Thank you for choosing CDDR-III, CTDR-III electric walkie stacker!

They are designed to improve material handling productivity.

Thank you for purchasing our product. Please read this manual carefully and repeatedly before use, to ensure safe and effective material handling through correct driving and appropriate maintenance.
Please abide by the Warnings and precautions marked in the product manual.
Please always keep it properly for reference.

Foreword

About the operational manual

This instruction manual shows how to use our electric trucks correctly and the relevant maintenance procedures. Please refer to each chapter to learn the relevant contents. Chapters are arranged in alphabetical order and pages are identified by numbers.

Please read this manual carefully before operation so that the truck can be operated and maintained correctly. When the truck is lent or transported, please ensure that this operation manual is accompanied with the truck, and confirm that this manual is available to the operators at any time.

Our company will continue to carry out equipment research and development. Therefore, the right to modify the shape, equipment and technology must be reserved. For these reasons, no claims for any specific performance of the equipment shall be derived from the contents of this operating instructions. Our company will not accept any appeal based on the technical indicators, drawings and instructions of this manual.

About technical support

If supplementary information and product technical support are needed, please contact our technology development center;

About safety instructions and labels

please pay attention to the following labels, safety tips and important explanations when reading this manual：

Dangerous

Warning a dangerous situation. Death or serious injuries might be caused if the danger is not avoided.

Warning

Warning of a potential risky situation. Death or serious injuries might be caused if it is not avoided.

Caution

Warning of a potential harmful situation. Moderate injuries might be caused if it is not avoid.

Note

Statements directly or indirectly related to personnel safety and truck maintenance. Please always pay attention to the notes.

Instructions

Instructions

The industrial trucks produced by the company are special motor trucks only used in the factory area and specific areas specified in the Regulations on safety supervision of special equipment.

Before operating the truck, please find the nameplate and load curve to confirm the attributes and load capacity, to avoid overload during work. Safety Warning labels are posted in the truck. Please find these labels and get familiar with the relevant contents.

All losses caused by unreasonable use shall be borne by the user only!

Double check when accepting

Each truck has obtained factory certificate after complete function tests before delivery. The trucks will be well preserved during transportation. Please take time to personally and carefully check the package as well as the truck when accepting, in order to ensure good operation conditions after long transportation.

Check items are listed as follow:

·tightness of the wheel nuts

·hydraulic oil level and electrolyte position

·driving function

·brake function

·steering function

·lifting and loading function

Copyright declaration

No changes shall be made to the truck without any written permission. If necessary, please negotiate with our company.

In order to ensure product quality, please purchase complete machines, accessories and services provided by formal channels of our company.

This manual is made on standard trucks. If there is any question about the purchased trucks, please consult our technicians.

User instructions

Operator qualification

Industrial trucks must be operated and used by persons with driving qualification under the law, and the operator must be a person who has received relevant training and operation experience. The user or other entrusting party must confirm the operator's driving qualification before allowing him/her to work, and authorize its operation after corresponding driving test.

The operating company must ensure that the operator can recognize the nameplate, load chart and the safety Warning label attached, and ensure that the operator can understand and abide by the prompt information provided in the operation manual.

As a company or responsible person, please ensure to comply with all regulations and safety guidelines applicable to the industrial trucks.

Please follow the relevant rules and guidelines, such as:

·Operating regulations for industrial trucks

·Lane and operating area regulations

·Operator's rights, obligations and code of conduct

·Instructions for special operation areas

·Daily maintenance

·Regular maintenance

Dangerous

·Unauthorized personnel must not use the truck.
·The goods shall be properly arranged with neat shape and center of gravity to avoid slippage.
·It is not allowed to modify without permission. If any modification is needed, please contact our dealer or after-sales personnel.
·Do not overload. Before operation, please confirm the rated load and load center on the weight table. When installing other accessories, please observe the weight marked on the load nameplate of the accessories.
·Do not operate after drinking, otherwise heavy casualties may be caused.

Note

Please read this manual carefully before operation.
·Operators shall wear work shoes and work clothes.
·Do not drive with wet or greasy hands.
·The truck must be inspected daily and maintained regularly.
·If the truck is found damaged or in abnormal conditions, please stop the operation immediately. Do not operate until it is completely repaired.

Safety labels

Safety labels are attached on the truck to remind the driver of potential dangers and precautions. Please find and read these labels carefully.

If the safety labels of the truck is unclear or displaced, please contact our local dealer for replacement immediately.

CATALOGUE

Product introduction A

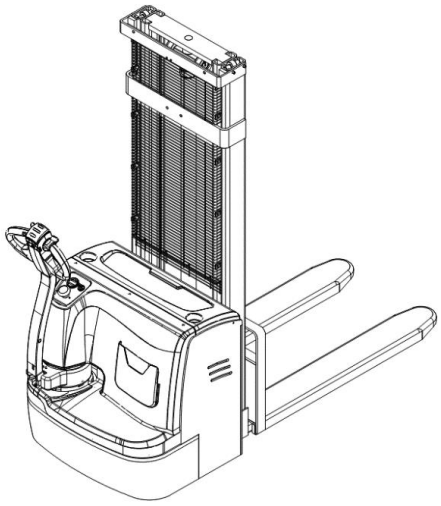
Structural outlines and technical parameters will be shown in this chapater A

A Product Introduction

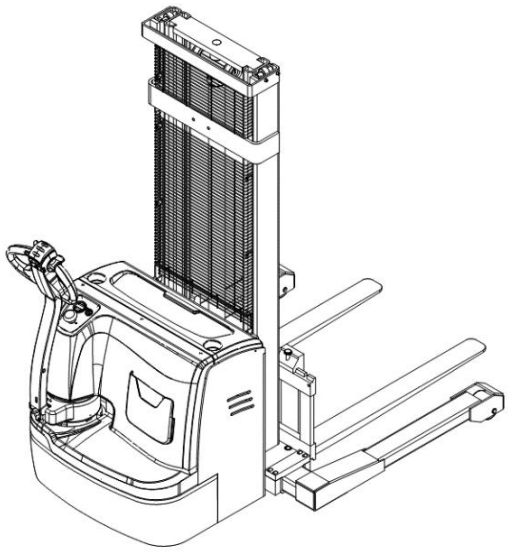
1 Product description：

CDDR-III and CTDR-III series electric pallet stackers use battery as power source, AC motor as power, and drive the truck to walk through gear transmission. Fork's lifting is driven by DC motor and hydraulic transmission to push the oil cylinder up and down to lift fork and goods. Because the walking and lifting of the truck are electric, the driving mode is walking, and the steering operation is handle steering, it has the characteristics of labor-saving, high efficiency, stable cargo operation, simple operation, safety and reliability, low noise and no pollution. The car adopts 24 volt high-capacity battery, which greatly prolongs the use time after one charge.

The truck is suitable for cargo handling on hard and flat ground. It can be used in ports, freight yards, factory workshops, warehouses and distribution centers. It is mainly used for loading, unloading, handling and stacking of pallet goods in factory plants, warehouses and containers. It is easy to use and high efficiency. It is a good expert in handling and stacking goods in factories and workshops.



CDDR-III series



CTDR-III series

Use as specified

The maximum load and the allowable maximum load spacing are shown in the load chart and shall not be exceeded. For allowable lifting capacity, please refer to the load chart attached on the truck. The

goods must be placed on loading parts or picked with accessories approved by the manufacturer. The goods must be placed against the back of the fork carriage and in the middle of the fork.

▲ Lift and lower the goods

▲ Transport the goods

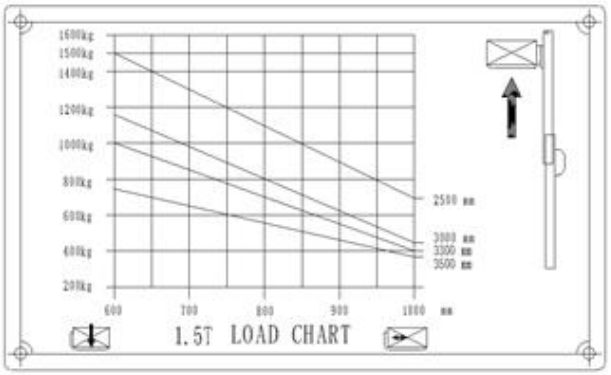
▲ Do not carry any personnel

▲Do not push and push the goods

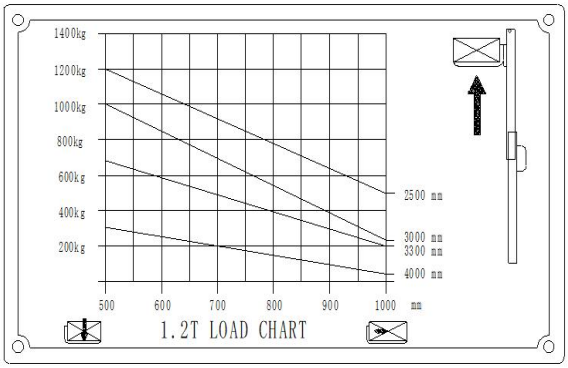
According to ISO3691 Industrial trucks — Safety requirements and verification, the following provisions are made for the load and lifting height of CDDR - III all electric stacker produced by our company.

▲ When the CDDR-III's lifting height is below 2500 mm (including 2500 mm), the maximum load capacity of the truck is the rated load capacity, and overload use is strictly prohibited.

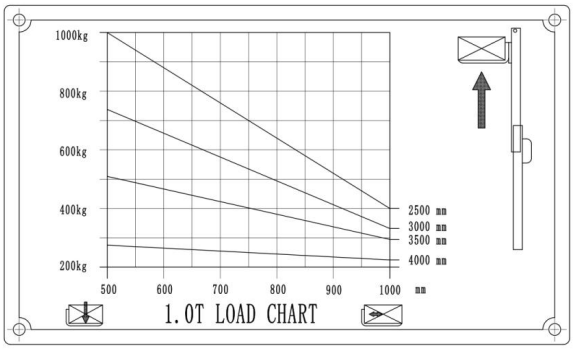
▲ When CDDR-III's lifting height is more than 2500 mm (excluding 2500 mm), the load capacity of the truck is less than the rated load capacity. The load capacity can be referred to the following figure, which are the load chart corresponding to different rated loads.



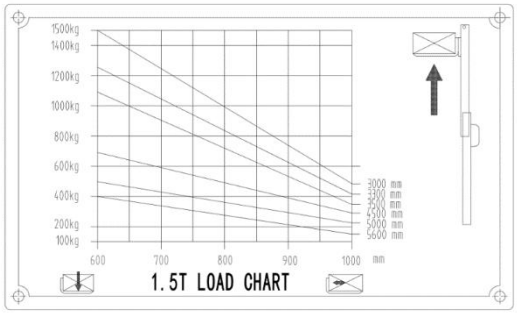
CDDR-III 1.5T Load chart



CDDR-III 1.2T Load chart



CDDR-III 1.0T Load chart



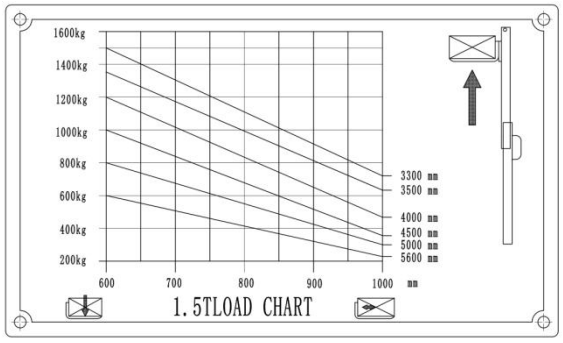
CDDR-IIIZC 1.5T Load chart

According to ISO3691 Industrial trucks — Safety requirements and verification, the following

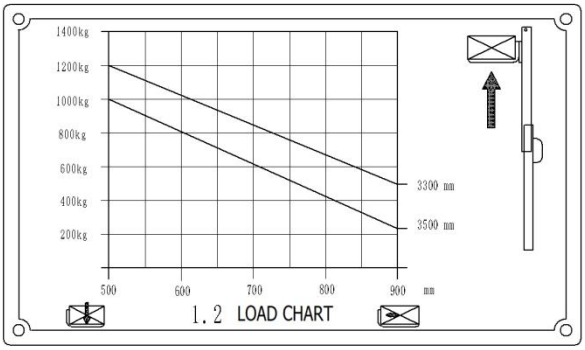
provisions are made for the load and lifting height of CTDR - III all electric stacker produced by our company.

▲ When the CTDR-III's lifting height is below 3300 mm (including 3300 mm), the maximum load capacity of the truck is the rated load capacity, and overload use is strictly prohibited.

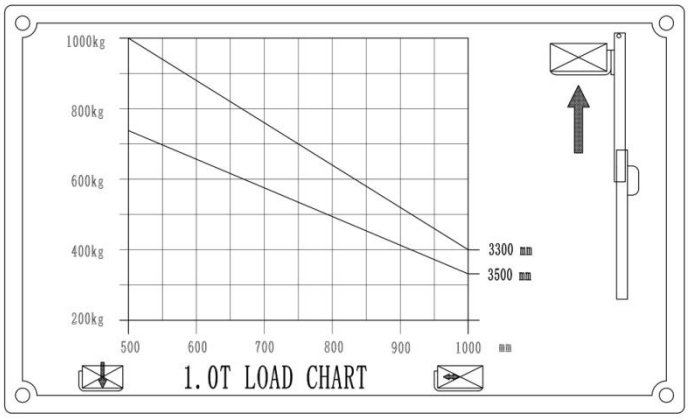
▲ When CTDR-III's lifting height is more than 3300 mm (excluding 3300 mm), the load capacity of the truck is less than the rated load capacity. The load capacity can be referred to the following figure, which are the load chart corresponding to different rated loads.



CTDR-III 1.5T Load chart



CTDR-III 1.2T Load chart



CTDR-III 1.0T Load chart

Operating environment：

▲ Attitude ≤ 1000m；

▲ Ambient air temperature is less than +40℃, but not less than -25℃;

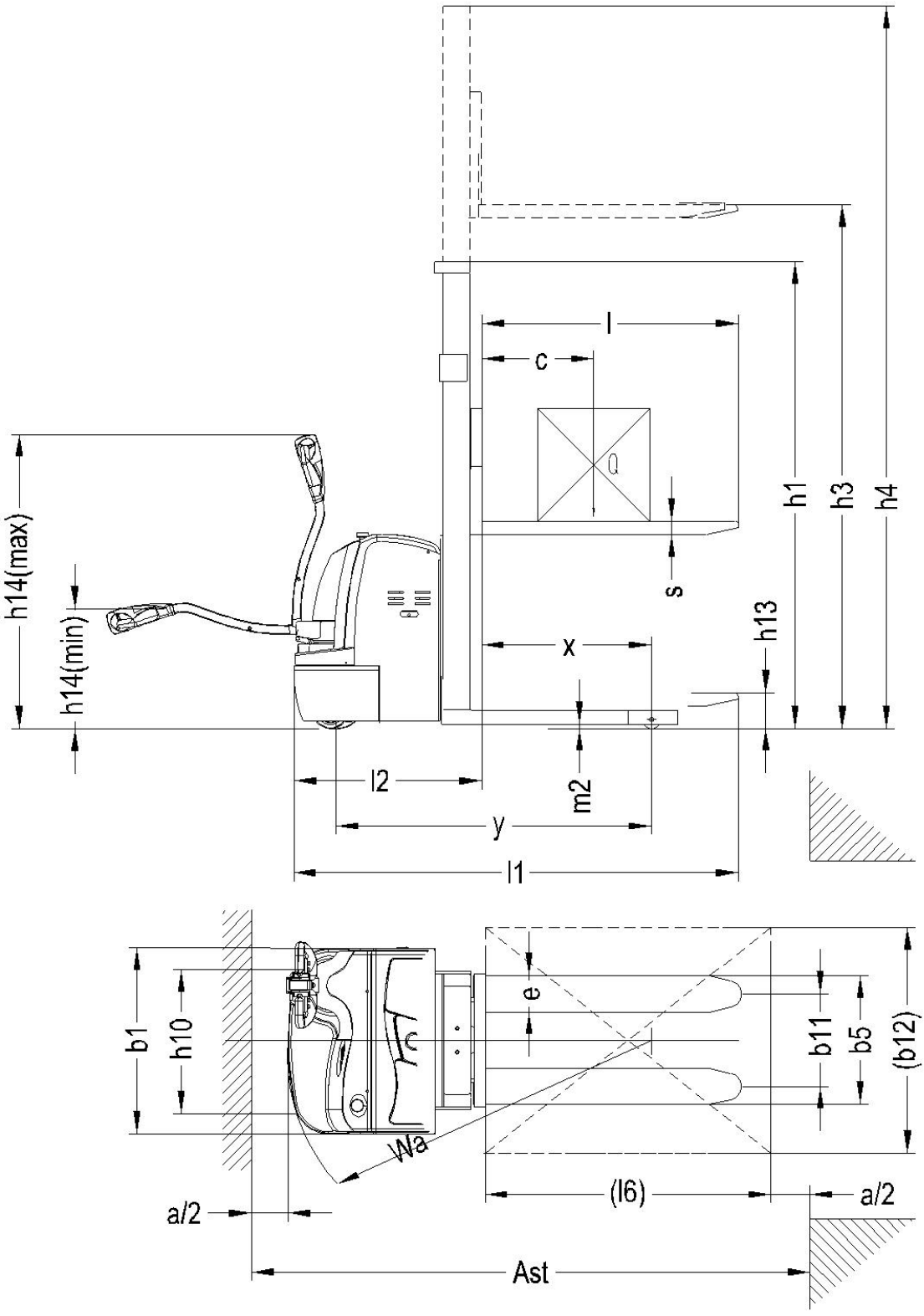
▲ When the ambient temperature is + 40 ℃, the relative humidity shall not exceed 50%. At a lower temperature, a higher relative humidity is allowed;

▲ Operate the truck at hard and flat ground.

▲ It is forbidden to use in flammable, explosive, acid-base and other corrosive environments.

1.1 Outline and technical parameter

1.1.1 CDDR-III


h14(max)
h14(min)
l
c
Q
s
h1
h3
h4
h13
x
m2
l2
y
l1
b1
h10
e
b11
b5
(b12)
Wa
a/2
(l6)
a/2
Ast

1.1.2 CDDR-III technical parameter

Characteristics	1.1	Manufacturer(abbreviated)				
	1.2	Model		CDD10R-III	CDD12R-III	CDD15R-III
	1.3	Driving model：Electric(Storage battery), diesel, gasoline, fuel gas		Electric		
	1.4	Driving model（Manual, Walking, Stand driving, Seat driving ,Order picking）		Walkie		
	1.5	Rated load	Q(kg)	1000	1200	1500
	1.6	Load center distance	c(mm)	500		600
	1.8	Front overhang	x(mm)	697		
	1.9	Tread	Y(mm)	1335		1410
Weight	2.1	Service weight(with battery)	kg	730/750/770	750/770/790	810/850/860
	2.2	Axle load, front/rear, laden	kg	950/770	1060/870	1280/1070
	2.3	Axle load, front/rear, unladen	kg	555/165	560/170	650/200
Wheel chassis	3.1	Wheels (rubber, high elasticity, pneumatic tyre, polyurethane wheel)		PU		
	3.2	Wheel dimension, front		φ250×70		
	3.3	Wheel dimension, rear		φ80×70		
	3.4	Balance wheel(dimension)		φ150×60		
	3.5	Wheel number, front/rear （x = driving wheel）		1x+1/4		
	3.6	Tread, front	b_{10}(mm)	520		
	3.7	Tread, rear	b_{11}(mm)	400/525		
Dimension	4.2	Height of mast, lowered	h_1(mm)	2087/1837/2087/2237		
	4.4	Lift height	h_3(mm)	1600/2500/3000/3300		
	4.5	Max. height of mast, extended	h_4(mm)	2087/3087/3587/3887		
	4.9	Min. /Max. height of operation handle, in driving position	h_{14}(mm)	670/1300		
	4.15	Height, lowered	h_{13}(mm)	90		
	4.19	Overall length	l_1(mm)	1965		2045
	4.20	Length to fork face	l_2(mm)	792		878
	4.21	Overall width of truck body	b_1(mm)	820		
	4.22	Fork dimension	s/e/l(mm)	60/170/1070(1150)		
	4.25	Overall width of fork	b_5(mm)	570/695		
	4.32	Wheelbase ground distance	m_2(mm)	26		
	4.33	Aisle width, with pallet 1000x1200 crosswise	A_{st}(mm)	2400		2480
	4.34	Aisle width, with pallet 800x1200 lengthwise	A_{st}(mm)	2370		2450
	4.35	Turning radius	W_a(mm)	1525		1605
Performance	5.1	Traveling speed, laden/unladen	Km/h	5.3/5.6		5.8/6(AC)
	5.2	Lifting speed, laden/unladen	m/s	0.11/0.17	0.10/0.16	0.09/0.16
	5.3	Lowering speed, laden/ unladen	m/s	0.15/0.16	0.15/0.16	0.15/0.16
	5.8	Max. gradeability, laden/unladen	%	6/15		
	5.10	Traveling brake		Electromagnetic brake		
Motor	6.1	Driving motor power	kW	0.8(DC)		1.2(AC)
	6.2	Lifting motor power	kW	2.2		
	6.4	Battery voltage/rated capacity	V/Ah	24/120		24/200
	6.5	Battery weight	kg	90		160
		Battery dimension（LXWXH）	mm	753×178×240		800×254×320
Other	8.4	Noise level at operator's ear, according to DIN12053	dB(A)	70		

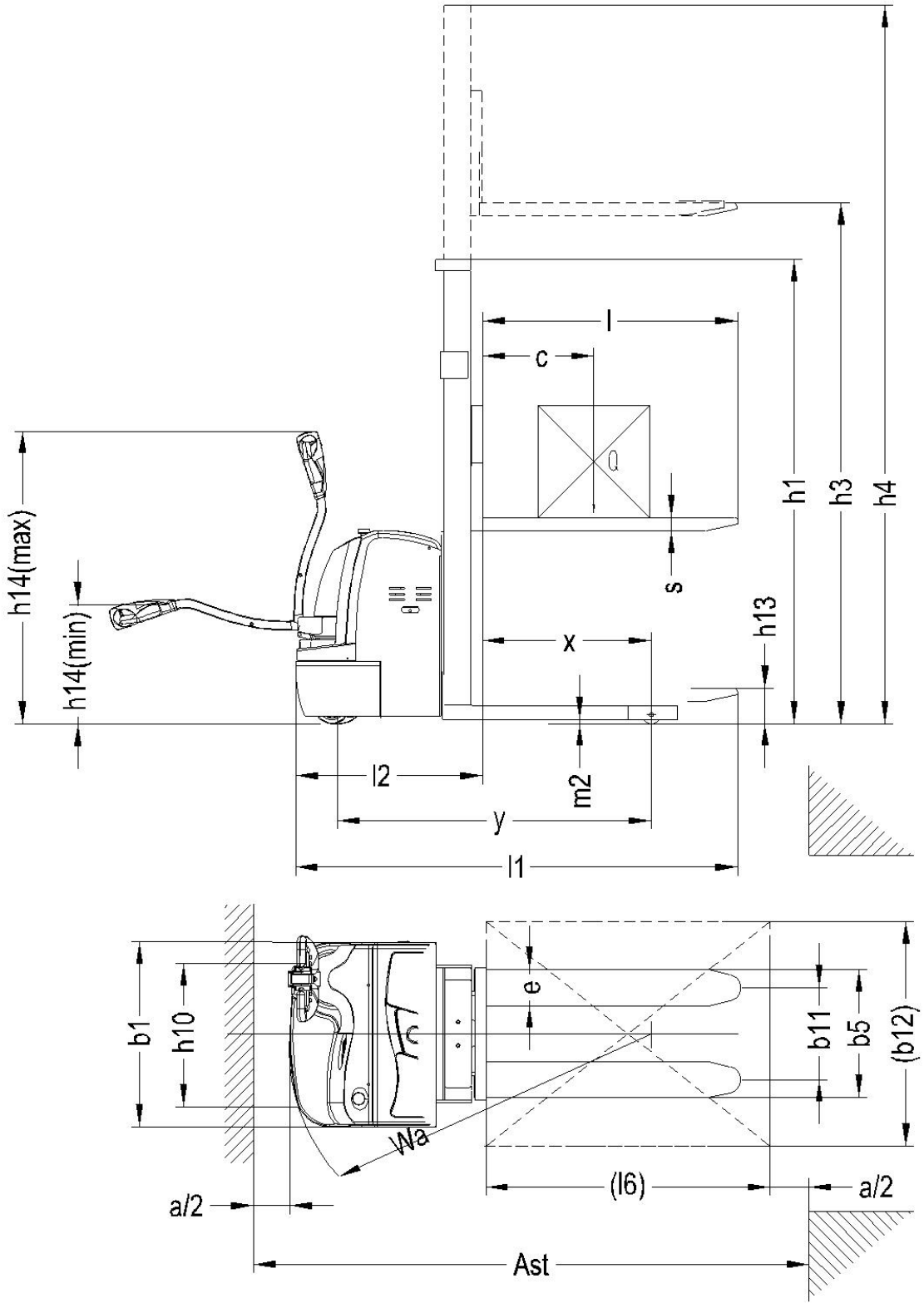
1.1.3 CDDR-III

Characteristics	1.1	Manufacturer(abbreviated)		
	1.2	Model		CDD15R-IIIZC
	1.3	Driving model：Electric(Storage battery), diesel, gasoline, fuel gas		Electric(storage battery))
	1.4	Driving model（Manual, Walking, Stand driving, Seat driving ,Order picking）		Walkie
	1.5	Rated load	Q(kg)	1500
	1.6	Load center distance	c(mm)	600
	1.8	Front overhang	x(mm)	667
	1.9	Tread	Y(mm)	1383
Weight	2.1	Service weight(with battery)	kg	1185/1205/1225
Wheel chassis	3.1	Axle load, front/rear, laden		PU
	3.2	Axle load, front/rear, unladen		φ250×70
	3.3	Wheels (rubber, high elasticity, pneumatic tyre, polyurethane wheel)		φ80×70
	3.4	Wheel dimension, front		φ150×60
	3.5	Wheel dimension, rear		1x+1/4
	3.6	Additional wheel(dimension)	b_{10}(mm)	520
	3.7	Wheel number, front/rear （x = driving wheel）	b_{11}(mm)	405/530
Dimension	4.2	Tread, front	h_1(mm)	2054/2214/2414
	4.3	Tread, rear	h_2(mm)	1570/1740/1940
	4.4	Height of mast, lowered	h_3(mm)	4500/5000/5600
	4.5	Lift height	h_4(mm)	5030/5510/6110
	4.9	Max. height of mast, extended	h_{14}(mm)	670/1300
	4.15	Min. /Max. height of operation handle, in driving position	h_{13}(mm)	90
	4.19	Height, lowered	l_1(mm)	1975/2055
	4.20	Overall length	l_2(mm)	905
	4.21	Length to fork face	b_1(mm)	820
	4.22	Overall width of truck body	s/e/l(mm)	60/180/1070(1150)
	4.25	Fork dimension	b_5(mm)	570/695
	4.32	Overall width of fork	m_2(mm)	21
	4.33	Wheelbase ground distance	A_{st}(mm)	2450
	4.34	Aisle width, with pallet 1000x1200 crosswise	A_{st}(mm)	2420
	4.35	Aisle width, with pallet 800x1200 lengthwise	W_a(mm)	1575
Performance data	5.1	Turning radius	Km/h	5.8/6
	5.2	Traveling speed, laden/unladen	m/s	0.09/0.16
	5.3	Lifting speed, laden/unladen	m/s	0.15/0.16
	5.8	Lowering speed, laden/ unladen	%	8/15
	5.10	Max. gradeability, laden/unladen		Electromagnetic brake
Motor	6.1	Traveling brake	kW	1.2(AC)
	6.2	Driving motor power	kW	2.2
	6.4	Lifting motor power	V/Ah	24/200
	6.5	Battery voltage/rated capacity	kg	160
		Battery weight	mm	800×254×320
Others	8.4	Battery dimension（LXWXH）	dB(A)	65
Parameters related to H1, l and Q are calculated as H1 = 3000mm and L = 1070mm				

1.1.4 CDDR-III technical parameter

Characteristics	1.1	Manufacturer(abbreviated)				
	1.2	Model		CDD15R-IIILi		CDD15R-IIIZC Li（Mast）
	1.3	Driving model：Electric,diesel oil,gasoline		Electric(Li-ion battery)		Electric(storage battery)
	1.4	Drive mode(manual, walkie, stand, seat, pick)		Walkie		
	1.5	Rated capacity	Q(kg)	1500		
	1.6	Load center	c(mm)	600		
	1.8	Front overhang	x(mm)	697		667
	1.9	Tread	Y(mm)	1410		1383
Weight	2.1	Service weigh(with battery)	kg	810/850/860		1185/1205/1225
	2.2	Axle load, front/rear, laden	kg	1280/1070		/
	2.3	Axle load, front/rear, unladen	kg	650/200		/
Wheel chassis	3.1	Wheel(rubber, high elasticity, PU)		PU		
	3.2	Wheel size, front		φ250×70		
	3.3	Wheel size, rear		φ80×70		
	3.4	Wheel size, balance wheel		φ150×60		
	3.5	Wheel number,		1x+1/4		
	3.6	Tread, front	b_{10}(mm)	520		
	3.7	Tread,rear	b_{11}(mm)	400/525		405/530
Dimension	4.2	Height, mast lowered	h_1(mm)	2087/1837/2087/2237		2054/2214/2414
	4.3	Height, full free lift(option)	h_2(mm)	/		1570/1740/1940
	4.4	Lifting height	h_3(mm)	1600/2500/3000/3300		4500/5000/5600
	4.5	Height, mast extended	h_4(mm)	2087/3087/3587/3887		5030/5510/6110
	4.9	Height of tiller in drive position,	h_{14}(mm)	670/1300		
	4.15	Fork lowered height	h_{13}(mm)	90		
	4.19	Overall length	l_1(mm)	1965	90	1975/2055
	4.20	Length to face of fork	l_2(mm)	792	820	905
	4.21	Overall width	b_1(mm)	820		
	4.22	Fork dimension	s/e/l(mm)	60/170/1070(1150)		
	4.25	Fork	b_5(mm)	570/695		
	4.32	Wheelbase ground clearance	m_2(mm)	26		21
	4.33	Aisle width for pallet 1000*1200 crossways	A_{st}(mm)	2480		2450
	4.34	Aisle width for pallet 800*1200 lengthways	A_{st}(mm)	2450		2420
	4.35	Turning radius	W_a(mm)	1605		1575
Performance data	5.1	Travelling speed, laden/unladen	Km/h	5.8/6(AC)		5.8/6
	5.2	Lifting speed, laden/unladen	m/s	0.09/0.16		
	5.3	Lowering speed, laden/unladen	m/s	0.15/0.16		
	5.8	Max. grade ability, laden/unladen	%	6/15		8/15
	5.10	Travelling brake		Electromagnetic brake		Electromagnetic brake
Motor	6.1	Drive motor power	kW	1.2(AC)		1.2(AC)
	6.2	Lifting motor power	kW	2．2		2.2
	6.4	Battery voltage/rated capacity	V/Ah	24/225		24/225
	6.5	Storage batteryWeight	kg	85		85
		Storage batteryDimension	mm	760×170×564		760×170×564
Others	8.4	Noise level at operator's ear, according to DIN12053	dB(A)	70		70

1.1.5 CTDR-III outline drawing



1.1.6 CTDR-III technical parameters

Characteristics	1.1	Manufacturer(abbreviated)				
	1.2	Model		CTD10R-III	CTD12R-III	CTD15R-III
	1.3	Driving model：Electric, diesel oil, gasoline,		Electric(storage battery))		
	1.4	Drive mode(manual, walkie, stand, seat, pick)		Walkie		
	1.5	Rated capacity	Q(kg)	1000	1200	1500
	1.6	Load center	c(mm)	500		600
	1.8	Front overhang	x(mm)	795		
	1.9	Tread	Y(mm)	1385		1460
Weight	2.1	Service weight(with battery)	kg	760/780/800	780/800/820	940/960/980
	2.2	Axle load, front/rear, laden	kg	983/797	1098/901	1340/1120
	2.3	Axle load, front/rear, unladen	kg	601/179	614/186	734/226
Wheel chassis	3.1	Wheel(rubber, high elasticity, PU)		PU		
	3.2	Wheel size, front		φ250×70		
	3.3	Wheel size, rear		φ98×82		
	3.4	Wheel size, balance wheel		φ150×60		
	3.5	Wheel number, front/rear(X=driving wheel)		1x+1/2		
	3.6	Tread, front	b_{10}(mm	520		
	3.7	Tread, rear	b_{11}(mm	1066-1466		
Dimension	4.2	Height, mast lowered	h_1(mm)	2145/1895/2145/2295		
	4.4	Lifting height	h_3(mm)	1600/2500/3000/3300		
	4.5	Height, mast extended	h_4(mm)	2145/3145/3645/3945		
	4.9	Height of tiller in drive position, min./max.	h_{14}(mm	670/1300		
	4.15	Fork lowered height	h_{13}(mm	70		
	4.19	Overall length	l_1(mm)	2015		2095
	4.20	Length to face of fork	l_2(mm)	890		970
	4.21	Overall width	b_1(mm)	1182--1582		
	4.22	Fork dimension	s/e/l(m	35/100/1070(1150)		
	4.25	Fork overall width	b_5(mm)	200-800		
	4.32	Wheelbase ground clearance	m_2(mm)	35		
	4.33	Aisle width, with pallet 1000x1200 crosswise	A_{st}(mm)	2450		2530
	4.34	Aisle width, with pallet 800x1200 lengthwise	A_{st}(mm)	2420		2500
	4.35	Turning radius	W_a(mm)	1575		1655
Performance data	5.1	Travelling speed, laden/unladen	Km/h	5.3/5.6		5.8/6(AC)
	5.2	Lifting speed, laden/unladen	m/s	0.11/0.17	0.10/0.16	0.09/0.16
	5.3	Lowering speed, laden/unladen	m/s	0.15/0.16	0.15/0.16	0.15/0.16
	5.8	Max. grade ability, laden/unladen	%	6/15		
	5.10	Travelling brake		Electromagnetic brake		
Motor	6.1	Drive motor power	kW	0.8(DC)		1.2(AC)
	6.2	Lifting motor power	kW	2. 2		
	6.4	Battery voltage/rated capacity	V/Ah	24/120		24/200
	6.5	Storage battery Weight	kg	90		160
		Storage battery Dimension（L×W×H）	mm	753×178×240		800×254×320
Others	8.4	Noise level at operator's ear, according to DIN12053	dB(A)	70		

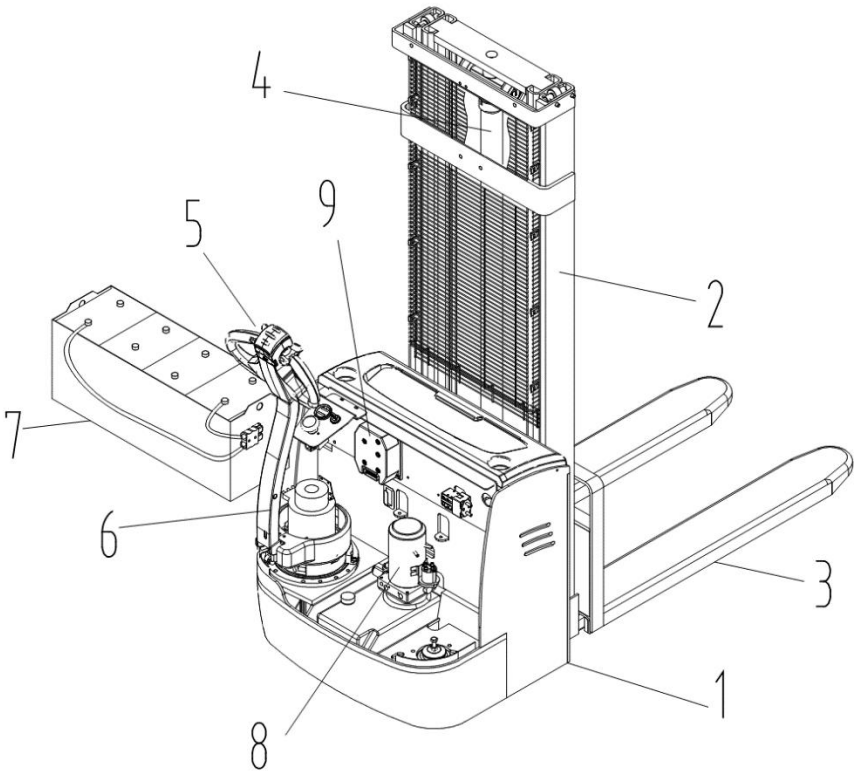
1.1.7 CTDR-III (triple mast) technical parameters

Characteristics	1.1	Manufacturer(abbreviated)		
	1.2	Model		CTD15R-IIIZC
	1.3	Driving model：Electric, diesel oil, gasoline,		Electric(storage battery))
	1.4	Drive mode(manual, walkie, stand, seat, pick)		Walkie
	1.5	Rated capacity	Q(kg)	1500
	1.6	Load center	c(mm)	600
	1.8	Front overhang	x(mm)	779
	1.9	Tread	Y(mm)	1539
Weight	2.1	Service weight(with battery)	kg	
Wheel chassis	3.1	Wheel(rubber, high elasticity, PU)		PU
	3.2	Wheel size, front		φ250×70
	3.3	Wheel size, rear		φ98×82
	3.4	Wheel size, balance wheel		φ150×60
	3.5	Wheel number, front/rear(X=driving wheel)		1x+1/4
	3.6	Tread, front	b_{10}(mm)	520
	3.7	Tread, rear	b_{11}(mm)	1066-1466
Dimension	4.2	Height, mast lowered	h_1(mm)	2120/2280/2480
	4.3	Height, full free lift(option)	h_2(mm)	1570/1740/1940
	4.4	Lifting height	h_3(mm)	4500/5000/5600
	4.5	Height, mast extended	h_4(mm)	5060/5560/6160
	4.9	Height of tiller in drive position, min./max.	h_{14}(mm)	670/1300
	4.15	Fork lowered height	h_{13}(mm)	70
	4.19	Overall length	l_1(mm)	2020/2100
	4.20	Length to face of fork	l_2(mm)	950
	4.21	Overall width	b_1(mm)	1182-1582
	4.22	Fork dimension	s/e/l(m	60/100/1070(1150)
	4.25	Fork overall width	b_5(mm)	200-800
	4.32	Wheelbase ground clearance	m_2(mm)	35
	4.33	Aisle width, with pallet 1000x1200 crosswise	A_{st}(mm)	2569
	4.34	Aisle width, with pallet 800x1200 lengthwise	A_{st}(mm)	2475
	4.35	Turning radius	W_a(mm)	1730
Performance data	5.1	Travelling speed, laden/unladen	Km/h	5.8/6
	5.2	Lifting speed, laden/unladen	m/s	0.09/0.16
	5.3	Lowering speed, laden/unladen	m/s	0.15/0.16
	5.8	Max. grade ability, laden/unladen	%	6/15
	5.10	Travelling brake		Electromagnetic brake
Motor	6.1	Drive motor power	kW	1.2(AC)
	6.2	Lifting motor power	kW	2.2
	6.4	Battery voltage/rated capacity	V/Ah	24/200
	6.5	Storage battery Weight	kg	160
		Storage battery Dimension（L×W×H）	mm	800×254×320
Others	8.4	Noise level at operator's ear, according to DIN12053	dB(A)	70
1.Parameters related to H1, l and Q are calculated as H1 = 3000mm and L = 1070mm				

1.1.8 CTDR-III with Li-ion battery technical parameters

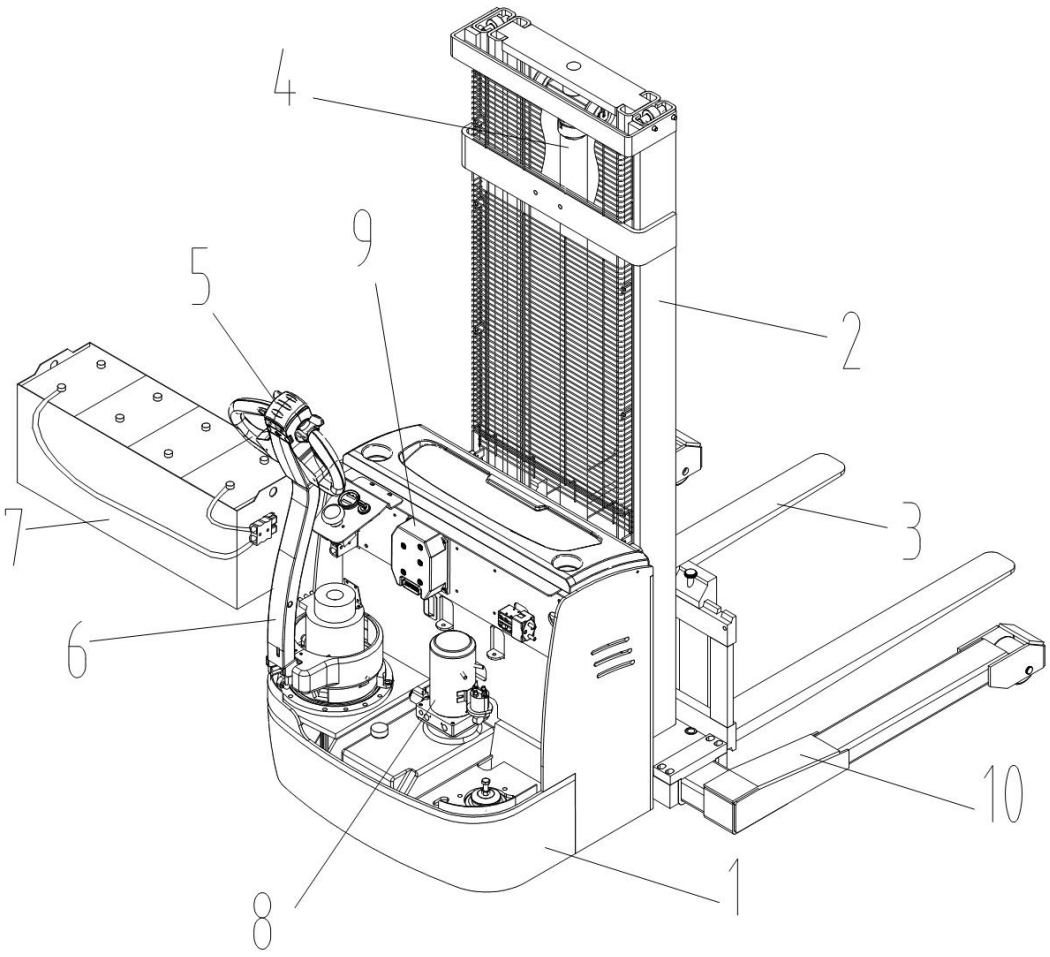
Characteristics	1.1	Manufacturer(abbreviated)			
	1.2	Model		CTD15R-Li	CTD15R-IIIZC-Li
	1.3	Driving model：Electric, diesel oil, gasoline,		Electric (Li-ion battery)	Electric (storage battery)
	1.4	Drive mode(manual, walkie, stand, seat, pick)		Walkie	
	1.5	Rated capacity	Q(kg)	1500	
	1.6	Load center	c(mm)	600	
	1.8	Front overhang	x(mm)	795	779
	1.9	Tread	Y(mm)	1460	1539
Weight	2.1	Service weight(with battery)	kg	940/960/980	
	2.2	Axle load, front/rear, laden	kg	1340/1120	
	2.3	Axle load, front/rear, unladen	kg	734/226	
Wheel chassis	3.1	Wheel(rubber, high elasticity, PU)		PU	PU
	3.2	Wheel size, front		φ250×70	φ250×70
	3.3	Wheel size, rear		φ98×82	φ98×82
	3.4	Wheel size, balance wheel		φ150×60	φ150×60
	3.5	Wheel number, front/rear(X=driving wheel)		1x+1/2	1x+1/4
	3.6	Tread, front	b_{10}(mm)	520	
	3.7	Tread, rear	b_{11}(mm)	1066-1466	1066-1466
Dimension	4.2	Height, mast lowered	h_1(mm)		2120/2280/2480
	4.3	Height, full free lift(option)	h_2(mm)	/	1570/1740/1940
	4.4	Lifting height	h_3(mm)	1600/2500/3000/3300	4500/5000/5600
	4.5	Height, mast extended	h_4(mm)	2145/3145/3645/3945	5060/5560/6160
	4.9	Height of tiller in drive position, min./max.	h_{14}(mm)	670/1300	670/1300
	4.15	Fork lowered height	h_{13}(mm)	70	
	4.19	Overall length	l_1(mm)	2095	2020/2100
	4.20	Length to face of fork	l_2(mm)	970	950
	4.21	Overall width	b_1(mm)	1182--1582	
	4.22	Fork dimension	s/e/l(mm)	35/100/1070(1150)	60/100/1070(1150)
	4.25	Fork width	b_5(mm)	200-800	
	4.32	Wheelbase ground clearance	m_2(mm)	35	
	4.33	Aisle width, with pallet 1000x1200 crosswise	A_{st}(mm)	2530	2569
	4.34	Aisle width, with pallet 800x1200 lengthwise	A_{st}(mm)	2500	2475
	4.35	Turning radius	W_a(mm)	1655	1730
Performance. data	5.1	Travelling speed, laden/unladen	Km/h	5.8/6(AC)	5.8/6
	5.2	Lifting speed, laden/unladen	m/s	0.09/0.16	
	5.3	Lowering speed, laden/unladen	m/s	0.15/0.16	
	5.8	Max. grade ability, laden/unladen	%	6/15	
	5.10	Travelling brake		Electromagnetic brake	
Motor	6.1	Drive motor power	kW	1.2(AC)	
	6.2	Lifting motor power	kW	2.2	
	6.4	Battery voltage/rated capacity	V/Ah	24/225	
	6.5	Storage battery Weight	kg	85	
		Storage battery Dimension（L×W×H）	mm	760×170×564	
Others	8.4	Noise level at operator's ear, according to DIN12053	dB(A)	70	
1.Parameters related to H1, l and Q are calculated as H1 = 3000mm and L = 1070mm					

2 Structure



CDDR-III structure diagram

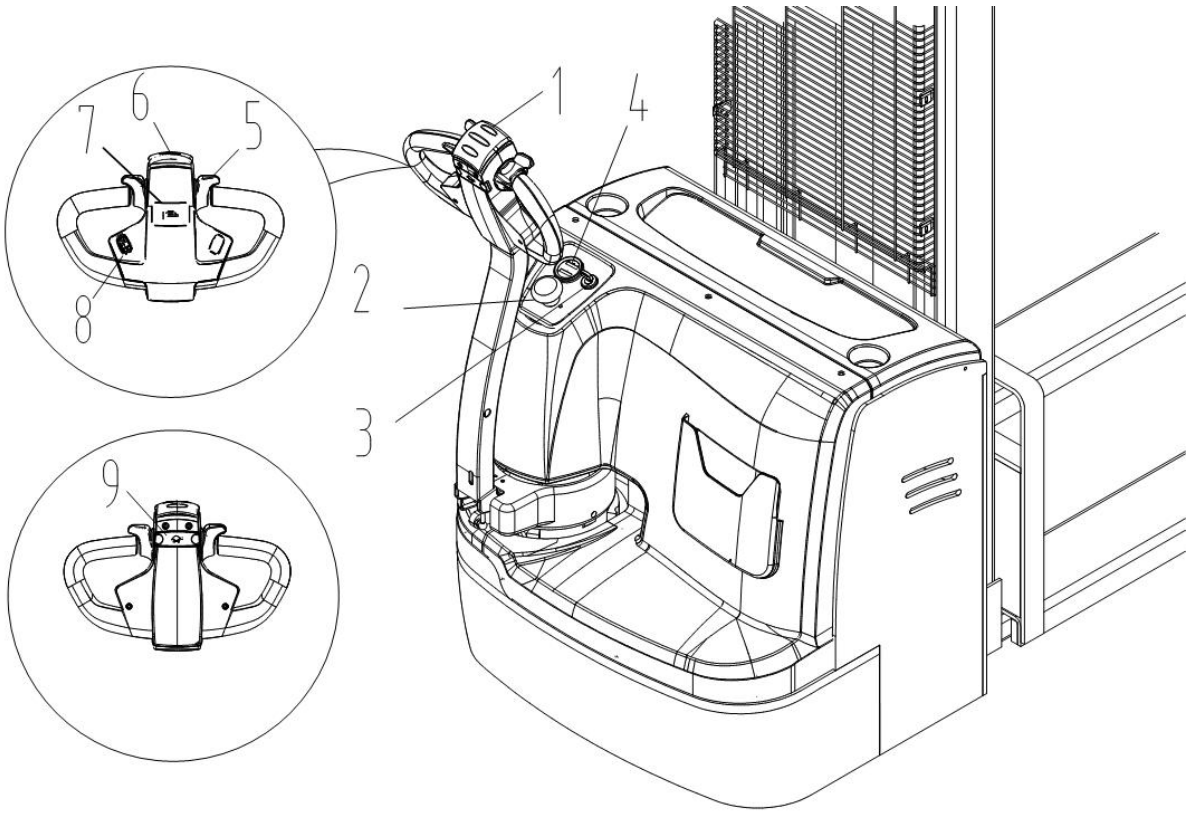
No.	Part	No.	Part
1	Truck frame	6	Steering gear
2	Mast	7	Battery
3	Fork	8	Hydraulic power unit
4	Lifting cylinder	9	Electric controlling system
5	Tiller head		



CTDR-III Structure diagram

No.	Part	No.	Part
1	Truck frame	6	Steering gear
2	Mast	7	Storage battery
3	Fork	8	Hydraulic power unit
4	Lifting cylinder	9	Electric controlling system
5	Tiller head	10	Straddle leg

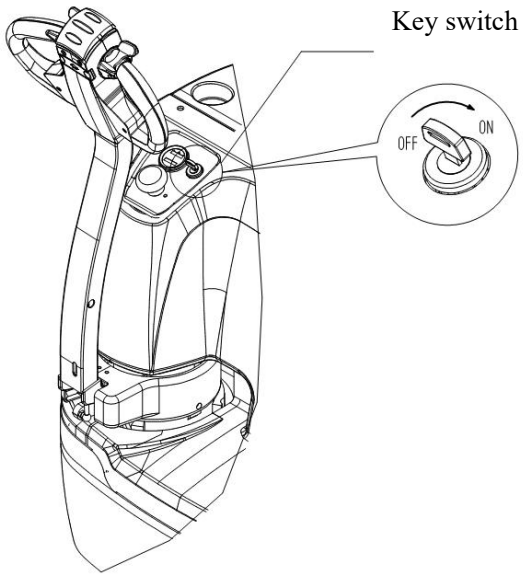
2.1 Display and control



No.	Part	No.	Part	No.	Part
1	Handle	4	BDI	7	Horn button
2	Emergency stop button	5	Accelerating rotary knob	8	Lifting/lowering button
3	Key switch	6	Emergency reversing button	9	Creep speed button

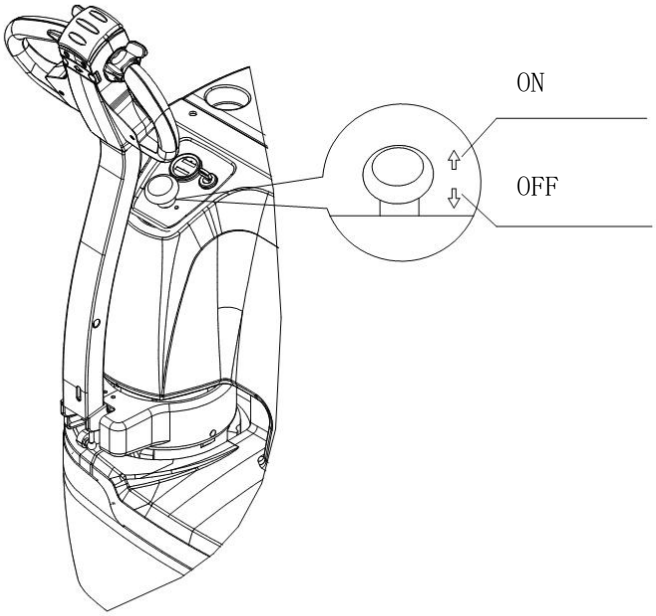
2.1.1 Control

① Start-up switch



urn on the key switch to start the truck. Turn off the key switch to shut down the truck. Must turn off the key switch before charging.

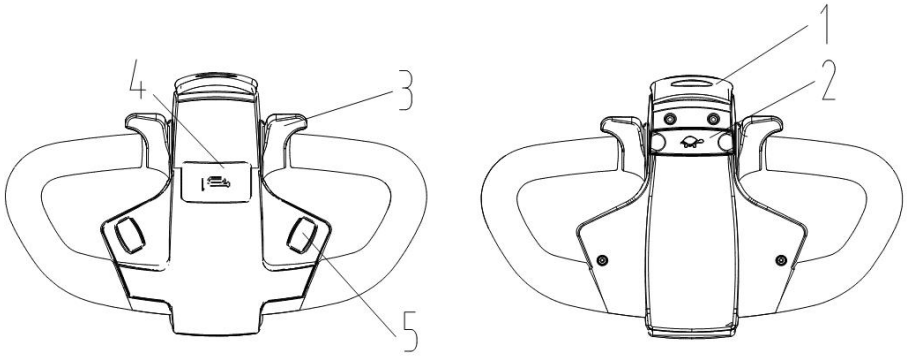
② Emergency stop button



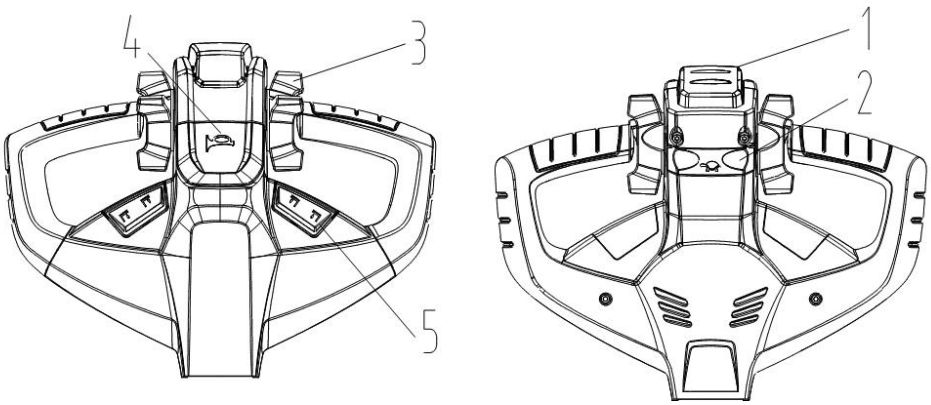
Press the emergency stop button to cut off the power supply when any emergency occurs or when

parking. Pull out the button to restart the truck.

③ Handle



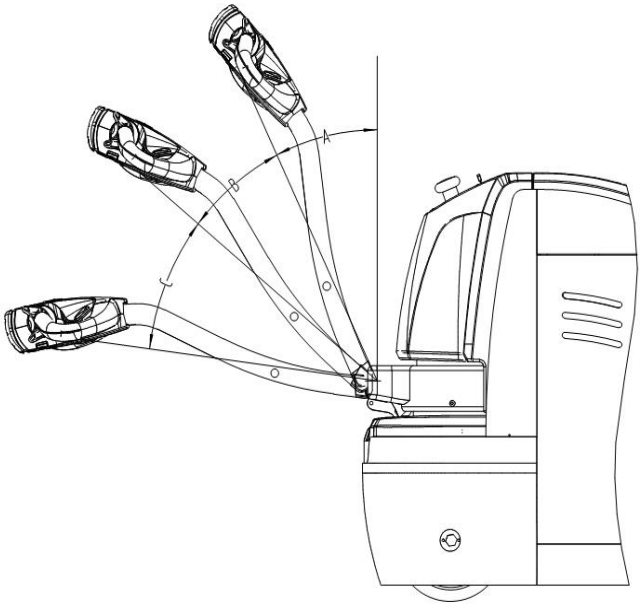
Frei tiller head



Ruyi tiller head

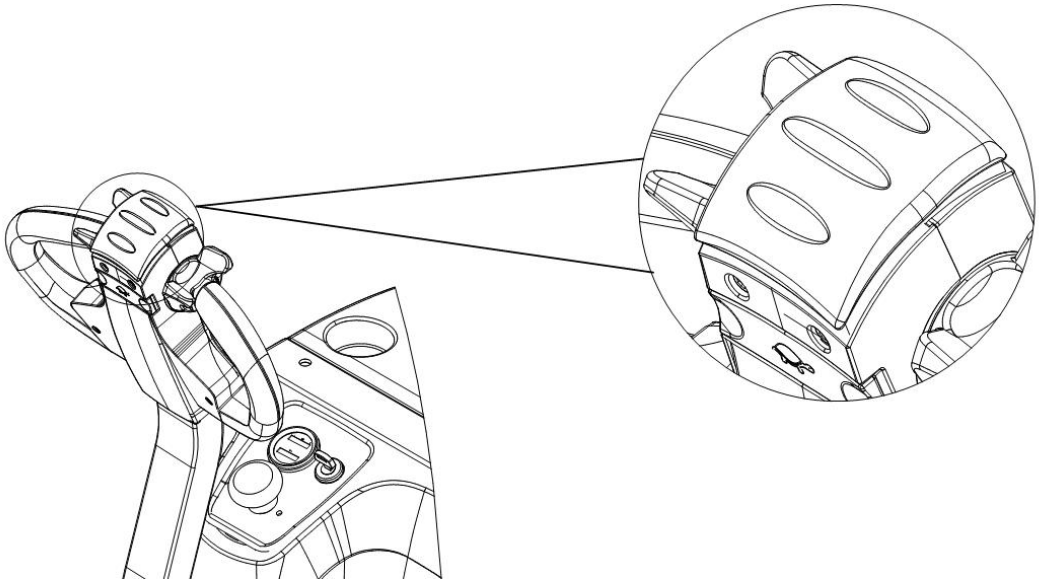
No.	Part	No.	Part	No.	Part
1	Emergency reversing button	3	Accelerating button	5	Lifting/lowering button
2	Creep speed button	4	Horn button		

Handle is used for steering and braking control. When turning the handle left and right by hand, the left and right steering of the truck can be realized. The maximum turning angle of the handle is about 175 °.

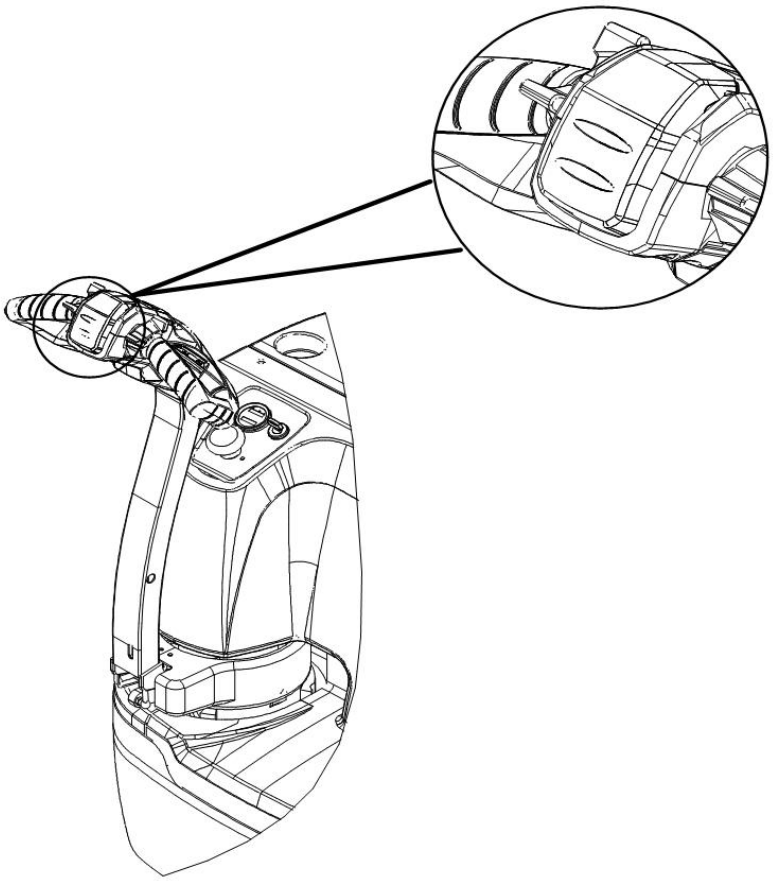


Tilt the handle up or down to the braking area (area A and area C) to brake

④ Emergency reversing button



Frei tiller head

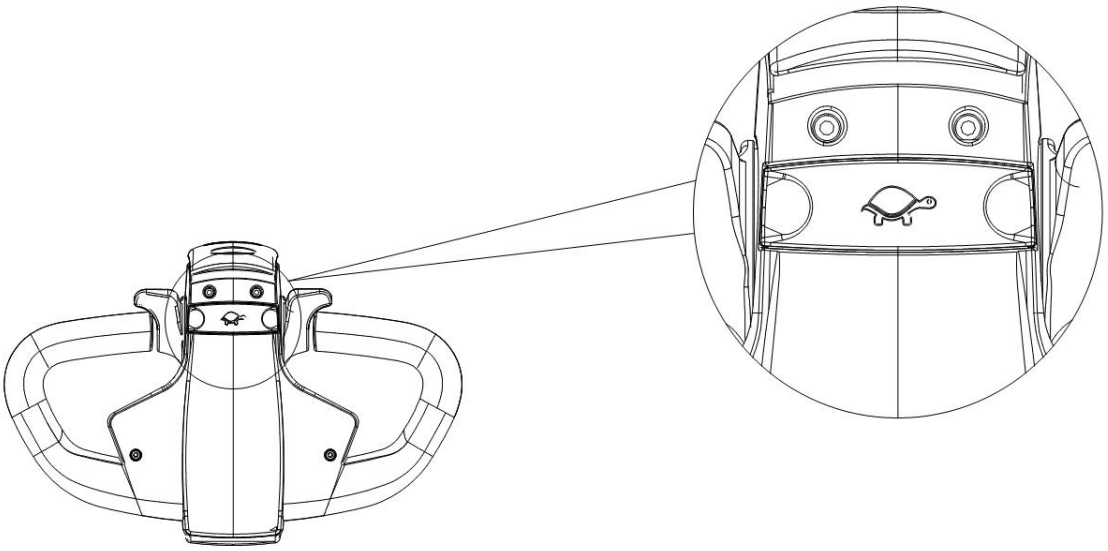


Ruyi tiller head

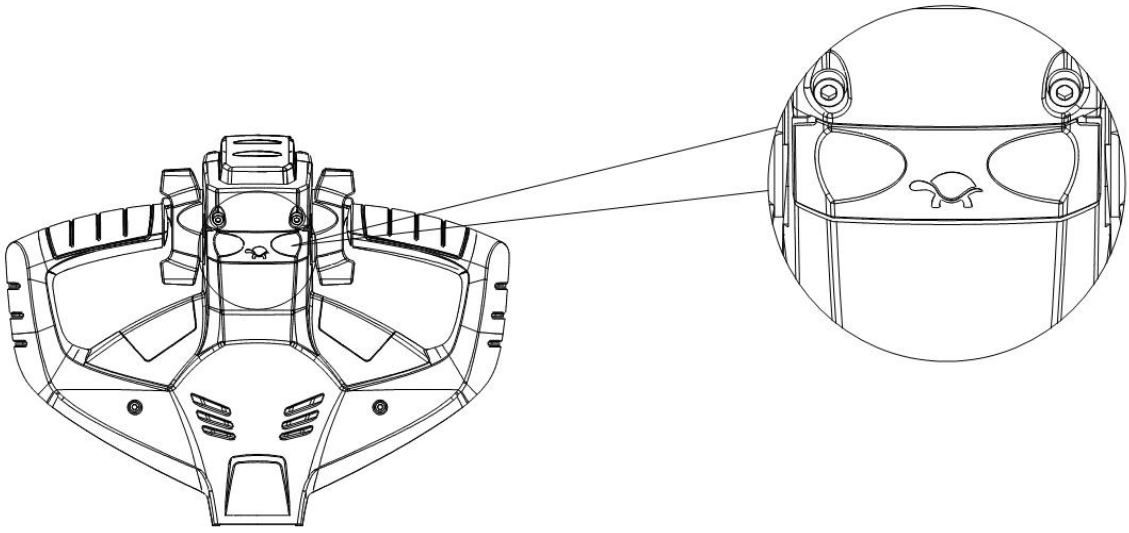
The emergency reversing button is at the head of the tiller head. Once it is triggered, the truck starts to travel in the opposite direction. It's designed to protect the operator in case the operator is stuck by the

handle and the other obstacle.

⑤ Creep speed button



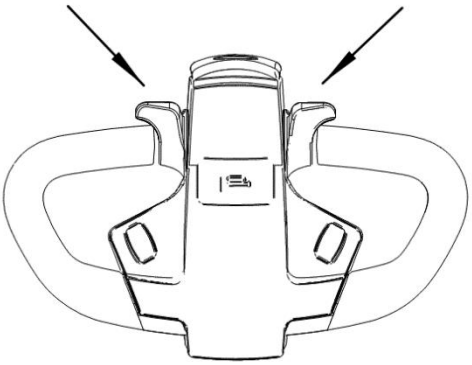
Frei handle



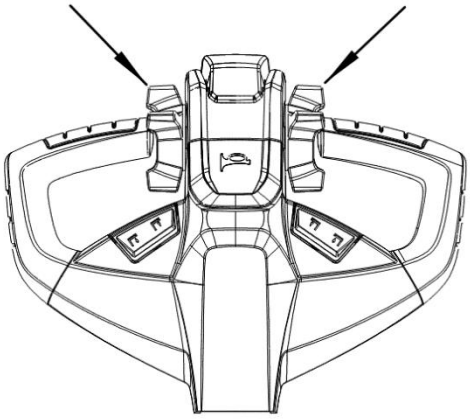
Ruyi handle

Press the creep speed button to lower the speed to 2.5KM/H. The speed returns to normal if the button is released.

⑥ Accelerating rotary knob

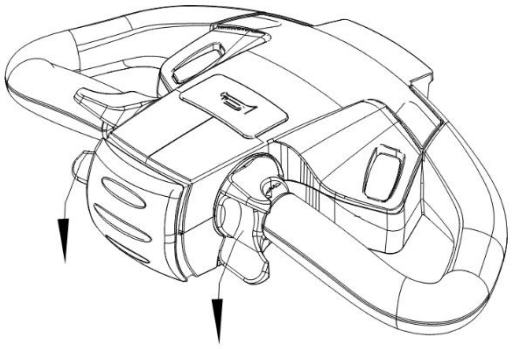


Frei tiller head

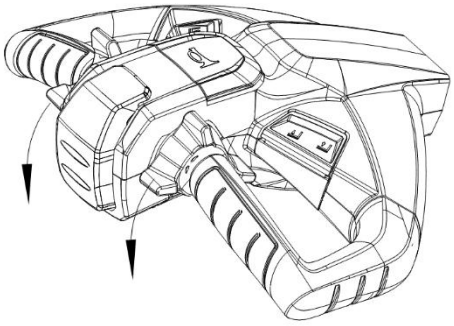


Ruyi tiller head

The button is located on both sides of the tiller head, one on the left and one on the right. It is used to control the running direction and speed.



Frei tiller head



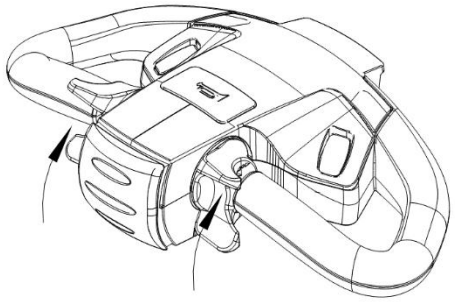
Ruyi tiller head

▲ Press down the tiller to driving area B

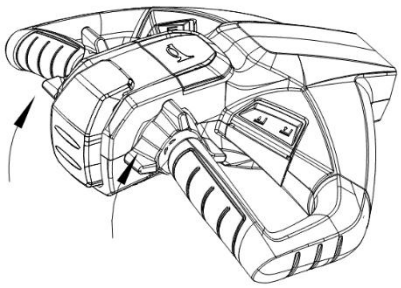
▲ Turn the accelerating rotary knob gradually from one side of the body to the outside with the thumb.

▲ The truck runs towards fork side

The truck runs towards the side of the handle



Frei tiller head



Ruyi tiller head

▲ Press the tiller down to the driving area B. Gradually turn the accelerating rotary knob towards one side of the body with your thumb.

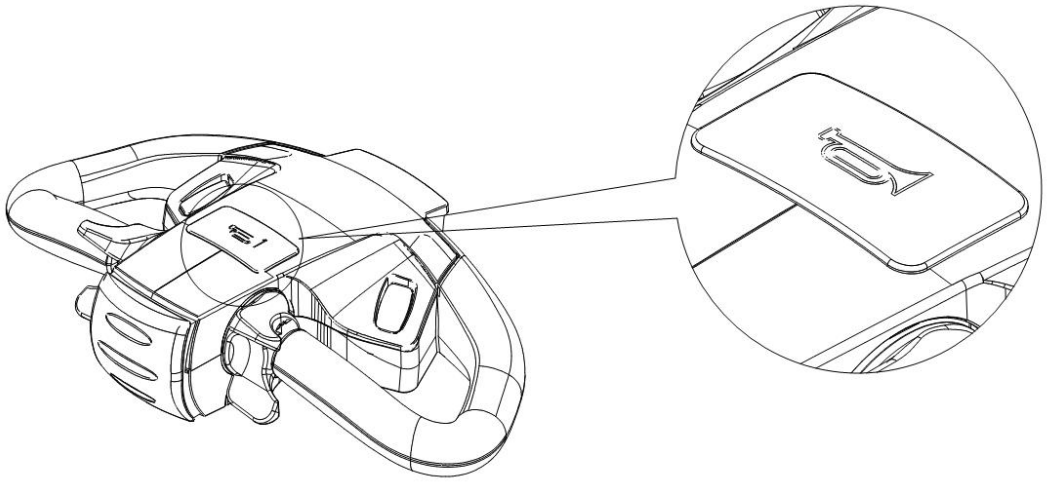
▲ The truck runs towards one side of the handle.

Note

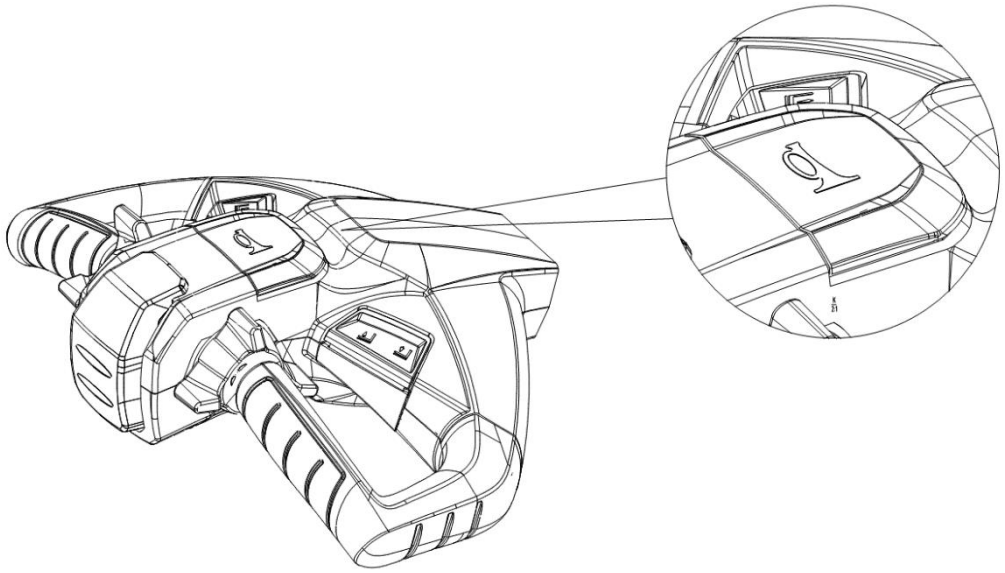
After the finger is released, the direction control button will automatically return to the position and the truck brakes. Therefore, the truck should continue to run during operation, and the finger cannot be released

⑦ Horn button

The horn button is located in the front table of the tiller header

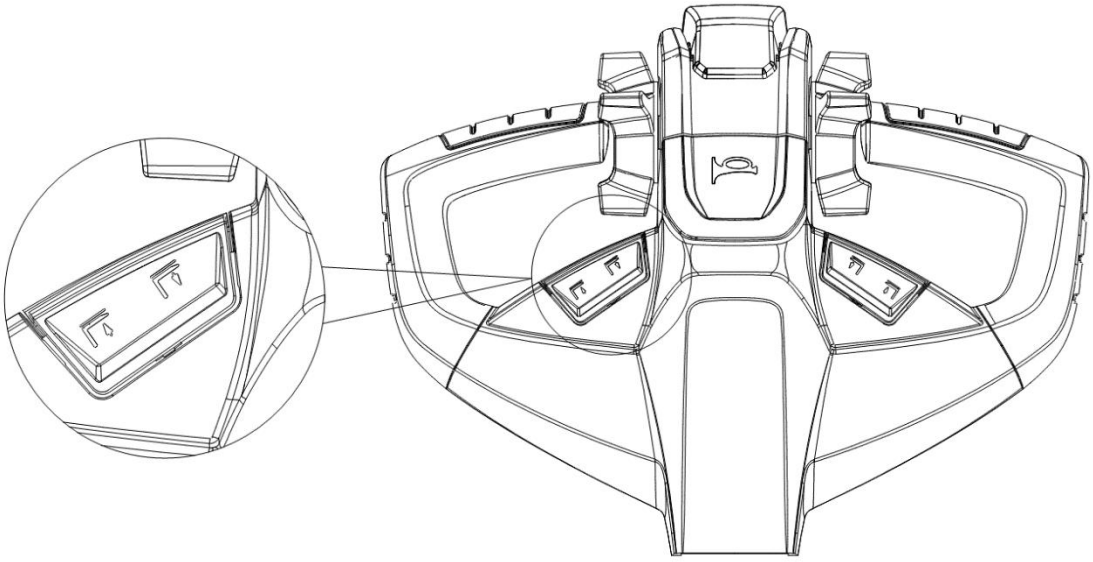


Frei tiller head



Ruyi tiller head

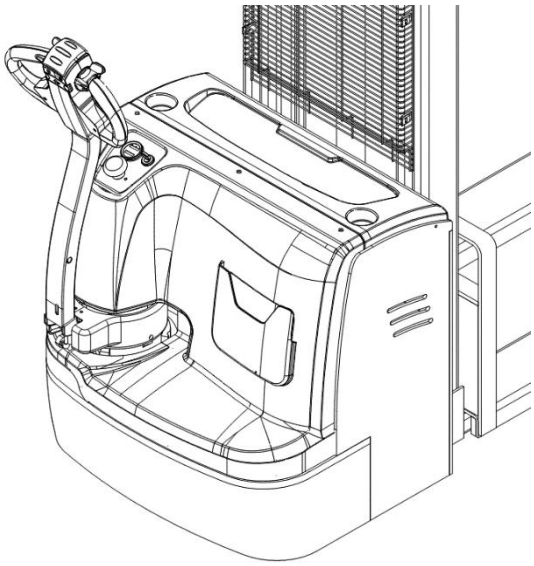
Lifting/lowering button



Ruyi tiller head

The lifting and lowering buttons are on the surfaces of both sides in the middle of the handle. Press the lifting button to lift the fork; press the down button to lower the fork. When the battery power is lower than 20%, the lifting function will be locked, and charging should be carried out as soon as possible.

⑧ Housing



The hydraulic unit, main transmission device, electrical system and other main parts are installed at bottom of the housing. During inspection, maintenance and repair, please remove the protective net cover first and open the rear hood.

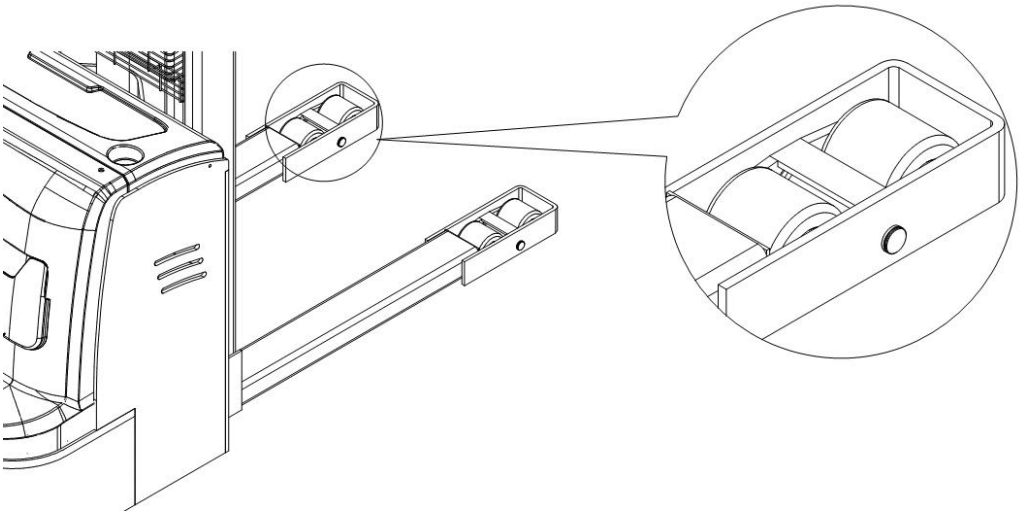
⑨ Fork

It is used to pick the goods. Fork is able to lift and lower.

Note

When fork lifts and lowers, hands, feet and any part of the body are not allowed to extend between the lifting assembly and the truck frame.

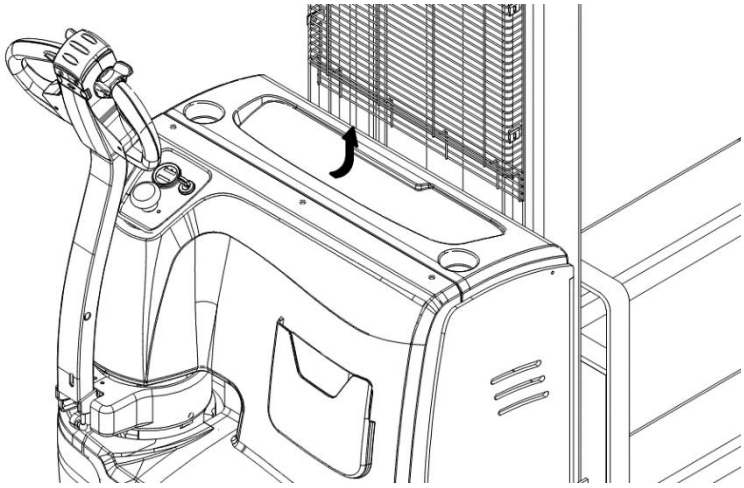
⑩ Fork rollers



The lower part of each front leg is respectively provided with fork rollers, which ensures the front and rear stability of the truck body.

Inspect the fork roller for damage or abnormal wear as required. If the fork roller or its internal bearing is damaged, the whole part shall be lifted off the ground or the front shall be supported off the ground, and the fork roller or bearing shall be replaced. At this time, enough general automobile lithium base grease shall be coated on the bearing.

⑪ Battery box cover



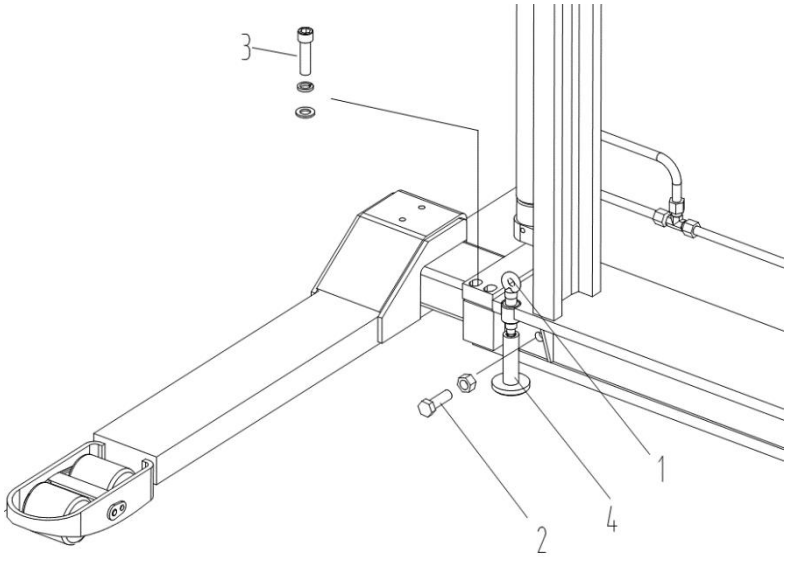
The front of the battery box cover is provided with a groove, so that the battery box cover can be opened upward by hand.

When checking, unplugging, charging or replacing the battery, the battery box cover can be easily opened.

Note

When closing the battery box cover, prevent your fingers from being caught.

⑫Installation and adjustment of straddle legs



No.	Part	No.	Part	No.	Part	No.	Part
1	Adjusting screw	2	Straddle leg adjusting screw	3	Straddle leg fixing screw	4	Support seat

Firstly, put the 4#support seat under the straddle leg, and align it with the threaded hole. Pump up

the straddle leg with 1# adjusting screw make the straddle leg suspended; Then remove 2# and 3# fixing screws with tools, and adjust the straddle leg to the appropriate inner width; Tighten 2# and 3# with tools, and then remove 1# and 4#.

2.1.1 Display

2.1.1.1 1Instrument 1

Curtis Model 3140 is designed to display critical truck and motor controller data in an easy-to-read and attractive LCD. The display includes three 10 mm digits and six 5 mm digits and all digits are in 16-segment format to allow the full use of the alphanumeric character set.

A 16-segment digital/alphanumeric LCD with fixed segment architecture and transreflective technology ensures legible reading under all lighting conditions, including battery-powered truck environments.

- SPEED MODE ICONS

A controller's speed mode determines the active acceleration and deceleration rates and maximum forward and reverse speeds. The speed modes balance fuel economy and truck power. The speed mode icons indicate the controller's active speed mode.

Speed Mode	Description	Icon

High mode	The speed mode with the fastest maximum speeds and acceleration/ deceleration rates. **Note:** High mode and power mode have the same characteristics. Some OEMs describe this mode as high mode, others as power mode.	H
Economy mode	Maximizes fuel economy by providing lower maximum speeds and acceleration/deceleration rates than high, power and standard modes.	E
Turtle mode	The speed mode with the slowest maximum speeds and acceleration/ deceleration rates.	C
Standard mode	A balance of maximum speeds, acceleration/deceleration rates and fuel efficiency.	S

- **HOUR METER**

The hour meter records operational hours for 3140 as well as the bus-connected devices and the Curtis controller interfaced via the SCI port .

The hour meter measures time in 0.1 hour units. The maximum value is 99,999.9 hours. After the hour meter reaches its maximum value, the hour meter resets to 0.0 hours.

2.1.1.2 Instrument 2

Curtis Model 3150R provides a 1.54 inch (39.1 mm), 240 × 240 pixel LCD that enables visualization of critical information

- SPEED MODE ICONS

A controller's speed mode determines the active acceleration and deceleration rates and maximum forward and reverse speeds. The speed modes balance fuel economy and truck power. The speed mode icons indicate the controller's active speed mode.

Speed Mode	**Description**	**Icon**
High mode	The speed mode with the fastest maximum speeds and acceleration/ deceleration rates. **Note:** High mode and power mode have the same characteristics. Some OEMs describe this mode as high mode, others as power mode.	H
Economy mode	Maximizes fuel economy by providing lower maximum speeds and acceleration/deceleration rates than high, power and standard modes.	E
Turtle mode	The speed mode with the slowest maximum speeds and acceleration/ deceleration rates.	T
Standard mode	A balance of maximum speeds, acceleration/deceleration rates and fuel effciency.	S

TRANSMISSION STATE ICONS

The following table describes icons that indicate the controller's transmission state:

Transmission State	**Icon**
Forward gear	↑

Reverse gear	↓
Neutral	N

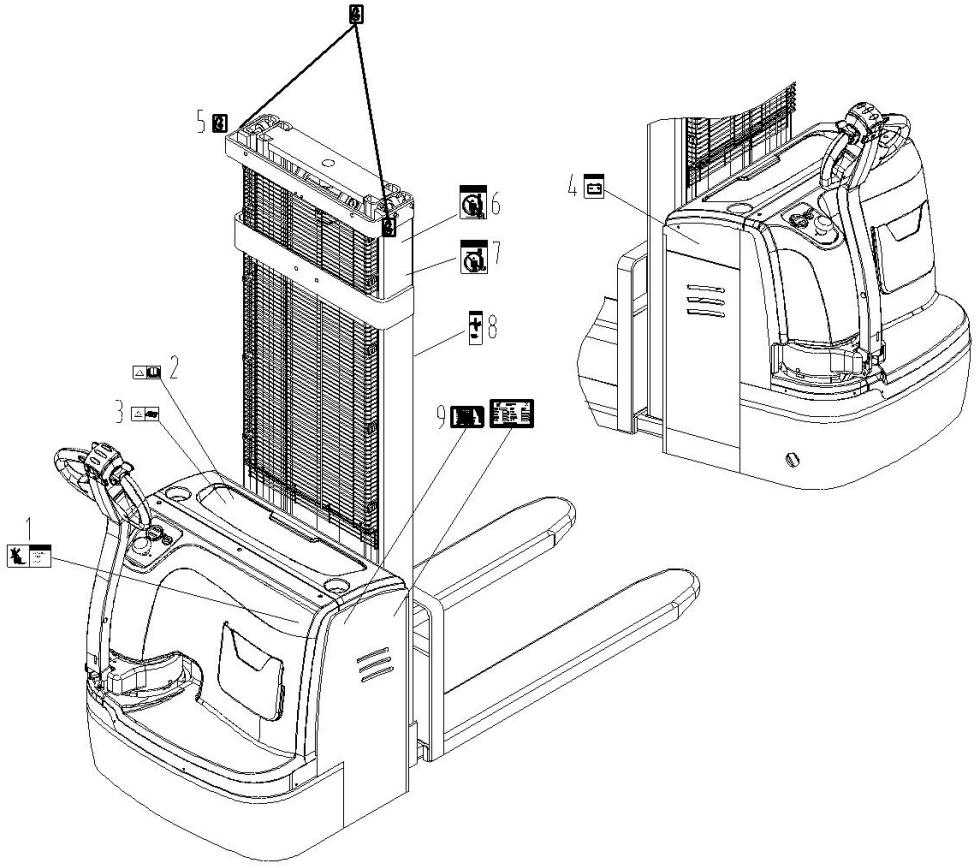
- **HOUR METER**

The hour meter indicates the running time of the 3150R, devices on the CAN bus, or Curtis controllers

connected to the SCI ports.

The hour meter measures time in 0.1-hour units. The maximum value is 99,999.9 hours. After the hour meter reaches its maximum value, the hour meter resets to 0.0 hours.

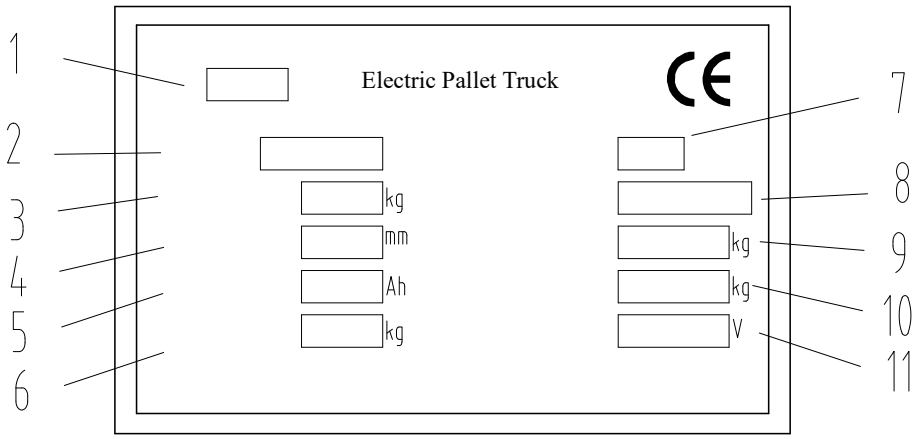
2.1.2 Positions to attach nameplates and labels



No.	Label name	No.	Label Name
1	No standing	6	No standing on the fork
2	Read the instruction	7	No standing under fork

3	Read the service manual	8	Pinch
4	Charging	9	Load chart plate
5	Hoist	10	Nameplate

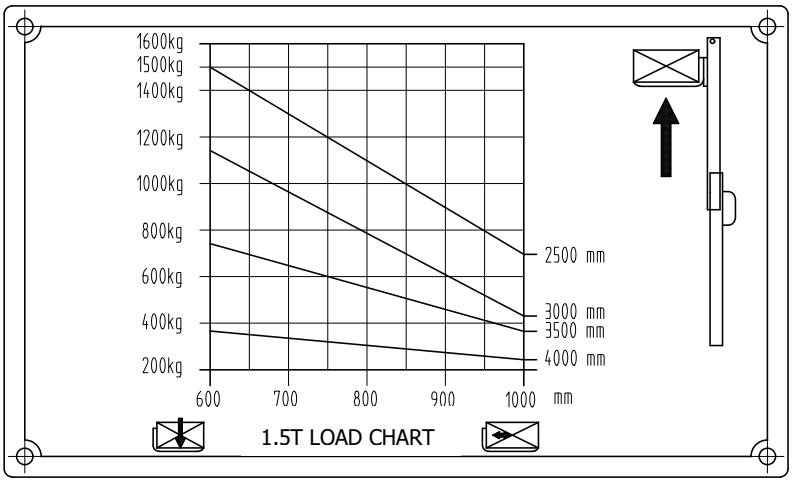
2.1.3 Nameplate



No.	Name	No.	Name
1	Manufacturer logo	7	Truck code
2	Specification and model	8	Serial No.
3	Rated load capacity	9	Weight, w/o battery
4	Lifting height	10	Allowable battery weight
5	Battery capacity		
6	Service weight		

2.1.4 Load chart

The rated load given is only applicable to trucks whose battery weight complies with the nameplate. The following figure lists the maximum load corresponding to the stacker when the standard load center distance D (mm) and the required lifting height h (mm) are determined.


1600kg
1500kg
1400kg
1200kg
1000kg
800kg
600kg
400kg
200kg
600
700
800
900
1000
mm
2500 mm
3000 mm
3500 mm
4000 mm
1.5T LOAD CHART

Operation

B

Chapater B shows how to operate the truck

B Operation

3 Safety Precautions (Observe the following before operating)

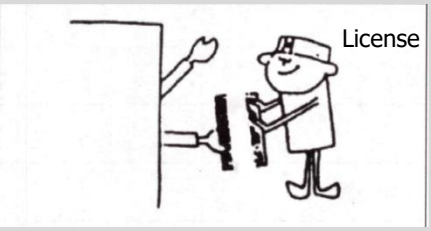
Warning

(1) It indicates a potentially dangerous situation. If not avoid, it will lead to death or serious injury.
The electric car is only used indoors with flat and hard ground.
It is strictly prohibited to use in flammable, explosive, acid-base and other corrosive environments.
(2) Only trained and recognized operators can drive the truck.
(3) please read this manual carefully before operating the truck. And master truck performance;
Carefully check whether the truck is normal before each use.
It is strictly prohibited to use faulty trucks;
It is forbidden to repair without training.
(4) Overloading is strictly prohibited.
(5) During handling, the center of gravity of the goods must be within two forks. It is strictly prohibited to handle loose goods.
(6) When the fork enters and exits the pallet, the truck shall be started slowly.
(7) It is strictly prohibited to press the up or down button when the truck is walking. It is strictly prohibited to switch the up and down button quickly and frequently. Rapid and frequent lift and down will cause damage to the truck and goods.
(8) Do not load heavy objects on the fork rapidly.
(9) Do not put the goods on the truck body for a long time.
(10) It is strictly prohibited to make sharp turns in narrow passages. At this time, slow down and turn slowly to ensure the safety of personnel and goods.
(11) When the stacker is not in use, the fork shall be lowered to the lowest position.
(12) It is forbidden to put any part of the body under heavy objects and forks!
(13) This stacker is suitable for use on flat ground or flat operation platform. It is strictly prohibited to park on slope for a long time.
(14) Overload or over ramp operation is strictly prohibited. Otherwise, it will cause wheel slip and damage the wheel, motor, goods and personal safety.
(15) It is forbidden to use the truck under the specified voltage of 20.4v.
(16) It is forbidden to directly connect the power plug with AC for charging.
(17) When the lifting height of the fork exceeds 500mm, driving is prohibited.

3.1 Safe operation specifications:

3.1.1 Operator training:

Note



The braking, acceleration and other characteristics of each truck with the same technical parameters may be different. Drive the truck after being familiar with various operations.

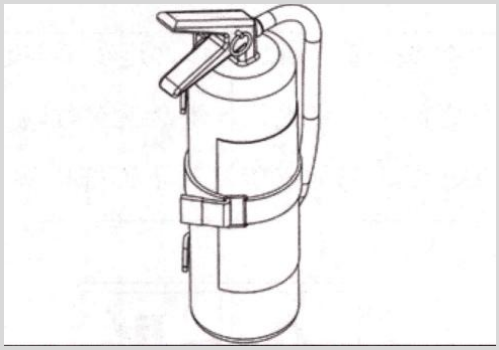
3.1.2 Wearing when driving:

Note

Please wear safety shoes and work clothes; For safety, please do not wear loose clothes to avoid being caught and dangerous.

3.1.3 Safety in the workplace：

Note



The electric truck is only used indoors with flat and hard ground. It is strictly prohibited to use in flammable, explosive, acid-base and other corrosive environments.

▲ Maintain good road conditions and keep the roads unblocked.

▲ here should be sufficient light in the workplace.

▲ The place where the truck is used and charged must be equipped with firefighting equipment, and the fire extinguisher must meet the requirements for extinguishing solid combustible and electrical fires.

▲ The value of truck noise in the manual refers to the value measured by the new truck under the condition of horizontal, smooth and hard road. If your road condition is bad or the wheels are damaged, the noise of the truck may become larger.

3.1.4 Ensure the integrity of the truck:

Note

Don’t modify the truck

▲ When operating, inspecting and repairing the truck, please abide by the safety rules and the rules of the workplace.

▲ The truck shall not be changed without authorization. Modifying the truck may affect the safe operation. Without the written permission of the original manufacturer, authorized agent or its principal, it is prohibited to make changes to electric industrial trucks that may affect the truck load capacity, stability and safety requirements. The impact of this change includes truck braking, steering, visibility and the addition of accessories. When the manufacturer or his principal approves the change, appropriate changes shall also be made to the load tray, label, label and operation and maintenance manual.

Only when the truck manufacturer no longer operates and there is no client, the user can make changes to the electric industrial truck. However, the user must:

▲ Arrange the design and test of truck changes and implement them by engineers and experts in industrial trucks and safety.

▲ Keep permanent records on the design, test and implementation of truck changes.

▲ Approve and make appropriate changes to load pallets, labels, labels and instruction manuals.

▲ Stick a permanently visible label on the truck to indicate the truck change method, change date and the name and address of the organization completing the work.

3.1.5 Develop safe operating procedures:

Before using the truck, please formulate safe operation procedures according to the actual situation, and fully consider safety when formulating working procedures.

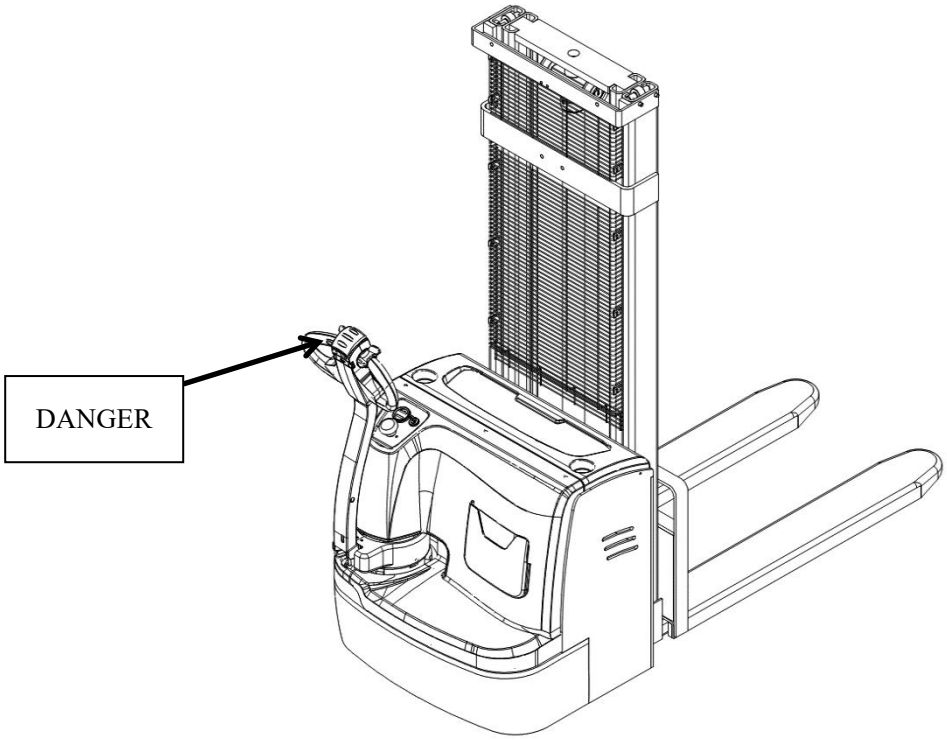
3.1.6 Do not operate the truck under unsafe conditions:

▲ It is strictly prohibited to use in places with unsafe factors such as uneven ground and poor road, and it is strictly prohibited to lift goods on the ramp.

▲ It is strictly forbidden to use a faulty truck.

▲ Make sure to check the car every day. If any abnormality is found, please repair or replace it.

▲ Whenever a fault occurs, stop the truck, hang the "DANGER" or "FAULT" sign on the truck, remove the key and report to the management personnel at the same time. Only use the truck after troubleshooting.



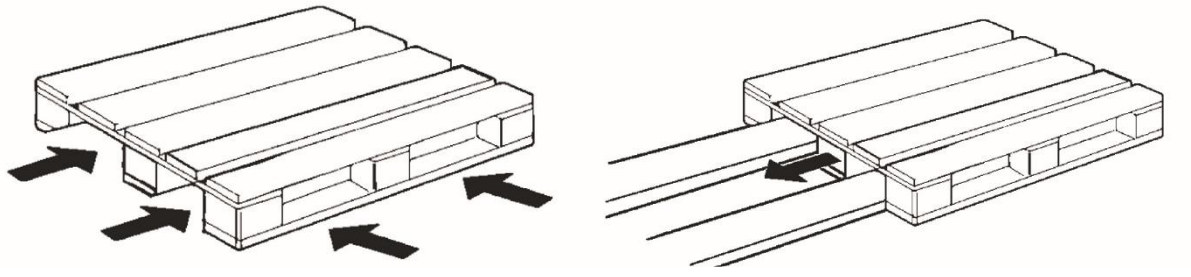
3.1.7 Do not overload the truck:

Warning

It is forbidden to overload the truck, which will damage the truck or cause injury to personnel.

3.1.8 Use appropriate pallets:

The size of the pallet used shall be appropriate and shall not be too wide or too large.



3.1.9 Electrical system inspection:

Note

Turn off the key switch and the emergency isolation switch when checking the electrical system.

Explosive gas is generated within the battery, thus absolutely prohibiting any proximity of flame to the battery. It is imperative to ensure that tools do not come into contact with the battery's two poles, to prevent sparks or short circuits.

3.1.10 Safe driving practices:

▲ check the safety conditions around the truck

Note

Make sure there is nobody around the truck before starting.

Note

When carrying huge goods and the sight is blocked, please drive reversely or guide by others.

Note

When reversing, make sure there is no one around.

Note

Be guided when driving in a narrow passage.

Note

The operator shall stop at the crossroad or other places where the sight is blocked to ensure that there is no one left or right before driving.

DANGER

The operator shall stop at the crossroad or other places where the sight is blocked to ensure that there is no one left or right before driving.

- Savage driving is strictly prohibited

Note

Do not start, brake or turn suddenly.

Note

Pay attention when driving; Sudden starting or braking may cause goods to fall; Sudden turning during driving will cause the truck to tip over and cause serious accidents; to slow down, turn carefully.

Note

Observe the safety regulations on the work site. When passing other trucks or trucks, slow down and sound the horn. Do not drive in areas with poor vision.

Note

Make sure there is a certain clearance between the car and the entrance and exit.

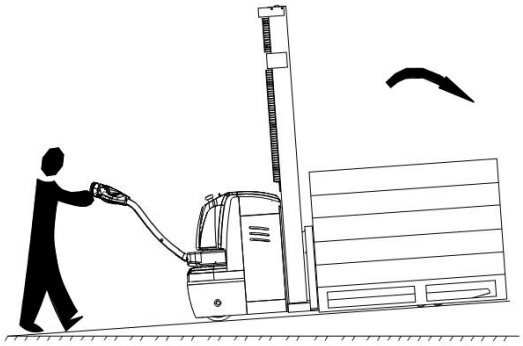
- Don’t drive by the side of the road

Note

Make sure there is enough distance between the truck and the roadside or platform edge.

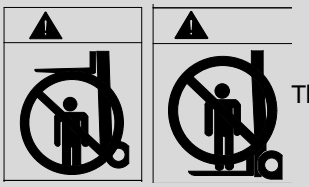
Warning

Do not conduct steering or loading and unloading operations on the slope, otherwise the truck may tip over.



3.2 operation specification:

Note



The truck can only carry goods below the rated capacity.

▲ Overload is prohibited

▲ It is forbidden to carry goods under partial load.

▲ It is forbidden to take people in cars.

▲ Do not operate the handle suddenly.

▲ Do not use the truck as a tractor.

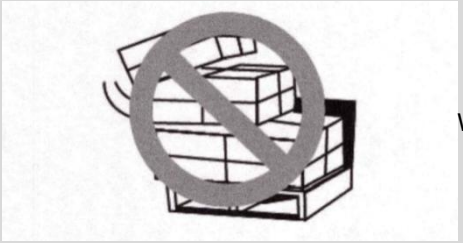
▲ When handling extra wide goods, the operator should be very careful, turn slowly, balance the goods, lift slowly, and pay attention to the safety around.

▲ The truck to be repaired with faults shall be parked in a place where the passage is not blocked, the fork shall be placed at the lowest position, the Warninging sign shall be hung, and the key shall be removed.

▲ When protective equipment such as mast protective cover is not installed, the truck cannot be

operated.

Note

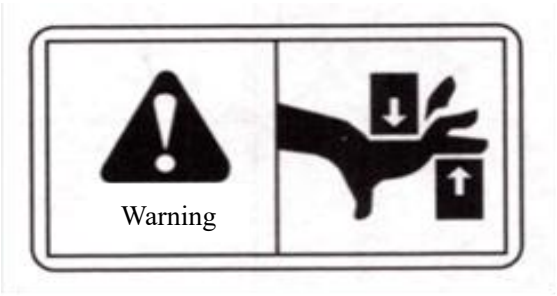


When loading, avoid wind hazards.

▲ The operator must decide the driving speed according to the specific conditions.

In the turning, narrow roadway, when passing through the swing door, and where the line of sight is obstructed, must keep driving slowly. Sufficient braking distance must be kept from the front stacker, and the electric truck must be controlled at all times. Sudden braking (except in case of accidents), quick turning or overtaking are not allowed in dangerous or obstructed positions.

▲ Operator's line of sight during driving: the operator must keep his sight in the driving direction and pay attention to the situation on the driving route at any time. If the goods to be transported obstruct the operator's line of sight, the goods must be adjusted to the rear of the operator's line of sight. If it cannot be adjusted, an additional operator must be arranged to walk with the truck in front of the operator's side, so as to sometimes report the road conditions ahead to the operator.



▲ Driving uphill or downhill: the uphill or downhill driving route must be the specified driving route. The road surface must be kept clean, not slippery, and meet the technical performance of the stacker truck, safe and reliable. When carrying goods uphill, the fork must be kept moving forward, and when going downhill, it should be driven backward. When driving uphill and downhill, do not turn, drive obliquely or park the stacker in the middle. When driving downhill, you must slow down and be ready to brake at any time.

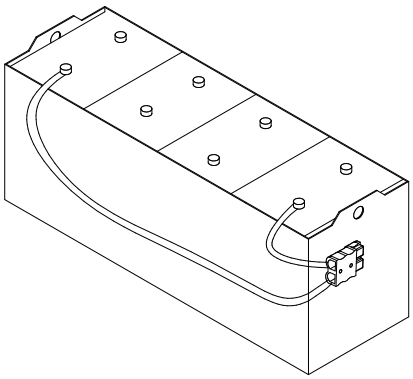
▲ Drive the stacker onto the elevator or loading platform: If it is necessary to drive the stacker onto the elevator or loading platform, it must be ensured that the elevator and loading platform have sufficient load capacity, the design and structure are suitable for carrying the stacker, and the permission of the equipment user must be obtained. It must be checked as required before operation. When the stacker drives into the elevator, the goods must be advanced. Select a suitable parking position to avoid collision with hoist way wall during lifting. If a worker uses the lift at the same time, he can enter

only after the operator has completely parked the stacker. After reaching the predetermined height, the staff leave the elevator first.

▲ **Conditions for handling goods:** the stacker operator must carefully check the goods to ensure that there is no danger. Before handling, the goods must be carefully placed and fixed. If the goods are in danger of overturning or falling during handling, appropriate protective devices (such as guardrails) must be installed. It is strictly forbidden to stretch the head, hands, feet and body between the frame and the lifting assembly. Once clamped, your life will be in danger.

4 Initial operation

4.1 Initial operation:



- In order to cut off power in case of danger, the battery plug (not included in the scope of accessories on the truck) must be connected with the emergency cut-off switch of the electric truck itself.

Warning

When there is no emergency stop switch, the electric truck is prohibited from running.

▲ Only battery power can be used to drive the stacker, and the rectified AC will damage the electronic components of the stacker. The length of battery cable (streamer) shall not exceed 6m.

▲ If the stacker is driven by an external battery through a streamer, it is prohibited to lift the load.

▲ After the arrival or handling of the stacker, the following inspections must be carried out before it can be put into use:

a. Check whether the equipment is complete and in normal condition.

b. If the battery has not been installed on the stacker, install the battery and be careful not to damage the battery cable.

▲ adjust the characteristic curve (charging curve) of the charger.

▲ if the stacker is parked for a long time, the ground of the wheel may be slightly flattened. After the electric truck drives for a short time, the flattened part will recover automatically.

4.1.1 Do not use the driving device of the stacker to drive the stacker:

Warning

It is strictly prohibited to drag the stacker on the slope.

▲ In order to drag the stacker in an emergency, the electromagnetically controlled brake must be released.

▲ After the stacker is parked at the specified place, the electromagnetic controlled brake must be fixed again, so that the stacker can be in the braking state again.

Instructions for use and operation

The traveling and lifting of all electric pallet stacker takes the battery as the power source to carry and stack goods in a short distance; the correct use and operation of the truck will bring great convenience to your work. Operating and using the truck in an incorrect way will damage the truck or bring danger to personal safety and goods.

5.1 Inspection before operation

In order to operate safely and keep the car in good condition, it is a legal duty to conduct a comprehensive inspection of the truck before operation. In case of any problem, contact the national service center or local authorized dealer in time.

5.1.1 Inspection points and contents:

	S/N	Check point	Inspection content
Braking system	1	Operating handle	Pull the operating handle to switch the handle between zone A, zone B and Zone C, and the brake makes a click sound.
	2	Brake clearance	The brake clearance shall be maintained at 0.2-0.5mm.
Steering system	3	Operating handle	Tightness and flexibility of rotation.
Hydraulic system	4	Tubing	Check whether the oil pipe leaks oil.
	5	Hydraulic oil	The appropriate amount of oil.
	6	Lifting cylinder	Check whether there is oil leakage in the cylinder.
Wheel	7	Pins, screws and all fasteners	Whether all pins, fasteners and screws of all wheels of the truck are loose or fall off.

	8	Wear condition	Compared with the parameter table, the wheel shall be replaced when the diameter is reduced by 5%.
Battery	9	Charge	Determine the battery capacity display condition.
	10	Electrolyte	Electrolyte level height and specific gravity.
	11	Connecting line	The connecting wire and socket shall be firm.
Horn	12	Horn	Whether the horn sounds after pressing the horn button.
Meter	13	Function	Turn on the key switch and check whether the instrument display is normal.
Others	14	Frame and other structural parts	No damage or crack.
	15	Function	Whether the lifting, forward, backward and emergency reverse are normal and whether there is abnormal sound.

5.1.2 Pre-use inspection:

DANGER

It is forbidden to use a faulty truck.

5.1.2.1 Before use, please check whether the truck is normal: whether there is oil leakage in the hydraulic pipeline, whether each supporting wheel can work normally and whether there is blocking. It is strictly prohibited to use a faulty truck.

5.1.2.2 Check how much battery power is left. Follow the Fig.1 to turn on the main power supply by pulling out the emergency button and turn on the key switch on the handle to check the BDI on the instrument panel. If the grid closing to the 0 end lights up for low battery power, the battery needs to be charged. It is strictly forbidden to use the truck once the power is low, otherwise, the battery life would be greatly shortened, even makes the battery damaged.

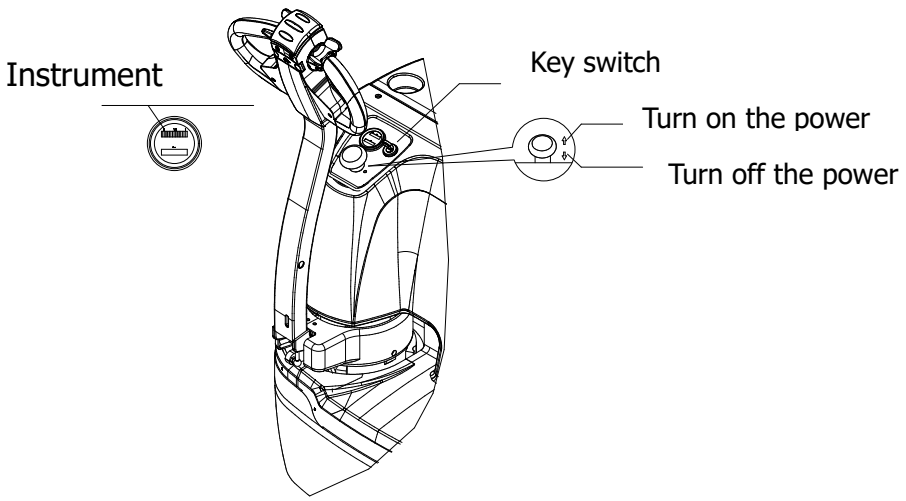


Figure 1

5.1.3 Check whether the braking is normal; Check whether the lifting, lowering, front and rear driving are

normal; Check whether the emergency reverse action is normal. The method is shown in Figure 2:

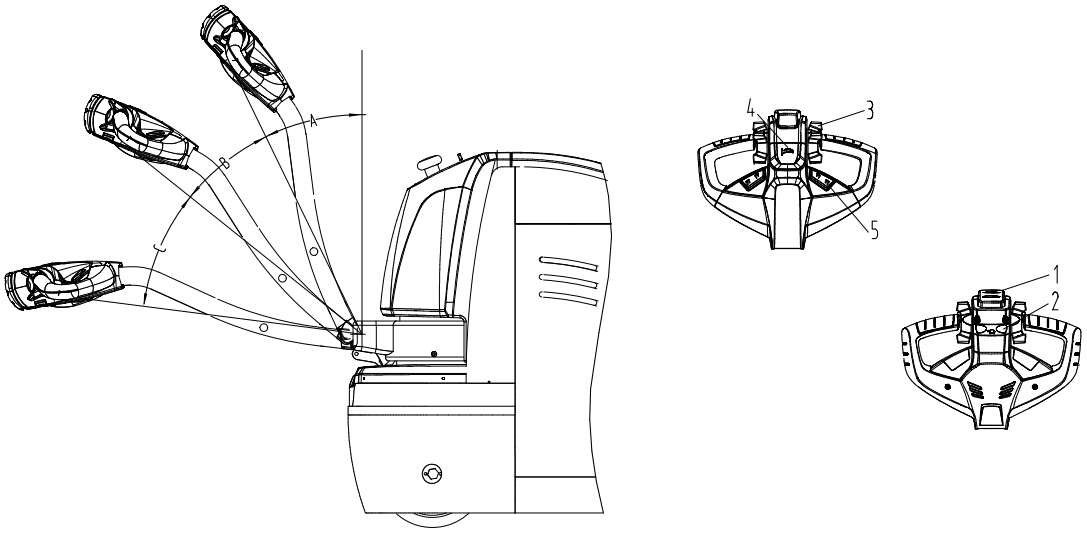


Figure 2

S/N	Part	S/N	name	S/N	Part
1	Emergency reverse button	3	Acceleration button	5	Lifting button
2	Creep speed button	4	Horn button		

Warning

When handling goods, it is strictly prohibited to quickly rotate the accelerator knob to suddenly accelerate and start the truck.

Turn the operating tiller to area A or area C as shown in Figure 2, press the up and down button on the operating tiller to see whether the fork lifting is normal.

Then pull the operating tiller to the position of area B as shown in Figure 2, slowly start the truck, Press the tiller to the horizontal position to see whether the truck can run and brake normally;

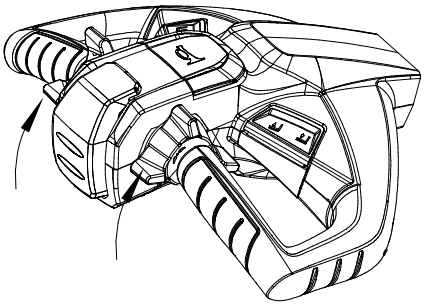
Turn the operating tiller to area B as shown in Figure 2, press the emergency reverse switch button on the top of the operating tiller to see if the truck can travel backward.

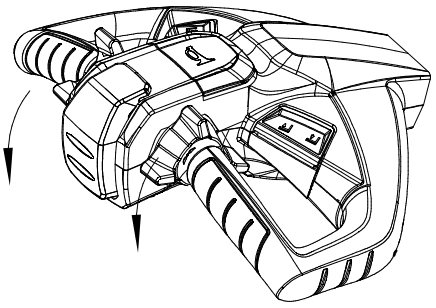
Through the above inspection, if the truck has no fault, the truck can be put into use. If there is a fault, please repair it immediately. It is strictly prohibited to use the faulty truck.

5.2 Operation

5.2.1 Accelerating knob: used to control the driving direction and speed of the truck. When driving

operation is required, first pull the operating tiller to area B as shown in the figure above. When the tiller is in area A or C, the truck is in the state of power-off braking and cannot drive. When the operating tiller is in area B and the accelerator knob is turned in one direction, the truck will drive in that direction and the driving speed will accelerate with the increase of the rotation range of the knob. When turn the accelerator knob in the other direction, the truck will drive in the other direction, and the driving speed will accelerate with the increase of the rotation range of the knob.





Note: the truck is equipped with a paramagnetic brake at the shaft end of the drive wheel motor, and a cam and micro switch are installed on the rotating shaft controlling the rotating arm. When the rotating arm is 45 ° ± 30° (as shown in Figure 2), the stacker can be powered on for operation. If the operating angle is greater than or less, the stacker will be braked and powered off as shown in Figure 2, When the operating tiller is in area A or C, the truck can only lift or lower, not drive; When the operating tiller is in area B, the truck can drive, lift and lower. In the following text description, the working position of the operating tiller will not be specified, that is, the truck handle is in area A or C, the truck cannot run, but can only lift and lower, and the handle must be in area B when the truck is running.

5.2.2 As shown in Figure 3, there is a Creep speed button on the handle. When the Creep speed button is pressed and the acceleration knob is turned, the truck will drive at a slow speed. This state is suitable for turning, stacking and picking up goods in and out of the shelf. When the tortoise speed button is released and the acceleration knob is turned, the truck will drive at normal speed.

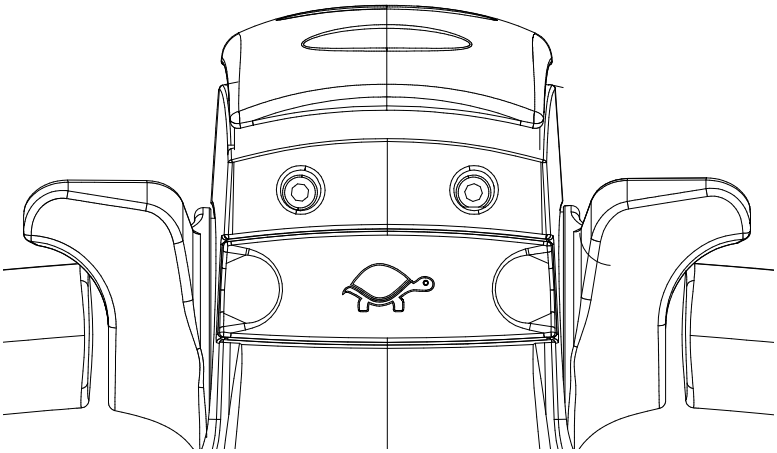


Figure 3

5.2.4 Handling and stacking

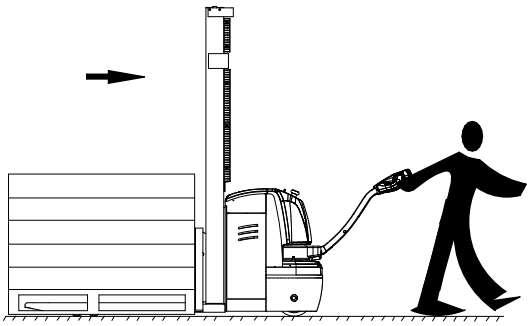
Note

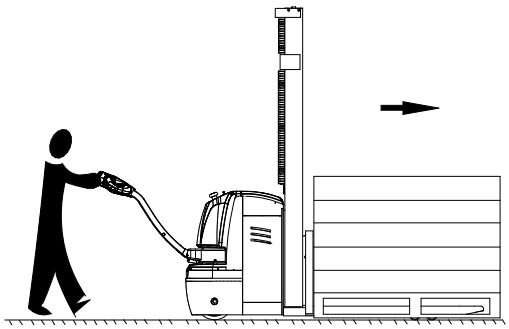
Before operating the truck, check the following items:
Ensure that there is no cargo falling and damaging the cargo in the loading area.
Ensure that no goods or objects interfere with safety.

As illustrated in Figure 1, initiate the process by pulling out the emergency power-off switch to activate the main power supply. Subsequently, turn on the key switch and maneuver the stacker (or truck, depending on context) to a location near the cargo stack, ensuring the fork head is positioned 300 mm away from the stack. Press the lowering button to adjust the fork height to a suitable level, then gently and as deeply as feasible insert the forks into the cargo pallet. Activate the raising button until the forks are elevated to a height of 200–300 mm above the ground. Drive the stacker to the shelving area and gradually come to a stop with the fork head maintained 300 mm from the shelf. Press the raising button once more to elevate the forks to an appropriate height on the shelf, ensuring the pallet bottom is approximately 100 mm above the shelf surface. Carefully position the cargo onto its designated spot on the shelf by gently moving the stacker. Press the lowering button to delicately place the cargo on the shelf and ensure the forks are completely disengaged from the load. Gradually drive the stacker to withdraw the forks from beneath the cargo pallet, keeping the fork head 300 mm away from the shelf. Lower the forks to approximately 300 mm above the ground and then steer the stacker away from the shelf. Throughout the driving process, remain vigilant for obstacles in all directions and reduce speed when executing turns.

When operating a walkie stacker, the driver should position themselves at the front of the stacker, slightly to the side and ahead. Grasp the tiller with one hand, using the thumb to operate the acceleration knob, while keeping a watchful eye on the path ahead to guide the stacker's movement. Alternatively, the

driver may choose to hold the tiller firmly with both hands and push the stacker forward manually.

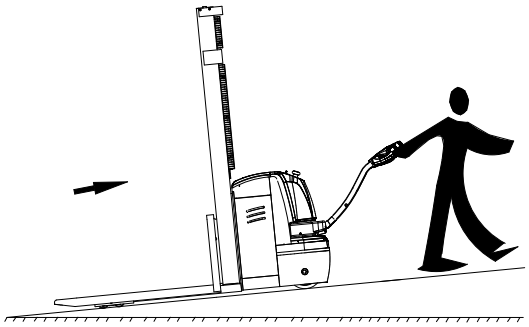


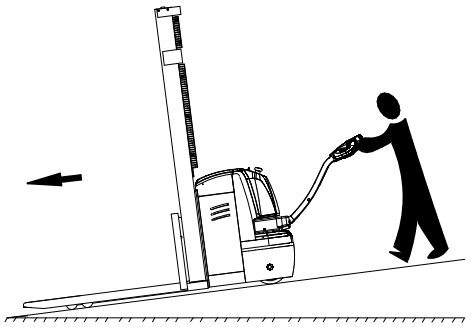


Note

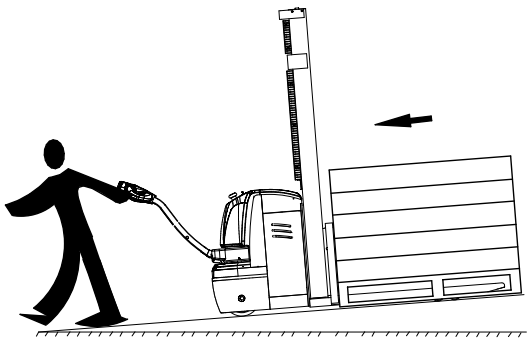
Different from ordinary trucks, the driving mechanism of the truck is installed in the front of the truck. When turning, the front part of the truck swings faster. Therefore, when the front of the truck is close to other objects, be sure to drive slowly or turn to prevent collision.

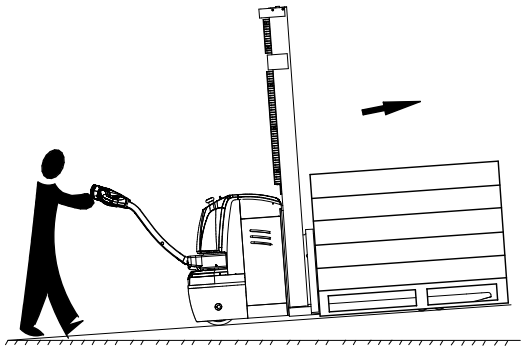
When driving on the ramp, keep the fork in the downhill direction when going up and down the slope without load.





When the load goes up and down the slope, keep the fork in the uphill direction.

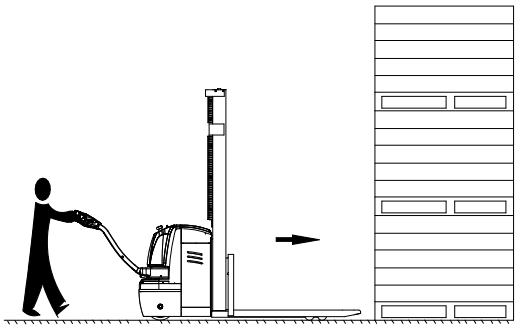




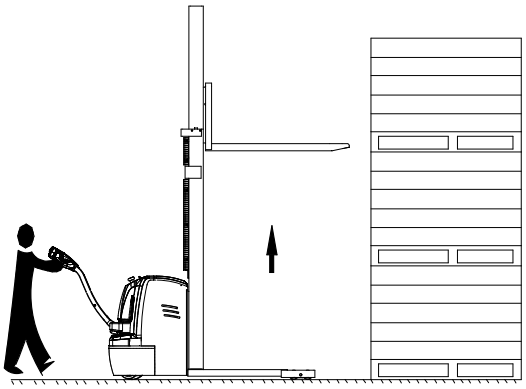
5.2.5 Remove goods from racks

As illustrated in Figure 2 the emergency power-off switch, pull out the emergency power-off switch to energize the main power system. Next, turn on the key switch and maneuver the stacker to a position adjacent to the rack, ensuring the fork head is positioned 300 mm away from the rack. Press the lowering

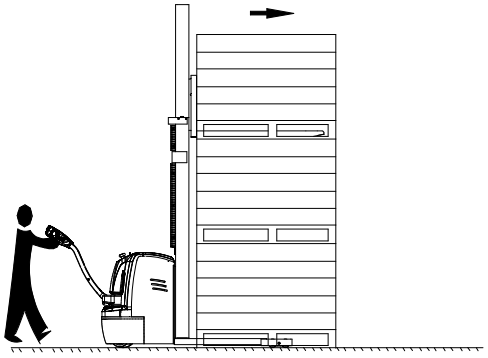
button to adjust the fork height to an appropriate level aligned with the rack. Gently and as deeply as possible insert the forks into the cargo pallet. Press the lifting button to elevate the cargo until the base of the cargo pallet sits approximately 100 mm above the rack surface. Gradually drive the stacker to move the cargo away from the rack (keeping the fork head 300 mm from the rack). Press the lowering button to lower the forks to a height ranging between 200–300 mm above the ground. Steer the stacker away from the rack, and once you have reached the intended spot, bring the stacker to a gradual, complete halt. Press the lowering button again to carefully deposit the cargo, ensuring the forks are fully retracted and clear of the load. Finally, slowly withdraw the forks from beneath the cargo pallet.



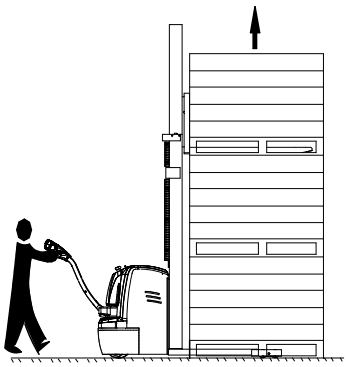
Carefully approach the goods



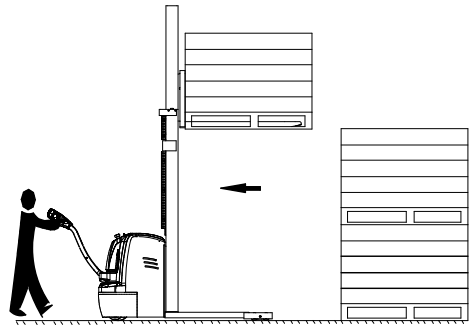
Adjust the fork height and align it with the pallet



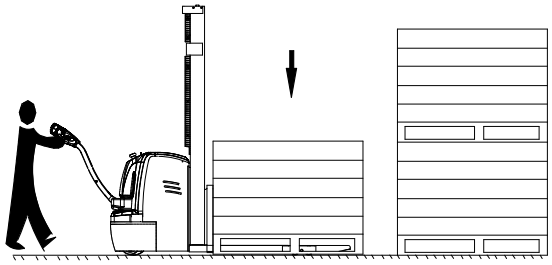
Move forward; make the fork into the pallet as far as possible



Lift the goods, and confirm whether the goods are firm

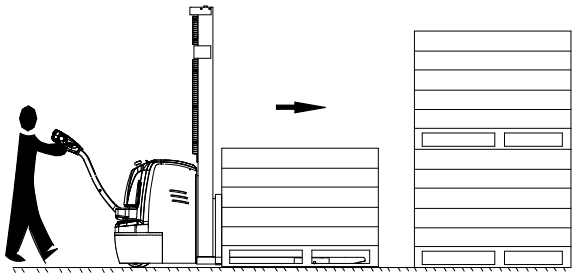


The truck slowly leaves and Unload the goods according to the following steps

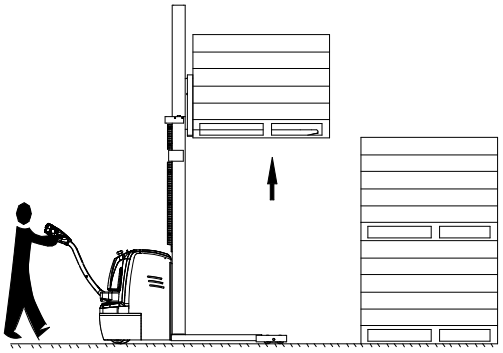


Lowers the cargo to the low position

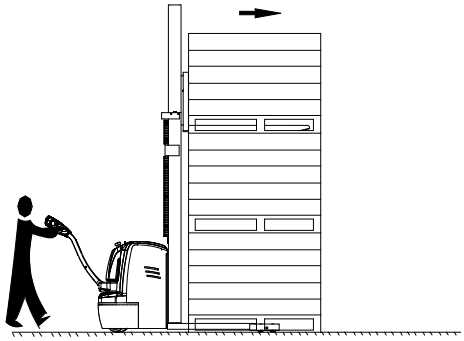
Unload the goods according to the following steps



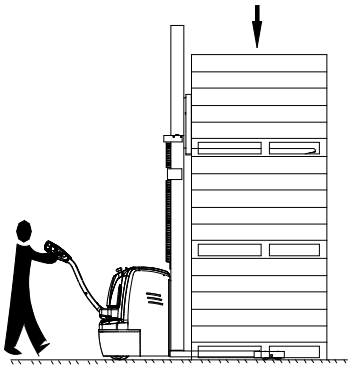
Approach the cargo storage site



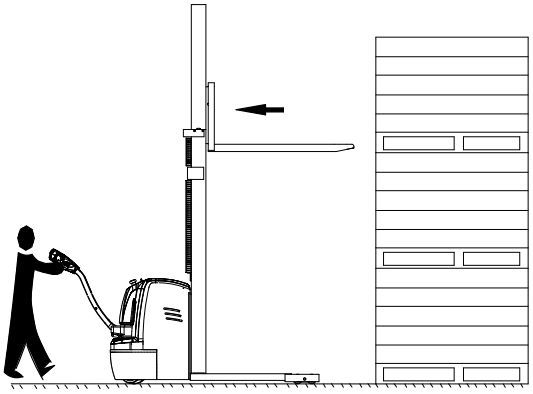
lift the cargo to the correct height



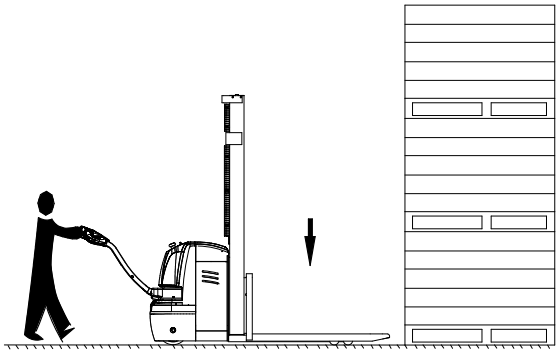
Move forward; place the goods above the unloading position, and then stop.



After confirming that the goods are directly above the unloading, the fork will slowly lower until the fork exits the goods



Retract the truck, withdrawing the fork from the cargo



Lower the fork to the proper position

5.3 Abnormal situations' settlements

5.3.1 When the lifting button is pressed, the fork can lift. When the lifting button is released, the fork is still lifting and is in the state of lifting out of control. At this time, the emergency stop switch should be pressed immediately to cut off the power supply. Move the truck to a safe position, lower the goods manually, and repair the circuit of the truck.

5.3.2 If brake failure is found during use, it must be stopped immediately and the truck shall be overhauled.

5.3.3 When the truck is moving forward, if the operator is pushed onto the wall or other objects, as long as the emergency reverse switch button on the top of the handle is pressed, the truck will automatically travel backward and reverse without causing injury to the operator.

5.4 After operation

After use, park the truck in a fixed parking position and carry out daily maintenance according to the matters specified in Article 7. And charge the truck.

5.4.1 Operating notes after use

Parking: always park the truck at a designated position. Must not leave it parked at a slope.

Before leaving the truck, the operator must:

▲ Lower the fork to the lowerest;

▲ Center the steering wheel;

▲ turn off the key switch.

5.4.2 Cleaning the truck

Note

When cleaning the truck's electrical system, use compressed air instead of water.

5.4.3 Inspection after operation

After completing the work, wipe the dirt on the truck, and check the truck in the following aspects:

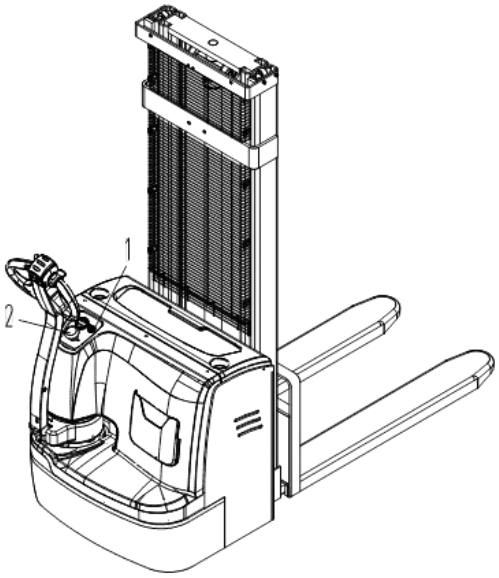
Keep all warning signs, nameplates and other graphic signs of the truck complete and clear. This graphic sign has a certain guiding, reminding and warning effect on the operator.

Whether there is deformation, distortion, damage or fracture.

Add grease as appropriate.

Replace faulty parts.

5.5 Park the stacker safely according to the regulation:



Parking instruction:

▲ the stacker shall be parked at the designated place.

▲ lower the fork to the lowest position.

▲ turn off key switch 1 and remove the key.

▲ press the emergency stop switch 2.

5.6 long term shutdown and storage

5.6.1 Long-term storage

▲ Check the overall condition of the truck, especially whether the wheels are damaged;

▲ Check whether the hydraulic oil and electrolyte leak;

▲ Add lubricating grease;

▲ Check whether the contact surface of the cylinder piston rod is loose and whether the piston rod surface is scratched;

▲ Cover the whole stacker with a cover;

▲ Check the specific gravity and liquid level of electrolyte once a month;

▲ Charge evenly once a month.

5.6.2 Put into operation again after long-term storage

▲ Remove foreign matters and water from the hydraulic oil tank;

▲ Charge the battery, load the stacker and connect the battery lead;

▲ Check carefully before starting, and check the functions of starting, running, deceleration, steering, braking and parking.

6 Battery charging, maintenance, storage and replacement

Charging: the truck is equipped with external chargers, and they can also be equipped with on-board chargers. When charging with an external charger, first open the side door, pull out the charging connector from the truck, insert the charging connector into the connector of the external charger, then insert the fixed charger plug into the AC power supply, and start charging after a few seconds. When charging with the on-board charger, first open the battery box cover, then take out the charging plug (in the battery box cover), insert the charging plug into the AC power supply, and start charging after a few seconds.

6.1 precautions for battery use

6.1.1 No smoking

 	Explosive gas will be generated inside the battery. Smoking, flame and spark will cause battery explosion.

6.1.2 Correct wiring

 	It is strictly prohibited to connect the positive and negative poles of the battery, otherwise spark, combustion or explosion will be caused.

6.1.3 Do not discharge excessively

	——Do not charge the battery until the stacker cannot move, which will shorten the battery life. ——When the double flashing light of the electricity indicator flashes, please charge it immediately.

6.1.4 Check the amount of electrolyte

 	——Do not use the stacker when the electrolyte is lacking. ——Check the electrolyte level once a week. When the electrolyte level is low, add distilLED water to the specified level.

6.2 Battery charging

6.2.1 Charging instruction:

▲ Dive the stacker to the designated charging area And park the stacker safely according to the regulations.

▲ Open the battery box cover 3 and unscrew the fixing screw 2 of the side door 1.

▲ Unplug the battery plug 4 from the stacker socket.

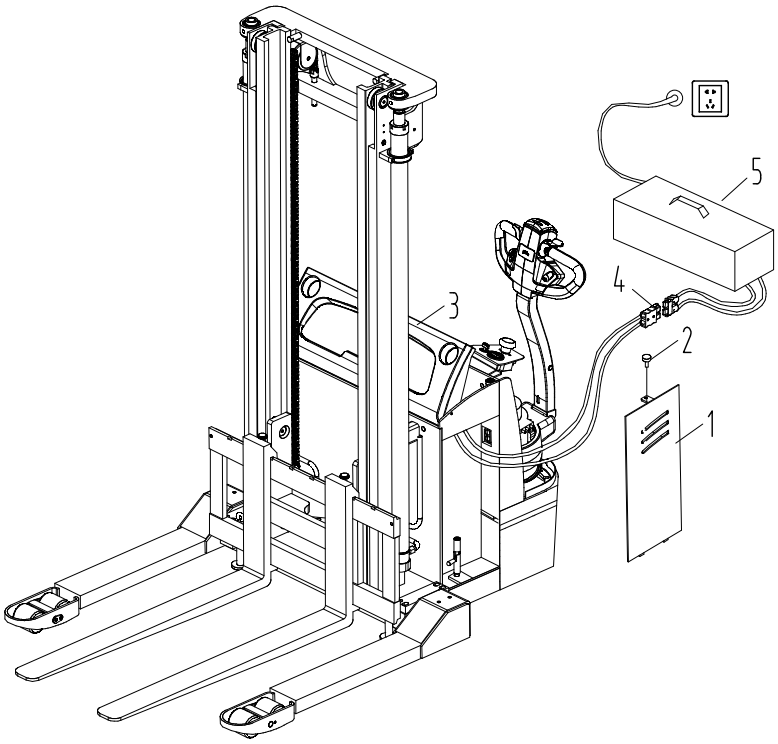
▲ Open the liquid filling cover of each single battery.

▲ Connect the charging plug of the charger to the battery plug.

▲ Start the charging process according to the operating instructions of charger 5.

▲ Start the charging process according to the operating instructions of the charger.

▲ When the battery is fully charged, end the charging process according to the operating instructions.



▲ Unplug the battery plug from the charger.

▲ Close the liquid filling cover of each single battery.

▲ Connect the battery plug with the socket of the stacker and cover the battery box cover.

After charging, the stacker can be put into use.

6.2.2 Charger operation panel description

① Power switch: used to connect or disconnect the power supply of the power grid;

② Information window (LED screen) - display various charging parameters, fault code information, etc.;

③ Information content indicator: when each light is on, the corresponding information window will display the information of the corresponding content.

④ Information key——

a. During the charging process of the charger, the charging voltage, charging time, charging current and charging capacity are displayed automatically in turn. Click the " Information" key to directly switch the display content;

b. Press the "information" key 4S to set the equalizing charging function;

c. Press the "information" key for 10s to set the initial charging function;

d. Press the "information" key for 15s to set the desulfurization charging function;

e. Press the "information" key 6S to cancel the functions of equalizing charging, initial charging and desulfurization charging;

f. Press the "information" key 2s to enter the query interface.

(Note: Clause b.c.d.e is only applicable to ordinary lead-acid batteries)

⑤ Charging operation and status indicator:

a. "ON" indicator light: the light is on, indicating that the charger is charging;

b. "80%" indicator light: the light is on, indicating that the charging capacity of the charger exceeds 80%;

c. "100%" indicator light: the light is on, indicating that the charger is charged; The battery is sufficient;

d. "Equalizing charge" indicator light: the light is on, indicating that the equalizing charge will be carried out this time; The light flashes, indicating that charging is in progress;

e. "Initial charging" indicator light: it lights up together with the working indicator light, indicating that the charger is in the process of initial charging;

f. "Desulfurization" indicator light: the light is on, indicating that the charger is desulfurization charging.

Warning

Please charge in a designated and well-ventilated venue.
The charging place put up a sign "No Fireworks" and prepare fire extinguishing equipment.
Before charging, please check the wires and sockets for damage. Do not charge when the wire or socket is damaged.
Open the battery lid while charging to release explosive gases.
It is forbidden to place metal objects on the battery.
Do not unplug the power switch or battery during charging, otherwise the plug and electrical components will be damaged.

6.3 initial charging

6.3.1 The unused battery shall be initially charged before use, that is, the first charge. Before initial charging, the battery surface shall be wiped clean to check for damage and ensure reliable connection.

6.3.2 Open the filling cap.

6.3.3 Under the condition that the charging equipment can work normally, pour sulfuric acid electrolyte with density of 1.260 ± 0.005 (25 °C) and temperature less than 30 °C into the battery, and the liquid level is 15 ~ 25 (mm) higher than the protective plate. In order to reduce the lifting temperature of electrolyte due to chemical reaction and allow the electrolyte to fully penetrate into the pores of electrode plate and diaphragm, the battery needs to stand for 3 ~ 4 hours, no more than 8 hours. Initial charging can be carried out only when the liquid temperature drops below 35 °C.(cool down in the cold water tank if necessary) when the liquid level drops after standing, make up the electrolyte.

6.3.4 Sulfuric acid electrolyte is prepared from battery sulfuric acid and distilLED water conforming to the national standard Hg / t2692-2015. Do not use industrial sulfuric acid and tap water instead. The standard temperature (25 °C) and density of electrolyte are converted according to the following formula.

$$D_{25}=D_t+0.0007(t-25)$$

Where: D_{25}：: electrolyte density at 25 °C.

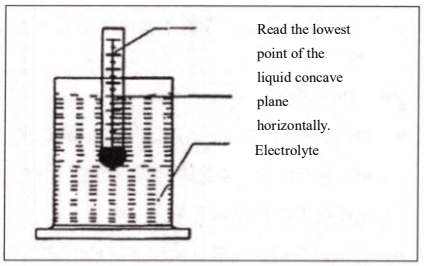
D_t：: measured density of electrolyte at t °C.

t: Electrolyte temperature at density measurement.

6.3.5 Dry the electrolyte splashed on the battery surface, connect the positive and negative terminals of the battery pack with the positive and negative terminals of the DC power supply (charger) respectively, and connect the power supply; First charge with 30A (phase ① current) until the voltage reaches 28.8v (12×2.4V = 28.8v), use 15A current in phase ② to continue charging. During charging, the electrolyte temperature shall not exceed 45 °C, and when it approaches 45 °C, the charging current shall be halved or the charging shall be suspended; Continue charging after the liquid temperature drops below 35 °C.However, the charging time shall be extended appropriately.

6.3.6 Basis for sufficient power: charge at stage ② until the voltage reaches 31.2v (12×2.6V = 31.2v), and the voltage change shall not be greater than 0.005 (V);When the electrolyte density reaches 1.280 ± 0.005 (25 °C) [xb21cn12], there is no obvious change within 2 hours, and there are fine bubbles. When intense bubbles occur, it is considered that the battery is fully charged. The charging capacity is 4 ~ 5 times of the rated capacity, and the charging time is about 70 hours.

6.3.7 In order to accurately control the sulfuric acid content in the electrolyte, the electrolyte density of each battery should be checked at the end of charging; If there is any discrepancy, adjust it with distil LED water or sulfuric acid with density of 1.40, and adjust the electrolyte density and liquid level to the specified value within 2 hours under the charged state.



6.3.8 After initial charging, clean the battery surface and close the liquid filling cover of the flip type liquid hole plug before it can be put into use.

6.4 Use and maintenance

6.4.1 In order to ensure the service life of the battery, all batteries put into use shall be fully charged; do not use a battery that is under charged. Pay close attention to the discharge degree during use, and excessive discharge is strictly prohibited - that is, the voltage is reduced to 1.7V/piece (the total voltage is reduced to 1.7V)×12 = 20.4V), when the electrolyte density drops to 1.17, stop discharging and charge in time; It shall not be put on hold for a long time. This kind of supplementary electricity that needs to be carried out frequently in the process of use is called ordinary charging.

6.4.2 Ordinary charging: the ordinary charging current is 30A in the first stage and 15A in the second stage. The charging method is the same as the initial charging. The charged power is 130 ~ 140% of the discharged power, and the charging time is about 12 hours.

6.4.3 Overcharge shall be avoided for batteries in normal use, but an appropriate amount of overcharge must be carried out for batteries under the following conditions, i.e. balanced charging.

a. "Backward battery" in the battery pack refers to the battery whose voltage value is lower than that of other batteries during charging and discharging and the battery repaired due to fault. (during equalizing charging, the positive and negative terminals of the backward battery shall be connected with the positive and negative terminals of the DC power supply separately)

b. The normally used battery shall be charged evenly every 2 ~ 3 months.

c. Batteries that have not been used for a long time shall be charged evenly before use.

6.4.4 Equalizing charge:

a. Charge at 4A current.

b. The charging voltage reaches 31.2V (12×2.6V = 31.2V), when there are bubbles in the electrohydraulic system, halve the current (i.e. 2A) to continue charging.

c. when it is fully charged, stop charging for 0.5 hours and then charge with 1A current for 1 hour.

d. after stopping charging for another 0.5 hours, charge with 1A current for 1 hour.

e. repeat for several times according to D in article d until there are bubbles in the battery as soon as the charger is switched on.

6.5 safekeeping and storage

The battery shall be placed in a clean, dry and ventilated warehouse at 5 ~ 40 °C, and the effective storage period is two years. During the storage period, it shall be properly kept according to the following requirements.

▲ It shall not be exposed to direct sunlight, and the distance from the heat source shall not be less than 2 m.

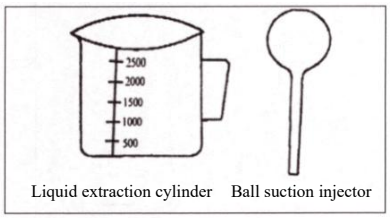
▲ Avoid contact with any harmful substances, and any metal impurities shall not fall into the battery.

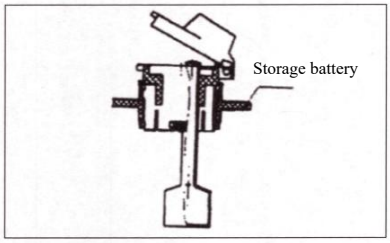
▲ It is not allowed to be upside down, and shall not be impacted or pressed by any machinery.

▲ Charged solution storage is not allowed. When charged solution storage is required under special circumstances, sufficient batteries shall be used to adjust the density and liquid level of electrolyte to the specified value. One month after the expiration of storage, it shall be recharged according to the ordinary charging method.

6.6 Operation of electrolyte

▲ Check the specific gravity. Use a suction hydrometer to check the specific gravity. Do not spill electrolyte during operation, and wear protective equipment.





▲For operations other than inspection, consult professional personnel, especially when replenishing electrolyte (dilute sulfuric acid).

▲ Electrolyte leakage: if electrolyte leakage is caused by battery overturning and damage, emergency treatment shall be carried out immediately (refer to emergency treatment).

6.7 operation of end-of-life battery

▲ Operation of end-of-life battery when the battery is close to the end of its life, the electrolyte in a single cell decreases very quickly, and distilled water shall be supplemented every day.

▲ Disposal of waste batteries

For waste batteries, extract the electrolyte and decompose the batteries.

It can be discussed whether the battery is recycled by the battery manufacturer.

When dealing with waste electrolyte or cleaning water containing electrolyte components, pay attention to the provisions of work protection, accident prevention regulations and water waste repair regulations.

6.8 emergency treatment

	▲ Electrolyte splashes on the skin. Wash with plenty of water. ▲ Electrolyte splashes on eyes. Wash with plenty of water and receive treatment from a professional doctor. ▲ Electrolyte splashes on clothes. Take off clothes immediately, rinse with water and then rinse with weak alkaline soap. ▲ Electrolyte leakage. When the electrolyte leaks to the outside, neutralize it immediately with lime, strong carbonated soda or carbonated soda, and wash it with a large amount of water.

6.9 Charger

if the charger is a self-equipped fully automatic charger, it must meet the following two requirements:

a. Output voltage: 24V

b. Output current: 30A

If the charger is semi-automatic or manually adjustable, please charge the battery pack according to the requirements in 6.2.

6.10 requirements for use of secondary on-board lithium battery system

This requirement is applicable to the use, maintenance and any operation of lithium battery system (hereinafter referred to as Li-ion battery) of electric storage and logistics trucks produced by the company.

6.10.1 Operator requirements

▲ Relevant personnel for the use and maintenance of lithium batteries of electric storage and logistics trucks and any operation on lithium batteries (hereinafter referred to as operators).

▲ Operators must receive relevant professional training, understand certain lithium battery application knowledge, and obtain certification permission from relevant departments before operating lithium batteries.

6.10.2 Safety code

▲ The following signs may be seen on the lithium battery box or the truck manual, which are for the safety of operators and lithium battery use and must be observed.

	High voltage Warning: This sign is used to indicate that there is a risk of electric shock. All electrical work on the equipment can only be performed by qualified professionals. Unauthorized disassembly is strictly prohibited.

	Caution corrosion: This sign indicates that the product shall be protected when there is an unsafe factor in the production environment.

	Rainproof and moisture-proof: This sign indicates that the product should be protected from rain, water and moisture.

	No fireworks: This sign indicates that fireworks are strictly prohibited in the nearby area when the product is used.

	No trampling: This sign indicates that the surface of the product cannot be trampLED.

▲ The use of lithium battery trucks shall comply with the requirements of temperature, humidity and environment specified in the truck manual. During maintenance and disassembly of lithium batteries, foreign matters, especially metal tools, shall not be placed in the box, and there must be no sundries and blockage in the air duct.

▲ The operator is forbidden to short-circuit the lithium battery, otherwise the system will be seriously damaged and personal safety will be injured.

▲ Lithium battery shall be kept away from heat source and fire source to avoid direct sunlight for a long time; It is forbidden to place the lithium battery in liquid (such as water, solvent) or high humidity environment to avoid damage to the lithium battery due to leakage or short circuit.

▲ The installation, commissioning and maintenance of lithium battery in rainy and snowy weather

must be carried out indoors to prevent short circuit caused by rainwater entering the lithium battery system.

▲ Since there is a communication protocol between the management of lithium batteries and trucks, it is forbidden to exchange lithium batteries with the same voltage and capacity on different trucks without the permission of the host manufacturer.

▲ It is forbidden to overlap lithium batteries with other types of batteries in the same truck for mixed use. For trucks with quick replacement of spare lithium batteries, it is necessary to confirm that they are of the same type and group type. After confirmation, the truck can be started after installation.

▲ Transport and handle the lithium battery box in strict accordance with the regulations. It is strictly prohibited to drag, pry, kick and other illegal operations, resulting in mechanical impact such as lithium battery falling, impact and extrusion. It is strictly prohibited to stack, invert and side place the lithium battery box naked.

▲ Whether charging or discharging, it shall be carried out under the correct connection and normal operation of the lithium battery management system to ensure the normal communication between the lithium battery management system and the whole truck system.

▲ It is forbidden to contact and mix the lithium battery with articles that can cause short circuit; It is forbidden to collide the lithium battery with sharp objects or wear clothes with exposed metal or metal ornaments to contact the lithium battery.

▲ Periodically check the lithium battery information displayed on the truck instrument. If there is a problem with the displayed information, do not open and operate the battery box by yourself, and immediately contact relevant technicians for further guidance.

▲ Disassembly, damage and installation of lithium battery components are strictly prohibited. It is forbidden to dissect the lithium battery or lithium battery pack without authorization to avoid danger. On professionals are prohibited to replace the data transmission interface and voltage acquisition interface of the lithium battery pack management system to avoid short circuit, damage to system components and even fire. Safety Warning signs shall be strictly observed to avoid safety accidents.

▲ if any of the following situations or any concerns about the safety of the product are found, shut down the truck first, take measures such as disconnecting the power supply to ensure the safety of personnel and trucks, and immediately contact relevant personnel for further guidance, which is divided into two parts:

▲ Contact relevant personnel for emergency repair. For example, there are signs of overheating,

smoke and sparks; Battery pack damage (such as rupture) and battery leakage; Water enters the battery system box and power line.

▲ Generally, contact relevant personnel for maintenance. For example, the power cord, plug, extension cord and protector are broken or damaged; When operating according to the operating instructions, the product cannot operate normally and other situations that do not involve personal and truck safety.

6.10.4 Discharge requirements of Li-ion battery

▲ The discharge temperature range of truck Li-ion battery is: - 20 ~ 60 ℃

▲ When the instrument displays Li-ion battery failure during truck startup or operation, it is necessary to query the cause of the failure according to the display code and the attached table of the truck manual, and timely notify the technicians for treatment.

▲ Ensure that the Li-ion battery has a charge of no less than 50% before truck maintenance and repair.

▲ In order to prevent damage to Li-ion battery due to over discharge of Li-ion battery, when the instrument displays low load alarm during truck operation, it shall be charged in time.

6.10.5 requirements for transportation, loading and unloading of Li-ion battery

▲ There must be an outer packing box for Li-ion battery transportation, and the outer packing box shall be firm and reliable.

▲ The outer packing box of Li-ion battery shall be provided with transportation signs such as fear of moisture, moisture, upward, handle with care, etc. When placing the Li-ion battery box, the front side of the mark on the outer packing box shall face up to avoid damage to the internal battery.

▲ In case of dislocation, extrusion and damage of Li-ion battery during transportation, check whether the exposed harness and connector are intact and whether the Li-ion battery is damaged and deformed. In case of smoke and ignition, stay away from the site immediately and notify professional technicians.

6.10.6 Storage requirements of Li-ion battery

▲ Lithium batteries shall be stored in a clean and ventilated room with an ambient temperature of -10 ℃ ~ 35 ℃ (recommended storage temperature: 0 ℃ ~ 25 ℃).The long-term battery (more than 3 months) must be placed in an environment with a temperature of 25 ± 3 ℃ and a relative humidity of 65 ± 20%.

▲ Avoid the Li-ion battery from contacting with corrosive chemicals or gases to prevent the Li-ion

battery or its connector from being corroded and affecting the appearance and service life of the Li-ion battery.

▲ At the same time, keep away from fire and heat sources, and do a good job in moisture and moisture prevention.

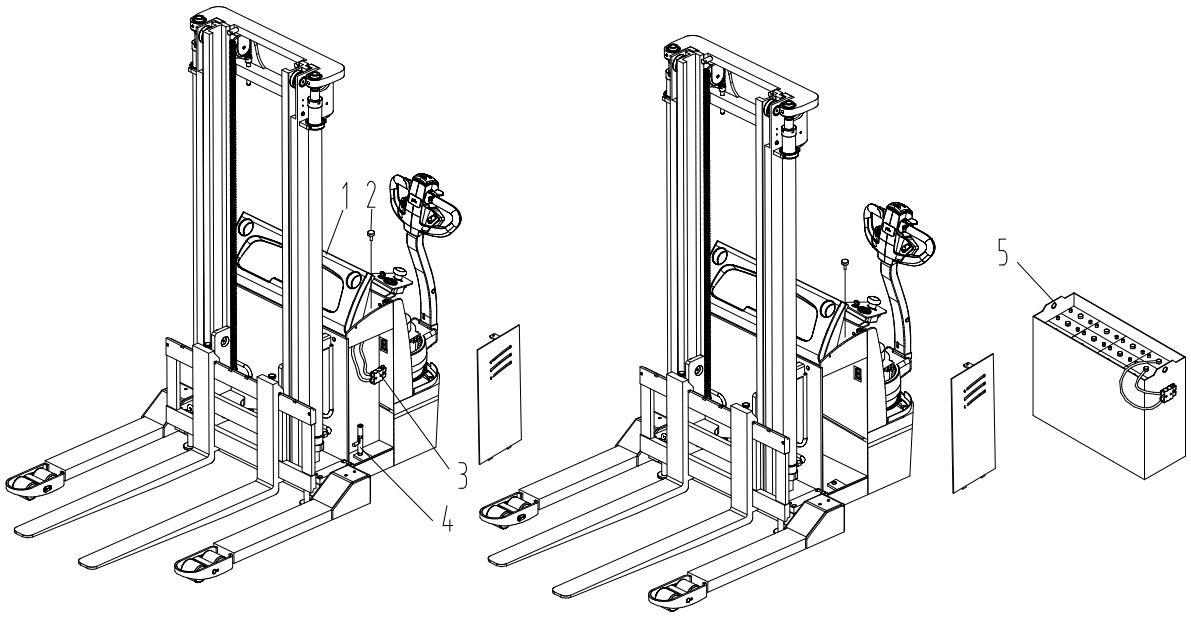
▲ Insulation, waterproof and dustproof treatment shall be done well during storage. Ensure that the protective cover plate above the Li-ion battery box is installed firmly without defects such as damage and damage. If there is no sealing upper cover, the Li-ion battery box bowl shall be covered with insulating material and sealed.

▲ During the storage of Li-ion battery, the charge shall be kept above 30%. In order to prevent the occurrence of over discharge during long-term storage (more than three months), the Li-ion battery must be charged regularly to ensure that the charge is 50% ~ 80%.

▲ When the truck is parked for a long time, it is necessary to conduct a charge inspection once a month. After each inspection, it is necessary to ensure that the charge is between 50% ~ 80%. If it is insufficient, it shall be charged to the required range.

▲ Lithium batteries that have been put aside for a long time need to be charged and discharged regularly, and the standard charge and discharge cycle shall be carried out once a month.

6.11 Battery replacement



The steps to replace the battery are as follows:

① Open the battery box cover 1, remove the side door fixing screw 2, open and remove the side door;

② Unplug the battery connector 3 from the truck body;

③ Pull out the latch 4 on the battery box upward to release the battery;

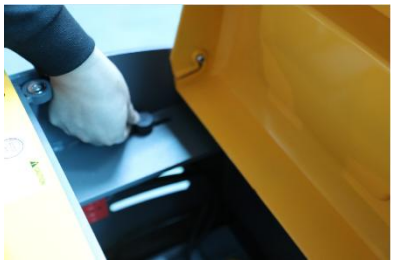
④ Pull out the battery from the side and remove it by special trolley or hoisting

⑤ The method of installing the battery pack is the reverse of the above steps.

Note

The battery must be handled with care when lifting or handling, otherwise it may damage the battery or cause personal injury.

Battery replacement diagram

		
① Open the battery box cover	② Remove fixing screws of side door	③ Unplug the battery connector

		
④ Pull out the latch on the battery box	⑤ Pull out the battery from the side	

Warning

Be careful when lifting or handling the battery, otherwise it may damage the battery or cause personal injury.

Ensure that the lifting capacity of the crane is greater than that of the battery.

The disposal of waste batteries must comply with local environmental regulations.

Before replacing the battery, confirm the voltage, capacity, size and weight of the new battery. Ensure that the specification, size and weight of the battery are consistent with the original battery.

Product maintenance

C

This chapater shows how to conduct maintenance

C Product maintenance

7 Daily maintenance:

A comprehensive inspection of the truck can avoid failure and failure to reach its due service life.The hours listed in the maintenance procedure are based on the truck working 8 hours a day and 200 hours a month. In order to operate safely, the truck should be maintained according to the maintenance procedure.

Note

All maintenance work shall be carried out by professionals.

If need to adjust or replace parts, please contact our after-sales department.

7.1 Precautions for maintenance:

Note

The pure parts of our company shall be used for replacement. All parts on the truck must be replaced with parts with the same safety requirements as the original design.
Use the lubricating oil and hydraulic oil recommended by our company

▲ Place for maintenance:

Note

It shall be a designated place, and other lifting and other service institutions and safety protection facilities can be provided.
·The site shall be flat ground.
·The place shall be well ventilated.
·The place shall be equipped with fire extinguishing devices.

▲ Precautions before maintenance:

Note

No Smoking.
Well protect the operator himself over maintenance.
Wipe off the oil in time.
When adding lubricating oil, clean the original dirty oil or dust on the joint with a brush or cloth.
Except in some cases, turn off the key switch and unplug the power socket.
When maintaining the truck, the fork shall be kept to the minimum.
When removing the high-pressure oil pipe, ensure that there are no goods on the truck, and lower the fork to the lowest position to release the pressure in the hydraulic system.
When contacting the main line terminal, please discharge the circuit in advance. There are capacitors in the circuit, and there may be a small amount of electric energy.
Clean the electrical part with compressed air. It is strictly prohibited to wash with water.

7.2 Inspection and maintenance of new trucks before use

In order to comply with relevant industry regulations and ensure the absolute safety of the truck during transportation, the newly delivered truck may not have electrolyte inside the battery before being

used for the first time (except for those sold in the mainland).

When the truck leaves the factory, it is equipped with prepared battery electrolyte. Before the first use, professional personnel shall fill the battery electrolyte into the battery. First, place the truck in a well ventilated place, open the battery box cover, and lift all the plastic covers on the top of the battery. Lift the plastic pot containing battery electrolyte with a plastic funnel and slowly pour the electrolyte into the battery until the liquid level can be seen. After all batteries are fully charged, the batteries shall be initially charged in time according to the operation requirements of 6.3.

7.3 daily inspection

▲ Check the hydraulic oil level:

▲ Lower the fork to the lowest position, and the refueling volume is 12L.The recommended brand of hydraulic oil shall be selected.

▲ Check the battery power;

▲ See use and maintenance of battery.

7.4 check as needed

▲ Clean the truck

▲ Check and tighten all fasteners

▲ Check the wheel damage

7.5 inspection and maintenance after 50 hours (weekly)

Braking system	1	Pull the handle to switch between Area A and area B, and the brake makes a click sound.
	2	Clean the oil and dust on the steering gear.
	3	The brake clearance shall be maintained at 0.2-0.5mm.
Electrolyte capacity	4	Check the electrolyte level. If the liquid level is too low, it can be supplemented with pure water.
Specific gravity of electrolyte	5	The specific gravity tested after charging shall be 1.28g/ml.
Clean the battery	6	Cover and rinse with tap water.
Check the contactor	7	Polish the rough surface of the contact with sandpaper.

7.6 200-hour inspection and maintenance (1 month)

In addition to weekly maintenance, the following maintenance shall be carried out:

Through inspection, please contact the maintenance personnel of our company when it is

determined that adjustment and replacement are needed. (monthly maintenance records must be kept)

	S/N	Checkpoint	Inspection content
Complete truck	1	General situation	Is there any abnormality
	2	horn	voice
steering system, braking system, Hydraulic system, Lifting system	3	Handle	Pull the handle of the operating rudder handle to switch between Area A and area B, and the brake makes a click sound.
	4	brake clearance	The brake clearance should be maintained at 0.2-0.8mm.
	5	Handle	Tightness and flexibility of rotation.
	6	Frame, fasteners	Function, cracks, lubrication and looseness of fasteners.
	7	Connecting rod wheel frame	Function, whether there are cracks, bending deformation and lubrication.
	8	Tubing	Check whether the oil pipe leaks oil.
	9	Hydraulic oil	The appropriate amount of oil.
	10	Lifting cylinder	Whether there is oil leakage.
Battery Charger Electrical system	11	electrolyte	Liquid level, specific gravity, cleanliness
	12	Plug	Function, check for damage
	13	Key switch	function
	14	Contactor	Contact and function
	15	The micro switch	function
	16	controller	function
	17	Drive motor	Wear of carbon brush and commutator
	18	Lifting motor	Wear of carbon brush and commutator
	19	Steering motor	Wear of carbon brush and commutator.
	20	Fuse	Is it intact
	21	Harness and terminal block	Loose and damaged

See9.5.4 for brake clearance adjustment method

7.7 600 hours of maintenance (three months)

During the maintenance every three months, repeat the monthly maintenance process. If the parts must be adjusted and replaced, please contact the maintenance personnel of our company.

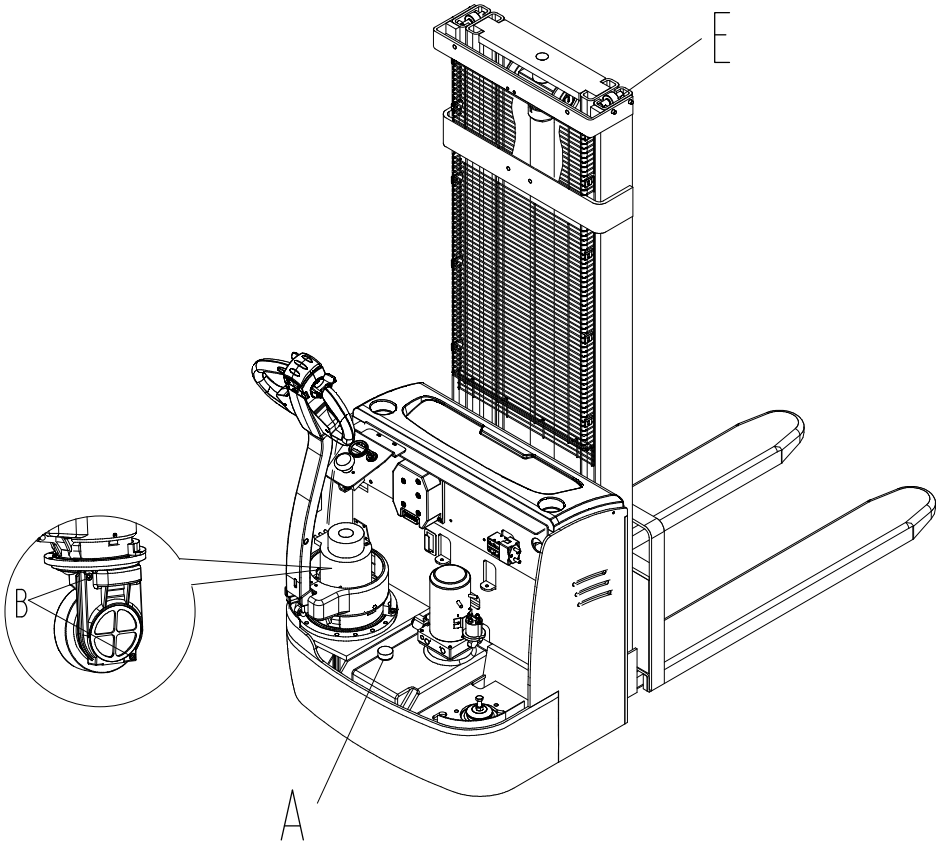
Contactor	Grind the uneven contact of the contactor with sandpaper
	When the function is not good, replace it according to the situation
Electric machinery	Wear of carbon brush and commutator.
Brake	Clean the dirt and dust on the brake friction plate and check the wear of the friction plate

7.8 1200 hours of maintenance (half a year)

During the semi annual maintenance, repeat the maintenance process for three months. If the parts must be adjusted and replaced, please contact the maintenance personnel of our company.

Contactor	Grind the uneven contact of the contactor with sandpaper
	When the function is not good, replace it according to the situation
Electric machinery	Wear of carbon brush and commutator.
Reduction gearbox	Change gear oil
Oil filter	clean
Brake	Clean the dirt and dust on the brake friction plate and check the wear of the friction plate
Hydraulic system	Replace the hydraulic oil, check the lifting cylinder for leakage, and replace the seal if necessary
Fork wheel and fork wheel bearing	Check the wear and replace it according to the situation if the function is not good

7.9 Working medium recommendation



▲ Hydraulic oil;

a. Under normal load, it is recommended to use:

Hydraulic oil: LHPISOVG46, conforming to DIN51524T. 2 standards, with an average continuous temperature of 40-60 ℃.

b. In case of heavy load, it is recommended to use:

Hydraulic oil: LHPISOVG68, conforming to DIN51524T. 2 standards, with an average continuous temperature of more than 60 ℃.

c. For low temperature and light load, it is recommended to use:

Hydraulic oil: HLPISOVG32, conforming to din51524T. 2 standards, with average continuous temperature below 60 ℃.

d. Hydraulic oil conforming to DIN51524T. 2 standards: HLPISOVG 46 can be used under all the above working conditions Instead, this lubricating oil has a high viscosity. (mostly used for hydraulic oil).

When it is difficult to purchase hydraulic oil, SAE20W / 20 engine oil can be used to replace HLP 68 hydraulic oil

Diagram

①-Add hydraulic oil

Gearbox oil drain

Gearbox oil filler

②. Add gear oil: hyperbolic gear oil 85W-90 (GL-5)

▲ Lubricating grease: No. 3 lithium grease

All kinds of waste hydraulic oil, gear oil and grease will pollute the environment. Please recycle the replaced working medium or dispose of it according to relevant local regulations.

7.10 Maintenance cycle of wearing parts:

Item	Maintenance contents	Maintenance cycle	remarks
Fork wheel bearing	Replace	1200 hours	
Fork wheel	Replace	1200 hours	
Sealing element	Replace	1200 hours	Replace at any time in case of damage
transmission case	Replace the lubricating oil	1000 hours	
Hydraulic oil	Replace	1000 hours	
High pressure oil pipe	Replace	2000 hours	Replace at any time in case of damage
Hydraulic tank screen	Clean	1000 hours	
Drive motor	Check carbon brushes and bearings	1000 hours	
Oil pump motor	Check carbon brushes and bearings	1000 hours	

8 Storage, transportation, loading and unloading:

8.1 storage of truck:

If the truck has been out of use for more than 2 months, the truck shall be parked in a well ventilated, frost free, clean and dry room, and the following measures shall be taken.

▲ Clean the truck thoroughly.

▲ Lift the fork several times and check whether it is normal.

▲ Lower the fork to the minimum.

▲ Support the driver's end of the truck with a wooden square to make the driving wheel of the truck off the ground.

▲ Apply a thin layer of oil or grease on the surface of all exposed mechanical parts.

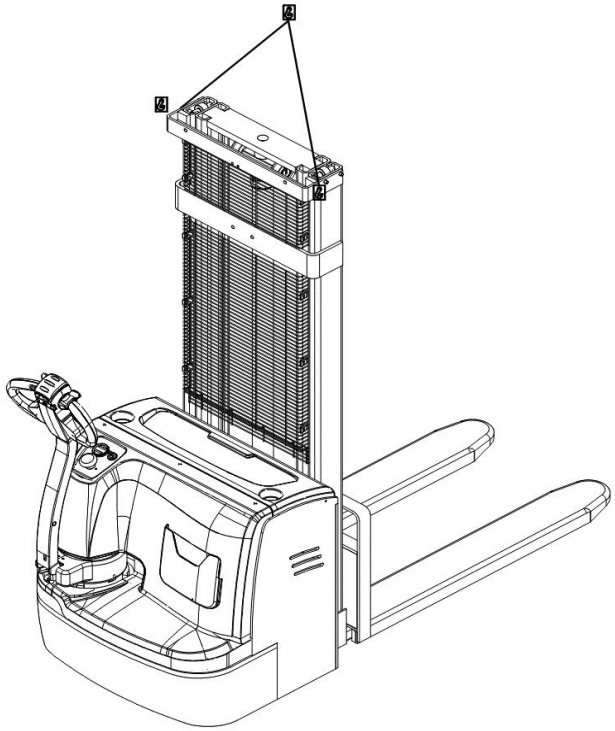
▲ Lubricate the truck.

▲ Check the condition and electrolyte of the battery, and apply nonacid grease on the battery terminal.

▲ Spray all electrical contacts with appropriate contact spray.

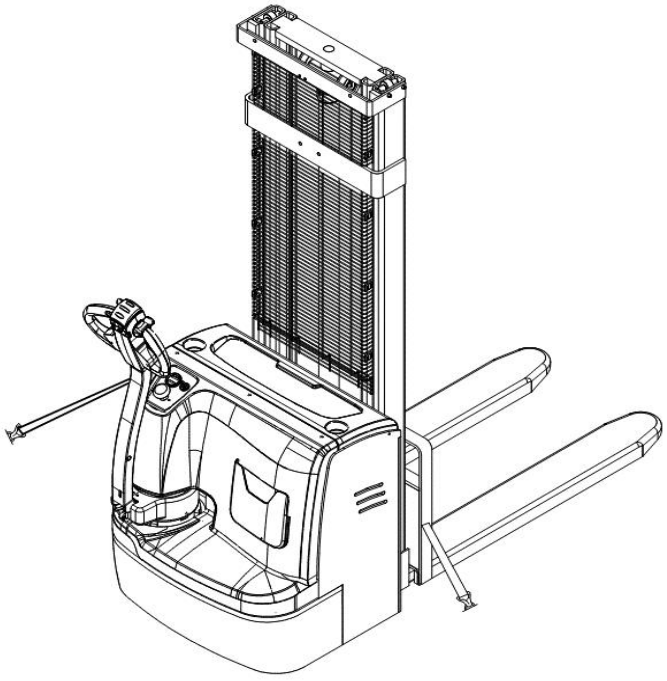
8.2 Transportation:

If the truck is to be transported for a long distance, support the drive's end of the truck with a wooden square to make the driving wheel of the truck separate from the ground, fix the two front wheels firmly with wedge-shaped wood blocks, and tie the truck with a rope.



8.3 loading and unloading of trucks:

Before loading and unloading the truck, please check the total weight of the truck marked on the nameplate of the truck and select appropriate lifting and loading equipment. The lifting of the truck shall be kept horizontal. When landing, it shall be ensured to land slowly. The surrounding personnel shall pay attention to safety and one person shall command. If the truck is used for loading and unloading, please first observe the condition of the bottom of the loaded and unloaded truck. Please operate carefully when the fork is inserted into the bottom of the truck to prevent the fork from damaging the driving wheel, balance wheel and front wheel of the truck.



8.4 How to move a damaged truck

The brake of the truck is normally closed, so when the stacker fails or is damaged and cannot move, it is not allowed to drag the stacker directly on the ground, and the damaged stacker shall be transported away with appropriate transportation tools.

Product schematic diagram D

This chapter will explain the product structure and principle

D Product schematic diagram

9 Drive unit (see 2 Structure introduction)

9.1 Structure and principle of driving unit

The LDL 250r vertical driving wheel structure is composed of a pair of cylindrical gears and a pair of bevel gears to form a two-stage reduction drive to drive the wheels to rotate and drive the truck. The driving direction of the truck is changed by changing the rotation direction of the driving motor, so that the truck can move forward or backward. When the driving wheel turns, the outer ring of the turntable assembly is fixed and does not rotate with the wheel, and the motor rotates left and right with the wheel movement, so as to realize the left and right turning of the truck. This series of drive wheels is easy to use and maintain (see Figure 9-1).

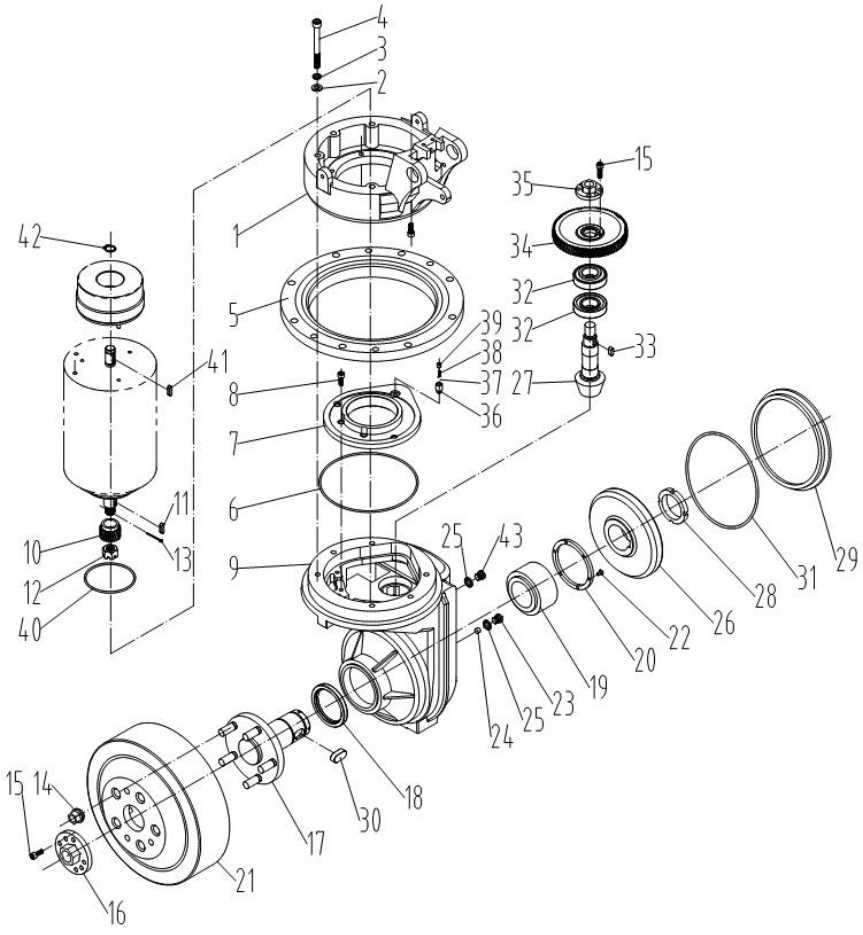
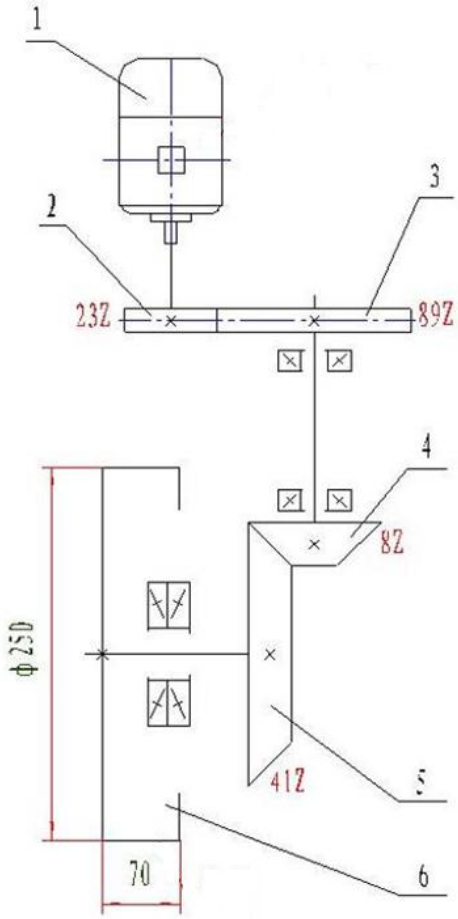


Figure 9-1 Structure of driving unit

S/N	Part	S/N	Part	S/N	Part	S/N	Part	S/N	Part
1	Mounting seat	2	Washer	3	Washer	4	Screw M8x80	5	turntable assembly
6	O-ring 150x2.65	7	Sealing cover	8	Screw M6x16	9	Gear box	10	gear
11	Flat key A-5x5x15	12	Nut	13	Pin 2.5x25	14	Nut	15	Screw M6x20
16	Bolt	17	Axle assembly	18	Sealing ring TC 55x72x8	19	Bearing 352009	20	Washer
21	wheel	22	Screw M4x12	23	Screw plug	24	Magnetic steel	25	Combination washer 10
26	Driven gear	27	Driving bevel gear	28	Round nut	29	Gearbox cover	30	Flat key A-14x9x22
31	Screw plug	32	O-ring 150x3.55	33	Bearing 30205-p5	34	Flat key A-6x6x14	35	gear
36	Screw plug	37	Steel ball	38	Compression spring	39	Screw plug	40	O-ring 75x2.65
41	Flat key type A 5x5x18	41	Retaining ring 15						

The transmission diagram of the reducer is shown in the figure below. The pinion 2 is connected with the motor 1 through the flat key, and the motor drives the reducer. Power transmission sequence: Part 1 → Part 2 → Part 3 → Part 4 → Part 5 → Part 6



S/N	Part	S/N	Part	S/N	Part
1	Drive motor	2	Small gear	3	Gear wheel
4	Driving bevel gear	5	Driven bevel gear	6	Wheel

Drive wheel parameters

Model		LDL250R
Rated power of matching motor (kw)		1.2/1.5(AC)
Rated speed of matching motor		2600
First stage deceleration	Reduction gear	Cylindrical helical gear
	Reduction ratio	3.87
Second stage deceleration	Reduction gear	Spiral bevel gear
	Reduction ratio	5.125
Total transmission ratio		19.83
Lubricating oil	Model and brand	GL-5 85W / 90 heavy duty gear oil / 18# hyperbolic gear oil
	Oil amount L	1.7

9.2 Remove the drive unit from the truck

▲ Park the truck on a flat ground, lower the fork to the bottom, and turn off the key switch. Press the emergency stop switch and unplug the battery.

▲ Remove the housing.

▲Remove the motor power line and signal line, and unplug the brake connecting plug.

▲ Use an Hexagon wrench to remove the screw fixing the drive unit.

▲ Remove the fixing screws with the brake.

▲ Fix the special tool lifting earrings on the threaded holes of the motor and take out the drive unit.

▲ The installation sequence is opposite to the disassembly direction.

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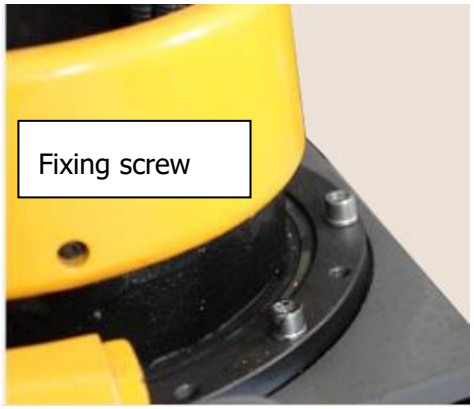
<tr><td colspan="2">Diagram</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>① Remove the housing</td><td>② Remove the fixing screws of the drive unit</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>③ Remove the brake</td><td>④ Rotate a certain angle and lift the drive wheel with a tool</td></tr>
</table>

9.3 Precautions for installation and use

▲ During installation, clean the oil seal on the surface of the product. Avoid damaging the product, and do not disassemble or decompose the product at will.

▲ All mounting surfaces and exposed gears shall be protected from knocking to avoid affecting installation and use.

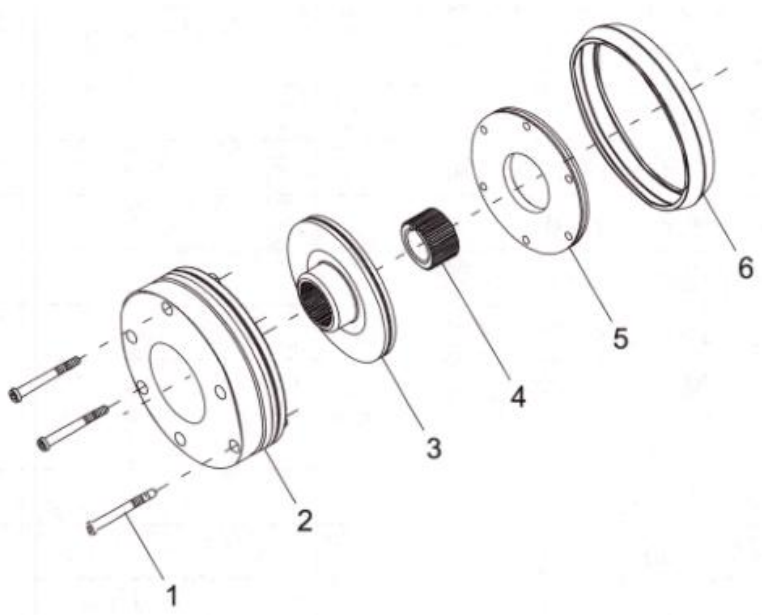
▲ Normal operating oil temperature ≤ 70 ℃.

9.4 Fault and troubleshooting

Fault phenomenon	Possible causes	measures
Abnormal noise of gears during driving	Excessive gear clearance	adjustment
	Lack of grease	supplement
	Excessive gear wear	replace
Abnormal noise during steering	The bearing of rotary table assembly is damaged	replace
	Insufficient lubrication of rotary table assembly bearing	Replenish grease
Brake failure or failure	Loose or damaged micro switch	Tighten or replace
	Excessive brake clearance	adjustment
	Excessive brake disc wear	replace
	Brake looseness	Fastening
	Line damage	repair

9.5 Electric magnetic brake

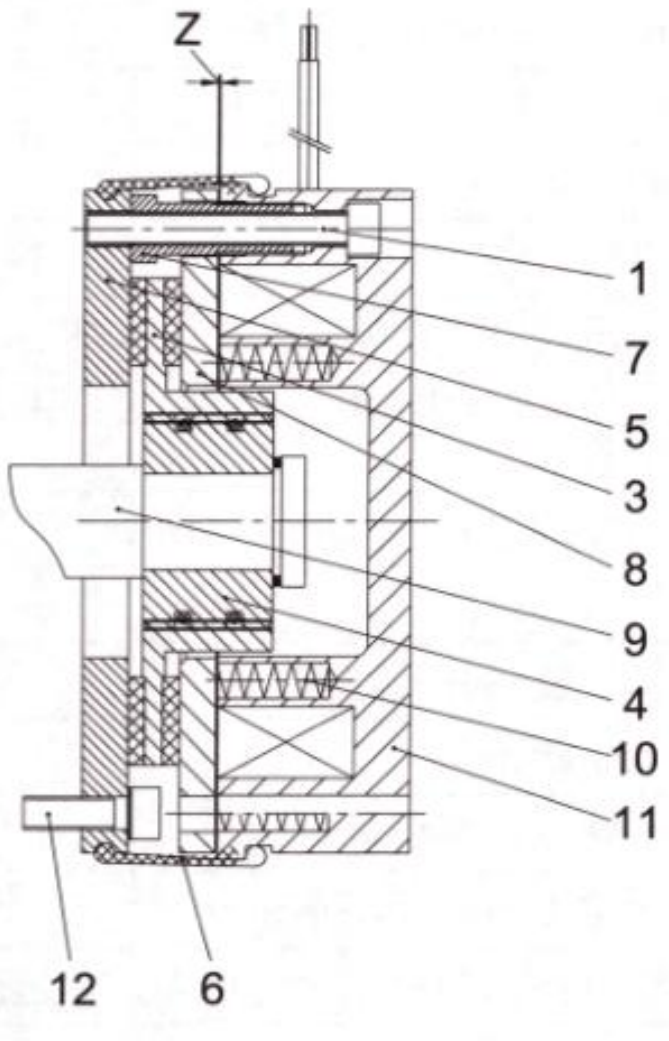
The truck applies a spring loaded EM brake, which is a single disc with double frictions. Compression spring generates great braking torque when power is off, achieving electric magnetic effect, releasing the brake.



S/N	Part	S/N	Part	S/N	Part
1	Brake mounting screw	2	Stator assembly	3	Friction brake pad
4	Axle sleeve	5	Friction disc	6	Dust cover

9.5.1 Working principle

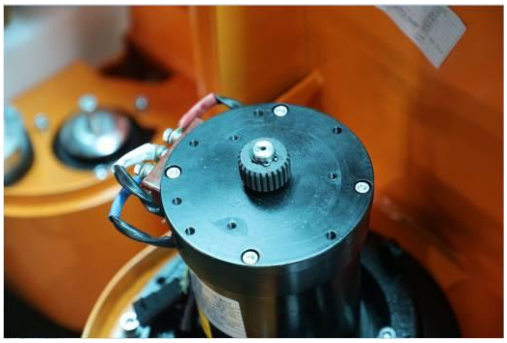
The motor shaft (9) is connected with the shaft sleeve (4) through the flat key; The shaft sleeve (4) is connected with the friction brake pad (3) through splines. When the stator (11) is powered off, the force generated by the pressure spring (10) acts on the armature (8), tightly clamping the friction brake pad (3) driven by the motor shaft between the armature (8) and the cover plate (5), so as to generate braking torque. At this time, an air gap "Z" will be generated between the armature and the stator. When the brake needs to be released, the stator is connected with DC, and the generated magnet attracts the armature (8) to move towards the stator. When the armature moves, the pressure spring (10) is compressed. At this time, the friction brake pad (3) is released and the brake is released.



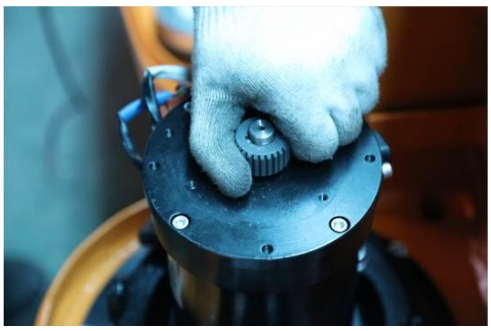
S/N	Part	S/N	Part	S/N	Part	S/N	Part
1	Brake mounting screw	3	Friction brake pad	4	Axle sleeve	5	Friction disc
6	Dust cover	7	Hollow screw	8	Armature	9	Motor shaft
10	Pressure spring	11	Stator	12	Friction disc mounting screw	Z	Air gap

9.5.2 Brake removal

Step diagram

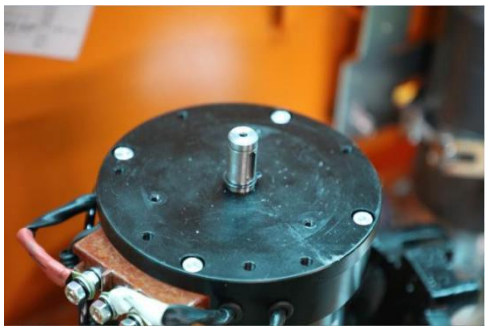


① Remove the fixing screws between the brake and the end face of the motor with an Allen wrench



② Take out the brake and remove the circlip of the motor and shaft sleeve with circlip pliers;

③ Take out the shaft sleeve and the flat key;



④ Install the new brake back to the motor in reverse order.

Note

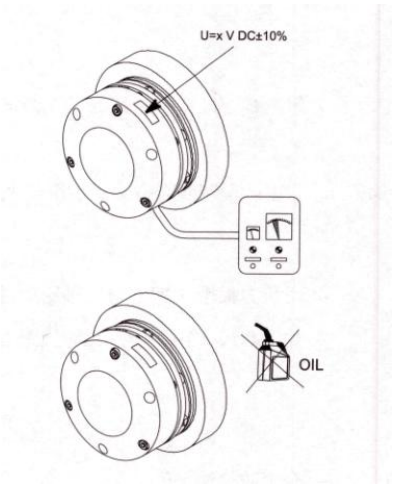
The conductor sheath shall not be damaged to avoid circuit damage.

During the pressure assembly on the motor shaft, the force shall not be too large, the friction surface shall not be damaged, the installation hole and surface shall be deburred as much as possible, the upper shaft sleeve shall be installed on the installation shaft, and the axial snap ring shall be fixed.

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

The brake shall not be contaminated with oil during installation and use.

9.5.3 Maintenance



▲ When used in high temperature environment for a long time, rust shall be prevented. Rust on the suction surface will affect the use.

▲ The friction surface shall not be directly contacted by hand, and there shall be no oil stain, otherwise the maximum torque cannot be reached.

▲ Generally, the ambient temperature is - 10 ℃ ~ 40 ℃

▲ Please check regularly. The regular inspection items include: whether the switch action is normal; Whether there is noise; Whether there is abnormal fever; Whether foreign matters and oil stains are mixed in the friction part and rotating part; Whether the clearance of the friction part is appropriate and whether the excitation voltage is normal.

9.5.4 Brake clearance adjustment

The rated clearance "Z" will increase due to wear. To ensure that the brake has sufficient braking torque, it is necessary to adjust the clearance after a period of time. When the brake is powered off, adjust the clearance between the stator (11) and the armature (8) to the rated value "Z" (rated 0.2mm, maximum 0.5mm) by adjusting three brake mounting screws (1) and hollow screws (7) with the aid of a feeler gauge, and pay attention to ensure that the clearance in all directions is the same.

▲ Loosen the brake mounting screw (1) with the inner door hex wrench.

▲ Adjust the hollow screw (7) with a wrench;

▲ Tighten three brake mounting screws (1);

▲ Check whether the brake clearance "Z" meets the requirements with a feeler gauge;

▲ Adjust the three mounting screws and hollow screws respectively according to the method shown in the figure. After adjusting the clearance, tighten the brake mounting screws.

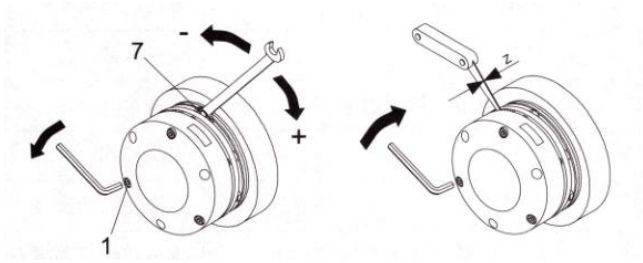


Figure 9-2

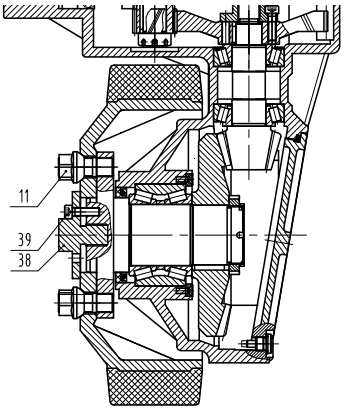
Under normal working conditions, the first clearance adjustment shall be carried out after 1500-2000 hours of brake operation, and the frequency of clearance adjustment is once every 6 months.

9.5.5 Common faults and troubleshooting

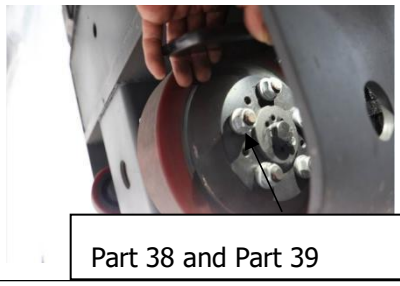
Fault	Possible causes	Trouble shooting
Brake inoperative	Power failure	Connect the power supply
	Excitation voltage too low	Check the voltage and adjust it properly
	Improper clearance	Adjust the clearance
	Mixing of oil and foreign matters	Remove oil and foreign matters
Long braking time	Intermittent inappropriate	Adjust the clearance
	Mixing of oil and foreign matters	Remove oil and foreign matters
Slip	Unstable operation at the beginning of use	Run in for a period of time
	Mixing of oil and foreign matters	Remove oil and foreign matters
	Excessive load	Reduce the load or replace the large specification
High temperature	High excitation voltage	Check the voltage and adjust it properly
	Interference between motor and brake	Check the control circuit to eliminate interference
	High ambient temperature	Set ventilation
	High frequency of use	Reduce to appropriate frequency
	Excessive load	Reduce load
Loud noise	Foreign matter mixing	Remove foreign matters
	Poor installation	Replace the mounting surface or shaft

9.6 Wheel replacement

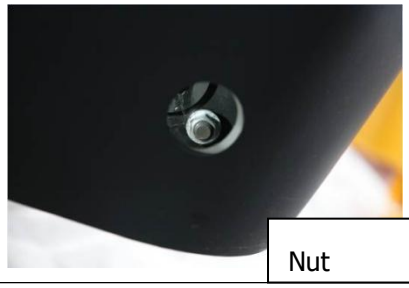
9.6.1 Drive wheel replacement



① Lift the truck with a stacker and suspend the drive wheel



Part 38 and Part 39



Nut

Sleeve

② First remove the screws of Part 38 and 39 with a special tool, then remove the conical nut 11 and push out the wheel.

Do not hit the wheel with a hammer , otherwise it may damage the bearing and the meshing of the driving and driven gears.

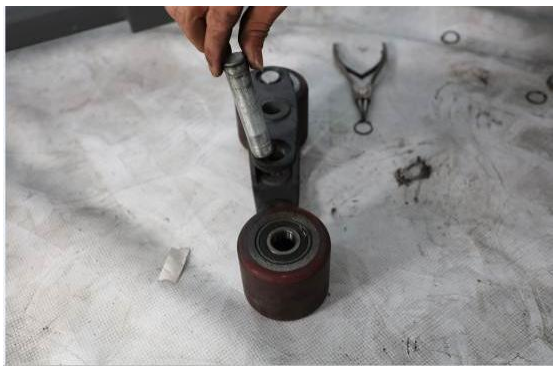
9.6.2 Fork roller replacement

Diagram

① Lift the fork to a certain height and jack up the outrigger with square wood block to make the fork roller leave the ground;

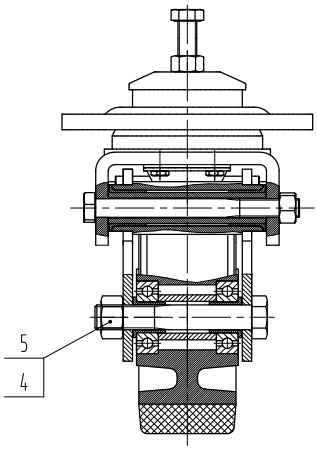
② Remove the circlip with circlip pliers;

③ Take out the axle and take out the fork roller;



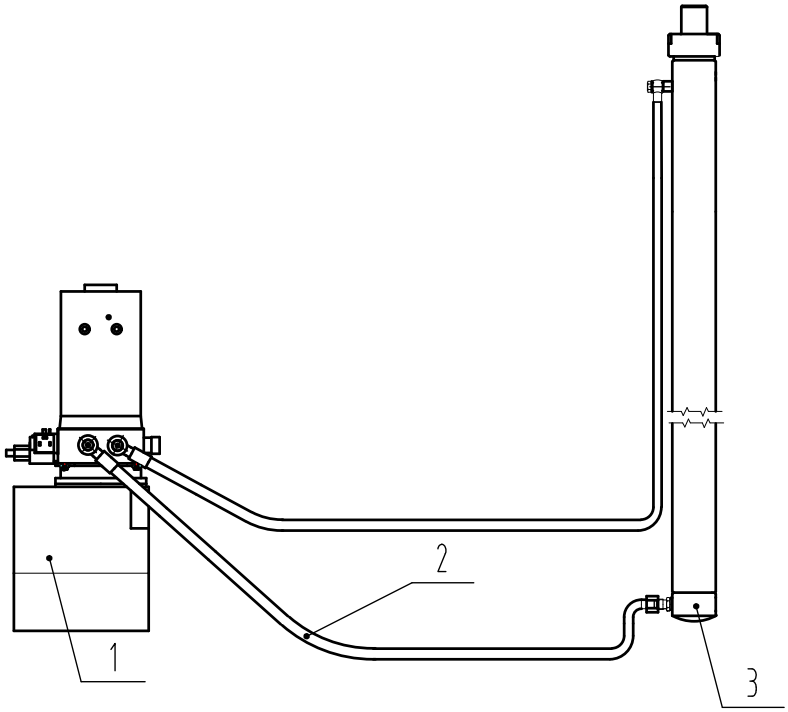
⑤ Replace the new rollers in the reverse order.

9.6.3 Balance Wheel replacement

步骤图示	
	
① Drop the truck with a stacker and suspend the balance wheel	
	
② Use an adjustable wrench to remove the fixing screws 4 and 5 fixing the balance wheel from under the frame;	
③ Take out the wheel from under the truck after the wheel is put down;	
	
④ Install the balance wheel back into the stacker in the reverse order.	

10 Hydraulic system

The hydraulic system is mainly composed of hydraulic unit (1), rubber hose (2) and lifting cylinder (3).



10.1 Working principle of hydraulic system

Lifting load

Press the lifting button on the handle of the operating rod to start the oil pump motor and transmit the torque from the motor to the gear pump through the transmission shaft. The gear pump pressure oil is sucked out of the oil tank and enters the lifting cylinder through the check valve. High pressure oil pushes the piston rod to move, thus driving the mast and load up.

Release the lifting button, the oil pump motor stops running, the gear pump stops sucking oil, and the check valve is closed, so that the lifting cylinder and load remain unchanged in the lifting position.

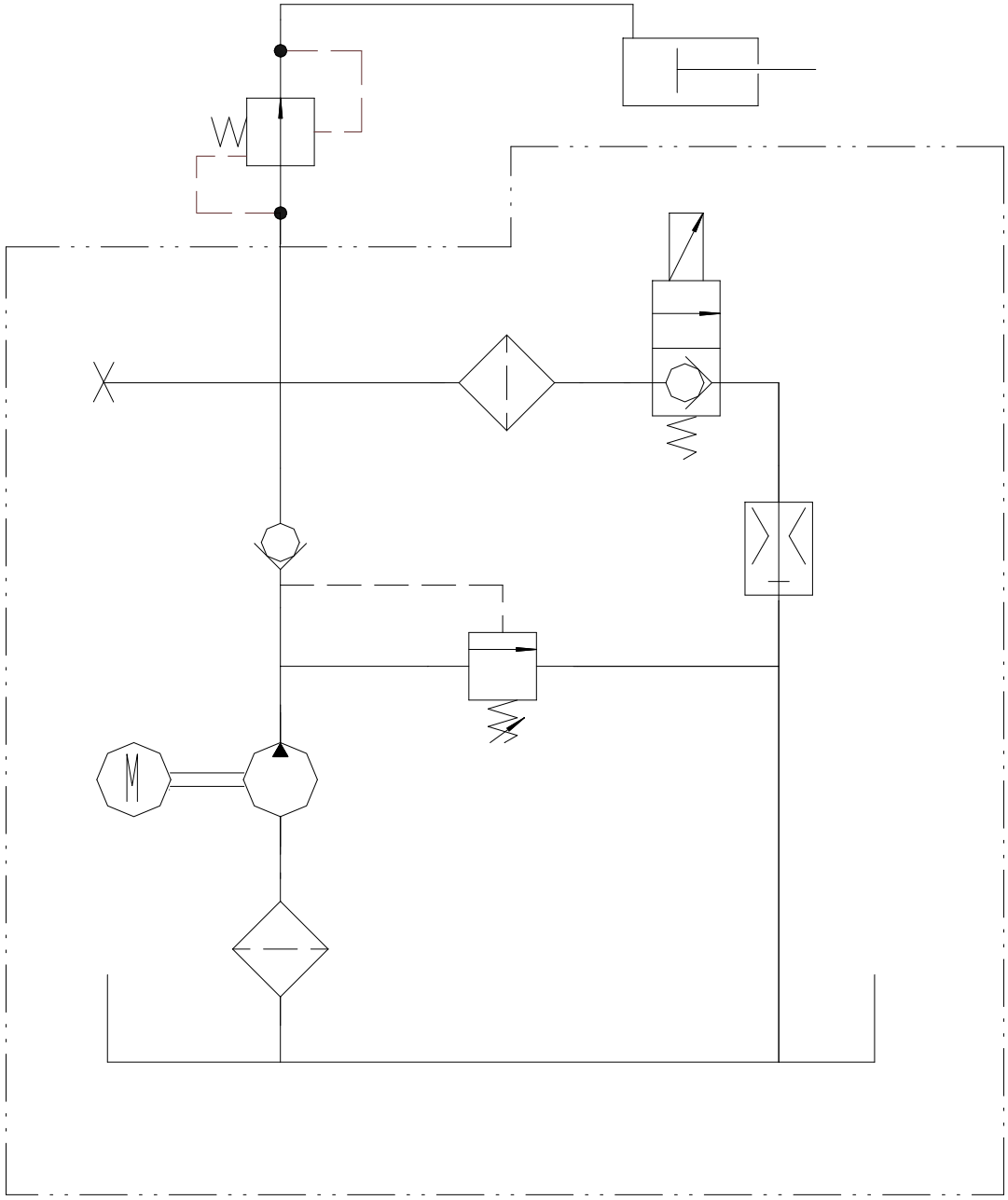
When the lifting cylinder piston reaches the end position or the truck is overloaded, the pressure will exceed the safety pressure set by the overflow valve. At this time, the overflow valve opens and the hydraulic oil flows back to the oil tank.

Reduce load

Press the lowering button on the handle, the normally closed solenoid valve and the reversing valve

are energized, and the oil return channel is opened. Under the action of gravity, the hydraulic oil in the lifting cylinder flows back to the oil tank through the solenoid valve and speed limiting valve, the oil cylinder drops and the load drops.

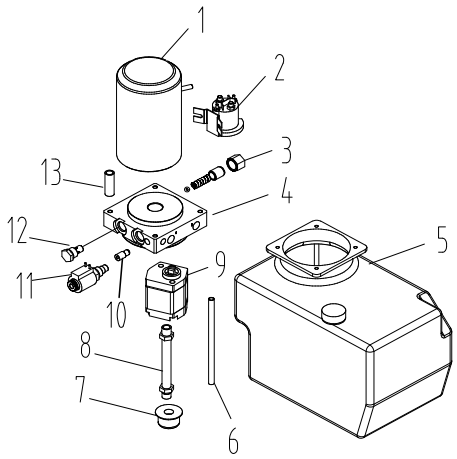
The speed-limiting valve is to prevent the load from falling too fast, causing damage to the truck and load.



Hydraulic schematic diagram

10.2 Hydraulic unit

The truck adopts a combined hydraulic unit, which is composed of the following components:



S/N	Part	S/N	Part	S/N	Part
1	DC motor	2	Contactor	3	Relief valve
4	Valve block	5	tank	6	Oil return pipe
7	Oil filter	8	Oil suction pipe	9	Gear pump
10	Speed limiting valve	11	Solenoid valve	12	Check valve
13	transmission shaft				

10.2.1 Relief valve safety pressure adjustment

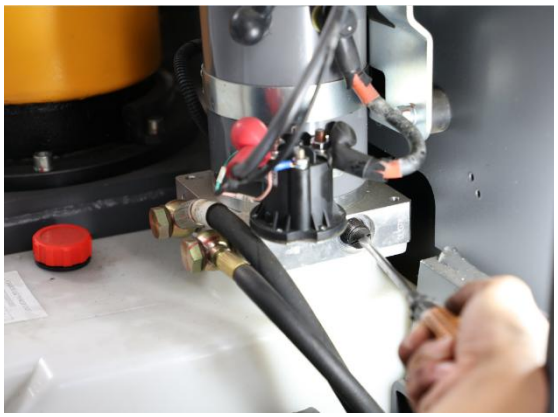
The pressure of the safety valve has been adjusted when the truck leaves the factory, and the user shall not adjust it at will, otherwise it will bring danger to the truck's hydraulic system and truck safety. If the oil pressure is inconsistent with the specified value, please adjust it by professionals according to the following methods according to the test method specified in JB /T3341 standard:

The regulating pressure of the system is 1.15 times, and the second stage mast just cannot be lifted.[A12] Rated load is

▲ when the oil pressure is inconsistent with the specified value, loosen the lock nut of the overflow valve, turn the pressure regulating screw left and right to adjust the pressure to the specified value.When the screw is adjusted inward, the system pressure increases, and when the screw is adjusted outward, the system pressure decreases.

▲ tighten the lock nut after adjustment.

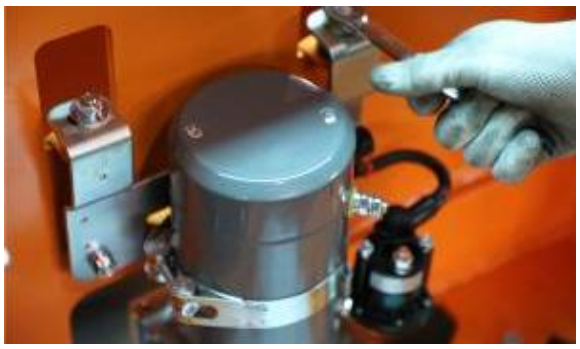
Diagram



①	Loosen the lock nut of the overflow valve with an adjustable wrench
②	Adjust the pressure value with professional tools;

10.3 Remove the hydraulic unit from the truck

Step diagram

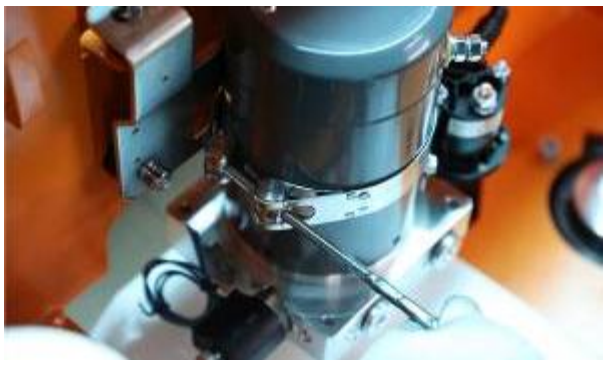


① Remove the hood with an internal angle wrench.

② Remove the connector and oil pipe connected to the oil cylinder on the hydraulic unit.

③ Use a wrench to remove the fixing screws of the hydraulic station to fix the bending plate.

④ Loosen the hydraulic station fixing clamp with an internal angle wrench.



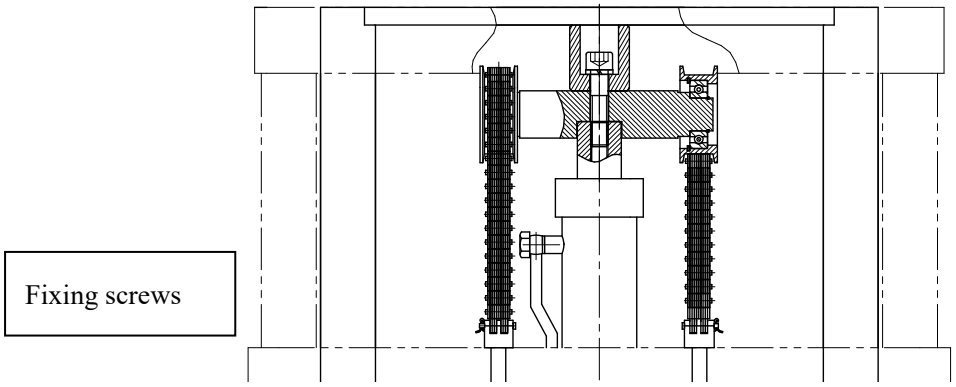
⑤ Hold the motor with both hands and slowly take out the hydraulic station.

⑥ The installation procedure is the reverse of the removal procedure.

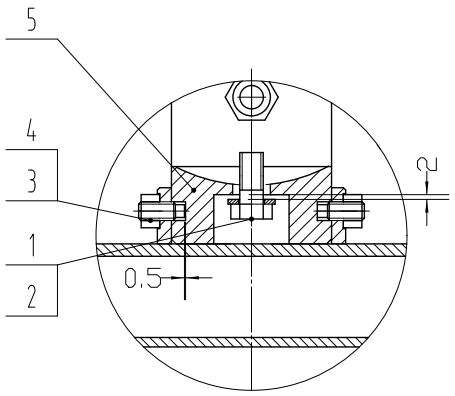
10.4 remove the lifting cylinder from the truck

Before removing the lifting cylinder, make sure that the cylinder is lowered to the bottom and unplug the battery plug.

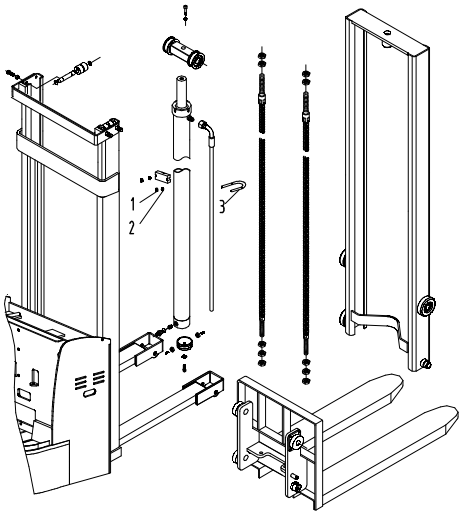
Diagram



① Remove the fixing screws between the piston rod and the inner door frame with an internal angle wrench



② Use an adjustable wrench to remove the fixing screws of oil cylinder base and outer door frame, Part 3 and Part 4.

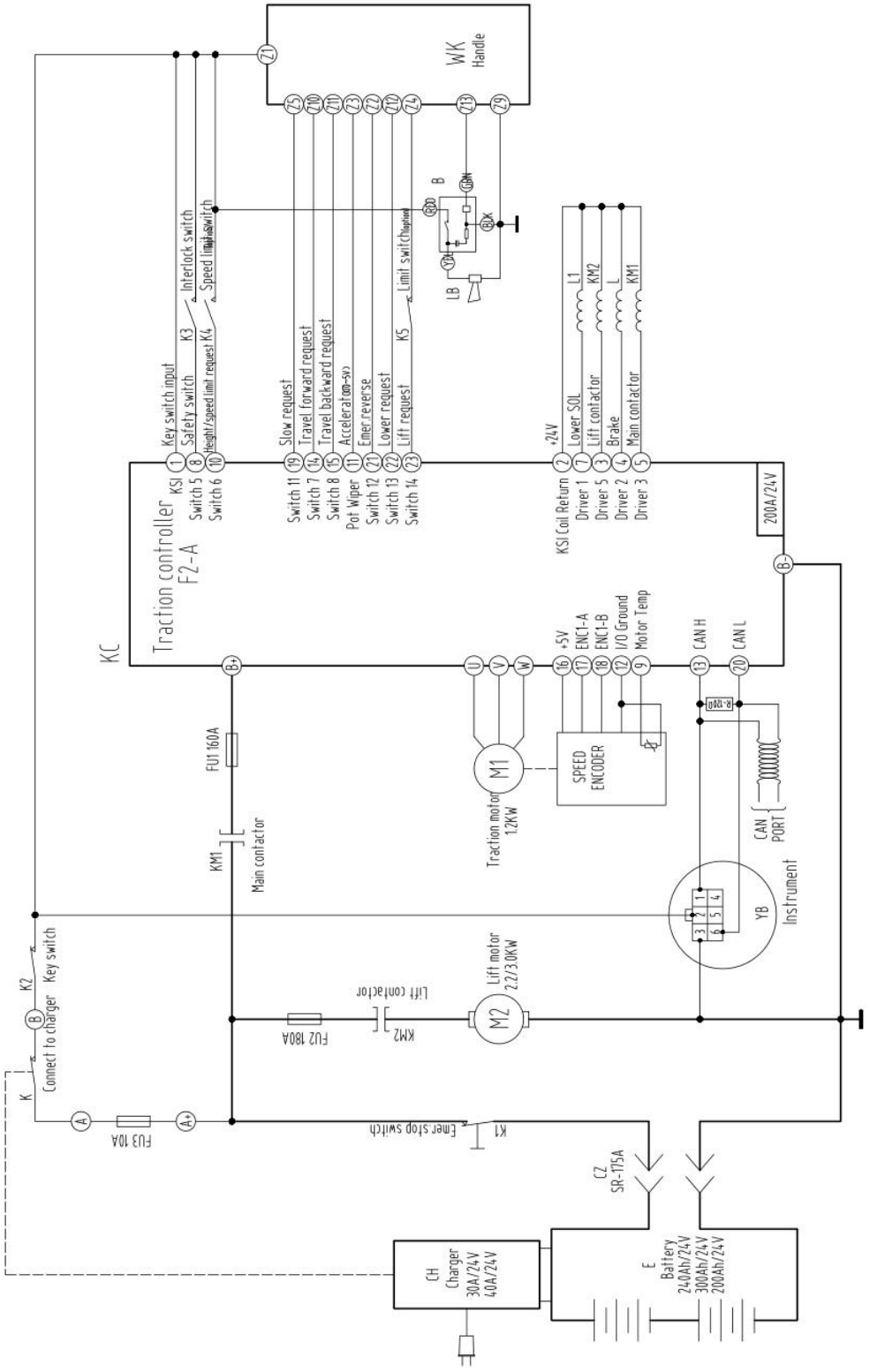


③ Lift the inner mast slightly with the crane, remove the oil cylinder hoop 3, and then take out the oil cylinder. The installation sequence is opposite to the disassembly.

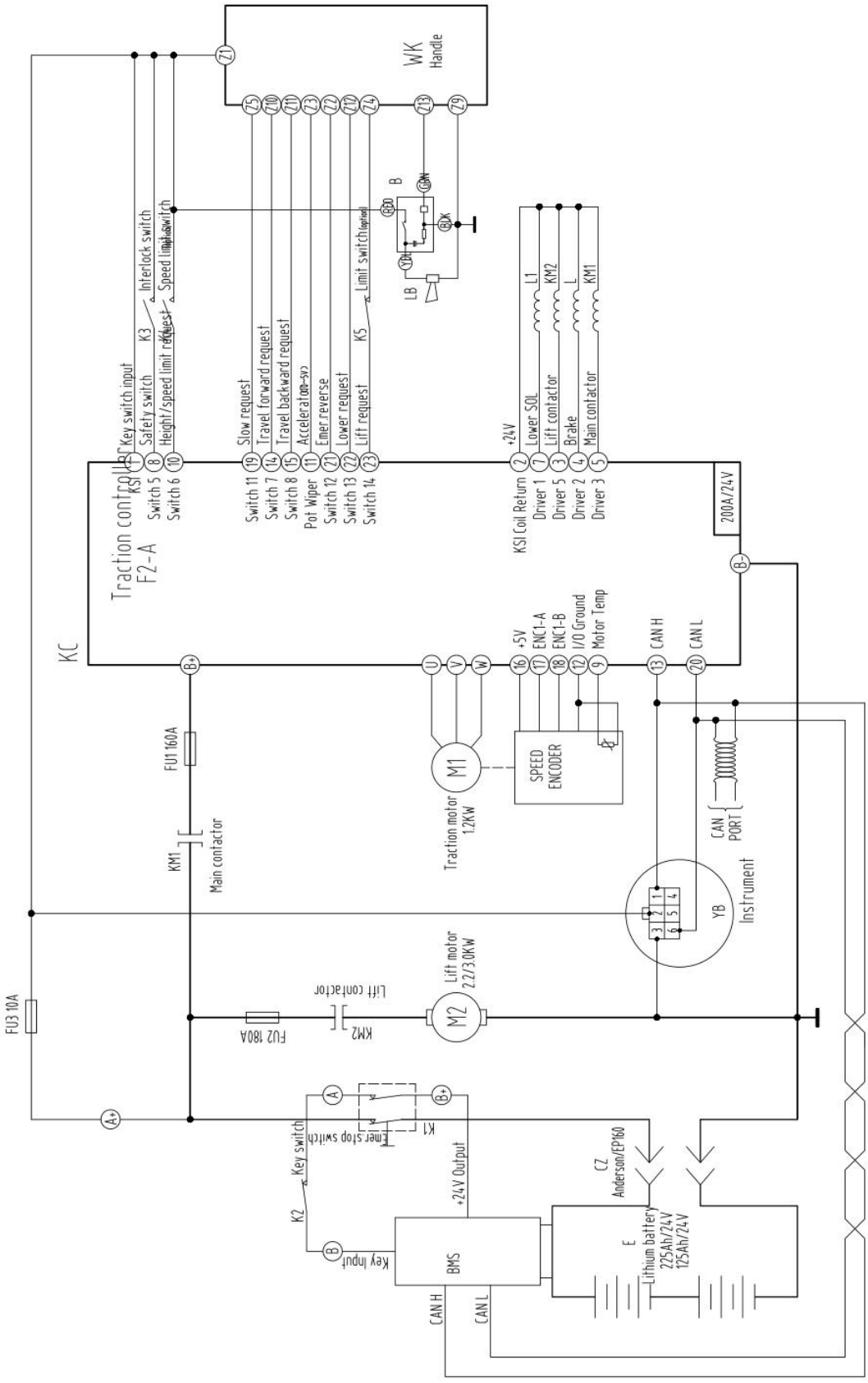
11 Electrical system

11.1 Electrical schematic diagram

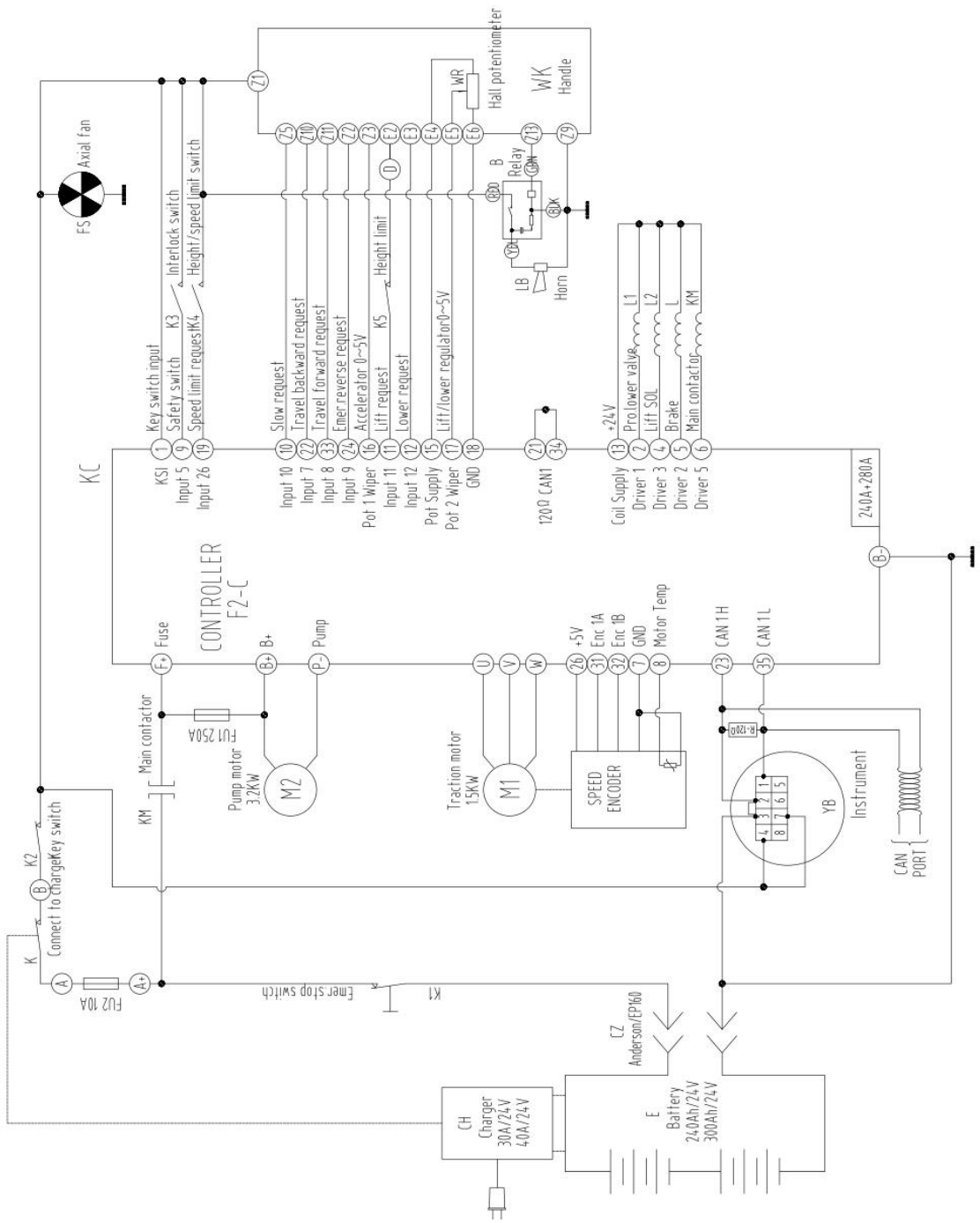
11.1.1 F2-A Lead acid schematic diagram



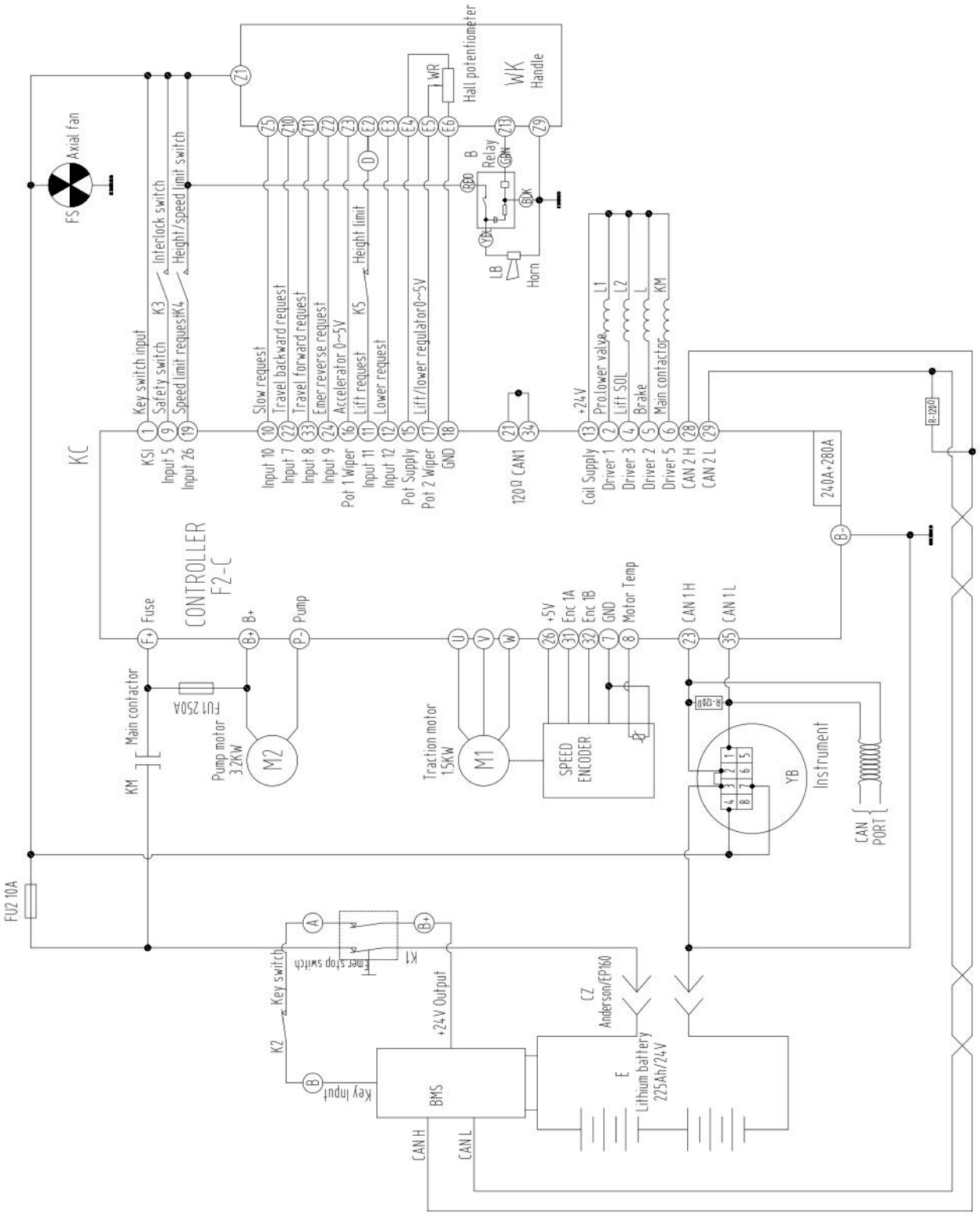
11.1.2 F2-A Lithium electricity schematic diagram



11.1.3 F2-C Lead acid schematic diagram



11.1.4 F2-C Lithium electricity schematic diagram



11.2 AC motor controller

11.2.1Maintenance

The AC motor controller, fuse and fuse are assembled on the electric control-mounting bracket. When installing the electric control, a layer of heat-conducting silicone grease shall be evenly applied at the bottom of the electric control.

maintain

The controller has no user repair parts. Do not try to open, repair or otherwise change the controller. This will damage the control and invalidate the warranty.

It is recommended to keep the controller clean and dry frequently, and check and clear the diagnostic history files regularly.

clean

Regular cleaning of the outside of the controller can help to prevent corrosion or other electronic control failures caused by dirt, dust and chemicals, which are part of the environment and are often found in battery power supply systems.

Pay attention to safety before operating battery-powered trucks. These include but are not limited to: correct training, do not wear loose clothes and jewelry.

Follow the following cleaning steps for the maintenance process. Do not use a high-pressure washer to clean the controller.

▲ Remove the battery to power off;

▲ Connect the load (such as contactor coil or horn) between the controller B + and B - to discharge the capacitance in the controller.

▲ Remove dirt or corrosion at power and signal terminals. Wipe the controller with a wet cloth and dry the controller before connecting the battery.

▲ The controller shall not be impacted by pressurized water flow.

▲ Make sure the wiring is correct and fastened

Warning

No water! Live operation is strictly prohibited! Reverse polarity connection is strictly prohibited! Do not short circuit the motor!

Product maintenance E

This chapter will explain the product troubleshooting

E Product maintenance

12 Common troubleshooting :

12.1 Troubleshooting of hydraulic system

Fault		Possible causes	Trouble shooting
There is no hydraulic oil from the oil pump		Low oil level in oil tank	Fill to the specified oil level
		The filter screen is blocked	Clean the oil circuit and oil tank.If the hydraulic oil is dirty, replace it
Low oil pump output pressure		Bearing wear: damaged O-ring	Replace faulty parts
Noise from oil pump		Cavitation due to blockage of filter screen	Adjust or replace the hose and clean the filter screen
		Hydraulic oil viscosity too high	Use new hydraulic oil with viscosity suitable for oil pump operation
		Bubbles in hydraulic oil	First check the cause of bubbles, and then take measures
Fork cannot lift	Gear pump operates	Blocked or damaged oil circuit	Repair or replace
	No action of gear pump	Lifting microswitch loose or damaged	Retighten or replace
		Motor or circuit fault	Inspect and repair
Fork does not descend		The solenoid valve is blocked or damaged	Repair or replace
The pressure of the safety valve is unstable or cannot be adjusted		The pressure regulating screw is loose	Re adjust the pressure and lock it
		The pressure regulating spring is deformed or damaged	replace
		The safety valve core is worn or stuck	Replace or disassemble and reassemble
		Pump failure	Inspect and repair

S/N	fault	reason	Elimination method
1	The stacker cannot be started (the contactor does not work)	① The control circuit fuse has been burnt out	replace
		② Poor contact or damage of power switch	Repair or replace
		③ The main circuit fuse has blown	replace
		④ Poor contact or damage of electric lock switch	Repair or replace
		⑤ The battery connection is loose or falls off	tighten
	Stacker does not start (contactor works)	① The magnetic brake near the driving wheel does not engage, and the truck is in braking state	Repair or replace
		② The truckbon brush of traveling motor is worn or the commutator has poor contact with the truckbon brush	Repair or replace
		③ The excitation coil of traveling motor is broken or the wire end is in poor contact	Repair or replace
		④ Poor contact of contactor contact	Repair or replace
		⑤ The MOSFET transistor circuit board is faulty	Repair or replace
2	The stacker can only move forward (or backward)	① Poor contact or burnt out of contactor	Repair or replace
		② The circuit board is faulty	Repair or replace
3	The stacker cannot stop while driving	The contactor contact is damaged and the moving contact does not reset	Cut off the power supply in an emergency and replace the contactor contact
4	Brake failure	① The microswitch mounting bolt is loose or damaged	Adjust or tighten the bolts, or replace the microswitch
		② The wiring of the paramagnetic brake is loose or the paramagnetic brake is damaged	Tighten the bolts or repair the magnetic brake
		③ Wear of brake pad of paramagnetic brake	Replace the brake pads
5	Steering stuck	① Steering gear bearing damaged	Replace the bearing
		② The steering gear bearing lacks oil or has too much dust	Clean the bearing
6	The steering of the driving wheel is heavy and noisy, and the motor is in overload state	① The gear and bearing are stuck with foreign matters	Clean or replace the bearing
		② Bearing installation clearance	Adjust the clearance
		③ The front wheel bearing is damaged	Replace the bearing
7	Fork does not lift	① Overload use	Reduce load
		② Overflow valve pressure too low	Raise
		③ Abnormal internal leakage of lifting cylinder	Replace the seal
		④ Insufficient hydraulic oil	Add an appropriate amount of filtered hydraulic oil
		⑤ Insufficient battery voltage	Battery charging
		⑥ The control handle is not in the horizontal or vertical position, and the motor is not powered on	Improper operation
		⑦ Oil pump motor damaged	Repair or replace
		⑧ Oil pump damaged	Repair or replace

		⑨ The lifting key switch is damaged	Repair or replace
		⑩ The electric lock is not opened or damaged	Repair or replace
		⑪ The battery voltage is seriously insufficient	charge
8	Fork does not descend after lifting	① Overload deformation of inner mast	Repair or replace
		② Overload deformation of outer mast	Repair or replace
		③ The mast roller is stuck	Repair or adjustment
		④ Bent guide rod of mast	Repair or straighten
		⑤ The oil return hole is blocked	clear
		⑥ Hydraulic station solenoid valve out of control	Troubleshoot the solenoid valve
9	Battery terminal voltage decreases (after charging)	① Individual single battery damaged	Repair or replace
		② Low electrolyte level	Add electrolyte
		③ Impurities in electrolyte	Change electrolyte
10	The truck body shakes when walking	① The nut for fixing the driving wheel is loose or falls off	Tighten the retaining nut
		② The balance wheel, drive wheel and two front wheels and four wheels are not in the same plane	Adjust the bolts of the balance wheel so that the four wheels are flat

12.2 Troubleshooting of electrical system

12.2.1 Fault information can be obtained

▲by the instrument: When a failure occurs, the LCD display screen of the instrument displays the fault type and code;

▲by accessing the handheld programmer;

▲by observing the LED status indicator light built into the controller.

12.2.1 Handheld programmer

Curtis 1313 handheld programmer is used to configure Curtis motor control system. Through this programmer, you can adjust and save set parameters, real-time monitoring controller data and fault diagnosis.

① High resolution color LCD

The 45 * 60MM LCD screen is convenient for information reading and the displayed information is clear at a glance. Secondly, the content, time / date, link status and access authority of the specified menu will be displayed on the LCD screen.

② The layout of the simple positioning display screen and programming keys is simple and clear to facilitate direct positioning.

③ Convenient parameter adjustment. You can easily adjust parameters to meet customers' needs. The performance of the user’s truck. And the set parameters can be saved in a. CPF file. A large number of. CPF files can be saved and recalled.

④ Real time monitoring the monitoring data can be displayed in real time in the monitoring menu.

⑤ The current faults and all accumulated faults in the fault diagnosis controller can be clearly seen in the fault diagnosis list. At the same time, it is recommended to clear each displayed fault.

⑥ The graphic recording program can let the user see the parameter changes for a period of time, and upload the graphics or data to the Excel spreadsheet.

⑦ Hot key function

Three general hotkeys provide multiple functions according to the operation.

⑧ Help function the help interface gives corresponding descriptions of adjustable parameters, monitoring parameters and faults.

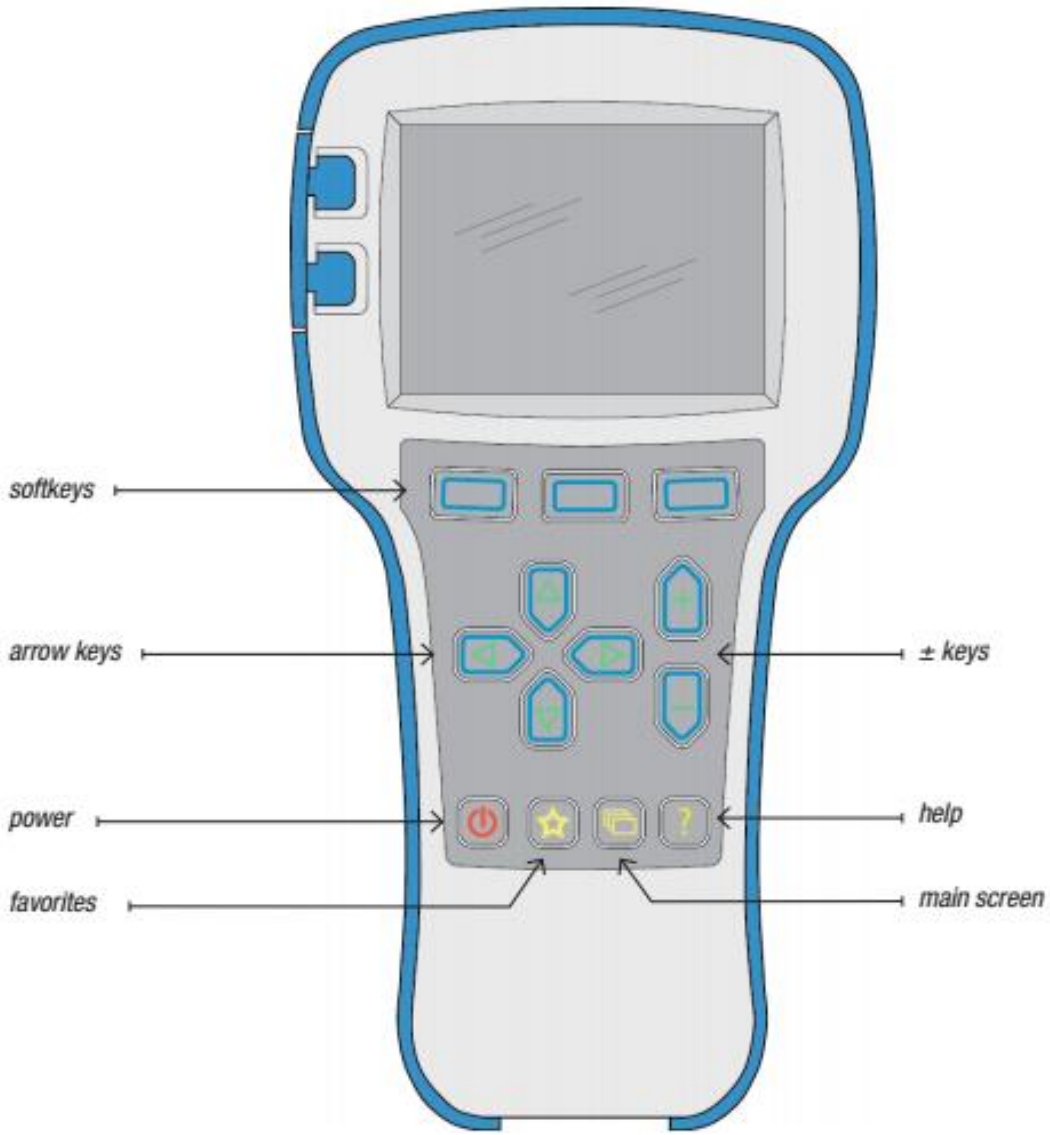
⑨ The PCPC interface is directly connected to the computer through SD card or hand-held programmer through USB cable. Files can be directly downloaded to the programmer and the program can be installed into the controller.

⑩ Upgrade the handheld programmer to upgrade its own software.

⑪ The SD card expansion SD card provides additional storage space. You can save the screen capture data of 1313 in the SD card. The SD card can be used for software upgrade and allow multiple programmers to install the same software.

⑫ Two AA batteries can be used in 1313When the controller is connected, the power supply can ensure the normal operation of the programmer clock.

⑬ Collection function allows you to create a shortcut that allows you to call frequently modify and monitor parameters. Key function the keys on the programmer can make the menu operation very simple.



	**Function key** Since the functions of the three keys are determined according to the specified contents, the three keys are blank. At any specific time, the functions of the keys will be displayed on the upper LCD screen. "»" this sign indicates that there will be more options. After pressing the function key under the "»" sign, the programmer will turn to the next option page.
	**Direction arrow key** The displayed information can be selected up, down, left and right through four direction keys. In the main menu, we can use the direction keys to select one of the menus. When you need to open the selected menu, you can press the "select" function key. In the submenu, press the left direction key to return to the previous menu. In the submenu, press the right direction key to enter the next menu.

	**+/-Key press** These two keys can be used to add or subtract parameters. At the same time, the key "+" can mean "yes" in operation and "-" can mean "no" in operation. In some cases, they can also be used to scroll options.
	**Power key** When the programmer is plugged into a powered on controller, the programmer does not have to press the power key to use. The programmer will start automatically. When the power key is pressed and held for a few seconds, the programmer will prompt whether it needs to be turned off. Select "yes" or "no" represented by the function key to determine whether it needs to be turned off. When the programmer is turned off, press the power key for a few seconds, and the programmer will restart.
	**Favorite key** There are two ways to enter the Favorites menu. You can enter the Favorites menu by selecting "Favorites" in the main menu or by pressing the icon on the left. This function will also be described in detail later.
	**Screenshot key** The information displayed on the LCD screen can be screenshot by pressing the power key first and then the favorite key.
	**Main menu key** No matter what level of menu the programmer enters, after pressing the main menu key, the programmer will return to the main menu. If you press the main menu key in the main menu interface, you can also cycle through the sub menu in the interface.
	**Help key** This key is used to display the specified help document. This is a toggle key. You can close the help document by pressing the help key again. You can exit by selecting the "exit" function key or pressing the left key.

12.2.2 LED status indication

12.2.2.1 **Controller LED status indication and fault code table**

A. the controller has a built-in LED status indicator (red or yellow).

Display	Description
Both OFF	Power supply is not connected; Or the battery is exhausted; Or other serious failures.
The yellow LED light	The controller is working normally

flashes	
Both ON.	Program is loading.
The red LED light is always on	Watchdog failure or software not installed; Restart the key switch; Reinstall the software if necessary.
Yellow and red LED lights flash alternately	The controller detected a fault with a two-digit code. Yellow and red lights flash alternately to represent the code, with red indicating the first digit and yellow the second.

For example, the fault code "23" is shown as follows:

Red	Yellow
※ ※	※ ※ ※
(1st digit 2)	(2nd digit 3)

B. Fault code table

This fault code table provides the following information:

-Fault code

-Fault name displayed on Curtis programmer

-Performance caused by the failure

-Possible causes of the failure

-Deep cause of the failure

-Troubleshooting

If a fault occurs and is not due to wiring or mechanical issues, try restarting by cycling the key switch. If the fault persists, turn off the switch, inspect the 35-pin connector for proper connection or dirt, clean and reconnect it, then restart the truck.

Fault code of Curtis F2A controller

FLASH CODE	FAULT NAME	POSSIBLE CAUSE	SET/CLEAR CONDITIONS

1-2 0x12	**Controller Overcurrent** Controller_Overcurrent_Active 0x2510 Fault Type(s): 1 = Controller Over Current Phase U 2 = Controller Over Current Phase W 3 = Controller Over Current Phase V 4 = Irms > 135 % Current Limit	1) External short of phase U, V, or W motor connections. 2) Speed encoder noise problems. 3) Motor parameters are mistuned. 4) Controller defective.	Set: Phase current exceeded the current measurement limit. Clear: Reset Controller
1-3 0x13	**Current Sensor** Current_Sensor_Active 0x2832 Fault Type(s): 1	1) 1. Leakage to truck frame from phase U, V, or W (short in motor stator). 2) Controller defective.	Set: Controller current sensors have invalid offset reading. Clear: Reset Controller
1-4 0x14	**Precharge Failed** Precharge_Failed_Active 0x2223 Fault Type(s): 1 Abort 2 Energy Limit Exceeded 3 Time Limit Exceeded	1) An external load on the capacitor bank (B+ connection terminal) thatprevents the capacitor bank fromcharging. 2) See Programmer » System Monitormenu » Controller » CapacitorVoltage.	Set: The precharge failed to charge the capacitor bank. Clear: Cycle Interlock or Reset Controller
1-5	**Controller Severe**	1) Controller is operating in an	Set: Heatsink temperature

0x15	**Undertemp** Controller_Severe_Undertemp_ Active 0x2141 Fault Type(s): 1	extreme environment. 2) See Programmer » System Monitor menu » Controller » Controller Temperature.	below –40 °C. Clear: Bring heatsink temperature above –40 °C. and then Reset Controller
1-6 0x16	**Controller Severe Overtemp** Controller_Severe_Overtemp_ Active 0x2142 Fault Type(s): 1	1) Controller is operating in an extreme environment. 2) Excessive load on truck. 3) Improper mounting of controller. 4) See Programmer » System Monitor menu » Controller » Controller Temperature.	Set: Heatsink temperature above +95 °C. Clear: Bring heatsink temperature below +95 °C, and then Reset Controller.
1-7 0x17	**Severe B+ Undervoltage** Severe_B_Plus_Undervoltage_ Active 0x2120 Fault Type(s): 1	1) Non-controller system drain on battery. 2) Battery resistance too high. 3) Battery disconnected while driving. 4) Blown B+ fuse or main contactor did not close. 5) Battery parameters aremisadjusted. 6) See Programmer » Monitor menu »Controller » Capacitor Voltage.	Set: When Main is closed and FET Bridge enabled: Either the undervoltage drive current cut back = 0 % for 64 ms or the Brownout Voltage is reached. Clear: Undervoltage drive current cut back > 0 % for 100 ms and capacitor voltage > brownout voltage.
1-7 0x17	**Severe KSI Undervoltage** Severe_KSI_Undervoltage_ Active	1) Non-controller system drain on battery/keyswitch circuit wiring. 2) Resistance in low power (KSI) circuit is too high.	Set: When below Brownout Voltage for 2 seconds. Clear: Bring KSI voltage above Brownout Voltage.

	0x2122 Fault Type(s): 1	3) KSI disconnected while driving. 4) Blown fuse. 5) See Programmer » System Monitor menu » Battery » Keyswitch Voltage.	
1-8 0x18	**Severe B+ Overvoltage** Severe_B_Plus_Overvoltage_ Active 0x2130 Fault Type(s): 1	1) Battery parameters are misadjusted. 2) Battery resistance too high for given regen current. 3) Battery disconnected while regen braking. 4) See Programmer » System Monitor menu » Controller » Capacitor Voltage.	Set: Capacitor bank voltage exceeded the Severe Overvoltage limit with FET bridge enabled. Clear: Bring capacitor voltage below Severe Overvoltage limit, and then Reset Controller.
1-8 0x18	**Severe KSI Overvoltage** Severe_KSI_Overvoltage_Active 0x2132 Fault Type(s): 1	1) 1. Battery-voltage applied to KSI (pin exceeds the Severe Overvoltage limit. 2) See Programmer » Monitor menu » Battery » Keyswitch Voltage.	Set: KSI voltage exceeded the Severe Overvoltage limit. Clear: Bring KSI voltage below the Severe Overvoltage limit, and then Reset Controller.
1-9 0x19	**Speed Limit Supervision** Speed_Limit_Supervision_ Active 0x2133 Fault Type(s): 1	1) Motor speed detected exceeding the limit set by the Max Speed Supervision parameter. 2) Misadjusted Max Speed Supervision parameters. 3) See: Programmer » Application Setup » Max Speed Supervision menu.	Set: Motor rpm has exceeded the Max Speed Limit setting for the Max Speed Time Limit setting's duration. Clear: Reset Controller.
1-10	**Travel Control**	1) With the truck in the	Set: The motor frequency and/

0x1A	**Supervision** Travel_Control_Supervision_ Active 0x2134 Fault Type(s): 1	stopped state, the motor frequency and/or phase current detected exceeding the limit set by the Travel Control Supervision parameter. 2) Misadjusted Travel Control Supervision parameters. 3) See: Programmer » Application Setup » Travel Control Supervision menu.	or and phase-current are above their Travel Control Supervision settings when in the stopped state. Clear: Reset Controller.
2-2 0x22	**Controller Overtemp Cutback** Controler_Overtemp_Cutback_ Active 0x2140 Fault Type(s):1	1) Controller is operating in an extreme environment. 2) Excessive load on truck. 3) Improper mounting of controller which is preventing controller cooling. 4) Controller is performance-limited at this temperature. 5) See Programmer » System Monitor menu » Controller: Temperature.	Set: Controller's Heatsink temperature exceeded 85 °C. Clear: Bring heatsink temperature below 85 °C.
2-3 0x23	**Undervoltage Cutback** Undervoltage_Cutback_Active 0x2121 Fault Type(s): 1	1) Batteries need recharging. Controller is performance limited at this voltage. 2) Battery parameters are misadjusted. 3) Non-controller system-drain on battery.	Set: Capacitor bank voltage dropped below the UnderVoltageCutback limit with the FET bridge enabled. Clear: Bring the capacitor voltage above the controller's UnderVoltageCutback limit.

		4) Battery resistance too high. 5) Battery disconnected while driving. 6) Blown B+ fuse or main contactor did not close. 7) See Programmer » System Monitor menu » Controller » Currents » UnderVoltageCutback. 8) See Programmer » System Monitor menu » Controller » Capacitor Voltage.	
2-4 0x24	**Overvoltage Cutback** Overvoltage_Cutback_Active 0x2131 Fault Type(s): 1	1) Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2) Battery parameters are misadjusted. 3) Battery resistance too high for given regen current. 4) Battery disconnected while regen braking. 5) See Programmer » System Monitor menu » Controller » Currents » OverVoltageCutback. 6) See Programmer » System Monitor menu » Controller »	Set: The controller's capacitor bank voltage exceeded the OverVoltageCutback limit with the FET bridge enabled. Clear: Bring controller's capacitor voltage below the OverVoltageCutback limit.

		Capacitor Voltage.	
2-5 0x25	**Ext 5V Supply Failure** Ext_5V_Supply_Failure_Active 0x2531 Fault Type(s): 1 = 5 V Supply's voltage is out-of-range 2 = 5 V Supply's current is out-of-range	1) External load impedance on the +5 V supply (pin 16) is too low. 2) See Programmer » System Monitor menu » Outputs:External_5V_Supply,Ext_5V_Current.	Set: (1) The 5 V Supply (pin 16) is outside 5 V±10 % (2) The current is outside limits defined by: Ext_5V_Supply_Min Ext_5V_Supply_Max Clear: Reset Controller, or Re-set using VCL variable Ext_5V_Output_Enable
2-6 0x26	**Ext 12V Supply Failure** Ext_12V_Supply_Failure_Active 0x2532 Fault Type(s): 1 = 12 V Supply's voltage is out-of-range 2 = 12 V Supply's current is out-of-range	1) External load impedance on the +12 V supply (pin 23) is too low. 2) See Programmer » System Monitor menu » Outputs:External_12V_Supply,Ext_12V_Current.	Set: (1) The 12 V supply (pin 23) is outside 12 V ± 15 % (2) The current is outside the limits defined by: Ext_12V_Supply_Min Ext_12V_Supply_Max Clear: Reset Controller. Or Re-set using VCL variable Ext_12V_Output_Enable.
2-8 0x28	**Motor Temp Hot Cutback** Motor_Temp_Hot_Cutback_ Active 0x2151	1) Motor temperature is at or above the programmed Temperature Hot setting—resulting in a reduction of controller drive current.	Set: Motor temperature is at or above the Temperature Hot parameter setting. Clear: Bring the motor temperature within range.

	Fault Type(s): 1	2) The motor temperature and sensor control parameters are misadjusted. 3) See Programmer » AC Motor Setup» Temperature Sensor.	
2-9 0x29	**Motor Temp Sensor** Motor_Temp_Sensor_ Active 0x2150 Fault Type(s): 1	1) Motor thermistor is not connected properly. 2) sensor polarity (between Pin 9 and Pin 12) is incorrect. 3) The motor temperature and sensor parameters are misadjusted. 4) See Programmer » System Monitor menu » AC Motor » Temperature.	Set: Motor thermistor input (pin 9) is at the voltage rail. Clear: Bring the motor thermistor input voltage within range.
3-1 0x31	**MAIN DRIVER** Main_Driver_Fault_Acti ve 0x2222 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Open Wire (at pin)	1) Open or short on driver load. 2) Dirty connector pins at controller or contactor coil. 3) Bad connector crimps or faulty wiring.	Set: Main Contactor driver is either open or shorted. This fault can be set only when Main Enable = On. Clear: Restore/repair any external wiring or device-coil to their correct state, then Reset Controller.
3-2	**EM Brake Driver**	1) Open or short on driver	Set: Electromagnetic brake

0x32	EM_Brake_Driver_fault_Active 0x2320 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Open Wire (at pin)	load. 2) Dirty connector pins at controller or contactor coil. 3) Bad connector crimps or faulty wiring.	driver (pin 4) is either open or shorted. This fault can be set only when EM Brake Type >0. Clear: Restore/repair any external wiring or device-coil to their correct state, then Reset Controller.
3-5 0x35	**Lower Driver** Lower_Driver_Fault_Active 0x2440	See Driver 1 Fault (Fault 10-1)	
3-6 0x36	**Encoder Fault** Encoder_Fault_Active 0x2230 Fault Type(s): 1 = Loss of regulation 2 = Over Current trips Loss of pulses 3 = Loss of speed signal pulses 4 = Autocharacterization 5 = Encoder supply (voltage) fault	1) Motor encoder failure. 2) Bad crimps or faulty wiring. 3) See Programmer » System Monitor menu » AC Motor: Motor RPM. 4) See Programmer » AC Motor Setup » Quadrature Encoder » Encoder fault Setup.	Set: Motor encoder phase failure detected. Clear: Either Reset Controller, or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Encoder Fault is cleared and Encoder LOS fault (flash code 9-3) is set, allowing limited motor control.

3-7 0x37	**Motor Open** Motor_Open_Active 0x2240 Fault Type(s): 1	1) Motor phase is open. 2) Bad crimps or faulty wiring.	Set: Motor phase U, V, or W detected open. Clear: Cycle KSI.
3-8 0x38	**Main Contactor Welded** Main_Contactor_Welded_Active 0x2220 Fault Type(s): 1	1) Main contactor tips are welded closed. 2) Motor phase U or V is disconnected or open. 3) An alternate voltage path (such as an external circuit to B+) is providing a current to the capacitor bank (B+ connection terminal).	Set: Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded (via the motor) for a short time and the voltage did not discharge indicating a direct-contact to the battery (i.e., Main tips are welded closed). Clear: Reset Controller
3-9 0x39	**Main Contactor Did Not Close** Main_Contactor_Did_Not_ Close_Active 0x2221 Fault Type(s): 1 = Main did not close when commanded 2 = Main disconnected during operation	Type1: 1) Main contactor did not close. 2) Main contactor tips are oxidized,burned, or not making good contact. 3) An external load on the capacitor bank (B+ connection terminal) is preventing the capacitor bank from charging. 4) Blown B+ fuse. 5) Main Contactor parameters mistuned Main Pull In Voltage,Main Holding Voltage. Type2:	Set: With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. Clear: Reset Controller.

		1) Main opened during operation (while commanded closed). 2) Driver wiring to contactor's coil (e.g., pin 3 wiring) removed during operation. 3) Contactor/coil defective.	
4-2 0x42	**Throttle Input** Throttle_Input_Active 0x2210 Fault Type(s): 4 1 = Outside the Low or High parameter.	1) Throttle voltage exceeded the Analog Low or Analog High parameters for the analog input defined for the throttle input. 2) See Programmer » Controller Setup » Analog Inputs » Analog 1 Type. 3) See Programmer » Controller Setup » Analog Inputs » Configure.	Set: Throttle voltage exceeded the Analog Low or Analog High parameters for the analog input defined for the throttle input. Clear: Bring throttle input voltage within the Min and max thresholds. Reset Controller.
4-6 0x46	**NV Memory Failure** NV_Memory_Failure_Active 0x2830 Fault Type(s): 1 = Invalid checksum. 2 = NV write failed. 3 = NV read failed. 4 = NV write did not complete during power down.	1) Failure to read or write tononvolatile (NV) memory. 2) Internal controller fault.	Set: Controller operating system tried to read or write to EEPROM memory and failed. Clear: Download the correct software and matching parameter default settings into the controller and Reset Controller.
4-7 0x47	**HPD Sequencing** Hpd_Sequencing_Activ	1) Incorrect sequence in application of Keyswitch,	Set: HPD (High Pedal Disable) or SRO (Static Return to Off)

	e 0x2211 Fault Type(s): 1	Interlock, Direction,or Throttle. 2) Faulty wiring, crimps, or switches at KSI, Interlock, Direction, or Throttle. 3) Moisture in above-noted digital input switches causing invalid (real) On/Off state. 4) Verify input switch status. See Programmer » System Monitor menu » Inputs » Switch Status. 5) Verify Throttle. See Programmer » System Monitor menu » Inputs » Throttle Command.	sequencing fault caused by incorrect sequence of KSI, interlock, direction, and throttle inputs. Clear: Reapply inputs in correct sequence.
4-7 0x47	**EMER Rev HPD** Emer_Rev_Hpd_Active 0x2331 Fault Type(s): 1	Emergency Reverse operation has concluded, but the throttle, forward and reverse inputs, and interlock have not been returned to neutral.	Set: At the conclusion of Emergency Reverse, the fault was set because various inputs were not returned to neutral. Clear: If EMR_Interlock = On, clear the interlock, throttle, and direction inputs. If EMR_Interlock = Off, clear the throttle and direction inputs.
4-9 0x49	**Parameter Change** Parameter_Change_Active 0x2813 Fault Type(s):	When Interlock is On, changing a safety-based parameter. Parameters with this property are marked with a [PCF] (Parameter Change fault) in the	Set: Adjustment of a parameter setting that requires cycling of KSI. Clear: Reset Controller.

	Reports the CAN Object ID of parameter.	Parameter menu listings.	
4-10 0x4A	**EMR Switch Redundancy** Emr_Switch_Redundancy_ Active 0x2817 Fault Type(s): 1	1) Either or both Emergency Reverse input switches are inoperative,resulting in an invalid state.NO NC State On Off valid Off On valid On On invalid Off Off invalid 2) Ingress of dirt or moisture in switch(s).	Set: Emer Rev Switch NO input does not agree with the Emer Rev Switch NC input. Clear: Correct switch states. Reset Controller.
5-1 0x51	**User 1 Fault** User_{1, 2 … 32}_Fault_Active 0x2710 Fault Type(s): OEM Definable	1) These faults (and fault actions) can be defined by the User/ OEM and are implemented in the application-specific VCL software. 2) See User/OEM documentation.	Set: See User/OEM documentation Clear: See User/OEM Documentation
5-2 0x52 ～ 7-13 0x7D	**User 2,3…32 Fault**	See User 1 fault (above)	Set: See User/OEM documentation Clear: See User/OEM Documentation
6-8 0x68	**VCL Run Time Error** VCL_Run_Time_Error_ Active 0x2820 Fault Type(s): 1	1) Runtime errors are defined using the VCL Error Module and VCL Error. See the System Information file: • Curtis Integrated Toolkit™ »	Set: VCL Run Time Error detected Clear: Edit VCL application software to fix this error condition; flash the new

		VCL Studio » Help 2) Using driver control commands in VCL can lead to VCL runtime errors if the VCL command and the driver assignment do not match.	compiled software and matching parameter settings; Reset Controller.
7-2 0x72	**PDO Timeout** PDO_Timeout_Active 0x2541 Fault Type(s): 1	1) The time between CAN PDO messages received exceeded the PDO Timeout Period as defined by the Event Timer parameter. 2) Adjust PDO Settings. See Programmer » Application Setup » CAN Interface » PDO Setups.	Set: Time between CAN PDO messages received exceeded the PDO Timeout Period. Clear: Receive CAN NMT message, or Reset Controller.
7-3 0x73	**Stall Detected** Stall_Detected_Active 0x2231 Fault Type(s): 1	1) Stalled motor. 2) Motor encoder failure. 3) Bad crimps or faulty wiring. 4) Problems with power supply for the motor encoder. 5) See Programmer »System Monitor menu » AC Motor » Motor RPM.	Set: No motor encoder movement detected. Clear: Either Reset Controller, or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Stall Detected fault is cleared and the Encoder LOS fault (flash code 9-3) is set, allowing limited motor control.
7-7 0x77	**Supervision** Supervision_Active 0x2840 Fault Type(s): Curtis Supervision	Internal controller fault.	Set: Internal controller failure Clear: Reset Controller.

	Code		
7-9 0x79	**Supervision Input Check** Supervision_Input_Check Active 0x2841 Fault Type(s): 1	Internal controller fault.	Set: Damaged Controller. Clear: Reset Controller.
8-2 0x82	**PDO Mapping Error** PDO_Mapping_Error_Active 0x2542 Fault Type(s): 1	1) The PDO Map has too many data bytes assigned or has objects mapped that are not compatible. 2) Adjust PDO Settings. See Programmer » Application Setup » CAN Interface » PDO Setups.	Set: Incorrect PDO map detected. Clear: Reset Controller.
8-3 0x83	**Internal Hardware** Internal_Hardware_Active 0x2835 Fault Type(s): Curtis hardware code	Internal controller fault detected.	Set: Internal controller fault detected. Clear: Reset Controller.
8-7 0x87	**Motor Characterization Error** Motor_Characterization_Active 0x2850 Fault Type(s): 71 Failure to write NV ram	Motor characterization failed during characterization process. See fault type for cause.	Set: Motor characterization failed during the motor characterization process. Clear: Reset Controller.

	72 Temp sensor fault 73 Motor hot 74 Controller temperature cutback 76 Undervoltage cutback 77 Overvoltage cutback 78 No encoder information 79 Current Regulator Tuning out of range 80 Current Regulator Tuning out of range 81 Encoder signal seen but step size not auto-detected 82 Aborted autocharacterization — 90/98 PMAC Sin/Cos no rotation detected 91 PMAC motor not rotating 92 PMAC Motor not accelerating. Low acceleration		

	94–97 PMAC lag compensation out of range 99 PMAC Motor rotating at start of characterization 102 PMAC motor temp sensor 103 PMAC motor temp hot cutback 104 PMAC controller temp cutback 106 PMAC Undervoltage cutback 107 PMAC overvoltage cutback		
8-8 0x88	**Encoder Pulse Error** Encoder_Pulse_Error_Active 0x2234 Fault Type(s): 1	1) Encoder Steps parameter does not match the actual motor encoder. 2) Verify parameter settings: AC Motor Setup » Quadrature Encoder » Encoder Steps. 3) Motor lost IFO control and accelerated without throttle command.	Set: Detected wrong setting of the Encoder Steps parameter. Clear: Ensure the Encoder Steps parameter matches the actual encoder; Reset Controller.
8-9 0x89	**Parameter Out of Range**	1) Parameter value detected outside of the limits.	Set: Parameter detected outside of limits

	Parameter_Out_Of_Range_ Active 0x2811 Fault Type(s): Reports the CAN Object ID of parameter.	2) Use CIT to view and write parameter value and range.	Clear: Bring parameter within its limits.
9-1 0x91	**Bad Firmware** Bad_Firmware_Active 0x2815 Fault Type(s): 1	The firmware in the controller is incorrect. 1) The CRC of the application or OS do not match. 2) The application was built with an incompatible OS version.	Set: The Loaded software is not compatible with the controller hardware Clear: Load the matching software. Verify that the controller model matches the cdev file for the project and the VCL Studio application.
9-2 0x92	**EM Brake Failed To Set** EM_Brake_Failed_to_Set_ Active 0x2321 Fault Type(s): 1	1) Truck movement sensed after the EM Brake has been commanded to set. 2) EM Brake will not hold the motor from rotating.	Set: After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, truck movement has been sensed. Clear: 1. Activate the Throttle (EM Brake type 2). 2. Activate the Interlock (EM Brake type 1).
9-3 0x93	**Encoder LOS** Encoder_LOS_Active 0x2233 Fault Type(s): 1	1) Limited Operating Strategy (LOS) control mode has been activated; as a result of either an Encoder Fault (flash code 3-6) or a Stall Detected fault (flash code	Set: Encoder Fault (flash code 3-6) or Stall Detected (flash code 7-3) was activated, if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Encoder

		7-3). 2) Motor encoder failure. 3) Bad crimps or faulty wiring. 4) Truck is stalled.	LOS (flash code 9-3) control mode is activated, allowing limited motor control. Clear: Cycle KSI or, if LOS Mode was activated by the Stall Detected fault, clear by ensuring encoder senses proper operation, Motor RPM = 0, and Throttle Command = 0.
9-4 0x94	**Emer Rev Timeout** Emer_Rev_Timeout_Active 0x2330 Fault Type(s): 1	1) Emergency Reverse was activated and concluded because the EMR Timeout timer has expired. 2) The emergency reverse input is stuck On.	Set: Emergency Reverse was activated and ran until the EMR Timeout timer expired. Clear: Turn the emergency reverse input (switch) to Off.
9-9 0x99	**Parameter Mismatch** Parameter_Mismatch_Active 0x2812 Fault Type(s): 1 = Dual Drive is enabled in Torque Mode. 2 = Motor Tech = SPMSM, Feedback = Encoder 3 = Motor Tech = ACIM, Feedback = Sin/Cos	1) Incorrect position feedback type chosen for motor technology in use. 2) Dual drive is enabled in torque mode. 3) Dual drive enabled on only one controller.	Set: 1. When the Dual Drive software is enabled, the controller must be set to either Speed Mode Express or Speed Mode; otherwise this fault is set. 2. Motor Technology = 1 must be paired with Feedback Type = 2; otherwise this fault is set. 3. Motor Technology = 0 must be paired with Feedback Type = 1; otherwise this fault is set. Clear: Adjust parameters to appropriate values and then Reset Controller.
9-10	**Interlock Braking**	1) During an interlock braking	Set: During an interlock

0x9A	**Supervision** Interlock_Braking_Supervision_ Active 0x2332 Fault Type(s): 1 Motor speed is outside the Interlock Brake Supervision Speed Limit. 2 Interlock is Off and EM Brake not applied within time limit. 3 Interlock is Off and EM Brake not applied, and the rotor position is outside the RPM- position limit.	event,the motor speed exceeded the limit set by the Interlock Braking Supervision parameters. 2) See Programmer » Application Setup » Interlock Braking » Supervision Enable. 3) See Programmer » Application Setup » Interlock Braking » Interlock Braking Supervision.	braking event, the motor speed exceeded the limit set by the Interlock Braking Supervision parameters. Clear: Reset Controller.
9-11 0x9B	**EMR Supervision** Emr_Supervision_Active 0x2333 Fault Type(s): 1	1) During an EMR event, the motor speed exceeded the limit set by the Emergency Reverse Supervision parameters. 2) See Programmer » Application Setup » Emergency Reverse » Emergency Reverse	Set: During an interlock braking event, the motor speed exceeded the limit set by the Emergency Reverse Supervision parameters. Clear: Reset Controller.

		Supervision.	
10-1 0xA1	**Driver 1 Fault** Driver_1_Fault_Active 0x2160 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1) Open or short on driver load. 2) Dirty connector pins at controller or contactor coil. 3) Bad connector crimps or faulty wiring. 4) Driver overcurrent, as set by the Driver 1 Overcurrent parameter. 5) See Programmer » Controller Setup » Outputs » Driver 1 » Driver 1 Overcurrent.	Set: Driver 1 is either open or shorted. Or Driver 1 exceeded its overcurrent setting. Clear: Correct open or short, and then Reset Controller.
10-2 0xA2	**Driver 2 Fault** Driver_2_Fault_Active 0x2161 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1) Open or short on driver load. 2) Dirty connector pins at controller or contactor coil. 3) Bad connector crimps or faulty wiring. 4) Driver overcurrent, as set by the Driver 2 Overcurrent parameter. 5) See Programmer » Controller Setup » Outputs » Driver 2 » Driver 2 Overcurrent.	Set: Driver 2 is either open or shorted. Or Driver 2 exceeded its overcurrent setting. Clear: Correct open or short, and then Reset Controller.
10-3 0xA3	**Driver 3 Fault** Driver_3_Fault_Active 0x2162 Fault Type(s):	1) Open or short on driver load. 2) Dirty connector pins at controller or contactor coil.	Set: Driver 3 is either open or shorted. Or Driver 3 exceeded its overcurrent setting. Clear: Correct open or short,

	1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	3) Bad connector crimps or faulty wiring. 4) Driver overcurrent, as set by the Driver 3 Overcurrent parameter. 5) See Programmer » Controller Setup » Outputs » Driver 3 » Driver 3 Overcurrent.	and then Reset Controller.
10-4 0xA4	**Driver 4 Fault** Driver_4_Fault_Active 0x2163 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low) 4 = Open/Short (Low, should be High) 5 = Driver Open	1) Open or short on driver load. 2) Dirty connector pins at controller or contactor coil. 3) Bad connector crimps or faulty wiring. 4) Driver overcurrent, as set by the Driver 4 Overcurrent parameter. 5) See Programmer » Controller Setup » Outputs » Driver 4 » Driver 4 Overcurrent.	Set: Driver 4 is either open or shorted. Or Driver 4 exceeded its overcurrent setting. Clear: Correct open or short, and then Reset Controller.
10-5 0xA5	**Driver 5 Fault** Driver_5_Fault_Active 0x2164 Fault Type(s): 1 = Driver Short 2 = Driver Overcurrent 3 = Open/Short (High, should be Low)	1) Open or short on driver load. 2) Dirty connector pins at controller or contactor coil. 3) Bad connector crimps or faulty wiring. 4) Driver overcurrent, as set by theDriver 5 Overcurrent parameter.	Set: Driver 5 is either open or shorted. Or Driver 5 exceeded its overcurrent setting. Clear: Correct open or short, and then Reset Controller.

	4 = Open/Short (Low, should be High) 5 = Driver Open	5) See Programmer » Controller Setup » Outputs » Driver 5 » Driver 5 Overcurrent.	
10-8 0xA8	**Driver Assignment** Driver_Assignment_Active 0x2632 Fault Type(s): 5 {X} = Driver number that cause the fault	1) A Driver Output is used for two or more functions. 2) See Programmer » Controller Setup » IO Assignments » Coil Drivers: Main Contactor Driver, EM Brake Driver, Hydraulic Contactor Driver.	Set: Driver assignment conflict Clear: Resolve the conflicted driver assignment, then Reset Controller.
11-1 0xB1	**ANALOG 1 OUT OF RANGE** Analog_1_Out_Of_Range 0x2620 Analog_X_Out_of_Range Fault Type(s): 1 = above High limit 2 = below Low limit	1) Analog 1 input voltage above the parameter setting of Analog 1 High. 2) Analog 1 input voltage is below the parameter setting of Analog 1 Low. 3) See Programmer » Controller Setup » Analog Inputs » Analog 1. 4) See Programmer » Controller Setup » Analog Inputs » Configure » Analog 1 Low/Analog 1 High.	Set: (1) Input voltage (on pin) is above the parameter's set-point threshold. (2) Input voltage (on pin) is below the parameter's set-point threshold. Clear: Return the voltage to within the allowed range, then Reset Controller.
11-2 0xB2	**ANALOG 2 OUT OF RANGE** Analog_2_Out_Of_Range 0x2621	See Analog 1 Out of Range.	See Analog 1 Out of Range

11-3 0xB3	**ANALOG 3 OUT OF RANGE** Analog_3_Out_Of_Range 0x2622	See Analog 1 Out of Range.	See Analog 1 Out of Range
11-4 0xB4	**ANALOG 4 OUT OF RANGE** Analog_4_Out_Of_Range 0x2623	See Analog 1 Out of Range.	See Analog 1 Out of Range
B-5 0xB5	**ANALOG 5 OUT OF RANGE** Analog_5_Out_Of_Range 0x2624	See Analog 1 Out of Range.	See Analog 1 Out of Range
11-6 0xB6	**ANALOG 6 OUT OF RANGE** Analog_6_Out_Of_Range 0x2625	See Analog 1 Out of Range.	See Analog 1 Out of Range
11-7 0xB7	**ANALOG 7 OUT OF RANGE** Analog_7_Out_Of_Range 0x2626	See Analog 1 Out of Range.	See Analog 1 Out of Range
11-8 0xB8	**ANALOG 8 OUT OF RANGE** Analog_8_Out_Of_Range 0x2627	See Analog 1 Out of Range.	See Analog 1 Out of Range

11-11 0xBB	**ANALOG 14 OUT OF RANGE** Analog_14_Out_Of_Range 0x262A	See Analog 1 Out of Range.	See Analog 1 Out of Range
11-12 0xBC	**Analog Assignment** Analog_Assignmnt_Active 0x2631 Fault Type(s): 9 {X = 1–8, 14} X = Analog Input number that caused the fault	1) An Analog Input is used for two or more functions. 2) An Analog Input is outside the range of analog inputs. 3) See Programmer » Controller Setup » IO Assignments » Controls.	Set: An Analog Input is used for two or more functions or is outside the range of analog inputs Clear: Resolve assignment conflict, and then Reset Controller.
12-1 0xC1	**Branding Error** Branding_Error_Active 0x2860 Fault Type(s): 1	1) Software and hardware branding mismatch. 2) For technical support on this fault,contact the Curtis distributor where you obtained your controller or the Curtis sales-support office in your region.	Set: Software/Hardware incompatibly. Clear: As applicable: Load Branded software, or use Branded controller with the correct device profile and the correct Curtis Integrated Toolkit TM key.
12-3 0xC3	**Hardware Compatibility** Hardware_Compatibility_Active 0x2870 Fault Type(s): 1	The OS (.cdev) is incompatible with the controller. The loaded software is not compatible with the controller hardware.	Set: Incorrect OS (.cdev) Clear: Load the matching OS (.cdev).
12-5 0xC5	**Lift Input Fault** Lift_Input_Active 0x2104	The associated fault diagnostic with the assigned lift-input source triggers this fault.	Set: Faults from the respective/ assigned "Lift_Input_Source" are cascaded and reported.

	Fault Type(s): 1	For example: If the Lift_Input_Source is an analog input, then any faults detected by the respective Input fault diagnostics are cascaded and reported within thisfault code.Note: An analog input fault diagnostics may be out of range when set as a voltage input or may include potentiometer faults if configured as a 2/3-wire pot.	Clear: Resolve any input assignment conflict, or out-of-range faults. Then Reset Controller.
12-6 0xC6	**Lower Input Fault** Lower_Input_Active 0x2105 Fault Type(s): 1	The associated fault diagnostic with the assigned lower-input source triggers this fault. For example: If the Lower_Input_Source is an analog input, then any faults detected by the respective Input fault diagnostics are cascaded and reported within this fault code. Note: An analog input fault diagnostics may be out of range when set as a voltage input or may include potentiometer faults if configured as a 2/3-wire pot.	Set: Faults from the respective/ assigned "Lower_Input_ Source" are cascaded and reported. Clear: Resolve any input assignment conflict, or out-of-range faults. Then Reset Controller.

Fault code of Curtis F2C controller

Fault	Description	Possible causes	Triggering &troubleshooting	Controller command when a fault occurs
1-2	**Controller Overcurrent** Fault type: 1 = U-phase overcurrent 2 = w-phase overcurrent 3 = phase V overcurrent 4 = controller current > 135% current limit	1. External connection short circuit of u, V and W phases of motor 2. Motor encoder signal is disturbed 3. Wrong adjustment of motor parameters 4. Controller failure	Trigger: phase current exceeds upper limit of current detection Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
1-3	**Current Sensor** Fault type: 1	1. Leakage from u, V or W phase to truck body (short circuit in stator) 2. Controller failure	Trigger: current sensor has invalid offset reading Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
1-4	**Precharge Failed** Fault type: 1. Interrupt 2. Energy limitation 3. Time limit	1. The load connected to the b+ terminal of the controller inhibits the internal capacitor charging of the controller 2. Check the voltage displayed by programmer\system monitor menu\controller\capacitor voltage	Trigger: controller capacitor charging failed Clear: on-off interlock or reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
1-5	**Controller Severe**	1. The controller operates in extreme environment	Trigger: radiator temperature below	Close motor, main contactor, EM

	Undertemp Fault type: 1	2. Check the temperature displayed by programmer\system monitor menu\controller\controller temperature	-40 ° C Clear: the radiator temperature is higher than -40 ° C, Then reset the controller	brake, accelerator, full power braking
1-6	**Controller Severe Overtemp** Fault type: 1	1. The controller operates in extreme environment 2. Overload 3. Unreasonable controller installation 4. Check the temperature displayed by programmer\system monitor menu\controller\controller temperature	Trigger: radiator temperature below +95 ° C Clear: the radiator temperature is lower than +95 ° C, and then reset the controller	Close motor, main contactor, EM brake, accelerator, full power braking
1-7	**Severe B+ Undervoltage** Fault type: 1	1. Non controller system consumes photocell 2. The internal resistance of the battery is too high 3. The battery is not connected when driving the motor 4. The fuse connecting b+ is burnt out or the main contactor is not closed 5. Controller battery parameter setting error 6. Check the voltage displayed by programmer\system monitor menu\controller\capacitor voltage	Triggering: main contactor closing, FET bridge circuit After operation: or due to low-voltage shutdown current transmission It exceeds 64ms or reaches the low-voltage shutdown voltage value of the controller Clear: controller current output >0% exceeds 100ms, or capacitor	No drive torque output

			voltage > low voltage off voltage value	
1-7	**Severe KSI Undervoltage** Fault type: 1	1. Non controller system consumes photocell 2. KSI input circuit resistance is too high 3. KSI line is disconnected when driving motor 4. Fuse blown 5. Check the voltage displayed by programmer\system monitor menu\controller\keyswitch voltage	Trigger: KSI voltage is lower than low voltage shutdown Press for 2 seconds Clear: KSI voltage > low voltage off voltage value	None, unless there is special measure in the VCL software
1-8	**Severe B+ Overvoltage** Fault type: 1	1. Controller battery parameter setting error 2. For regenerative braking, when there is current to recharge the battery, the internal resistance of the battery is too high 3. The battery is not connected during regenerative braking 4. Check the voltage displayed by programmer\system monitor menu\controller\capacitor voltage	Trigger: when the FET bridge works, the capacitor is energized The pressure exceeds the set value of severe high pressure Clear: capacitor voltage is lower than severe high voltage setting Set value, reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
1-8	**Severe KSI Overvoltage** Fault type: 1	1. The battery voltage to the KSI (Pin1) terminal of the controller exceeds the set value of severe high voltage 2. Check the voltage displayed by programmer\system monitor	Trigger: KSI voltage exceeds the severe high voltage setting Fixed value Clear: capacitor	Close motor, main contactor, EM brake, accelerator, full power braking

		menu\controller\key switch voltage	voltage is lower than severe high voltage setting Set value, reset controller	
1-9	**Speed Limit Supervision** Fault type: 1	1. It is detected that the motor speed exceeds the set value of max speed supervision 2. The max speed supervision setting value is incorrect 3. Check the programmer\application setup\max speed supervision setting value	Trigger: the motor speed exceeds the set value and The duration also exceeds the set value Clear: reset controller	Close interlock, EM brake、
1-10	**Travel Control Supervision** Fault type: 1	1. When the truck is stopped, it is detected that the controller output frequency and phase current exceed travel control Parameter settings under supervision 2. Incorrect parameter setting under travel control supervision 3. Check the programmer\application setup\travel control supervision setting value	Trigger: motor frequency Phase current exceeds travel control Parameter settings under supervision Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
2-2	**Controller Overtemp Cutback** Fault type: 1	1. The controller operates in extreme environment 2. Overload 3. Unreasonable controller installation 4. The controller performance is limited at this temperature 5. Check the temperature displayed by programmer\system monitor	Trigger: radiator temperature below +85 ° C Clear: radiator temperature is lower than +85 ° C, Then reset the controller	Reduce drive and braking torque

		menu\controller\controller temperature		
2-3	**Undervoltage Cutback** Fault type: 1	1. The battery needs to be charged, and the controller performance is limited under this voltage 2. Controller battery parameter setting error 3. Non controller system consumes photocell 4. The internal resistance of the battery is too high 5. The battery is not connected when driving the motor 6. The fuse connecting b+ is burnt out or the main contactor is not closed 7. Check the programmer\system monitor menu\controller\currents\undervoltage cutback 8. Check the voltage displayed by programmer\system monitor menu\controller\capacitor voltage	Trigger: after the FET bridge works, the capacitor is energized Pressure below the undervoltage cutback limit Clear: capacitor voltage is higher than undervoltage Cutback limit value	Reduce drive torque
2-4	**Overvoltage Cutback** Fault type: 1	1. During normal operation, the current generated by regenerative braking is recharged to the battery, and the battery voltage is too high, resulting in The controller performance is limited at this voltage 2. Controller battery parameter setting error 3. For regenerative braking, when there is current to recharge the battery, the	Trigger: after the FET bridge works, the capacitor is energized Pressure exceeds the overvoltage cutback limit Clear: the capacitor voltage is higher than the overvoltage	Reduce drive torque Note: This fault is only detectable during regenerative braking.

		internal resistance of the battery is too high 4. The battery is not connected during regenerative braking 5. Check the programmer\system monitor menu\controller\currents\overvoltage cutback 6. Check the voltage displayed by programmer\system monitor menu\controller\capacitor voltage	cutoff limit	
2-5	**Ext 5V Supply Failure** Fault type: 1. Output 5V voltage out of range 2. The current of 5V voltage is out of range	1. The external 5V load is small (pin16) 2. Check programmer\system monitor Menu\outputs displays the voltage and electric current	Trigger: 1. 5V output exceeds 5V ± 10%; 2. 5V current is limited by parameter setting; Clear: reset the controller or VCL reset position	Close 5V output
2-6	**Ext 12V Supply Failure** Fault type: 1. Output 12V voltage out of range 2, 12 voltage current out of range	1. The external 12V load is small (pin23) 2. Check programmer\system monitor Menu\outputs displays the voltage of the 12V output And current	Trigger: 1. 12V output exceeds 12V ± 15%; 2. 12V current is limited by parameter setting; Clear: reset the controller, or VCL reset	Close 12V output
2-8	**Motor Temp Hot Cutback** Fault type: 1	1. The motor temperature is greater than or equal to the temperature hot setting value, resulting in the controller output	Trigger: the motor temperature is greater than or equal	1. Reduce the drive torque 2. If MotorBraking

		current limiting 2. Motor temperature and sensor parameter settings are incorrect 3. Check programmer\ac motor setup\temperature sensor	to the temperature hot setting value Clear: reduce the temperature to normal value	Thermal CutBack_ Ena ble=On, reducing braking torque
2-9	**Motor Temp Sensor** Fault type: 1	1. The motor temperature sensor was not connected properly; 2. Sensor polarity connection is incorrect (pin9 and pin12) 3. Motor temperature and sensor parameter settings are incorrect 4. Check programmer\system monitor menu\ac motor\temperature	Trigger: the voltage value converted by the motor temperature sensor input (pin9) is out of range Clear: motor temperature sensor input voltage Return to normal range	Enter LOS mode, reduce the motor speed, and turn off the high position reduction function of the motor
3-1	**MAIN DRIVER** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open circuit / short circuit (high detected, it should be low) 4. Open circuit / short circuit (low detected, should be high) 5. Disconnection	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error	Trigger: when main enable = on, the main contactor drive is open or short circuited Clear: reset the controller after repair	Close motor, main contactor, EM brake, accelerator, full power braking

3-2	**EM Brake Driver** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open circuit / short circuit (high detected, it should be low) 4. Open circuit / short circuit (low detected, should be high) 5. Disconnection	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error	Trigger: when EM brake type >0, power Magnetic brake (pin 4) drive open circuit or short circuit Clear: reset the controller after repair	Close EM brake, accelerator, full power braking
3-4	**Load Hold Diver Fault**	Equivalent Driver 1 Fault	Equivalent Driver 1 Fault	Close the currently allocated drive
3-5	**Lower Driver**	Equivalent to driver 1 fault (fault 10-1)		
3-6	**Encoder Fault** Fault type: 1. Calibration loss 2. Pulse loss caused by overcurrent 3. Loss of speed pulse signal 4. Motor matching 5. Encoder power supply failure	1. Motor encoder failure 2. Crimping or wiring error 3. Check programmer\system monitor Menu\AC Motor\Motor RPM 4. Check programmer\ac motor setup\quadrant encoder\encoder fault setup	Trigger: motor encoder signal detection failure Clear: reset the controller, or if refer to Count Los upon encoder fault =on, reset the interlock switch and the fault is cleared, and enter Los fault mode	Close motor, main contactor, EM brake, accelerator, full power braking

			(9-3fault)	
3-7	**Motor Open** Fault type: 1	1. Motor phase open circuit 2. Crimping or wiring error	Trigger: Motor u, V and W phases are detected open circuit Clear: switch KSI	Close motor, main contactor, EM brake, accelerator, full power braking
3-8	**Main Contactor Welded** Fault type: 1	1. The contact of main contactor is stuck and normally open 2. Motor V-phase or U-phase open circuit 3. The external voltage is directly connected to the controller b+ wiring column	Trigger: release after the main contactor is closed, and the capacitor voltage does not drop Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
3-9	**Main Contactor Did Not Close** Fault type: 1. The main contactor is not closed after there is a control command 2. The main contactor is disconnected during operation	Type 1: 1. Main contactor does not pull in 2. Main contactor contact is defective 3. The controller b+ terminal is externally connected with a large load, resulting in Capacitor cannot be effectively charged 4. High current fuse is burnt out 5. Main contactor parameter setting error Type 2: 1. The main contactor is disconnected during operation 2. Contactor coil disconnected 3. Contactor failure	Triggering: after the main contactor is controlled and closed, the The capacitive voltage is not charged to the battery voltage Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
4-2	**Throttle Input** Fault type: 1. External too low or too high	1. The accelerator input voltage exceeds the range set by analog low and analog high, and the corresponding analog quantity	Trigger: the accelerator input voltage exceeds the analog low and	Close accelerator

		Input defined as accelerator input 2. Check programmer\controller setup\analog inputs\analog 1 type 3. Check programmer\controller setup\analog inputs\configure	analog high settings Range of settings Clear: accelerator input voltage returns to normal Range, reset controller	
4-4	Brake Input Fault type： 1	Corresponding fault triggered by brake input source (allocated analog input)	Note: Input 1 fault diagnosis may also indicate that the input voltage is out of range	Full power braking
4-6	**NV Memory Failure** Fault type: 1. Invalid verification 2. Data writing error 3. Data reading error 4. Data writing was not completed due to power failure	1. Memory data read / write failure 2. Controller internal fault	Trigger: the number of EEPROM read and write by the controller Data failed Clear: download the correct software and corresponding parameters Number setting, reset controller	Close motor, main contactor, EM brake, accelerator, interlock, drive1, drive2, drive 3. Drive 4, Drive 5, Proportional drive, Full power braking
4-7	**HPD Sequencing** Fault type: 1	1. The key switch, interlock, direction switch and accelerator input operation sequence is incorrect 2. Wiring or crimping error occurs when the key switch, interlock, direction switch and accelerator input are	Triggering: HPD or SRO fault is triggered by incorrect operating sequence of key switch, interlock, direction	Close accelerator

		disconnected 3. Key switch, interlock, direction switch and accelerator input are damp 4. Check the programmer\system monitor menu\inputs\switch status 5. Check the programmer\system monitor menu\inputs\throttle command	switch and accelerator input Clear: re count in the correct order	
4-7	**EMER Rev HPD** Fault type: 1	1. The emergency reverse operation has ended, but the accelerator input, direction switch and interlock have not returned	Trigger: the emergency reverse operation has ended, but Accelerator input, direction switch and interlock Do not return Clear: if EMR interlock is set to on, the accelerator, direction switch and interlock input need to be cleared; If EMR interlock is set to off, the accelerator and direction switch inputs need to be cleared	Close accelerator, EM brake
4-7	**Pump HPD** Fault type： 1. Lifting only 2. Lowering only 3,	Incorrect input condition for lifting/powering accelerator (>25%) Setting parameter error: 1. Hydraulic suppression type 2. HPD/SRO judgment time oil	Trigger: 1. Lifting accelerator output is high during startup	Close oil pump

	lifting&lowering	pumpaccelerator hardware failure	2. During startup, the output of the lowering accelerator is high 3. When starting, the output of the lifting&lowering accelerator is high Clear: When starting, the accelerator output returns to less than 25%, and the switch KSI	
4-9	**Parameter Change** Fault type: Can ID of the recorded parameter	1. After the interlock is closed, modify the parameters related to safety, i.e. the parameters marked with PCF	Trigger: adjust parameters requiring switch KSI Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
4-10	**EMR Switch Redundancy** Fault type: 1	1. One or two of the two emergency reverse switches do not work, resulting in invalid status 2. The switch is damp or dirty	Triggering: emergency reverse switch normally open and normally closed are not synchronized Clear: correct the switch status and reset the controller	Close interlock, EM brake
5-1 To	**User 1,2...32 Fault**	User defined, implemented through VCL	User defined, implemented	User defined, implemented

7-13	Fault type: User defined		through VCL	through VCL
6-8	**VCL Run Time Error**	1. Operation time fault is defined by VCL. Refer to system information 2. The drive command and drive letter do not match when using VCL to control the drive	Trigger: VCL running time error detected error Clear: modify VCL and reset controller	Close motor, main contactor, EM brake, accelerator, interlock, drive 1, drive 2, drive 3, drive 4, drive 5, proportional drive, full power braking
7-2	**PDO Timeout** Fault type: 1	1. The time for two adjacent PDOS to receive information exceeds the set PDO timeout 2. Adjust the PDO settings and check the programmer/application setup/can interface PDO setups	Trigger: the time for two adjacent PDOS to receive information exceeds the set PDO timeout Clear: receive can NMT information or reset the controller	Close accelerator
7-3	**Stall Detected** Fault type: 1	1. Motor Locked Rotor 2. Motor encoder failure 3. Incorrect crimping or wiring 4. Abnormal power supply of motor encoder 5. Check programmer\system monitor Menu\AC Motor\Motor RPM	Trigger: no change of motor encoder signal detected Clear: reset the controller, or if the parameter Los upon encoder fault =on, the fault clears after resetting the interlock switch and enters Los Fault mode (9-3fault), allowing	Close motor, EM brake, accelerator, control mode changed to LOS, motor output limited

			to limit motor output	
7-7	**Supervision** Fault type: Curtis monitoring code	1. Controller internal fault	Trigger: controller internal failure Clear: reset controller	Close motor, main contactor, EM brake, accelerator, interlock, drive 1, drive 2, drive 3, drive 4, drive 5, proportional drive, full power braking
7-9	**Supervision Input Check** Fault type: 1	1. Controller internal fault	Trigger: the controller is damaged Clear: reset controller	Close motor, main contactor, EM brake, accelerator, interlock, drive 1, drive 2, drive 3, drive 4, drive 5, proportional drive, full power braking
8-2	**PDO Mapping Error** Fault type: 1	1. Too many data bits are allocated during PDO mapping, Or the target is incompatible 2. Adjust PDO settings and view Programmer/Application Setup/CAN Interface/PDO Setups	Trigger: incorrect PDO mapping detected Clear: reset controller	Close PDO
8-3	**Internal Hardware** Fault type: Curtis hardware code	1. Internal controller fault detected	Trigger: controller internal fault detected Clear: reset controller	Close motor, main contactor, EM brake, accelerator, full power braking
8-7	**Motor Characterization**	1. Motor matching failed during motor matching	Trigger: motor matching failed	Close motor, main contactor, EM

	Error Fault type: 71 write memory RAM failure 72 temperature sensor failure 73 motor overheating 74 controller temperature reduction 76 low voltage reduction 77 high voltage reduction 78 No encoder signal 79 current calibration out of range 80 current calibration out of range 81 can detect the encoder signal, but cannot automatically detect the number of pulses per cycle (encoder steps) 82 auto match		during motor matching Clear: reset controller	brake, accelerator, full power braking

	failed 90/98 permanent magnet synchronous motor feedback sine / cosine signal is not detected 91 permanent magnet synchronous motor does not rotate 92 no acceleration or low acceleration of permanent magnet synchronous motor 94-97 permanent magnet synchronous motor delay compensation out of range 99 permanent magnet synchronous motor rotates at the beginning of matching 102 permanent			

	magnet synchronous motor temperature sensor fault 103 high temperature reduction of permanent magnet synchronous motor 104 permanent magnet synchronous motor controller temperature reduction 106 low voltage reduction of permanent magnet synchronous motor controller 107 high voltage reduction of permanent magnet synchronous motor controller			
8-8	**Encoder Pulse Error**	1. The encoder step number setting is inconsistent with the actual value	Trigger: wrong encoder step setting	Close motor, main contactor, EM

	Fault type: 1	2. Check the parameter setting programmer\ac Motor Setup\Quadrature Encoder\Encoder Steps 3. Motor lost IFO control and no accelerator signal Acceleration of motor rotation under input	detected Clear: confirm that the encoder step number setting is consistent with the actual value, and reset the controller	brake, accelerator, full power braking
8-9	**Parameter Out of Range** Fault type: Record target canid	1. Parameter value out of range detected 2. Check and rewrite parameters with CIT tool	Trigger: parameter value out of range detected Clear: Rewrite parameters to normal range	Close motor, main contactor, EM brake, accelerator, full power braking
9-1	**Bad Firmware** Fault type: 1	Incorrect controller firmware 1. CRC or OS mismatch 2. Incompatible OS is used	Trigger: the downloaded software and controller hardware Do not match Clear: Download matching software	Controller cannot fully started
9-2	**EM Brake Failed To Set** Fault type: 1	1. Truck operation is detected, and the electromagnetic brake is set After braking 2. The motor cannot be prevented from rotating after electromagnetic braking	Trigger: after the electromagnetic brake is set and delayed, the truck operation is detected Clear: 1 activate accelerator (EM brake Type = 2）；2 activation interlock (EM	Trigger the parking function after activating the Close electromagnetic brake and accelerator interlock

			Brake Type = 1）	
9-3	**Encoder LOS** Fault type: 1	1. Encoder 3-6 fault or 7-3 fault, enter Los mode 2. Motor encoder failure 3. Crimping or wiring error 4. Truck stalling	Trigger: encoder 3-6 fault or 7-3 fault. If the parameter Los upon encoder fault =on, reset the interlock switch and enter the Los fault mode (9-3 fault), allowing to limit the motor output Clear: switch KSI, or if Los has been triggered, clear after confirming that the encoder is normal, motor rpm = 0, throttle command = 0	LOS mode
9-4	**Emer Rev Timeout** Fault type: 1	1. Emergency reverse trigger and end, because the emergency reverse time expires 2. The emergency reverse input is stuck	Trigger: trigger the emergency reverse, and the operation expires Clear: turn off emergency reverse input	Close accelerator, EM brake
9-5	**Pump Overcurrent** Fault type: 1. Oil pump current sensor	1. Oil pump motor external short circuit 2. Controller failure	Trigger: oil pump current over current detection upper limit	Close oil pump

	value is close to its power supply voltage 2. Oil pump current sensor value approaching sensor grounding 3. Upper limit of oil pump current overcurrent detection		Clear: Switch KSI	
9-6	**Pump BDI**	1. The battery level is lower than the low battery lock parameter setting value 2. BDI parameter setting error	Trigger: When the battery level drops below the low battery lock parameter setting, the oil pump action is triggered Clear: battery charging	Close oil pump
9-7	**Pump Hardware** Fault type: 1. The duty cycle remains unchanged 2. The input and output duty cycles of the oil	1. Oil pump motor external short circuit 2. Controller failure	Trigger: 1. Oil pump duty cycle update failed; 2. Input and output duty cycle mismatch Clear: Switch KSI	Close truck traveling

	pump do not match			
9-9	**Parameter Mismatch** Fault type: 1. Dual drive function is turned on in torque mode 2. SPMSM motor feedback selects encoder 3. Positive Yuxuan is selected for AC induction motor feedback	1. Incorrect motor feedback selection for different motor technology applications 2. Dual drive function is turned on in torque mode 3. The dual drive function is enabled when the single controller is applied	Trigger: 1. The dual drive function is turned on in torque mode 2. SPMSM motor feedback selects code implement 3. Sine and cosine is selected for AC induction motor feedback Clear: adjust the parameters to appropriate values and reset the controller	Close motor, main contactor, EM brake, accelerator, full power braking
9-10	**Interlock Braking Supervision** Fault type: 1. The motor speed exceeded the speed limit of interlock braking monitoring 2. The interlock is disconnected, and the	1. During interlock braking, the motor speed exceeds the parameters set under interlock braking supervision 2. Check programmer / application setup / interlock braking / supervision enable 3. View programmer / application setup / interlock braking / interlock braking supervision	Trigger: during interlock braking, the motor turns The speed exceeds the parameters set under the interlock braking supervision Clear: reset controller	Close motor, EM brake, main contactor

	electromagnetic brake is not set within the set time 3. The interlock is disconnected, the electromagnetic brake is not set, and the rotor position exceeds the RPM position limit			
9-11	**EMR Supervision** Fault type: 1	1. During emergency reverse, the motor speed exceeds the speed set under emergency reverse supervision parameter 2. Check programmer / application setup/ emergency reverse / emergency reverse Supervision.	Trigger: during the emergency reverse process, the motor turns Speed exceeds emergency reverse Parameters set under supervision Clear: reset controller	Close motor, EM brake, main contactor
10-1	**Driver 1 Fault** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open / short circuit (high detected, Should be low)	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error 4. The driver 1 overcurrent setting parameter value is exceeded 5. View programmer / controller setup /outputs / driver 1 / driver 1 overcurrent	Trigger: drive 1 open circuit or short circuit or drive Overcurrent, exceeding the value of driver 1 overcurrent setting parameter Clear: reset the control after	Close drive 1

	4. Open / short circuit (low detected, Should be high) 5. Disconnection		repairing the short circuit or open circuit Brake	
10-2	**Driver 2 Fault** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open / short circuit (high detected, Should be low) 4. Open / short circuit (low detected, Should be high) 5. Disconnection	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error 4. Driver 2 overcurrent Set parameter value 5. View programmer / controller setup/ Outputs / Driver 2 / Driver 2 Overcurrent.	Trigger: drive 2 open or short circuit or drive Overcurrent, exceeding the value of driver 2 overcurrent setting parameter Clear: reset the controller after repairing the short circuit or open circuit	Close drive 2
10-3	**Driver 3 Fault** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open / short circuit (high detected, Should be low) 4. Open / short	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error 4. The driver 3 overcurrent setting parameter value is exceeded 5. View programmer / controller setup /outputs / driver 3 / driver 3 overcurrent	Trigger: drive open circuit or short circuit or over drive Stream, exceeding the driver 3 overcurrent setting Set parameter value Clear: reset the controller after repairing the short circuit or open circuit	Close drive 3

	circuit (low detected, Should be high) 5. Disconnection			
10-4	**Driver 4 Fault** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open / short circuit (high detected, Should be low) 4. Open / short circuit (low detected, Should be high) 5. Disconnection	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error 4. The driver 4 overcurrent setting parameter value is exceeded 5. View programmer / controller setup /outputs / driver 4 / driver 4 overcurrent	Trigger: drive 4 open circuit or short circuit or drive Overcurrent, exceeding the value of the driver 4 overcurrent setting parameter Clear: reset the controller after repairing the short circuit or open circuit	Close drive 4
10-5	**Driver 5 Fault** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open / short circuit (high detected, Should be low) 4. Open / short circuit (low	1. Open circuit or short circuit of driver load 2. Connector pin or contactor coil is dirty 3. Connector crimping error or wiring error 4. Drive overcurrent exceeds the driver 5 overcurrent setting parameter value 5. View programmer / controller setup /outputs / driver 5 / driver 5 overcurrent	Trigger: drive 5 open circuit or short circuit or drive Overcurrent, exceeding the driver 5 overcurrent setting parameter value Clear: reset the controller after repairing the short circuit or open circuit	Close drive 5

	detected, Should be high) 5. Disconnection			
10-6	**Driver 6 Fault** Fault type: 1. Drive short circuit 2. Drive overcurrent 3. Open circuit/short circuit (high detected, should be low) 4. Open circuit/short circuit (low detected, should be high) 5. Broken wire 6. Output limit no current fault type 3-5 requires drive fault detection to be turned on	1. Driver load open circuit or short circuit 2. The pin pin of the connector or the coil of the contactor is dirty 3. Connector crimping error or wiring error 4. Drive overcurrent, exceeding the parameter value set for Driver 6 Overcurrent 5. View Programmer/Controller Setup/Outputs/Driver 6/Driver 6 overcurrent	Trigger: Drive 6 open circuit or short circuit, or drive overcurrent, exceeding the parameter value set for Driver 6 Overcurrent Clear: Reset the controller after repairing a short or open circuit	Close drive 6
10-7	**Driver 7 Fault** Fault type: 1. Drive short circuit	1. Driver load open circuit or short circuit 2. The pin pin of the connector or the coil of the contactor is dirty 3. Connector crimping error or wiring	Trigger: Drive 7 open circuit or short circuit, or drive overcurrent, exceeding the	Close drive 7

	2. Drive overcurrent 3. Open circuit/short circuit (high detected, should be low) 4. Open circuit/short circuit (low detected, should be high) 5. Broken wire 6. Output limit no current fault type 3-5 requires open drive fault detection	error 4. Drive overcurrent, exceeding the parameter value set for Driver 7 Overcurrent 5. View Programmer/Controller Setup/Outputs/Driver 7/Driver 7 Overcurrent	parameter value set for Driver 7 Overcurrent Clear: Reset the controller after repairing a short or open circuit	
10-8	**Driver Assignment** Fault type: 5 drive S/N causes the fault	1. One drive is used for 2 or more functions 2. View programmer / controller setup/ IO Assignments / Coil Drivers: Main contactor drive Electromagnetic brake drive Pump contactor drive	Trigger: drive assignment conflict Clear: reset the controller after resolving the drive assignment conflict	Close driver
10-9	**Coil Supply Fault** Fault type: 1. Short circuit to B - or hardware failure	1. Driver load short circuit 2. The pin pin of the connector or the coil of the contactor is dirty 3. Connector crimping error or wiring error 4. Controller failure	Trigger: a short circuit was detected after the startup check passed. Detected a short circuit in the	Close all output of the controller

	2. The drive has an internal short circuit, causing the coil power to be cut off 3. Coil power start detection failure 4. Coil power start inhibit detection failure		drive on the low side, and the corresponding fault cannot cut off the drive current Clear: Switch KSI	
11-1	**ANALOG 1 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. Input voltage of analog quantity 1 is higher than analog 1 High setting value 2. The input voltage of analog quantity 1 is lower than the set value of analog 1 low 3. View programmer / controller setup /analog inputs / analog 1 4. View programmer / controller setup/ Analog Inputs / Configure / Analog 1 Low/Analog 1 High	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	None, unless there is special measure in the VCL
11-2	**ANALOG 2 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the	1. Input voltage of analog quantity 2 is higher than analog 2 High setting value 2. The input voltage of analog quantity 2 is lower than analog 2 low Set value	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower	None, unless there is special measure in the VCL

	lower limit	3. View programmer / controller setup/ Analog Inputs / Analog 2 4. View programmer / controller setup/ Analog Inputs / Configure / Analog 2 Low/Analog 2 High	than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	
11-3	**ANALOG 3 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. Input voltage of analog quantity 3 is higher than analog 3 High setting value 2. The input voltage of analog 3 is lower than the set value of analog 3 low 3. View programmer / controller setup /analog inputs / analog 3 4. View programmer / controller setup /analog inputs / configure / analog 3 Low/Analog 3 High	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	None, unless there is special measure in the VCL
11-4	**ANALOG 4 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. The input voltage of analog quantity 4 is higher than the set value of analog 4 high 2. The input voltage of analog 4 is lower than the set value of analog 4 low 3. View programmer / controller setup /analog inputs / analog 4 4. View programmer / controller setup /analog inputs / configure / analog 4	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter;	None, unless there is special measure in the VCL

		Low/Analog 4 High	Clear: input voltage returns to the parameter setting range and resets the controller	
11-5	**ANALOG 5 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. The input voltage of analog quantity 5 is higher than the set value of analog 5 high 2. The input voltage of analog quantity 5 is lower than the set value of analog 5 low 3. View programmer / controller setup /analog inputs / analog 5 4. View programmer / controller setup /analog inputs / configure / analog 5 Low/Analog 5 High	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	None, unless there is special measure in the VCL
11-6	**ANALOG 6 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. The input voltage of analog quantity 6 is higher than the set value of analog 6 high 2. The input voltage of analog quantity 6 is lower than the set value of analog 6 low 3. View programmer / controller setup /analog inputs / analog 6 4. View programmer / controller setup /analog inputs / configure / analog 6 low/analog 6 high	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting	None, unless there is special measure in the VCL

			range and resets the controller	
11-7	**ANALOG 7 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. The input voltage of analog quantity 1 is higher than the set value of analog 7 high 2. Analog 7 input voltage is lower than analog 7 low setting value 3. View programmer / controller setup /analog inputs / analog 7 4. View programmer / controller setup /analog inputs / configure / analog 7 low/analog 7 high	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	None, unless there is special measure in the VCL
11-8	**ANALOG 8 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. The input voltage of analog quantity 8 is higher than the set value of analog 8 high 2. The input voltage of analog quantity 8 is lower than the set value of analog 8 low 3. View programmer / controller setup /analog inputs / analog 8 4. View programmer / controller setup /analog inputs / configure / analog 8 Low/Analog 8 High	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	None, unless there is special measure in the VCL
11-9	**Analog 9 Out**	1. The input voltage of analog	Trigger: 1. The	None, unless there

	of Range Fault type: 1. Exceeding the upper limit 2. 2. Below the lower limit	quantity 9 is higher than the set value of Analog 9High 2. The input voltage of analog quantity 8 is lower than the set value of Analog 9 Low 3. View Programmer/Controller Setup/Analog Inputs/Analog 9 4. View Programmer/Controller Setup/Analog	input voltage is higher than the threshold set by the parameter; 2. The input voltage is below the threshold set by the parameter; Clear: Return the input voltage to the parameter setting range and reset the controller	is special measure in the VCL
11-11	**ANALOG 14 OUT OF RANGE** Fault type: 1. Exceeding the upper limit 2. Lower than the lower limit	1. The input voltage of analog quantity 14 is higher than the set value of analog 14 high 2. The input voltage of analog quantity 14 is lower than the set value of analog 14 low 3. View programmer / controller setup/ Analog Inputs / Analog 14 4. View programmer / controller setup/ Analog Inputs / Configure / Analog 14 Low/Analog 14 High	Trigger: (1) input voltage is higher than parameter setting Threshold of; (2) The input voltage is lower than the threshold value set by the parameter; Clear: input voltage returns to the parameter setting range and resets the controller	None, unless there is special measure in the VCL
11-12	**Analog Assignment** Fault type: 9	1. One analog quantity is used as two or more functions 2. One analog input is out of range	Trigger: an analog quantity is used as 2 or more functions or	None, unless there is special measure in the VCL

	analog quantity S/N causes the fault	3. View programmer / controller setup/ IO Assignments / Controls	input is out of range Clear: reset the controller after resolving the drive assignment conflict	
11-13	**Analog 18 Out of Range** Fault type: 1. Exceeding the upper limit 2. Below the lower limit	1. The input voltage of analog quantity 18 is higher than the set value of Analog 18 High 2. The input voltage of analog quantity 18 is lower than the set value of Analog 18 Low 3. View Programmer/Controller Setup/Analog Inputs/Analog 18 4. View Programmer/Controller Setup/Analog Inputs/Configure/Analog 18 Low/Analog 18 High	Trigger: 1. The input voltage is higher than the threshold set by the parameter; 2. The input voltage is below the threshold set by the parameter; Clear: Return the input voltage to the parameter setting range and reset the controlle	None, unless there is special measure in the VCL
11-15	**Pump Current Sensor** Fault type: 1. The oil pump current sensor value is close to its power supply voltage 2. Oil pump current sensor value	1. Oil pump motor external short circuit 2. Controller failure	Trigger: The oil pump current sensor value approaches its power supply voltage and the sensor is grounded without current compensation Clear: Switch KSI	Close truck traveling

	approaching sensor grounding			
12-1	**Branding Error** Fault type: 1	1. Software and hardware brands do not match 2. Contact local Curtis technical support to deal with the problem barrier	Trigger: software and hardware incompatible Clear: as available, load branded software, or use branded controller and configure correct files and CIT tools	Close motor, main contactor, EM brake, accelerator, full power braking
12-3	**Hardware Compatibility failure** Fault type: 1	OS and controller incompatible 1. The downloaded software is incompatible with the controller hardware	Trigger: incorrect OS Clear: Download matching OS	Close motor, main contactor, EM brake, accelerator, full power braking
12-5	**Lift Input Fault** Fault type: 1	The fault diagnosis associated with the lifting input source will be triggered The fault. For example, the lifting input source is an analog Quantity input, then the All faults shall be collected and reported	Trigger: fault diagnosis associated with lifting input source will trigger the fault Clear: resolve any assignment conflicts or input out of range, and then reset the controller	Close lifting
12-6	**Lower Input Fault** Fault type: 1	The fault is triggered by the fault diagnosis associated with the descent input source. For example, the descent input source is an analog Quantity input, then the	Trigger: the fault is triggered by the fault diagnosis associated with the descent input source	Close lowering

		All faults shall be collected and reported	Clear: resolve any assignment conflicts or input out of range, and then reset the controller	

Attachment: inspection table of electric stacker, pallet carrier, trailer stacker

Inspection table of electric pallet stacking truck			
Patrol inspection and maintenance contents	**On-Site Inspection**	**500h**	**2000h**
Clean the stacker			
Check the key switch, password lock, horn and lighting system			
Check whether the pedal function is normal and whether there is damage			
Check whether the frame arm guard function is normal and whether the bolt connection is firm			
Check the lever function and reset function			
Check the function and of the safety linkage for damage			
Check the travel speed and braking distance			
Check the lifting and lowering speed			
Check the oil pipe and its joint for leakage, damage and damage			
Check whether the standard plate and safety Warning device are complete, clear and damaged			
Check whether the cable is worn and whether the terminal and plug are firm			
Check the battery acid concentration, liquid level and battery voltage			
Check the working condition of charger			
Check the function of the display device			
Check the fork for wear and damage			
Check the trailer coupling mechanism for normal function and damage (trailer head)			
Check the wheels for wear and damage			
Check whether the hydraulic system functions normally			
Check the function and damage of the hose guide			
Check the hydraulic oil level			
Check and clean the air gap of the electromagnetic brake			
Check contactors and relays			
Check microswitch settings and functions			
Check frame connection			
Check motor installation			
Check all motor carbon brushes (AC none)			
Check the safety device and parameter value			
Check all cables and connections			
Check and clean the pulse control part and electric control part			
Check the travel mechanism and adjust it if necessary			
Check wheel bearing and wheel fixing			
Lubricate seat guide wheel, door and cover sheet (trailer head)			
Change gear oil			
Replace hydraulic oil and filter element			