truck.
- When replacing a fuse, select a fuse with the same specification as the fuse being replaced.

– When repairing the controller electrical controller, the operator must first cut off the power supply, then use a 10-100 ohm resistor to connect to the positive and negative terminals of the controller to short out the residual voltage on the capacitor, otherwise there is a risk of electric shock.

– The electromagnetic fields and radiation in the environment can affect the inverter, and the long-term influence may damage the controller. Therefore, it should be kept away from electromagnetic fields and radiation.

7.8. Open the hood



Operating steps:

- Park the truck safely according to rules and regulations.
- Unfold the footboard (stand-up type only).
- Unscrew the 2 bolts from the hood with a wrench.
- Lift the machine hood and then remove and place it near the truck.

The hood disassembly is completed.

The assembly steps are a reverse of the disassembly ones.

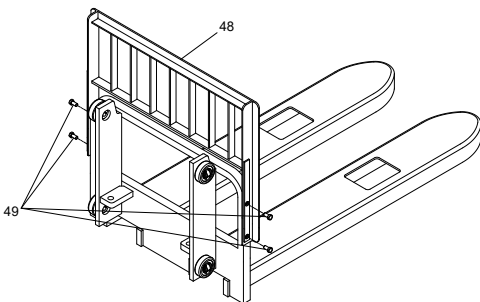
7.9 Install the backrest

Screw in the 4 fastening bolts (49) to fit a load backrest (48) into the truck.



Warning

- Take care to prevent fingers from being clamped when mounting a backrest.



7.9 Table for tightening torque for bolts

Unit: N·m

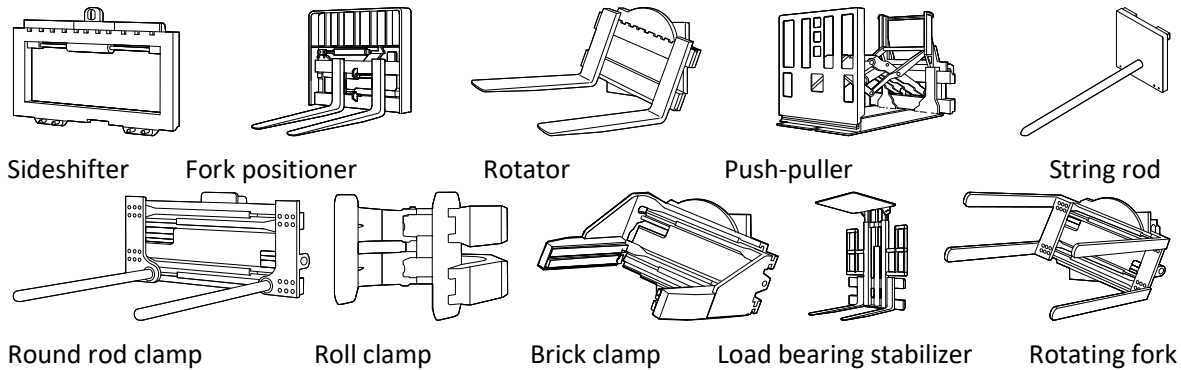
Bolt Specification	Class			
	4.6	5.6	6.6	8.8
M6	4 - 5	5 - 7	6 - 8	9 - 12
M8	10 - 12	12 - 15	14 - 18	22 - 29
M10	20 - 25	25 - 31	29 - 39	44 - 58
M12	35 - 44	44 - 54	49 - 64	76 - 107
M14	54 - 69	69 - 88	83 - 98	121 - 162
M16	88 - 108	108 - 137	127 - 157	189 - 252
M18	118 - 147	147 - 186	176 - 216	260 - 347
M20	167 - 206	206 - 265	245 - 314	369 - 492
M22	225 - 284	284 - 343	343 - 431	502 - 669
M24	294 - 370	370 - 441	441 - 539	638 - 850
M27	441 - 519	539 - 686	637 - 784	933 - 1244

Note:

- Grade 8.8 bolts are used for all key joints.
- The bolt grade can be found in the head, if not, it is Grade 8.8.

8 Use, installation and safety rules for attachments

We select the attachments, such as the side shifter, fork positioner, rotator, push-puller and string rod, etc., in accordance with international standard ISO2328: Forklift trucks - Hook-on type fork arms and fork arm carriages - Mounting dimensions.



8.1. Installation of attachments

- Without the technical permission of the company, it is strictly prohibited to modify the safety and performance of the forklift truck attachments.
- The actual load-carrying capacity shall be subject to the rated load-carrying capacity of the forklift truck, the load-carrying capacity of attachments, or the overall load-carrying capacity of the whole truck, whichever is the smaller. Generally, the overall load-carrying capacity of the whole truck is the minimum of the three. "Load-carrying capacity of attachments" is a calculated value for the force applied on attachments.
- The installation and positioning should be reasonable, reliable and safe, to avoid attachments sliding from side to side along the fork arm carrier of the forklift truck during use.
- After the attachments are mounted, if there is a upper hook block, it should be embedded in the notch of the upper beam, so that the offset between the center line of attachments
- and that of the fork arm carrier is less than 50mm; otherwise, it will affect the lateral stability of the forklift truck.
- For attachments with a rotation function, (roll clamp, soft clamp, multi-purpose rigid arm clamp, bucket clamp) after hanging and installation, stop blocks should be welded on both sides of the joint between the upper beam of the fork arm carrier and the attachments to prevent sliding when operating them.
- When attachments with lower hook positioning are installed, the joint spacing between the

lower hook and the lower beam of the fork arm carrier should be adjusted appropriately.

8.2. Use of attachments

- Become familiar with the relevant content on the nameplate of the forklift truck, read the relevant operation manual carefully before use (especially the user manual and installation manual of the professional attachment company), and be trained and qualified to operate the forklift truck attachments.
- Fully understand the basic performance and operation methods of forklift attachments, especially the allowable load, lift height, cargo size and the fitting range of attachments.
- When operating forklift truck attachments with multiple functions, such as side shift, clamping or rotation, do not perform multiple operations at the same time. One action can be carried out only after the other one is completed.
- Forklift trucks provided with attachments must not be driven when the cargo is at a high level; when the cargo volume is too large do not drive the forklift truck forwards; when transporting cargo, ensure that cargo is 300mm above the ground, and the mast is tilted backward;
- The weight of the cargo should not exceed the limit of the combined load-carrying capacity of the forklift truck and attachments. Try not to load eccentrically at high cargo positions. Attachments with side shift function can only be operated for a short time. Eccentric load is strictly limited to 100mm on the left and right (the side shift amount of the side shifter above 5 tons (including 5 tons)) is within the range of $\pm 150\text{mm}$).
- Except for the driver's position which is protected by the overhead guard, it is strictly prohibited to stand within 2 meters of the projection area under attachments and cargo to avoid injury.
- It is strictly prohibited to engage the emergency brake when the forklift truck with attachments is running and it is required to drive slowly with a load.
- Do not allow external forces to act on the truck when the attachment is working; do not use the attachment for unsuitable purposes, the normal working range of the attachment must not be exceeded.
- Do not use attachments for unsuitable purposes, do not exceed the normal scope of work of attachments.
- When attachments are faulty, they should not be used until the fault has been eliminated.

8.3 Checks and maintenance of the attachments

- Check whether the spacing between the lower beams of the forks of the forklift truck and the lower hooks of attachments conform to the requirements of the attachment manual.
- Check whether the upper hook is properly embedded in the groove of the fork arm carrier of the forklift truck.
- The upper and lower sliding support surfaces should be lubricated with general automotive lithium-based grease every 500 hours.
- Check fasteners for tightness.
- Regularly check whether hydraulic circuit connections are loose and whether the hose is damaged. If it is damaged, it must not be used before repair.
- Regularly check whether the transmission or rotating elements of attachments are worn or stuck, and replace them promptly if any damage or defect is found.
- In the case of dynamic loads, check whether the working elements of the attachments are normal, whether the working pressure of the attachments is normal, and whether the attachments work normally. If not, it is necessary to check the hydraulic circuit, find any leaking elements, and replace the seals or the whole circuit.

9 Relevant safety directive or standard (CE)

After CE certificated, the truck meets the following directive and standard:

- 2006/42/EC machinery directive (namely *Directive of the council of the laws of the member states concerning machinery*), 2000/14/EC Noise Directive (Namely *Directive of the council of the laws of the member states concerning noise radiation of outdoor equipment*) ;
- EN ISO3691-1:2015+A1:2020 (Industrial trucks -- Safety requirements and verification -- Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks) 、 EN16307-1:2020 (Industrial trucks. Safety requirements and verification. Supplementary requirements for self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks) .
- EN1175:2020 (Safety of industrial trucks - Electrical requirements - Part 1: General requirements for battery powered trucks) 、 EN1726-1:1998 (*Safety standard for machinery industrial vehicle*) , EN12053:2001+A1:2008, EN1175:2020, EN 13059:2002+A1:2008, EN1757-2: 2001 harmonized standard;
- Main safety elements are in accordance with 2006/42/EC machinery directive as well as EN1175:2020, EN1726-1:1998 standard;
Electronic components design and manufacture meet low-voltage apparatus directive 2006/95/EC;
Noise is calculated according to EN 12053:2001+A1:2008: pallet truck noise, sound pressure value.
 - Lifting: right ear 65.8dB, left ear 65.1dB
 - Driving: right ear 68.5dB, left ear 68.4dB
- Vibration data are calculated according to the EN13059:2002+A1:2008 (Safety of industrial trucks - Test methods for measuring vibration) ,ISO5349-2:2001 and ISO2631-1:1997 standard, meet 2002/44/EC directive: handle vibration amplitude is 0.0558m/s².
- Electromagnetic compatibility is calculated according to EN12895:2015+A1:2019 and meet 2014/30/EU directive.

Maintenance Record Sheet

Date	Maintenance Content	Serviceman



HANGCHA GROUP CO., LTD.

- Address: 666 Xiangfu Road, Hangzhou, Zhejiang, China
- Fax: 0086-571-88926789 0086-571-88132890 ■ ZIP: 311305
- Web: <http://www.hcforklift.com> ■ E-mail: sales@hcforklift.com