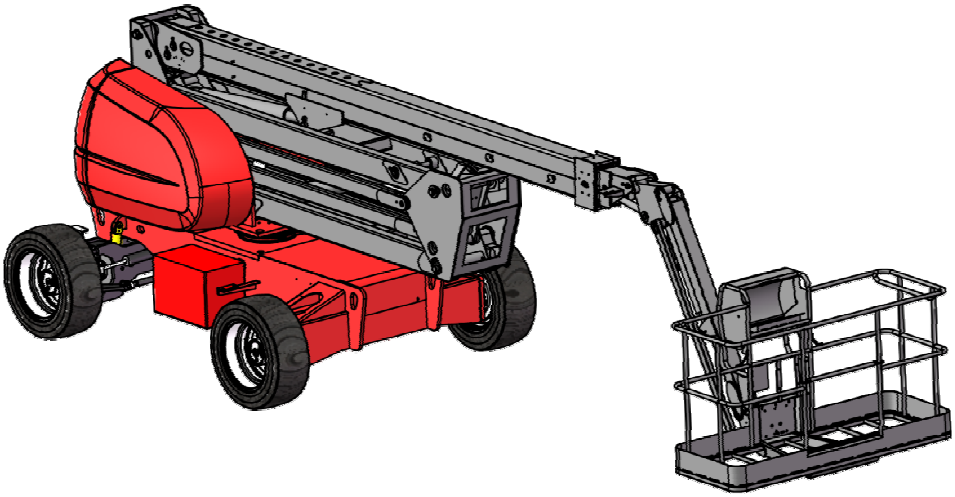
HZ Series

Curved arm high-altitude work platform

HZ210A

Repair manual



HANGCHA GROUP CO., LTD

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Catalogue

Preface

Thank you for purchasing the machine from Hangcha Group. Before using the machine, you should master the use and operation requirements of the machine! Any operation of the machine is risky. Only by mastering the safety rules and carefully operating can we effectively prevent personal injury, property damage and accidents. Your safety needs our joint efforts!

The machine is limited to transporting people and tools to the working position and carrying out operations on the working platform. Human safety is closely related to the operation and use of the machine. It is very important to train competent and careful personnel to use the machine and carry out safe operation of the machine. Only trained and authorized personnel are allowed to operate the machine.

This manual is used to guide users/operators to operate and use the machine. It is the responsibility of the user/operator to read, understand and follow this manual and manufacturer's instructions before operating and using the machine. Operators should read, understand and comply with the safety rules and operation instructions, consider the operating parameters and expected environment of the equipment, and strictly comply with the requirements for safe use.

This manual, together with the *Operation Manual* and the *Parts Manual*, should be taken as a part of the machine and kept with the machine at all times! And the manager of the machine shall ensure that all necessary information about operation and routine inspection/maintenance is provided to each lessee by the machine manufacturer. If the sale shall be distributed randomly, the machine manager shall also provide the manufacturer's maintenance information to the trained maintenance personnel responsible for the machine.

Our product design will be constantly updated and improved, the content of this manual may be different from the equipment in your hand.

In case of any ambiguity, please contact the sales company or agent of Hangcha Group Co., Ltd.

Chapter 1 product performance parameters

1.1 Product performance parameters

Table 1-1 product performance parameters

Dimension parameters	
Maximum platform height	18.80m
Maximum working height	20.80m
Maximum crossing height	8.28m
Maximum horizontal extension	11.45m
Maximum horizontal working distance	11.95m
Length	8.63m
Length（Transportation status）	
Width	2.49m
Width（Transportation status）	2.49m
Height	2.43m
Height（Transportation status）	2.43m（2.31m）
Wheelbase	2.5m
Maximum ground clearance	0.31m
Platform (long) × wide × High)	2.2m×0.8m×1.1m
Tire model	315/55 D20
Performance parameter	
Rated load	255kg（350kg Limited）
Maximum number of operators	2 persons
Maximum manual force	400N
Maximum driving speed	6.1km/h
Maximum traveling speed in lifting state	0.8km/h
Minimum turning radius	2.05m(inner)
Gradeability	40%
Maxi slope acceptable	5°
Turret rotation	360°free
Maximum allowable wind speed	12.5m/s
Platform rotation angle	180°
Jib luffing angle	70°/-60°

Power parameters	
Drive mode (drive × Steering)	4WD×2WS
Drive motor	7.6kW
Hydraulic motor	6kW
Pump	6ml/r
Tank Capacity	60L
Hydraulic system pressure	21MPa
Battery Specification--	48V，375Ah
Battery Specification（lithium）	48V，480Ah
System voltage （lead-acid）	48V
Control voltage	12V
Weight	
Total weight	9300kg
Total weight	9680kg
Ground bearing information	
Maximum tire load	5000kg

Be careful:

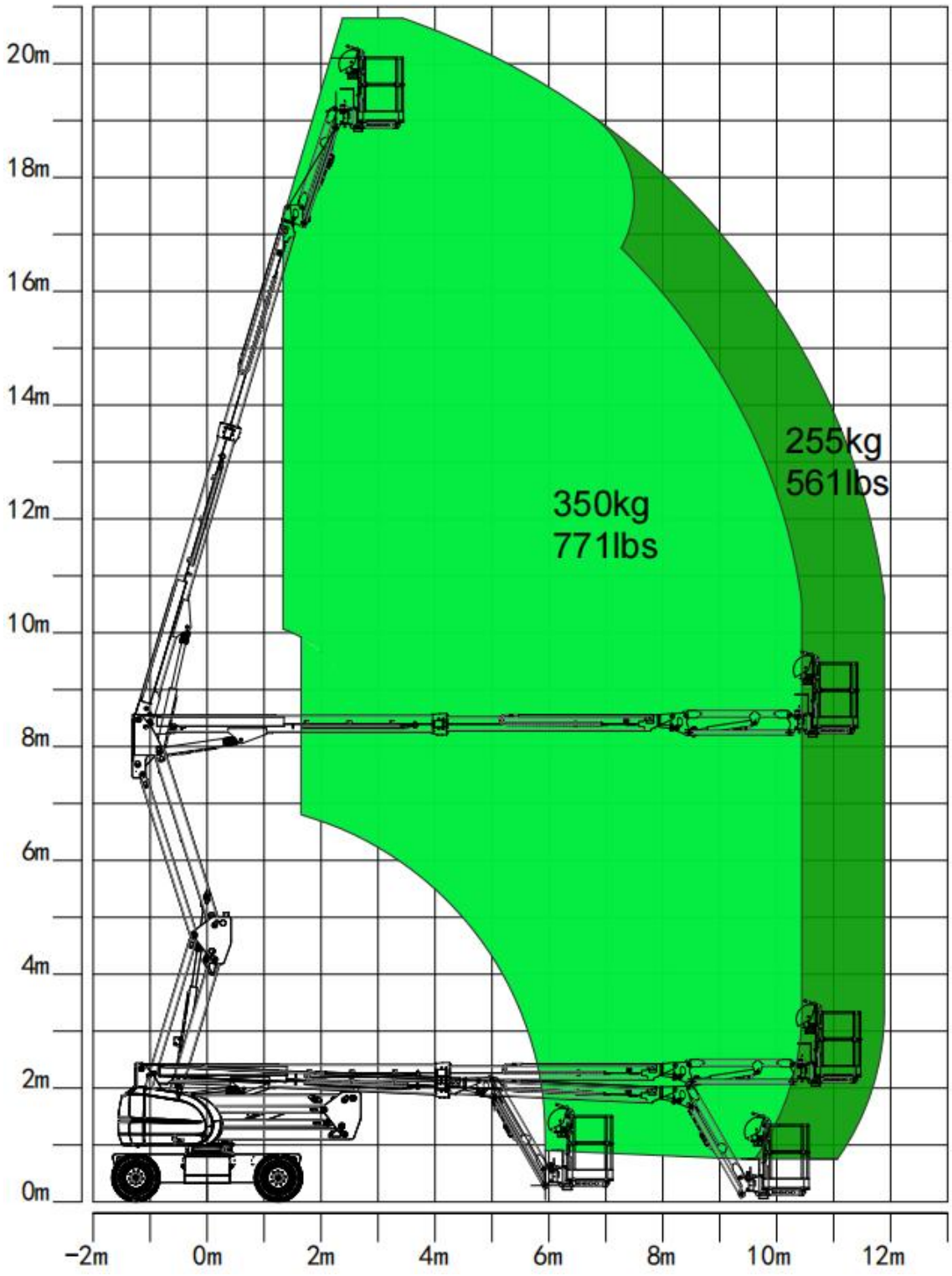
-Calculated according to the height of personnel equal to 2m, the working height is equal to the height of working platform plus 2m;

- The ground bearing information is myopia information, and different selection and configuration factors are not included. This information can only be used if there is a sufficiently high safety factor;

-Add hydraulic oil and lubricating oil suitable for the environment according to the ambient temperature in different regions;

1.2 Operation scope diagram

Table 1-2 scope of work



1.3 Action time

Table 1-3 Operating speed

Parameter item	HZ210AI
Lower arm luffing upper	56±3s
Lower arm luffing	46±3s
Upper luffing arm	48±3s
Lower arm luffing	43±3s
Turntable rotation (360 °) - boom extension	180±3s
Telescopic arm extension	45±3s
Telescopic boom retraction	36±3s
Platform rotation（180°）	12±2
Boom up	30±3s
Boom lower	38±3s
Maximum walking speed（10m）	56±3s

- The start and end depend on the action, not on the controller or switch.
- The walking test results are different due to different tire specifications.
- All speed tests shall be conducted on the platform control box, and there will be differences in the operation of the ground control box.
- All tests shall be carried out when the hydraulic oil temperature is higher than 40 ℃. If the hydraulic oil temperature is too low, the test results will be affected.

1.4 Test requirements

- **Lower arm luffing**: the folding arm luffing is in place, and the telescopic arm is fully retracted. Lower arm luffing up action (from the lowest point to the maximum angle) twice, luffing down action (from the maximum angle to the lowest point) twice.
- **Upper arm luffing:** the folding arm luffing moves up twice and down twice. Turntable rotation: the boom is located in the center, rotates for one cycle, and is tested twice.
- **Telescopic:** the lower arm is horizontal, extending from full retraction to full extension twice, and retracting from full extension to position twice.
- **Platform rotation:** when the working platform is horizontal, the platform rotates from the leftmost to the rightmost twice, and from the rightmost to the leftmost twice.
- **Boom up and down:** start from the lowest end of the boom. The boom rises twice and drops twice.

The test shall be carried out on a horizontal plane. Switch to the traveling high-speed state, and push the traveling handle to the maximum travel. Drive 30 meters forward twice and 30 meters backward twice.

1.5 Parameter

Table 1-4 parameters

Parameter	Specifications
Hydraulic oil	
Normal temperature area（0℃～40℃）	L-HM46
Cold area（-25℃～25℃）	L-HV32
High temperature area（＞40℃）	L-HM68
Extremely cold area（＜-30℃[-22°F]）	Special customization required
Hydraulic pump	
Type	Gear pump
Flow	20L/min
Rated working pressure	21MPa
Function valve	
Maximum working pressure of main valve	21MPa

1.6 Installation instructions for hydraulic hose and pipe joint

1.6.1 Hydraulic hose torque

When removing or installing the hydraulic hose, it must be removed or installed according to the torque specified in the table below.

Table 1-5 torque of hydraulic hose

Metric thread	L	S
M12× 1.5	19± 1 Nm	
M14× 1.5	26± 2 Nm	
M16× 1.5	40± 3 Nm	
M18× 1.5	50± 4 Nm	
M20× 1.5	-	60± 4 Nm
M22× 1.5	70± 5 Nm	-
M24×1.5	-	85± 6 Nm
M26× 1.5	90± 6 Nm	-
M30× 2	120± 8Nm	140± 10Nm
M36× 2	150± 12Nm	180± 12Nm
M42× 2	-	260± 16Nm
M45× 2	240± 15Nm	-

1.6.2 Hydraulic coupling torque

When removing or installing the hydraulic coupling metric thread, it must be removed or installed according to the torque specified in the table below.

Table 1-6 hydraulic pipe joint torque - Metric

Thread specification	Al	Steel	
	ED+O Ring	ED+O Ring	O Ring
L			
M10×1	18 ± 1 Nm	20 ± 2 Nm	18 ± 1 Nm
M12×1.5	30 ± 2 Nm	35 ± 2 Nm	30 ± 2 Nm
M14×1.5	42 ± 3 Nm	48 ± 4 Nm	35 ± 2 Nm
M16×1.5	55 ± 4 Nm	60 ± 4 Nm	40 ± 3 Nm
M18×1.5	75 ± 5 Nm	75 ± 5 Nm	45 ± 3 Nm
M22×1.5	90 ± 6 Nm	130 ± 8 Nm	60 ± 4 Nm
M27×2	120 ± 8 Nm	185±12Nm	100 ± 7 Nm
M30×2	140 ± 8 Nm	245±15Nm	135 ± 8 Nm
M33×2	180 ± 10 Nm	320±20Nm	160 ± 10 Nm
M42×2	240 ± 15 Nm	450±25Nm	210 ± 13 Nm
M48×2	280 ± 20 Nm	540±30Nm	260 ± 15 Nm
S			
M12×1.5	33 ± 2 Nm	43 ± 3 Nm	35 ± 2 Nm
M14×1.5	42 ± 3 Nm	50 ± 4 Nm	45 ± 3 Nm
M16×1.5	55 ± 4 Nm	75 ± 5 Nm	55 ± 4 Nm
M18×1.5	75 ± 5 Nm	95 ± 6 Nm	70 ± 5 Nm
M22×1.5	90 ± 6 Nm	140±8Nm	100 ± 10 Nm
M27×2	120 ± 8 Nm	185±12Nm	160 ± 10 Nm
M30×2	140 ± 8 Nm	245±15Nm	210 ± 13 Nm
M33×2	180 ± 10 Nm	320±20Nm	260 ± 15 Nm
M42×2	240 ± 15 Nm	450 ± 25 Nm	330 ± 20 Nm
M48×2	280 ± 20 Nm	540 ± 30 Nm	420 ± 25 Nm

When removing or installing the hydraulic coupling - Inch BSP thread, it must be removed or installed according to the torque specified in the table below.

Table 1-7 hydraulic pipe joint torque - British system (BSP)

Thread specification	Al	Steel	
	ED+O Ring	ED+O Ring	O Ring
L			
G1/8A	20 ± 1 Nm	20 ± 1 Nm	-
G1/4A	35 ± 2 Nm	40 ± 2 Nm	-
G3/8A	50 ± 3 Nm	75 ± 5 Nm	-
G1/2A	75 ± 5 Nm	95 ± 6 Nm	-
G3/4A	120 ± 8 Nm	185 ± 12 Nm	-
G1A	180 ± 10 Nm	320 ± 20 Nm	-
G1-1/4A	240 ± 15 Nm	450 ± 25 Nm	-
G1-1/2A	280 ± 20 Nm	540 ± 30 Nm	-
S			
G1/4A	40 ± 3 Nm	43 ± 3 Nm	-
G3/8A	55 ± 3 Nm	85 ± 5 Nm	-
G1/2A	80 ± 5 Nm	120 ± 8 Nm	-
G3/4A	120 ± 8 Nm	185 ± 12 Nm	-
G1A	180 ± 10 Nm	320 ± 20 Nm	-
G1-1/4A	240 ± 15 Nm	450 ± 25 Nm	-
G1-1/2A	280 ± 20 Nm	540 ± 30 Nm	-

When removing or installing the hydraulic coupling - American UNC / UNF thread, it must be removed or installed according to the torque specified in the following table.

Table 1-8 hydraulic pipe joint torque - American system (UNC / UNF)

Thread specification	Al	Steel	
	ED+O Ring	ED+O Ring	O Ring
L			
7/16-20	21± 2 Nm	21± 2 Nm	
9/16-18	34± 2 Nm	35± 2 Nm	
11/16-12	40± 3 Nm	50± 4 Nm	
3/4-16	50± 3 Nm	65± 4 Nm	
7/8-14	75± 5 Nm	110± 8 Nm	

Thread specification	Al	Steel	
	ED+O Ring	ED+O Ring	O Ring
1-1/16-12	110± 8 Nm	140±10Nm	
1-5/16-12	160± 10Nm	210±15Nm	
S			
7/16-20	21± 2 Nm	23± 2 Nm	
9/16-18	34± 2 Nm	40± 3 Nm	
11/16-12	40± 3 Nm	65± 4 Nm	
3/4-16	50± 3 Nm	80± 6 Nm	
7/8-14	75± 5 Nm	125±10Nm	
1-1/16-12	110± 8 Nm	185±15Nm	
1-5/16-12	160± 10Nm	280±20Nm	

1.6.3 Tightening procedure of hydraulic hose and pipe joint

When installing hydraulic hose and pipe joint, it must be installed according to the following requirements.

1. Replace the O-ring when the seal is damaged or there is oil leakage at the seal. Once the tightening torque of the pipe joint or rubber hose exceeds the specified tightening torque value, the O-ring cannot be reused.
2. Lubricate the O-ring before installation.
3. Install the O-ring correctly.
4. When butting the rubber hose nut and pipe joint, align the pipe joint, rubber hose and rubber hose nut, and tighten the nut according to the torque requirements.
5. Tighten the nut or coupling according to the torque provided in the table above.
6. Perform all functions of the machine and check the rubber hose, pipe joint and related parts to ensure there is no leakage.

1.6.4 Tightening torque of fasteners

Unless there are special torque requirements in the manual or other instructions, the general tightening torque of metric bolts shall be implemented according to the following table.

Table 1-9 tightening torque of fasteners - Metric

Diameter (mm)	Pitch (mm)	8.8 Grade	10.9Grade	12.9Grade
5	0.8	7 Nm	9 Nm	10 Nm
6	1	12 Nm	15 Nm	18 Nm
8	1.25	30 Nm	35 Nm	42 Nm
	1	30 Nm	37 Nm	45 Nm

Diameter (mm)	Pitch (mm)	8.8 Grade	10.9Grade	12.9Grade
10	1.5	55 Nm	75 Nm	85 Nm
	1.25	56 Nm	77 Nm	87 Nm
	1	60 Nm	80 Nm	92 Nm
12	1.75	95 Nm	125 Nm	150 Nm
	1.5	100 Nm	130 Nm	155 Nm
	1.25	105 Nm	135 Nm	160 Nm
14	2	150 Nm	200 Nm	230 Nm
	1.5	165 Nm	210 Nm	250 Nm
16	2	230 Nm	300 Nm	360 Nm
	1.5	250 Nm	320 Nm	380 Nm
18	2.5	320 Nm	420 Nm	500 Nm
	1.5	360 Nm	470 Nm	550 Nm
20	2.5	450 Nm	600 Nm	700 Nm
	1.5	500 Nm	650 Nm	770 Nm
22	2.5	600 Nm	800 Nm	980 Nm
	2	650 Nm	850 Nm	1050 Nm
24	3	750 Nm	1050 Nm	1250 Nm
	2	800 Nm	1100 Nm	1300 Nm
27	3	1150 Nm	1500 Nm	1800 Nm
30	3.5	1500 Nm	2000 Nm	2400 Nm

Unless there are special torque requirements in the manual or other instructions, the tightening torque of general American bolts (thread mark: UNC) shall be implemented according to the following table.

Table 1-10 tightening torque of fasteners - American (UNC)

Diameter（in）	Opposite dimension of nut（s）	American grade 5	American grade 8
1/4-20	7/16"	10Nm	14Nm
5/16-18	1/2"	21Nm	29Nm
3/8-16	9/16"	37Nm	51Nm
7/16-14	5/8"	60Nm	82Nm
1/2-13	3/4"	90Nm	130Nm
9/16-12	13/16"	130Nm	180Nm
5/8-11	15/16"	178Nm	250Nm
3/4-10	1-1/8"	315Nm	445Nm
7/8-9	-	509Nm	715Nm

Unless there are special torque requirements in the manual or other instructions, the tightening torque of general American bolts (thread mark: UNF) shall be implemented according to the following table.

Table 1-11 tightening torque of fasteners - American (UNF)

Diameter (in)	Opposite dimension of nut (s)	American grade 5	American grade 8
1/4-28	7/16"	11.5Nm	16Nm
5/16-24	1/2"	23Nm	32Nm
3/8-24	9/16"	41Nm	58Nm
7/16-20	5/8"	65Nm	92Nm
1/2-20	3/4"	100Nm	145Nm
9/16-18	13/16"	145Nm	200Nm
5/8-18	15/16"	200Nm	280Nm
3/4-16	1-1/8"	350Nm	495Nm
7/8-14	-	560Nm	780Nm

Chapter 2 Important safety rules

2.1 Summary

This chapter covers how to use your machine correctly and safely in most applications.In order to achieve this goal, we have established a set of daily checklist, which is mandatory for qualified quality inspectors to carry out daily maintenance in strict accordance with this checklist, so as to ensure that the machine can operate without fault and ensure safe operation.Read, understand and comply with safety rules, job site requirements and government regulations.

Whether you are the owner, user or operator of the machine，Before operating the machine for the first time， You must read and correctly understand the contents of this manual，The machine can only be operated independently after the whole process is operated from beginning to end under the supervision of qualified personnel with practical operation experience. If you have any questions about the use or operation of the machine, please call Hangcha group in time for consultation.

Most of the accidents involved in the operation, maintenance and repair process are caused by the failure to follow the basic safety operation procedures and precautions in the actual operation.In fact, if we can analyze the applied construction safety hazards and take corresponding safety measures before each construction operation, most accidents in practice can be completely avoided.Therefore, before each use and operation, it should be evaluated by the safety officer who has been trained and has the experience and ability of safety hazard analysis, and remind the personnel operating the machine to take necessary countermeasures to avoid the occurrence of danger.

Incorrect operation, lubrication, maintenance and repair are very dangerous, which may cause personal injury or casualties. Therefore, only after you read the manual thoroughly and fully understand the knowledge and information about operation, lubrication, maintenance and repair, can you take maintenance for the equipment.

2.2 Symbol description

This safety symbol appears in most safety statements. This means that you need to pay attention and be vigilant at all times, and your safety will be affected! Please read and observe the relevant information of safety warning symbols.

It is used to indicate that there is an emergency and dangerous situation. If it is not avoided, it will cause death or serious injury.

It is used to indicate that there is an emergency and dangerous situation.If it is not avoided, it will cause death or serious injury.

It is used to indicate that there is a potentially dangerous situation, which, if not avoided, may cause slight or moderate injury to personnel.

Attention

Conditions that may cause damage to the power plant, loss of personal property or harm to the environment, or lead to improper operation of the equipment.

Note: these steps, instructions or conditions should be followed in order to make the power unit or component work in the expected way.

2.3 Accident notification

In case of any accident involving the machinery of Hangcha Group Co., Ltd., Hangcha Group Co., Ltd. must be notified immediately. Even if there is no personal injury or property damage in the accident, Hangcha Group Co., Ltd. must be contacted by telephone and all necessary details must be provided.If the manufacturer is not notified within 48 hours after the accident involving the machinery of Hangcha Group Co., Ltd., the warranty of the product may be invalidated.

Attention

After any accident, thoroughly check the machine and its function.First test all functions from the ground controller, and then test from the platform controller.Before all damages are repaired and all controllers can be operated correctly, the lifting height must not exceed 3m.

2.4 Electric shock danger

Note: This machine is not insulated and does not have the function of electric shock protection.

All operators and managers shall comply with the relevant national or local regulations on the minimum safety distance of live conductors above the ground. If there is no such requirement, the operators and managers shall comply with the requirements of the minimum safety distance in.

Electric shock danger

- Follow relevant government rules and always keep a safe distance from power lines and electrical equipment. See 2-1 for details.
- Platform movement, wire swinging or sagging shall be considered, and strong wind or gust shall be avoided. Do not operate the machine in case of lightning or rainstorm.
- If the machine contact with live wires, stay away from the machine. Personnel on the ground or on the platform are not allowed to touch or operate the machine until the power is cut off.
- Do not use the machine as ground wire during welding, grinding and other operations.

Chart 2-1 Minimum safety distance of electrified body

Voltage range（Phase to phase，kV）	Minimum approach distance m（ft）
0～50	3（10）
50～200	5（15）
200～350	6（20）
350～500	8（25）
500～750	11（35）
750～1000	14（45）

2.5 Tipping danger

Chart 2-2 Maximum rated load of platform

Rated load	
Rated load	255kg（350kg limit）
Maximum number of people allowed	2 persons
Maximum manual operating force	400N

Overturn danger

- Personnel, equipment and materials on the platform shall not exceed the maximum load capacity.
- The platform can only be lifted or extended when the machine is on solid and flat ground.

Overturn danger

- Do not use the tilt alarm as a level indicator.The tilt alarm on the platform will sound only when the machine is heavily tilted.If the tilt alarm sounds: be very careful to lower the platform and transfer the machine to a solid and level ground. Do not change the level or limit switch.
- Do not drive faster than 0.8 km / h when the platform is raised.
- When the platform is raised, the machine cannot travel on uneven, unstable surfaces or other dangerous conditions.
- Do not operate the machine during strong wind or gust, and do not increase the surface area of the platform or load.Increasing the area exposed to the wind will reduce the stability of the machine.
- Be careful and reduce the speed when the machine is driving in uneven areas, gravel, or other uneven surfaces, or near holes and steep slopes.
- Do not push or pull any object outside the platform. The maximum allowable lateral force is 400N（90 lbf）
- Do not change any machine parts that may affect safety and stability.
- Do not replace key parts that affect the stability of the machine with parts of different weights or specifications.
- Do not modify or change the aerial work platform without the written permission of the manufacturer.
- Do not install additional devices for placing tools or other materials on the platform or guardrail, which will increase the weight and surface area of the platform or increase the load.
- Do not place or fix any suspended load on any part of this machine.
- Do not place ladders or scaffolds in the platform or lean against any part of the machine.
- Do not use the machine on moving or moving surfaces or on vehicles.Ensure that all tires are in good condition and that the tire nuts are tightened.
- Do not use the platform to push the machine or other objects.
- Do not allow the platform to contact adjacent components.
- Do not tie the platform to adjacent components with ropes or other binding materials.
- Do not place loads outside the perimeter of the platform.
- Do not use the platform controller to lower the platform when the platform is tripped, stuck, or other nearby objects hinder its normal movement.If it is intended to lower the platform using the ground controller, it must be operated after all personnel leave the platform.

2.6 Work environment danger

Unsafe workplace danger

- Do not operate the machine, on surfaces、edges or potholes that cannot bear the weight of the machine.The platform can only be raised or extended when the machine is on solid and flat ground.
- Do not use the tilt alarm as a level indicator. The tilt alarm on the platform will sound only when the machine is tilted seriously.
- When the platform is raised, if the tilt alarm sounds, carefully lower the platform and do not change the level or limit switch.
- Do not exceed 0.8 km / h when the platform is raised.
- If the machine can be used outdoors, do not operate the machine in strong winds or gusts.When the wind speed exceeds 12.5m/s (28mph)， Do not lift the platform； If the wind speed exceeds 12.5m/s (28mph) after lifting the platform,lower the platform immediately and do not continue to operate the machine.
- When the platform is raised, the machine cannot travel in uneven areas, unstable surfaces or other dangerous conditions.
- When the machine is stowed, be careful and reduce the speed when the machine is driving in uneven areas, gravel, unstable or smooth surfaces, steep and near holes.
- Do not drive or lift the machine on a slope, step or arched ground that exceeds the maximum climbing capacity of the machine.

Chart 2-3 The Beaufort Scale

Beaufort scale	m/s	Instruction	Ground condition
0	0～0.2	No wind	No wind, smoke vertical upward.
1	0.3～1.5	Soft wind	Smoke can indicate the wind direction.
2	1.6～3.3	Soft wind	The skin feels bare. The leaves make a slight noise.
3	3.4～5.4	Breeze	The twigs began to shake.
4	5.5～7.9	Gentle wind	Dust and scraps of paper rose and twigs began to shake.
5	8.0～10.7	Cool breeze	The tree shook.
6	10.8～13.8	Fierce wind	Tree branches shake, overhead wires whir and sound, and it is difficult to carry an umbrella.
7	13.9～17.1	strong wind	The whole tree shook. It is difficult to walk against the wind.
8	17.2～20.7	Gale	The branch broke. Vehicles on the road were blown off course by the wind.
9	20.8～24.4	Strong wind	Minor damage to buildings.

Before or during the use of the machine, check the possible hazards in the workplace and pay attention to environmental restrictions, including flammable and explosive gases or dust.

Attention

Maximum slope angle 40% . The maximum climbing capacity shall be applied to the machine with the platform in the retracted state.

The climbing capacity is the maximum allowable inclination angle when the machine is on solid ground and the platform carries only one person.When the platform increases weight, the rating of the slope will be reduced.

2.7 Unsafe operation danger

The operation of the machine shall strictly comply with the requirements of this manual and maintenance manual. If there are more stringent regulations in the industry or place, the latter shall be followed.

Unsafe operation danger

- Do not push or pull any object outside the platform. Maximum allowable lateral force：400 N(90 lbf)
- Do not change any machine parts that may affect safety and stability.
- Do not replace key parts that affect the stability of the machine with parts of different weights or specifications.
- Do not modify or alter the aerial work platform without the written permission of the manufacturer.
- Do not install additional devices for placing tools or other materials on the platform or guardrail, which will increase the weight and surface area of the platform or increase the load.
- Do not place ladders or scaffolds in the platform or lean against any part of the machine.
- Do not use the machine on moving or moving surfaces or on vehicles. Ensure that all tires are in good condition and that the tire nuts are tightened.
- Do not place or attach any suspended loads on any part of the machine.
- Do not use the machine as a crane.
- Do not use the platform to push the machine or other objects.
- Do not allow the platform to contact adjacent components.
- Do not tie the platform to adjacent components.
- Do not place the load outside the platform.
- Do not use the platform controller to lower the platform when the platform is tripped, stuck, or other nearby objects hinder its normal movement.If it is intended to lower the platform using the ground controller, it must be operated after all personnel leave the platform.
- When one or more tires are off the ground, evacuate all personnel before stabilizing the machine and use cranes, forklifts or other suitable equipment to stabilize the machine.

2.8 Fall danger

The operation of the machine shall strictly comply with the requirements of the operation manual and maintenance manual. If there are more stringent regulations in the industry or place, the latter shall be followed.

Fall danger

- Personnel on the platform must wear safety belts or use safety device in accordance with government regulations.Tie the anchor to the fixed points of the platform, and only one person can tie the anchor at each fixed point.
- It is forbidden to sit, stand or climb on the protective guardrail of the platform.Stand steadily on the platform floor at all times.
- When the platform is lifted, do not climb down from the platform.
- Keep the platform floor clear of obstacles.
- Do not enter or exit the platform unless the machine is in the fully stowed position.
- Close the entrance door before operation.
- Do not operate the machine if the guardrail is not installed correctly and the entrance door is not closed.

2.9 Collision danger

The operation of the machine shall strictly comply with the requirements of the operation manual and maintenance manual. If there are more stringent regulations in the industry or place, the latter shall be followed.

Collision danger

- When moving or operating the machine, pay attention to the sight range and the existence of blind spots.
- heck the work area to avoid overhead obstacles or other possible hazards.
- Be careful when using the platform controller and ground controller.The color marked direction arrows show the driving, lifting and steering functions.
- Users must comply with user, workplace and government regulations on "use of personal protective equipment"（Safety helmet, safety belt and gloves, etc）.
- Before releasing the brakes, the machine must be level or fastened.
- Lower the platform only when there are no people and obstacles in the bottom area.
- Limit travel speed based on ground conditions, congestion, ground slope, personnel location and any other factors that may cause a collision.

Collision danger

- Do not operate the machine in the range of any crane or mobile overhead unless the crane controller is locked or precautions have been taken to prevent any potential collision.
- Keep your hands and arms away from places where they may be squeezed.
- Do not work under the platform or near the telescopic boom.
- When using the controller to operate the machine on the ground, please maintain correct judgment.Keep proper distance between the operator, the machine and fixed objects.
- When operating the machine, do not drive or play with danger.

2.10 Squeeze danger

There is a potential danger of squeeze during machine movement. During the operation of the machine, body and clothes should always keep a safe distance from the machine.

Squeeze danger

- Keep your hands and arms away from places where they may be squeezed.
- Do not work under the platform or near the telescopic boom.
- When using the controller to operate the machine on the ground, please maintain correct judgment and keep an appropriate distance between the operator, the machine and fixed objects.

2.11 Danger of explosion and fire

Danger of explosion and fire

- Do not use the machine, charge the battery or refuel the machine in dangerous or flammable and explosive places.

2.12 Danger of machine damage

Attention

Follow the use and maintenance requirements of parts in this manual and maintenance manual, otherwise the machine will be damaged.

Danger of machine damage

- Unsafe operation hazard.
- Do not use damaged or faulty machines.
- Before every startup,the machine shall be checked before operation and all functions shall be tested.Damaged or faulty machines shall be marked immediately and stop operation.
- Ensure that all maintenance operations have been carried out in accordance with the provisions of the manual and the corresponding maintenance manual.
- Ensure that all labels are properly positioned and easy to identify.
- Ensure that the operation manual and maintenance manual are intact and easy to read, and stored in the document box on the platform.

2.13 Danger of physical injury

All operation and maintenance requirements in the manual and maintenance manual shall be observed.

- Hazards of unsafe operation.
- Do not operate the machine when there is hydraulic oil leakage.Hydraulic oil leakage may penetrate and burn the skin.

2.14 Battery danger

- The battery contains sulfuric acid and can produce an explosive mixture of hydrogen and oxygen.Any equipment that can cause sparks or flames (including cigarette / smoke materials) should be kept away from the battery to prevent explosion.
- Do not touch the battery terminals or cable clamps with spark generating tools.

2.15 Hydraulic system hazard

- Do not touch the hydraulic system when it is at high temperature!
- Hot hydraulic oil can cause serious personal injury.
- After the equipment is shut down, thoroughly clean the spilled hydraulic oil. Do not spill hydraulic oil on the ground. Once maintenance and repair are completed, wash any hydraulic oil on the skin immediately. Dispose of used hydraulic oil according to legal regulations.
- It is forbidden to block the leaking hydraulic oil by hand. If there is leakage, release the system pressure first and repair it after the hydraulic oil cools down. If you are injured by ignoring the danger of hydraulic oil, seek medical attention immediately. If not treated immediately, serious complications may occur.

2.16 Safety of welding, grinding and other operations on the platform

- Follow the welder manufacturer's recommendations for the correct use of welder procedures.
- Wires or cables for welding or grinding can be connected only after the power supply is turned off.
- Welding, grinding and other operations can be carried out only after wires or cables are correctly connected.
- During welding operation, the machine cannot be used as ground wire.
- At all times, ensure that the electric tools are completely stored in the working platform. Do not hang their wires on the guardrail of the working platform or the working area outside the platform, or hang the electric tools directly with wires.

Before welding, grinding and polishing, the welder must obtain the permission of the Department in charge of the workplace.

2.17 Lock after each use

1. Choose a safe parking place with solid horizontal ground, no obstacles and avoiding traffic congestion.

2. Ensure that the boom is lowered above the rear drive legs and that all service panels and doors are closed and secured.

3. The hydraulic cylinder shall not be fully extended before shutdown or when it is not used for a long time.

4. Press the "emergency stop switch" of the platform control box to the "off" position.

5. Cover the platform control box to protect the panel, switch handle and controller from being damaged by harsh environment.

6. Press the "emergency stop switch" of the turntable control box to the "off" position.

7. Turn the "key switch" of the turntable control box to the "off" position and pull out the key to avoid unauthorized use.

8. Disconnect the power-off switch.

9. Charge the battery.

Attention
After each use, the power-off switch must be in the off state.

Chapter 3 Working principle and each system

3.1 Energy

Driven by motor. It can be driven in the following ways:

The traveling is driven by four 48V motors, and the boom action is powered by the gear pump driven by 48V AC motor.

The auxiliary power is driven by a 12V battery and a 12V DC motor. The gear pump is connected with the output shaft of the motor through splines to provide auxiliary power for the system.

3.2 Hydraulic system

The machine is driven by a motor, and its whole hydraulic system can be divided into two parts: one part is used for the upper boom function, and the other part is used for the steering and floating control of the lower vehicle.

When the motor works, the high-pressure oil at the outlet of the gear pump drives the hydraulic actuator through the electric proportional flow valve and electromagnetic directional valve on the boom function valve group. According to the boom action with different flow demand, the electric control system outputs high-pressure oil with different flow by adjusting the motor speed.

3.3 Electrical system

In the system, 2V traction battery or 48V lithium battery are used in series to drive 48V AC motor to control boom function and travel steering function.

3.4 Machine control

The system is controlled by two controllers. A controller is installed on the left side of the turntable of the machine to control the action of the boom; Another controller is installed on the platform to control the machine walking and boom action. The controller carries out data interaction through a CAN bus.

3.5 Safety measures

A series of sensors and limit switches provide signals to the controller.

- the horizontal sensor measures the angle of x-axis and Y-axis of the vehicle body. When the angle of x-axis or y-axis exceeds 5 °, an alarm will be sent out, and the functions of lifting, walking and steering will be limited.
- The travel switch detects whether the lower arm is retracted in place. When the lower arm is retracted in place, limit the continued retraction of the boom frame.
- The angle sensor measures the relative angle of the lower arm and the folding arm,which is used to realize the identification of the working / walking state of the equipment and the buffer control of the boom in place.
- Load cell measures the load of the platform.When the platform load exceeds the rated bearing capacity, the buzzer will sound frequently, the overweight indicator will flash, and the display screen will show overweight, so relevant actions will be limited.

Chapter 4 Maintenance and Repair Guide

4.1 Summary

This section provides safety and necessary information to operators preparing to use this machine. In order to prolong the service life of the machine and ensure safe operation, ensure that all necessary inspections and maintenance work are completed before the machine is put into use.

Machine status description

Receiving status: Lower luffing and retraction of boom are in place.

Non working state: The angle between the upper luffing of the lower arm and the horizontal plane shall not exceed 3 °, and the angle between the upper luffing of the upper folding arm and the horizontal plane shall not exceed 3 °. The travel switch detects that the telescopic arm is retracted in place.

Working status / lifting status: The angle between the upper luffing of the lower arm and the horizontal plane exceeds 3°, or the angle between the upper luffing of the upper folding arm and the horizontal plane exceeds 3 °, or the travel switch detects that the telescopic arm is not retracted in place.

4.2 Preparation, inspection and maintenance

It is essential to develop and comply with complete inspection and preventive maintenance procedures. This manual provides the regular maintenance and inspection items recommended by Hangcha Group Co., Ltd. in detail. At the same time, please first understand the relevant laws and regulations of your country, region or place on aerial work platform. The frequency of inspection and maintenance shall be increased accordingly according to the specific environment, requirements and use frequency.

4.3 Hangcha approved equipment engineer

The equipment engineer recognized by Hangcha must have the following conditions: have a recognized educational background and certificate, have received comprehensive knowledge training on Hangcha products, and have the ability and level required for maintenance, repair and maintenance of relevant Hangcha product models.

4.4 Pre operation inspection

Before using every day or changing the operator every time, the user or operator should first conduct pre operation inspection. For the details of pre startup inspection, please refer to the chapter "pre operation inspection" in the operation manual, and be sure to read and understand the operation manual carefully.

4.5 Pre delivery inspection and daily inspection

The pre delivery inspection must be carried out by the equipment engineer approved by Hangcha Group Co., Ltd. The inspection contents of pre delivery inspection and daily inspection are the same, but the time is different. A pre delivery inspection must be performed before each sale, lease or lease delivery. When the machine is used for 3 months or 150 hours (whichever comes first), or idle for more than 3 months, or purchased as second-hand equipment, daily inspection must be carried out. The frequency of inspection shall be increased accordingly according to the specific environment, requirements and use frequency.

Refer to the "preparation record before delivery" and "maintenance inspection report" in this manual to determine the items to be inspected. The inspection and maintenance steps shall be carried out with reference to the relevant contents of the "inspection procedures" in this manual.

4.6 Annual inspection of machine

The annual machine inspection must be carried out once a year and must not be more than 13 months from the date of the last annual machine inspection. Hangcha Group Co., Ltd. suggests that the factory's qualified maintenance engineer should carry out this work, and the maintenance engineer has received the relevant knowledge training of Hangcha products, and has the ability and level required to maintain, repair and maintain the relevant Hangcha product models.

Refer to the "maintenance inspection report" in this manual to determine the items to be inspected. The inspection and maintenance steps shall be carried out with reference to the relevant contents of the "inspection procedures" in this manual.

In order to obtain the safety report, Hangcha Group Co., Ltd. needs to update the ownership information of each machine. Please inform Hangcha group of the current ownership information of the machine every time you perform the annual inspection of the machine.

4.7 Preventive maintenance

Preventive maintenance must be carried out by the equipment engineer approved by Hangcha Group Co., Ltd.

Refer to the "maintenance inspection report" and "maintenance schedule" in this manual to determine the items and time to be inspected. The inspection and maintenance steps shall be carried out with reference to the relevant contents of the "inspection procedures" in this manual.

type	frequency	Main responsibility	Maintenance qualification	reference
Preoperational inspection	Every day before use or every time the operator is changed	User or operator	User or operator	Operation manual
Advance payment inspection	Before each sale, lease or lease delivery, the equipment engineer approved by Hangcha	Owner, agent or user	Hangcha approved equipment engineer	Maintenance manual, "preparation record before delivery", "maintenance and inspection report"
Daily inspection	Use for 3 months or 150 hours (whichever comes first), or idle for more than 3 months, or purchased as second-hand equipment	Owner, agent or user	Hangcha approved equipment engineer	Maintenance manual, "maintenance inspection report"
Annual inspection of machine	Check every year and no more than 13 months from the date of the last annual inspection of the machine	Owner, agent or user	Factory qualified maintenance engineer	Maintenance manual, "preparation record before delivery", "maintenance and inspection report"
Preventive maintenance	According to the time interval specified in the manual	Owner, agent or user	Hangcha approved equipment engineer	Maintenance manual, "maintenance inspection report", "maintenance schedule"

4.8 Precautions for maintenance and repair

4.8.1 Summary

This section is used to assist you in using and applying the repair and maintenance procedures contained in this manual.

4.8.2 Safety and operation standards

When carrying out machine maintenance, you should first consider the safety of yourself and others. Do not attempt to move heavy parts without the assistance of mechanical equipment. It is forbidden to park heavy objects in unstable positions. When lifting the components of the machine, ensure that there is sufficient support.

4.8.3 Clean

- The most important thing to prolong the service life of the machine is to prevent dirt or impurities from entering the key parts of the machine. Precautions have been taken to protect the machine from such violations. Protective plates, covers, seals and filters are used to keep the air, fuel and oil supplies clean. However, in order to ensure the normal function of protective measures, they should be maintained according to the specified time.
- When the air, fuel or oil pipelines are disconnected, the adjacent areas, openings and joints shall be cleaned. And immediately cover all openings to prevent foreign matters from entering.
- During repair or maintenance, all parts shall be cleaned and checked, and all pipelines and openings shall be unblocked. Cover all parts and keep them clean. All parts must be clean before installation. New parts should be stored in containers before use.

4.8.4 Component removal and installation

- If mechanical assistance is required, please use adjustable lifting device as far as possible. All slings (chains, slings, etc.) shall be parallel to each other and as perpendicular to the top of the lifted part as possible.
- If it is necessary to disassemble components at a certain angle, please note that the load capacity of eyebolts or similar supports will be reduced when the included angle between the supporting structure and components is less than 90 degrees.
- If a part is difficult to disassemble, please check whether all nuts, bolts, cables, supports and wiring have been removed, and check whether adjacent parts hinder disassembly.

4.8.5 Component disassembly and reassembly

When disassembling or reassembling a component, complete the steps in sequence. If the disassembly or assembly of one part has not been completed, do

not start the operation of another part. Please always review your work to ensure that there are no omissions. No adjustments (other than those recommended) shall be made without approval.

4.8.6 Pressed parts

When assembling pressed parts, lubricate the mating surface with anti seize type or molybdenum disulfide based compound.

4.8.7 Bearing

- After removing the bearing, please cover it to avoid dust or wear. Clean the bearing with nonflammable cleaning solvent and dry it in the shade. Compressed air can be used, but do not rotate the bearing.
- If the bearing race and ball (or roller) have pits, notches or burn marks, the bearing shall be scrapped.
- If the bearing can still be maintained, apply a layer of oil and use clean paper(or wax paper) package. Do not unpack reusable bearings or new bearings until they are ready for installation.
- Before installation, lubricate the new bearing or refurbished bearing. When pressing the bearing into the bearing support or boring, apply pressure on the outer bearing race. If the bearing is to be installed on the shaft, apply pressure on the inner race.

4.8.8 Washer

Check that the hole in the washer is aligned with the opening of the mating part. If the gasket needs to be made by hand, the gasket material or other materials of equivalent material and thickness shall be used. Make sure that the hole is opened in the correct position, otherwise the gasket is not sealed, which may cause serious system damage.

4.8.9 Bolt usage and torque application

Attention
Do not reinstall self-locking fasteners, such as nylon inserts and thread deformation lock nuts, after removal.

When installing locking fasteners, always use new replacements. Please use bolts with appropriate length. If the bolt is too long, it may be pushed on relevant parts before tightening its head on corresponding parts; If the bolt is too short, there will not be enough threaded parts to bite and fix the parts. When replacing bolts, only bolts with the same or equivalent specifications as the original bolts can be used.

In addition to the specific torque requirements given in this manual, standard torque values shall be used on heat treated bolts, studs and steel nuts in accordance with recommended factory practices.

4.8.10 Hydraulic pipeline and electrical wiring

When unplugging or removing the hydraulic pipeline and electrical wiring from the equipment, the hydraulic pipeline and electrical wiring and their sockets shall be clearly marked. This ensures proper reinstallation.

4.8.11 Hydraulic system

- Pollutants are the primary factor endangering the hydraulic system. Pollutants can invade through various ways, such as improper use of hydraulic oil, and water, grease, metal chips, sealing elements, sand, etc. enter the system during maintenance.
- Keep the hydraulic system clean. If signs of metal or rubber particles are found in the hydraulic system, drain and flush the whole system immediately.
- Disassemble or reassemble parts on a clean worktable. Clean all metal parts with nonflammable cleaning solvent. Lubricate components as needed to facilitate assembly.

4.8.12 Lubrication

The relevant parts shall be lubricated at specified intervals with the lubricant of the quantity, type and grade recommended in this manual. If the recommended lubricant cannot be obtained, contact the local supplier to purchase the recommended lubricant or qualified lubricant.

4.8.13 Battery

Clean the battery with non-metallic brush, sodium bicarbonate and aqueous solution, and then rinse with clean water. After cleaning, after the battery is completely dry, coat the battery terminals with anti-corrosion compound.

4.9 Pin shaft and composite bearing

- I**n case of one of the following situations, the connecting pin shall be disassembled and inspected**:
  -The connector is too tilted
  -Noise at joints during operation
- **In case of any of the following situations, the composite bearing shall be replaced**:
  -Wear or separation of fibers on the bushing surface
  -Broken or damaged bearing liner support
  -The bearing has moved or rotated into the bearing pedestal
  -Debris is embedded in the bushing surface
- **Replace the pin shaft in case of any of the following situations (clean the pin shaft correctly before inspection):**
  -Wear found in bearing area
  -There are flakes, peeling, scratches or scratches on the surface of the pin shaft
  -The pin shaft in the bearing area is rusted

- **Reassemble the connecting pin and composite bearing：**
  -During installation and operation, the pin shaft shall be checked to ensure that there are no burrs, notches or scratches that may damage the bearing.
  -Dirt and debris should be blown off the bearing pedestal. There shall be no foreign matters on the bearing and bearing seat.
  -Bearings and pins shall be cleaned with cleaning agent to remove all grease and lubricating oil. The composite bearing is a dry joint and does not need lubrication.

4.10 Use insulating silicone grease at the electrical connection position

Insulating silicone grease shall be used for all electrical connections in order to:

- Prevent the mechanical connector between male and female pins from being oxidized.
- Prevent electrical failure caused by low conductivity between rows of needles due to humidity.

Please use insulating silicone grease at the electrical connection position according to the following steps. This procedure is applicable to all plug connections installed outside the distribution box. Silicone grease is not suitable for external sealing connectors.

1.In order to prevent oxidation, silicone grease shall be applied around the male and female pins inside the connector before machine assembly. It can be operated with a syringe.

Attention
Oxidation for more than a certain time will increase the resistance of the connector and eventually cause circuit failure.

2.In order to prevent short circuit, each wire exposed to the connector housing shall be coated with silicone grease. In addition, silicone grease shall also be used at the joint where the male plug and female plug are connected to each other. Other joints that may cause water to enter the connector (around the anti pull buckle, etc.) shall also be sealed.

Attention
Since the conductivity of cleaning solvent is stronger than that of water, this kind of situation is particularly easy to occur when using pressure cleaning method to clean the machine.

3.Connectors suitable for battery box and battery charger shall be sealed with silicone grease.

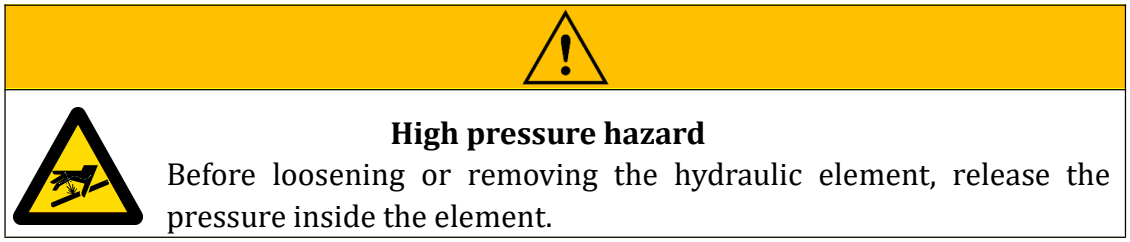
Attention
Solidified sealant can also be used to prevent short circuits and help keep them clean, but it will be more difficult to remove pins later.

Chapter 5 Maintenance

This section provides detailed operating procedures for periodic maintenance and inspection.

Unsafe operation hazard

Failure to perform proper maintenance may result in death, serious injury or machine damage.



High pressure hazard

Before loosening or removing the hydraulic element, release the pressure inside the element.

Follow the following rules:

- Maintenance inspection must be carried out by professionally trained and qualified personnel.
- Routine maintenance inspection refers to the inspection items during normal operation of the machine every day. The maintenance and inspection personnel must carry out inspection and maintenance according to the maintenance and inspection report and fill in the maintenance and inspection report in detail.
- Regular maintenance and inspection shall be carried out quarterly, semi annually and annually. The maintenance and inspection personnel must carry out inspection and maintenance according to the maintenance and inspection report and fill in the maintenance and inspection report in detail.
- Remove the damaged or faulty machine in time, mark it in time, and stop the operation at the same time.
- The damaged or faulty machine must be repaired before operating the machine.
- All inspection records shall be kept for at least 10 years or until the machine is out of use or as required by the machine owner / company / custodian.
- Machines that have not been maintained for more than three months must be inspected quarterly.
- The parts replaced during maintenance shall be the same as or equal to the parts of the original machine.

Unless otherwise specified, maintenance procedures shall be performed in accordance with the following provisions:

- Place the machine on a flat, level and firm ground.

- The machine is not working.
- Place the "key switch" of the ground controller in the "off" position and remove the key to make the equipment unable to start.
- Set the red "emergency stop switch" on the platform control box and ground controller to the "off" position to avoid accidental startup of the operating system.
- Disconnect the power-off switch.
- Disconnect all DC power on the machine.
- Lock all tires to prevent the machine from moving.

5.1 pre delivery inspection

When the machine owner / company changes, in addition to the pre delivery inspection, the corresponding inspection shall be carried out according to the maintenance inspection time requirements and inspection procedures.

The pre delivery inspection shall comply with and comply with the following requirements:

- It is the responsibility of the machine owner / company to perform predelivery inspection.
- This step must be performed before each delivery in order to find out whether there are obvious errors before the machine is put into use.
- Damaged or faulty machines shall not be used. Once a damaged or abnormal machine is found, it must be labeled and removed.
- The maintenance of the machine must be completed by qualified maintenance technicians in strict accordance with this manual.
- Routine maintenance must be completed by qualified maintenance Technicians according to the provisions of this manual.

Before delivering the machine, fill in the following records according to the following instructions:

- Preparations before delivery include pre operation inspection, maintenance procedures and function test.
- Use this form to record the results. After completing each part, tick the corresponding box.
- If any inspection result is "no", the machine must be stopped, and the machine must be rechecked after maintenance, and a mark must be ticked in the box marked "repaired".

Table 5-1 preparation record before delivery

Product model			
Factory number			
Inspection items	The machine is in good condition **YES**	Machine damage or failure **NO**	The machine has been repaired **REPAIRED**
Pre operation inspection			
Maintenance procedure			
Function check			
Machine buyer / lessee			
Signature of inspector			
Inspection date			
Inspector post			
Inspector unit			

5.2 Maintenance schedule

Regular maintenance inspections must be carried out every day, every quarter, every six months and every year. Use this form to help you comply with the routine maintenance plan.

Table 5-2 Maintenance schedule

Inspection interval	Inspection procedure
Every day or every 8 hours	A
Quarterly or every 150 hours	A+B
Every year or every 600 hours	A+B+C

5.3 Maintenance inspection report

- The maintenance inspection report is divided into four sections (A, B and C) according to the maintenance procedure, the time requirements of the maintenance plan and the requirements of the maintenance procedure.
- The maintenance inspection report contains a checklist for each type of periodic

inspection.

- Copy the maintenance inspection report for each inspection. The completed form shall be kept for at least 10 years or until the machine is out of use or at the request of the machine owner / company.
- Use the table below to record the results. After completing each part, tick the corresponding box.
- If any inspection result is "no", the machine must be stopped, and the machine must be rechecked after the maintenance is completed, and a mark must be ticked in the box marked "repaired". Select the appropriate inspection procedure according to the inspection type.

Table 5-3 Maintenance inspection report

Maintenance inspection report				
Product model				
Factory number				
Inspection procedure A				
Project	**Yes** the machine is in good condition	**NO** Machine damage or failure	**REPAIRED** The machine has been repaired	**Problem description**
A-1 Check each manual				
A-2 Check each label				
A-3 Check for damaged loose or missing parts				
A-4 Check the hydraulic oil level				
A-5 Check hydraulic oil leakage				
A-6 Function check				
A-7 Check the battery level				
A-8 Perform 30 day maintenance				

Inspection procedure B				
Project	**Yes** the machine is in good condition	**NO** Machine damage or failure	**REPAIRED** The machine has been repaired	**Problem description**
B-1 Check and replace the hydraulic oil tank return filter element				
B-2 Check the rims and tires and their fasteners				
B-3 check hydraulic oil				
B-4 Replace the high-pressure filter element				
B-5 Check the angle sensor and travel switch				
B-6 Check the oil level in the drive reducer				
B-7 Check the oil level in the swing reducer				
B-8 Check the connecting bolts of slewing support				
B-9 Remote lubrication swing support				
B-10 Check the platform swing cylinder fasteners				
B-11 Check the cylinder offset				
B-12 Inspection for air exhaust of floating oil cylinder and locking of balance valve				
B-13 Check the wires				
B-14 Check the battery				
B-15 Test travel speed				
B-16 Check the tilt protection system				

Inspection procedure C				
Project	**Yes** the machine is in good condition	**NO** Machine damage or failure	**REPAIRED** The machine has been repaired	**Problem description**
C-1 Replace the gear oil in the drive reducer				
C-2 Lubricate worm gear reducer				
C-3 Change hydraulic oil				
C-4 Replace the hydraulic oil tank suction filter				
C-5 Check the boom slider				
User				
Signature of inspector				
Inspection date				
Inspector post				
Inspector unit				

5.3.1 Inspection procedure A

A-1 Check each manual

Putting the operation manual and maintenance manual in a proper place is very important for the safe operation of the machine and should be placed in the document box specially storing the manual on the platform. If the manual is missing or illegible, it will not provide necessary safe operation information.

- Check and confirm that the document box is installed in a proper place on the platform.
- Check and confirm that the operation manual and maintenance manual are intact in the document box on the platform.
- Check the pages of each manual to ensure that the handwriting is clear and intact.
- Put the manual back into the document box after use.

Note: If you need to replace the manual, please contact Hangcha Group Co., Ltd.

A-2 Check each label

Ensuring that all labels are in good condition is essential for the safe operation of the machine. Labels remind operators of the dangers they may encounter during operation, and they provide users with operation and maintenance information. Illegible labels cannot correctly guide operators, which may lead to unsafe operation.

- Refer to the "label / nameplate inspection" section in the operation manual and use the label list and chart to determine the correct position of the label.

- Check whether all labels are legible and damaged, and replace the damaged and illegible labels in time.

Note: if the label needs to be replaced, please contact Hangcha Group Co., Ltd. in time.

A-3 Check all damaged, loose or missing parts

Check the following components or areas for damage, improper installation, loose or missing parts and unauthorized changes:

- Electrical components, wiring and cables.
- Hydraulic hose, pipe joint, hydraulic cylinder and valve block group.
- Hydraulic oil tank.
- Battery pack and its connection.
- Motor and rotary reducer.
- Boom slider and telescopic shaft slider.
- Limit switch and horn.
- Tires and rims.
- Alarms and lights (if equipped).
- Platform guardrails and doors.
- Cracking of structural members and welds.
- Nuts, bolts and other fasteners.

Attention
In case of damage, improper installation or missing parts, replace them immediately and install them correctly; If the fastener is found to fall off or loose, it shall be fastened immediately..

A-4 Check the hydraulic oil level

Maintaining the hydraulic oil at the proper level is very important for the operation of the machine. If the hydraulic oil level is too high, the oil will overflow from the oil tank during the use of the equipment; If the hydraulic oil level is too low, the oil pump will be empty and the hydraulic components will be damaged during the use of the equipment. Through daily inspection, the inspector can determine the change of hydraulic oil level, which can indicate potential problems in the hydraulic system.

When the boom is in the retracted state, perform the following steps:

- Open the left cover and visually inspect the side of the hydraulic tank. The hydraulic oil level shall be within the scale area of the level gauge of the oil tank.
- Ensure that there is no leakage between the hydraulic oil tank body and the connector.
- Add hydraulic oil as needed, do not add too much.

Table 5-4 Hydraulic oil

Customer requirements	Hydraulic oil brand
Normal temperature area 0℃～40℃ (32℉～104℉)	L-HV46
High temperature area -25℃～25℃ (-13℉～77℉)	L-HV32
High temperature area ＞40℃ (104℉)	L-HM68
Extremely cold area ＜-30℃ (-22℉)	Special scheme needs to be determined

A-5 Check hydraulic oil leakage

Preventing hydraulic oil leakage is very important for the safe operation and normal operation of the machine. If a leak is not found, a dangerous situation will occur, weaken the performance of the machine and damage the components.

Observe whether hydraulic oil overflows, drips or remains on or around the following components:

- Hydraulic oil tank, filter, pipe joint, oil pipe, auxiliary power unit
- All hydraulic cylinders, hydraulic valve groups and pumps
- Boom part

- Slewing bearing
- Drive chassis
- Area around the machine

A-6 Function check

Checking the functions of the machine is very important for the safe operation of the machine. If any function fails to work properly, unsafe conditions will occur. Any function shall work stably and reliably without shaking, violence and abnormal noise.

Unsafe operation hazard

Be sure to follow the instructions and safety rules in this manual and operation manual. Failure to follow the instructions and safety rules in this manual and operation manual may lead to death or serious injury.

Refer to the operation manual "pre operation function test" for the complete steps of the machine function check. Before performing this function check, be sure to fully read and understand the safety rules in the operation manual.

Control and indication description

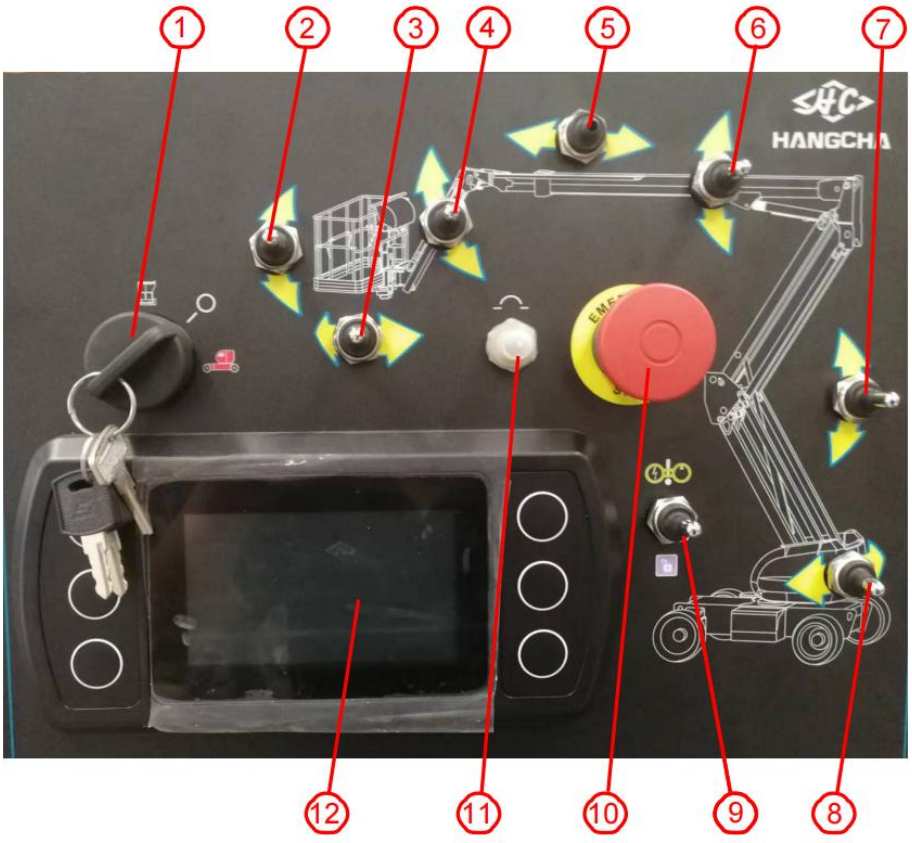
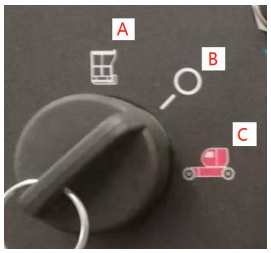
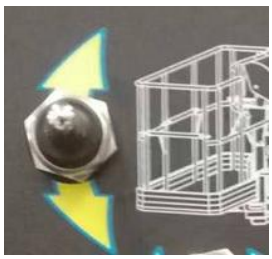
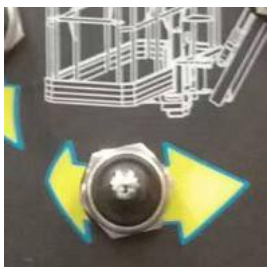
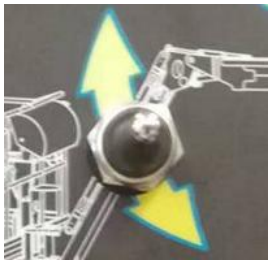
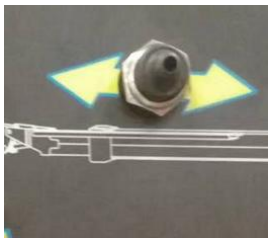
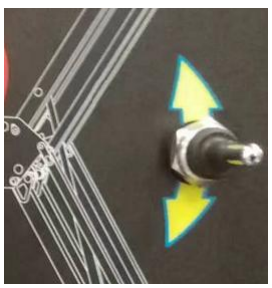
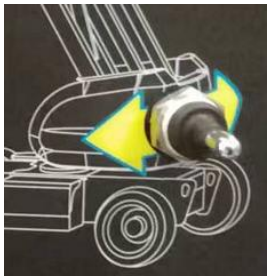
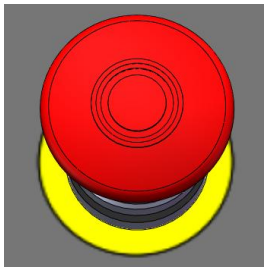


Figure 5-1 schematic diagram of lower control panel

No	Name	Describe
1	**Upper/lower control selection switch** 	Upper/lower control selection switch is a key switch used to select the lower controller or the upper controller for operation: ■ The key switch is in the median B: Cut off the power to the upper/lower controller. ■ Turn the key switch counterclockwise to A: Select the upper control to operate the machine, and the lower control does not work. ■ Turn the key switch clockwise to C: Select the lower control to operate the machine, and the upper control does not work. **NOTE:** (1)After operating the machine, press the Emergency Stop button of the upper/lower console to make the machine in the shutdown state; (2) After operating the machine, turn the key to the median B. Then pull out the key and cut off the power of the machine to prevent unauthorized personnel from operating by mistake.
2	**Platform leveling control switch** 	Platform leveling control switch is a self–resetting handle switch. After automatic leveling, if the working platform is tilted, the operator can use this handle switch to correct the working platform ■ When the working platform is tilted down, toggle the handle in the direction of the upward arrow and hold until the platform is in a horizontal position. Then release the handle, it automatically reset to the middle. ■ When the working platform is tilted upwards, toggle the handle in the direction of the downward arrow and hold until the platform is in a horizontal position. Then release the handle, the it automatically reset to the middle. **Note: When the platform is tilted, it needs to be carefully corrected with manual leveling. However, the wrong manual leveling may cause the personnel or cargo inside the platform to flip or even fall off the platform. Manual leveling errors can cause serious accidents and even casualties.**
3	**Platform swing control switch** 	Three position handle switch. In the free state, the switch automatically resets in the middle. It is used to control the rotation of the working fence to the left or right. Swing range of working fence: ±90°

No	Name	describe
4	**Forearm luffing control switch** 	Forearm luffing control switch is a self-resetting handle switch used to control the forearm luffing. ■ Pull the handle and hold along the upward arrow direction, and the forearm is luffing until it reaches the maximum angle. After releasing the handle, it automatically resets to the middle. ■ Pull the handle and hold along the downward arrow direction, and the forearm is luffing down until it reaches the lowest position. After releasing the handle, it automatically resets to the middle.
5	**Telescopic arm control switch** 	Telescopic arm control switch is a self-resetting handle switch used to control the telescoping function. ■ Pull the handle and hold along the arrow direction to the left, extending the telescopic arm until it reaches its maximum length. After releasing the handle, it automatically resets to the middle. ■ Pull the handle and hold along the arrow direction to the right, and retracting the telescopic arm until it reaches its minimum length. After releasing the handle, it automatically resets to the middle.
6	**Upper arm luffing control switch** 	Upper arm luffing control switch is a self-resetting handle switch used to control the upper arm luffing. ■ Pull the handle and hold along the upward arrow direction, and the upper arm is luffing until it reaches its maximum angle. After releasing the handle, it automatically resets to the middle. ■ Pull the handle and hold along the downward arrow direction, and the upper arm is luffing down until it reaches its lowest position. After releasing the handle, it automatically resets to the middle.
7	**Crank arm luffing control switch** 	Crank arm luffing control switch is a self-resetting handle switch, used to control the middle and lower luffing of the lifting arm. ■ Pull the handle and hold along the upward arrow direction, crank arm 1 and 2 synchronous luffing up until it reaches its maximum angle. After releasing the handle, it automatically resets to the middle. ■ Pull the handle and hold along the downward arrow direction, crank arm 1 and 2 synchronous luffing down until it reaches its lowest position. After releasing the handle, it automatically resets to the middle.

No	Name	describe
8	**Turntable control switch** 	Three-position handle switch. In the free state, the spring automatically resets in the middle. and the turntable is stationary. Turn the handle and the turntable will turn left or right in the direction indicated by the arrow.
9	**Functional control/emergency switch** 	Self-resetting handle switch. Use with function action switch, or for emergency operation. ■ Before toggle the handle of the function action switch, first toggle the handle of the function control switch downward and hold it, and then toggle the corresponding function action switch handle, so that the machine works, otherwise the operation is invalid. Release the handle after the operation, and it will automatically reset to the middle. ■ When the machine is faulty, or the main battery is dead, the operator can use this switch for emergency operation. Upward toggle the emergency lowering switch and hold, and then select the corresponding function action switch, you can carry out the emergency action. ***Note: Emergency operations supported at present include:*** *Folding arm luffing downward, main arm luffing downward, telescopic arm retraction, forearm luffing downward, turntable rotation. Do not choose more than two functional actions when using the emergency pump, to avoid the overload damage to the emergency pump.* **Warning: The emergency switch is prohibited for routine function operation. It can only be used when the machine has an electrical fault, otherwise it may cause a serious accident or even casualties.**
10	**Emergency stop switch** 	Two-position button control switch in the shape of red mushroom head is used to stop the machine in case of emergency. (1) Directly press the button to cut off the system power supply in case of emergency. (2) Before starting the system, the emergency stop button of the lower /upper control panel must be in the unpressed position; otherwise, the system cannot start. Turn the mushroom head clockwise to release the emergency stop button.

No	Name	describe
11	**Self-resetting fuse** 	Self-resetting fuse
12	**Display** 	Multifunction display for indicating: ■ Cumulative working hours system ■ Battery level ■ Fault code

Upper console

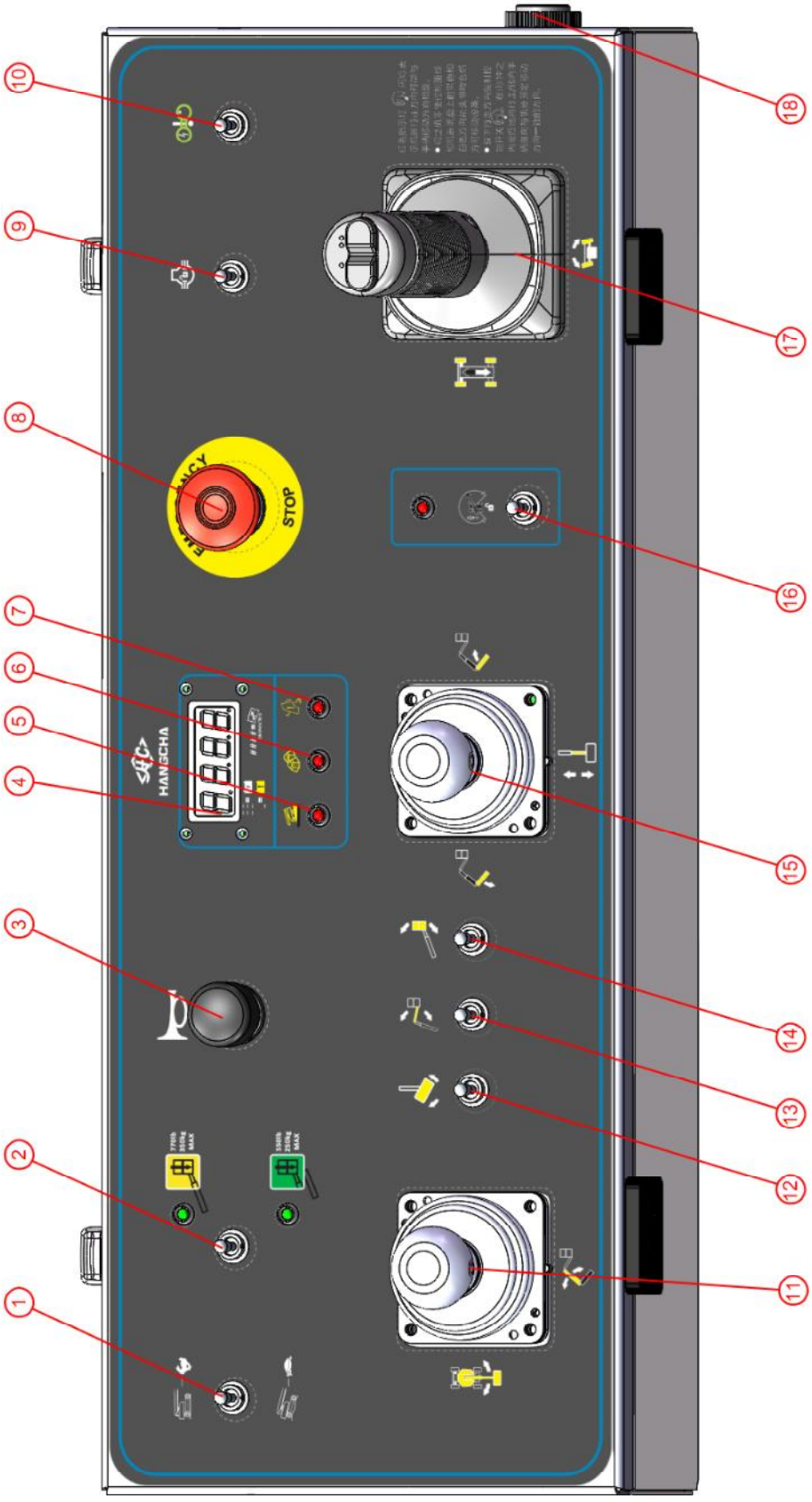
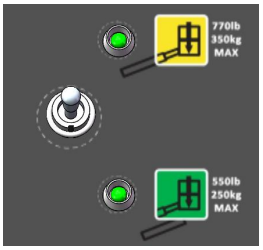
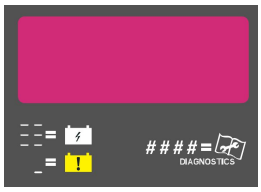
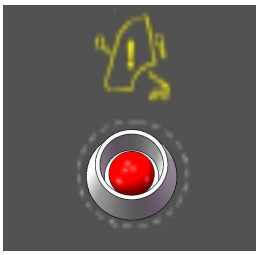
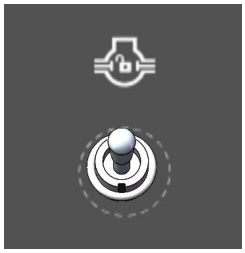
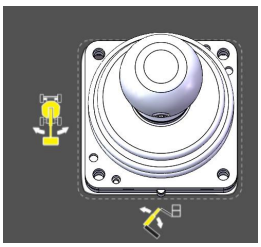
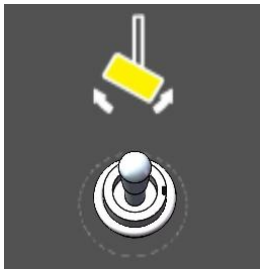
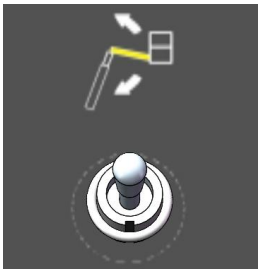
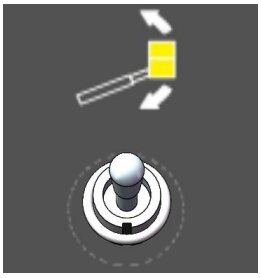
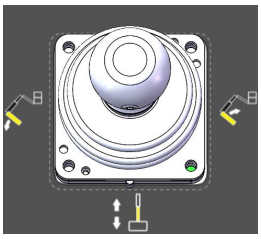


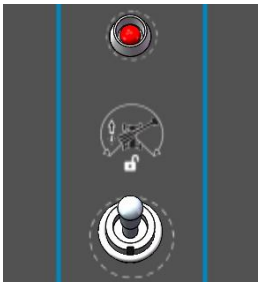
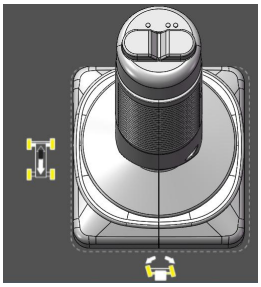
Figure 5-2 schematic diagram of upper control panel

Item	Name	Description
1	**Speed selector switch** 	"Tortoise"/ "Hare" selector switch is two-position handle switch. ➢ "Tortoise speed": Pull the handle down. ➢ "Hare speed": Pull the handle up.
2	**Load selector switch** 	Load selector switch is two-position handle switch. ➢ Pull the handle down and the lower indicator is on. The maximum load is 255kg and the equipment can be used in 255kg operating range. When the load exceeds 255kg, the equipment will overload warnings. ➢ Pull the handle up and the upper indicator is on. The maximum load is 350kg, and the equipment can be used in 350kg operating range. When the load exceeds 350kg, the equipment will overload warnings.
3	**Horn button** 	Press the button and the horn sounds. Release the button, the horn will not sound.
4	**Display** 	Used to display ： ➢ Battery level ➢ Fault code
5	**Tilt alarm indicator** 	Tilt alarm indicator is a red warning light. In normal state, the indicator is off. When the tilt switch detects that the tilt of the device is greater than 5°, it turns on.

Item	Name	Description
6	**Overload alarm indicator** 	Overload alarm indicator is a red warning light. In normal state, the indicator is off. Light up when the platform load is greater than the rated load.
7	**Fault alarm indicator** 	Overload alarm indicator is a red warning light. In normal state, the indicator is off. Light up when there is a fault.
8	**Emergency stop button** 	Two-position button control switch in the shape of red mushroom head is used to stop the machine in case of emergency. (1) Directly press the button to cut off the system power supply in case of emergency. (2) Before starting the system, the emergency stop button of the lower /upper control panel must be in the unpressed position; otherwise, the system cannot start. Turn the mushroom head clockwise to release the emergency stop button.
9	**Emergency unlock switch** 	Emergency unlock switch is a self-resetting toggle switch, which is used to unlock the limit of the overload alarm on the boom action: When the overload alarm sounds, toggle the emergency unlock switch. The telescopic boom retraction and up/down luffing lowering can be performed within the next ten seconds. This operation can be repeated. **Warning: Do not use this switch in normal state.**

Item	Name	Description
10	**Emergency switch** 	When machine is in certain fault conditions, can use this switch for emergency action. Toggle the emergency switch and hold it, and then select the corresponding function action switch to carry out the emergency function action. ***Note: Emergency operations supported at present include:*** *Folding arm luffing downward, main arm luffing downward, telescopic arm retraction, forearm luffing downward, turntable rotation. Do not choose more than two functional actions when using the emergency pump, to avoid the overload damage to the emergency pump.* **Warning: The emergency switch is prohibited for routine function operation. It can only be used when the machine has an electrical fault, otherwise it may cause a serious accident or even casualties.**
11	**Upper luffing /body rotation control handle** 	Push the handle forward and the upper luffing will swing down, Push the handle back and the upper luffing will swing up. Push the handle to the left, the machine will turn to the left, Push the handle right and the machine will turn right. ***Note:*** *When manipulating, you must first step on the foot safety start switch and select the action to perform the operation within 5 seconds.*
12	**Platform swing control switch** 	Self-resetting three-position handle switch, used to control the working platform swing to the left or right. Swing range of working platform: ±90° ***Note:*** *When manipulating, you must first step on the foot safety start switch and select the action to perform the operation within 5 seconds.*

Item	Name	Description
13	**Forearm luffing control switch** 	Forearm luffing control switch is a self-resetting handle switch used to control the forearm luffing. ■ Pull the handle and hold along the upward arrow direction, and the forearm is luffing until it reaches the maximum angle. After releasing the handle, it automatically resets to the middle. ■ Pull the handle and hold along the downward arrow direction, and the forearm is luffing down until it reaches the lowest position. After releasing the handle, it automatically resets to the middle. ***Note:*** *When manipulating, you must first step on the foot safety start switch and select the action to perform the operation within 5 seconds.*
14	**Platform leveling control switch** 	Platform leveling control switch is a self-resetting handle switch. After automatic leveling, if the working platform is tilted, the operator can use this handle switch to correct the working platform ➢ When the working platform is tilted down, toggle the handle in the direction of the upward arrow and hold until the platform is in a horizontal position. Then release the handle, the handle automatically reset to the middle position. ➢ When the working platform is tilted upwards, flip the handle in the direction of the downward arrow and hold until the platform is in a horizontal position. Then release the handle, the handle automatically reset to the middle position. **Platform leveling can be performed only in the retracted state.** ***Note:*** *When manipulating, you must first step on the foot safety start switch and select the action to perform the operation within 5 seconds.*
15	**Telescopic arm/lower luffing handle** 	Push the handle forward and the telescopic arm will retract. Push the handle back and the arm will extend. Push the handle to the left and the lower luffing will go down. Push the handle to the right and the lower luffing will go up. ***Note:*** *When manipulating, you must first step on the foot safety start switch and select the action to perform the operation within 5 seconds.*

Item	Name	Description
16	**Driving direction mandatory control switch** 	Driving direction mandatory control switch is used to confirm the driving direction. Toggle the driving direction mandatory control switch to slowly push the driving/steering handle in the direction consistent with the intended movement direction of the machine within 3 seconds. When the moving direction of the device is opposite to that of the handle, the red indicator blinks.
17	**Driving/steering control handle** 	Hold the enable switch, push the handle forward, the machine will go forward; push the handle back, the machine will go back. Hold the enable switch and press the left button of the thumb switch above the handle to turn the front wheel to the left; Press and hold the right thumb button to turn the front wheel to the right. ***Note:*** ➢ *Driving and steering can be done simultaneously, but it will reduce the speed.* ➢ *Adjust the device so that the black arrows on the control panel match the white arrows on the chassis before moving the device.*
18	**Buzzer** 	Used for action alarm or fault alarm.

A-7 Check the battery level

Turn the "ground / platform control switch" of the turntable control box to the "ground control position", and the panel of the turntable control box will display the percentage of battery power.

A-8 Perform 30 day maintenance

30 day maintenance refers to a one-time maintenance performed after 30 days or 50 hours of new equipment use. After performing this maintenance, perform relevant maintenance at normal intervals.

Perform the following 30 day maintenance procedures:

- B-1 check and replace the hydraulic oil tank return filter
- B-2 check the rim and tire and their fasteners
- B-13 check the connecting bolts of Slewing Support
- B-14 check the fasteners of the platform swing cylinder

5.3.2 Inspection procedure B

B-1 Check and replace the hydraulic oil tank return filter element

Regular replacement of the filter element of the return oil filter of the hydraulic oil tank is very important for the normal operation of the hydraulic system and prolonging the service life of the equipment. A filter with poor cleanliness or blockage may cause the machine to work abnormally, and the continued use may cause component damage. Working in a particularly harsh working environment requires frequent replacement of the filter element of the oil return filter.

Burn hazard

Allow the hydraulic oil to cool to room temperature before servicing the hydraulic system.

Attention

The inspection must be carried out with the machine switched off.

1. Open the left cover of the machine turntable.
2. Find the oil return filter at the hydraulic oil tank.
3. Remove the oil return filter with a wrench.
4. Loosen the top end cover of the filter and take out the filter element.
5. Apply a thin oil film on the gasket of the new oil return filter.
6. After cleaning the oil return filter housing and installing a new filter element,

reinstall the oil return filter.

7. Clean up the spilled hydraulic oil during execution.
8. Start the machine from the ground controller.
9. Check the filter and related parts to ensure no leakage.

High pressure hazard

Slowly remove the hydraulic components to reduce the hydraulic oil pressure. High hydraulic oil pressure may penetrate the skin. If you are injured, please see a doctor immediately.

B-2 Check the rims and tires and their fasteners

Maintaining the rims and tires and their fasteners is very important for the normal and safe operation of the machine. Problems with rims or tires may cause the machine to tip over. Any problems with rims and tires need to be repaired before operating the machine.

This machine uses solid tires or foam tires and does not need inflation.

1. Check the tire every day. If any of the following conditions are found, take immediate measures to stop using the machine and replace the tire or tire assembly (including rim).

- Tyre delamination, i.e. circumferential cracks or delamination between rubbers.
- Off ring, that is, the rubber is separated from the steel ring.
- The rubber surface falls off locally.
- The rubber cracks along the diameter direction.
- The rubber is worn to the wear line.

2.Check whether the tire nuts are tightened with the specified torque of 250Nm.

Attention

Tire nuts should be tightened before first use and after each tire is removed. Check and adjust the torque every 3 months or 150 hours of operation.

B-3 Check hydraulic oil

Checking the hydraulic oil is very important for the normal operation and service life of the machine. The hydraulic oil with unqualified cleanliness may cause abnormal operation of the machine, and continued use may cause damage to hydraulic parts. Particularly harsh working environment requires frequent replacement of hydraulic oil.

Note: Due to the wear of hydraulic components, metal particles may appear in the

hydraulic oil or filter of the new machine.

In case of any of the following conditions, the hydraulic oil shall be replaced in time:

- The hydraulic oil is milky white and turbid.
- The hydraulic oil is black.
- Take out part of the hydraulic oil and check it in the sun. There are metal luminous points, or there is an obvious sense of particles when rubbing with two fingers dipped in the hydraulic oil.
- The hydraulic oil stinks.

Burn hazard

Allow the hydraulic oil to cool to room temperature before servicing the hydraulic system.

B-4 Replace the high-pressure filter element

Regular replacement of high-pressure filter element is very important to the normal operation of the machine and prolong its service life. A filter with poor cleanliness or blockage may cause the machine to work abnormally, and the continued use may cause component damage. Particularly harsh working environment requires frequent replacement of high-pressure filter element.

Burn hazard

Be careful of hot hydraulic oil. If your body comes into contact with hot hydraulic oil, you may cause serious.

Attention

The inspection must be carried out with the machine switched off.

10. Open the cover on the right side of the turntable and find the high-pressure filter.
11. Place a suitable container under the filter.
12. Remove the high-pressure filter from the mounting bracket.
13. Replace the filter element as required.
14. Clean the hydraulic oil spilled during the execution.
15. Start the machine from the ground.

16. Check whether the high-pressure filter and related components have leakage.

B-5 Check the angle sensor and travel switch

Regular inspection of the angle sensor and travel switch is essential for the safe operation of the machine. If the sensor and travel switch do not work properly, unsafe conditions will occur.

Check the angle sensor

1. Turn the "ground / platform control switch" of the turntable control box to the left to the "ground control position".
2. Turn the "emergency stop switch" button on the turntable control box to the "on" position.
3. Use the folding arm luffing function and main arm luffing function to maximize the boom luffing.
4. Stop luffing after the luffing on the folding arm reaches the maximum angle, and stop luffing after the luffing on the main arm reaches the maximum angle.
5. Use the folding arm luffing function and the main arm luffing function to lower the boom.
6. Stop luffing after the lower luffing of the folding arm is in place, and stop luffing after the lower luffing of the main arm is in place.

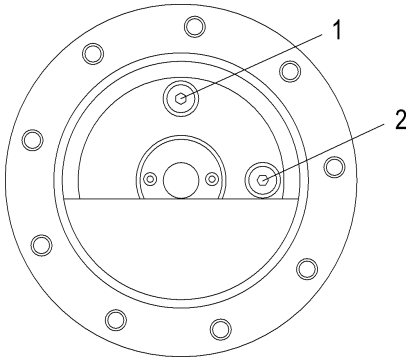
Check the travel switch

1. Turn the "ground / platform control switch" of the turntable control box to the left to the "ground control position".
2. Turn the "emergency stop switch" button on the turntable control box to the "on" position.
3. Use the telescopic function of the main boom to extend the boom.
4. Stop when the boom reaches the farthest position, and the boom cannot continue to extend.
5. Use the telescopic function of the main boom to retract the boom.
6. The boom can be retracted in place.

B-6 Check the oil level in the drive reducer

Improper gear oil level in the drive reducer will reduce the working performance of the machine. If it is continued to be used, it will cause component damage.

1. Drive the machine to rotate the reducer to the position shown in the figure below, so that one bolt is at the top and the other is at 90 °.
2. Remove No. 2 bolt and check the oil level.
3. The oil level should be flush with the bolt port.



4. If the oil level is lower than the bolt port, add oil.
5. Remove the No. 1 bolt and fill the gear oil from the No. 1 port until the oil level is flush with the No. 2 bolt port.
6. Install the removed bolts.
7. Clean up the gear oil spilled during the inspection.
8. This inspection is required for all driving and deceleration of the machine.

B-7 Check the connecting bolts of slewing support

Regular inspection of the connecting bolts of the slewing support is very important for the normal operation of the machine. After the first 50 hours of operation, the inspection must be carried out every 600 hours. If the bolt is found to fall off or loose during the inspection, it shall be replaced with a new bolt. After applying loctite 272 thread locking compound on the bolt thread, add torque according to the value in the torque table to tighten the bolt. After the bolts are replaced and re torqued, the firmness of the existing bolts shall be rechecked.

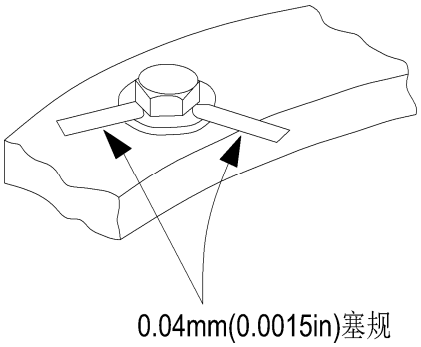


Figure 5-7

Check the connecting bolts between the underframe and the slewing support.

1. 1The folding arm has the largest amplitude; The main boom is horizontal and fully extended.
2. Find the connecting bolts between the underframe and the slewing support.
3. Insert the 0.04mm feeler gauge between the bolt and washer as shown by the arrow in Figure 5-7.
4. Ensure that the plug gauge does not pass through the periphery of the bolt head to the bolt rod.
5. Turn the turntable until all bolts are checked.
6. Check the connecting bolts between the turntable and the slewing support.

B-8 Remote lubrication swing support

Regular remote lubrication of the swing support is essential for the normal operation of the machine. When the equipment operates in multi shift system or is exposed to harsh environment, the lubrication frequency and dosage shall be increased accordingly.

- **Lubrication point:** 1 lubricating oil cup
- **Capacity:** as required
- **Lubricant:** ZL-3 lithium grease

B-9 Check the platform swing cylinder fasteners

Regular inspection of the fasteners of the platform swing cylinder is very important for the normal and safe operation of the machine.

1. The machine is in the retracted state.
2. Find the swing motor at the platform.
3. Check whether the bolt at position 1 in the figure above has been tightened with the correct torque of 70nm.
4. If the bolt needs to be replaced, tighten it according to the specified torque and apply loctite 272 glue.
5. Check whether the nuts at 2 places in the figure above have been tightened with the correct torque of 630nm.
6. If the bolt needs to be replaced, tighten it according to the specified torque.

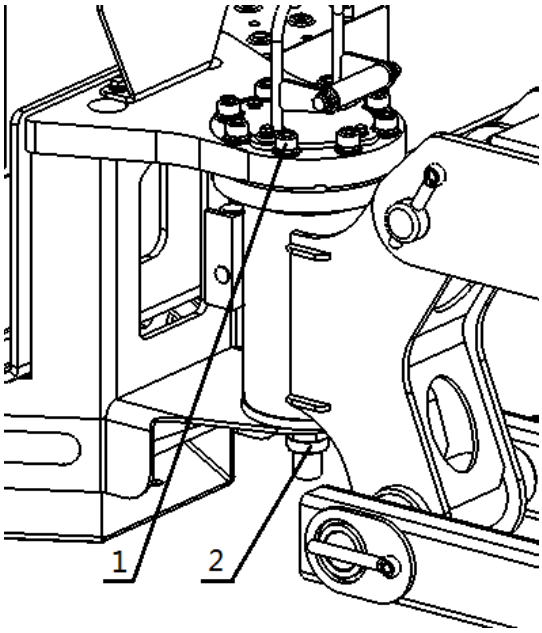


Figure 5-8

B-10 Check the cylinder offset

B-10.1 Platform offset

Measure the offset from the platform to the ground. Fully extend the main boom under the rated load of the platform and the power off state. The maximum allowable deviation within 10 minutes is 50mm (1.97 in). If the machine offset exceeds the maximum allowable value, do the following.

B-10.2 Cylinder offset

Figure 5-9

Cylinder bore size （mm/in）	Maximum allowable offset (within 10 minutes)（mm/in）
63/2. 48	1. 01/0. 040
70/2. 76	0. 82/0. 032
80/3. 15	0. 63/0. 025
100/3. 94	0. 40/0. 016
110/4. 33	0. 33/0. 013

- Measure the offset at the cylinder piston rod with a calibrated dial indicator.
- The oil in the cylinder must be at ambient temperature and the temperature must be stable.
- The cylinder must have normal load and be the normal platform load applied by the platform.
- If the cylinder passes this test, it is acceptable.

Note: this information is based on a cylinder leak of 6 drops per minute. Due to the physical characteristics of thermal expansion and cold contraction of hydraulic oil, the test offset may have an error of 7 / 10000.

B-11 Inspection for air exhaust of floating oil cylinder and locking of balance valve

B-11.1 Float cylinder exhaust

Attention
Please ensure that the platform is in the retracted state during the process of discharging the floating cylinder.

1. Loosen the rubber hose connector above the floating balance valve on the left side of the machine until oil flows out.
2. Place a 120mm (4.7 in) inclined wood block in front of the left front wheel of the machine.
3. Drive the machine to drive the left front tire onto the wooden block.
4. In this process, there should be a mixture of hydraulic oil and air flowing out of

the loosened joint.

5. Repeatedly drive the machine to and from the inclined wood block. After only hydraulic oil flows out of the loosened joint, tighten the joint.
6. At this time, the left floating cylinder is vented successfully.
7. Drive the machine down from the cushion block.
8. Exhaust the right floating cylinder according to the above steps.
9. Check the locking of balance valve.

Locking inspection of balance valve

1. Place a piece of wood (1.4 inch) on the front left side of the machine.
2. Extend the boom to make the machine work.
3. Drive the machine to drive the left front wheel tire onto the wooden block.
4. Slowly operate the turntable to rotate to the right by about 90 degrees.
5. At this time, the rear inspection indicator light is on, and operate the corresponding functions to make the boom horizontal and fully extended.
6. Observe the floating oil cylinder. The floating oil cylinder on the stressed side is not allowed to retract. And retract the boom.
7. Move the "Driving/steering control handle" and drive the machine down from the cushion block.
8. The auxiliary personnel shall check whether the left front wheel or the right rear wheel is still off the ground and keep it lifted.
9. Rotate the turntable slowly to return the turntable to the central position (between the two driving wheels).
10. When driving the machine forward or backward, the left front wheel floating cylinder should be released to lower the wheel to the ground and fit closely with the ground.
11. Repeat the above steps to check the right front wheel floating cylinder.
12. If the floating oil cylinder works abnormally, the fault should be eliminated by qualified maintenance personnel before further operation.

Attention
Every quarter, or after replacing any system components, or when the system is found to be working abnormally, the floating system inspection must be carried out.

B-12 Check the wires

The maintenance of electrical equipment is very important to the normal and safe operation of the machine. Allowing the machine to continue to operate in a damaged and corrosive environment may lead to unsafe operation or serious injury. Replace or repair damaged or corroded wires before operation.

Electric shock

Before checking the wires, be sure to disconnect the battery on the machine and the charger on the AC power socket. Contact with live wires may cause death or serious injury.

1. Check whether the wires in the following areas are damaged or corroded:

- Rotary table valve group harness
- Ground controller junction box
- Platform controller junction box
- Drag chain system harness

2. Check all movable connectors to ensure that they are not loose and the sensor lines are not damaged.

B-13 Check the battery

Good battery condition is essential for good machine performance and safe operation. Improper electrolyte level or damaged cables and wiring may cause component damage and dangerous situations.

Attention

Always wear protective gloves for inspection.

Electric shock

Contact with live circuits may result in death or serious injury. Remove all rings, watches and other accessories.

Danger of physical injury

The battery contains acidic substances, which should be prevented from leakage and contact.

If the acid in the battery leaks, use soda water and the leaked acid.

Attention
After the battery is fully charged, wear protective gloves for inspection. Ensure that the battery cable connections are not corroded.Ensure that the battery is firmly installed and the cable connection is tight.

Note: add terminal protectors and anti-corrosion sealants to help eliminate corrosion of battery terminals and cables.

Note: make sure the battery is fully charged before testing.

Batteries are divided into two types: lead-acid batteries and lithium batteries.

Check lead-acid battery

- wear protective clothing and glasses.
- ensure that the battery cable connections are not corroded.
- ensure that the battery is firmly installed and the cable connection is tight.
- open the exhaust covers of two groups of batteries and check the density of electrolyte of each group of batteries with a liquid densimeter.

Result: if the electrolyte density of any battery is less than 1.026, the battery must be replaced.

- check the electrolyte level. If necessary, make up distilled water from the water inlet on the top of the battery. Be careful not to spill.
- install the battery ventilation cover.
- check the battery line connection to ensure that the connection is accurate (red is connected to the positive pole and black is connected to the negative pole).
- connect the charging plug to the 220V socket.

result: the battery can be charged normally and the charging indicator light is on.

B-14 Test travel speed

1. Turn the "ground / platform control switch" of the turntable control box to the right to the "platform control position".
2. Turn the "emergency stop switch" button on the turntable control box and platform control box to the "on" position.
3. Switch the mode to electric mode.
4. Turn the "Speed selector switch" of the platform control box to switch the “Hare” speed.
5. Step on the "foot switch".
6. Slowly push forward the "travel / steering proportional control handle" to the full drive position.
7. See page 5-22 and table 5-12 for test results.
8. Turn the "Speed selector switch" of the platform control box to switch the “Tortoise” speed .
9. Step on the "foot switch".

10. Slowly push forward the "travel / steering proportional control handle" to the full drive position.

Table 5-10

Model	Test result
HZ210A/HZ210AI	When the boom is in non working state, the maximum driving speed is 6.1 km / h; when the boom is in working state, the maximum driving speed is 0.8 km / h.

Attention
If the running speed of the machine is higher than the test results in the above table, stop using it immediately and mark it.

B-15 Check the emergency descent function

When the motor power unit fails, the emergency power unit on the turntable control box or platform control box can be used according to the actual situation. Operate the emergency power unit switch, and then turn the relevant action switch to control the boom to perform the corresponding action.

Attention
➢ The "emergency power unit switch" is only used for a short time (lowering the work bar into place from the maximum angle and maximum length position) when the electric cannot work.

Operate on the ground：

1. Turn the "ground / platform control switch" of the turntable control box to the left to the "ground control position".
2. Turn the "emergency stop switch" button on the turntable control box to the "on" position.
3. Turn and hold the "emergency power unit switch" on the turntable control box.
4. Turn the corresponding boom function switch on the turntable control box to lower the platform.

Operate on the platform：

1. Turn the "ground / platform control switch" of the turntable control box to the right to the "platform control position".

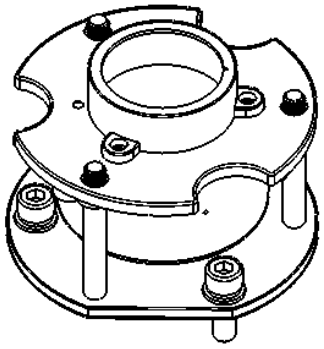
2. Turn the "emergency stop switch" button on the turntable control box and platform control box to the "on" position.

3. Turn and hold the "emergency power unit switch" on the platform control box.

4. Turn the corresponding boom function switch on the platform control box to lower the platform.

B-16 Check the tilt protection system

1. Turn the "ground / platform control switch" of the turntable control box to the left to the "ground control position".
2. Turn the "emergency stop switch" button on the turntable control box to the "on" position.
3. When the machine is in the non working state, pull the horizontal switch for more than 5 ° in the X (left and right) / Y (front and rear) direction.
4. At this time, there is a tilt alarm, "non horizontal indicator" flashes, and all actions are not limited.
5. When the machine is in the working state, pull the horizontal switch for more than 5 ° in the X (left and right) / Y (front and rear) direction.



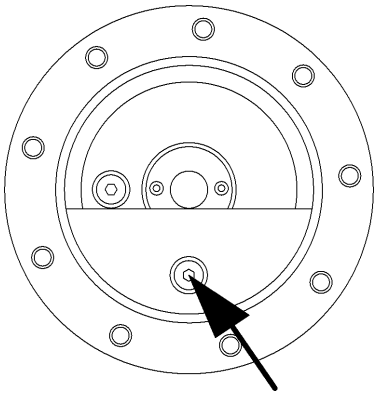
1. At this time, the tilt alarm appears, and the "non horizontal indicator" flashes, limiting some actions, allowing the boom to retract and lower luffing, and allowing the turntable to rotate slowly.
2. When the machine is in the working state, put the two pieces of wood on the lower side of the machine. Size of wood block (length) × wide × Height: 750 × two hundred and fifty × 218mm（29.5 in. × 9.8 in. × 8.6 in.).
3. At this time, there is a tilt alarm, "non horizontal indicator" flashes, and all actions are not limited.
4. Drive the machine down and remove the wood block.
5. Put these two pieces of wood under the two wheels in front (or behind) of the machine, and then drive the machine onto these two pieces of wood. Size of wood block (length) × wide × Height: 750 × two hundred and fifty × 262mm（29.5 in. × 9.8 in. × 10.3 in.).
6. At this time, the tilt alarm appears, and the "non horizontal indicator" flashes, limiting some actions, allowing the boom to retract and lower luffing, and allowing the turntable to rotate slowly.
7. After the boom is retracted, lower the luffing. After the machine is in non working state, drive down and remove the wood block.

5.3.3 Inspection procedure C

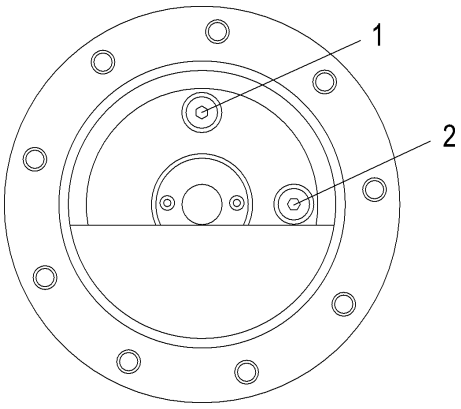
C-1 Replace the gear oil in the drive reducer

Regularly changing the gear oil in the drive reducer is very important to improve the working performance of the machine and prolong the service life of the reducer.

1. Drive the machine to rotate the reducer to the position shown in the figure below so that one bolt is at the bottom.



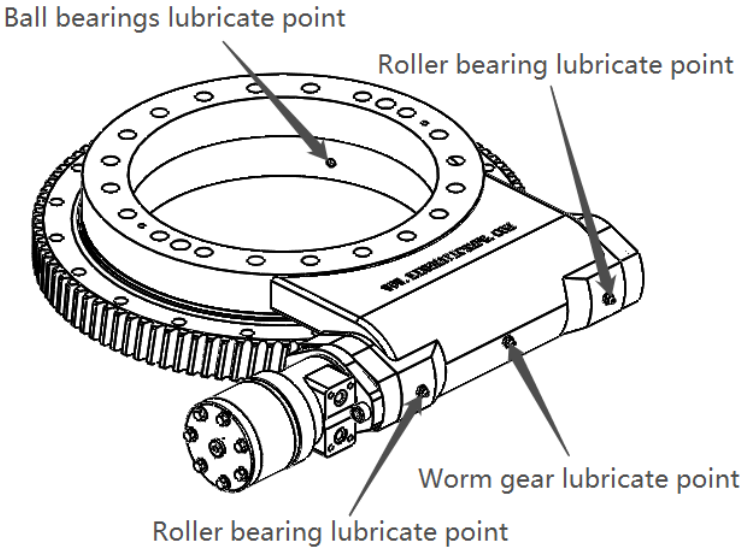
2. Place a suitable container under the bolt indicated by the arrow in the figure.
3. Remove the bolt indicated by the arrow in the figure.
4. Until all the gear oil in the drive reducer flows out into the designated container.
5. Install the removed bolts.
6. Drive the machine to rotate the reducer to the position shown in the figure below, so that one bolt is at the top and the other is at 90 °.



7. Remove bolts 1 and 2.
8. Add new gear oil from No. 1 port until the oil level is flush with No. 2 bolt port.
9. Install the removed bolts.
10. Clean up the gear oil spilled during the inspection.
11. This inspection is required for all driving and deceleration of the machine.

C-2 Lubricate worm gear reducer

Regularly lubricating the worm gear reducer is very important to improve the working performance of the machine and prolong the service life of the reducer.



1. Refer to the arrow to find the grease filling point.
2. Clean the grease filling point.
3. Use a grease gun to aim at the filling point. While rotating the rotary device, continuously inject grease into the oil nozzle. See the following table for the oil filling amount of each lubricating part.

Lubrication point	Quantity	Grease maintenance amount
Slewing Bearing	1	18g
Worm Cavity	1	325g
Bearings	2	40g in total

C-3 Change hydraulic oil

Regular replacement of hydraulic oil is very important for the normal operation of the machine and prolonging its service life. Hydraulic oil with unqualified cleanliness may cause abnormal operation of the machine, and continued use may cause damage to hydraulic parts. Particularly harsh working environment requires frequent replacement of hydraulic oil.

Burn hazard

Allow the hydraulic oil to cool to room temperature before servicing the hydraulic system.

Attention

The inspection must be carried out with the machine switched off.

When removing the rubber hose and pipe joint, the O-ring on the rubber hose and pipe joint must be replaced.

1. Open the cover on the left side of the turntable and find the hydraulic oil tank.
2. Close the hydraulic stop valve located on the side of the oil tank.
3. Remove the oil drain plug at the bottom of the oil tank and drain all the oil into a suitable container. See the product performance parameters for the volume of the hydraulic oil tank.

High pressure hazard

Slowly remove the hydraulic components to reduce the hydraulic oil pressure. High hydraulic oil pressure may penetrate the skin. If you are injured, please see a doctor immediately.

4. Disconnect and plug the oil suction pipe.
5. Disconnect and plug the oil return pipe.
6. Remove the hydraulic oil tank from the machine after removing the fastening bolts of the hydraulic oil tank.
7. Clean the inside of the oil tank with neutral solvent and dry the hydraulic oil tank.
8. Install the hydraulic oil tank on the machine.
9. Connect the oil suction and return lines to the hydraulic tank.

C-4 Replace the hydraulic oil tank suction filter

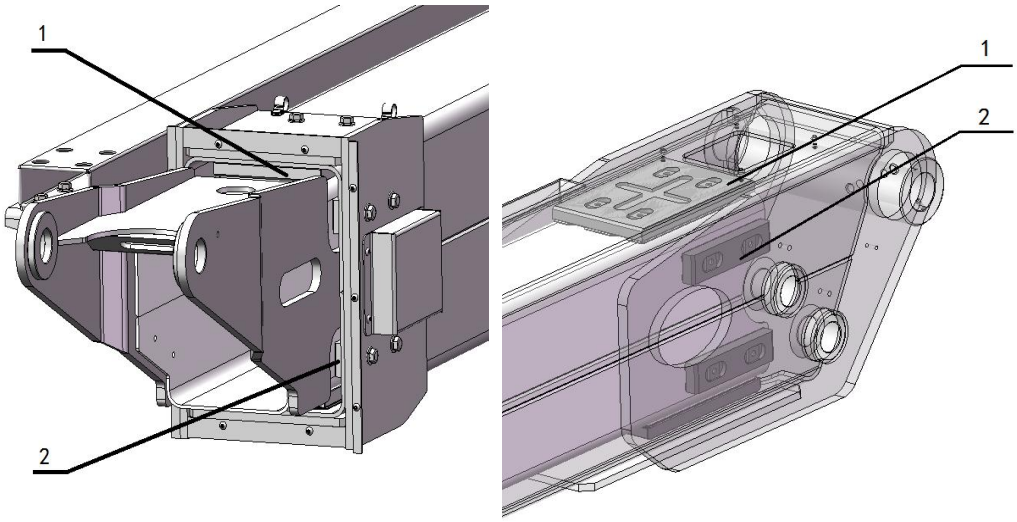
Regular replacement of the oil suction filter of the hydraulic oil tank is very important for the normal operation of the machine and prolonging its service life. The hydraulic oil with unqualified cleanliness may cause abnormal operation of the machine, and continued use may cause damage to hydraulic parts. Particularly harsh working environment requires frequent replacement of hydraulic oil.

When changing the hydraulic oil, replace the oil suction filter of the hydraulic oil tank.

C-5 Check the boom slider

Regular inspection of the boom slider is very important for the safe operation

of the machine. Each sliding block forms a friction pair with the surface of the telescopic arm. Improper sliding block gasket or continuous use of the old sliding block may lead to component damage and unsafe operation.



1. Remove the cover plate or nylon brush at both ends of the boom.
2. Measure the thickness of each slider in the figure above. The following table shows the specified thickness of each slider.

Serial number	Slider thickness
1	17mm（0.67in）
2	17mm（0.67in）

3. When the wear of the slider is greater than or equal to 3mm, the slider assembly needs to be replaced in time.

Attention
The removed slider cannot be reused and must be replaced with a new slider assembly.

Chapter 6 Maintenance procedures

- Maintenance procedures must be carried out by professionally trained and qualified personnel.
- Replace or repair damaged parts immediately. Do not operate the machine with damaged parts.
- Before operating the machine, properly maintain the machine.
- Before starting the machine:
  - read, understand and follow the safety rules and operating instructions in the operation manual.
  - read all procedures and rules.
  - unless otherwise specified, the maintenance procedures of this machine should be carried out under the following circumstances.
  - Place the machine on a flat, level, firm ground.

6.1 Boom and platform components

6.1.1 Boom and platform system

Platform control function authorization system

The platform control system of the machine adopts time-dependent support circuit to limit the time availability of active or enabled controllers. When the foot switch is pressed, the controller is enabled and the operator can operate any control within 60 seconds. As long as the operator continues to use any function, the controller will remain enabled, and the controller will remain enabled within 60 seconds after the last function is used. When the controller is active, the work light on the platform display panel will be on. After the specified time, the working light will go out, and the controller will go out or be disabled. To continue using the device, you must re enable the controller to start the timing system again. To start the timing system again, please follow the following steps: release all control buttons, handles and foot switches, and then press the foot switch again.

Transport position sensing system

The transportation position sensing system is realized by two angle sensors installed on the upper connecting frame and the travel switch installed on the main boom. When the angle sensor detects that the angle between the upper luffing of the main boom and the horizontal plane exceeds 3 °, or the angle between the upper luffing of the upper folding boom and the horizontal plane exceeds 3 °, or the travel switch detects that the telescopic boom is not retracted in place, it is judged to be in the working state, otherwise it is in the non working state. The position of the flying arm is not considered.

The system is used to control the following systems: **Travel deceleration system**

Travel deceleration system

When the boom is in the working state, the driving speed is automatically limited to the low-speed state.

6.1.2 Platform control box--remove

Electric shock

Before performing this procedure, be sure to disconnect the battery on the machine and the charger on the AC power socket. Contact with live conductors may cause death or serious injury.

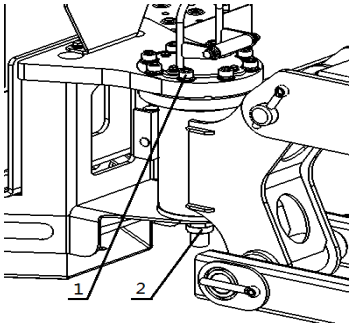
1. Disconnect the external power supply and set the emergency stop switch of the platform control box and ground controller to the "off" position.
2. Find the cable connecting the bottom of the platform control box.
3. Disconnect the cable from the bottom of the platform control box and mark it.
4. Remove the fastening bolts of the platform control box.
5. Remove the platform control box.

Attention

This operation should be performed when the machine is in the retracted state.

6.1.3 Working platform--remove

1. Use appropriate lifting equipment and slings to tie down the working platform.
2. Remove the platform with swing cylinder mounting bolts and nuts.
3. Use lifting equipment to remove the working platform slowly.



Attention

This operation should be performed when the machine is in the retracted state.

6.1.4 Jib--remove

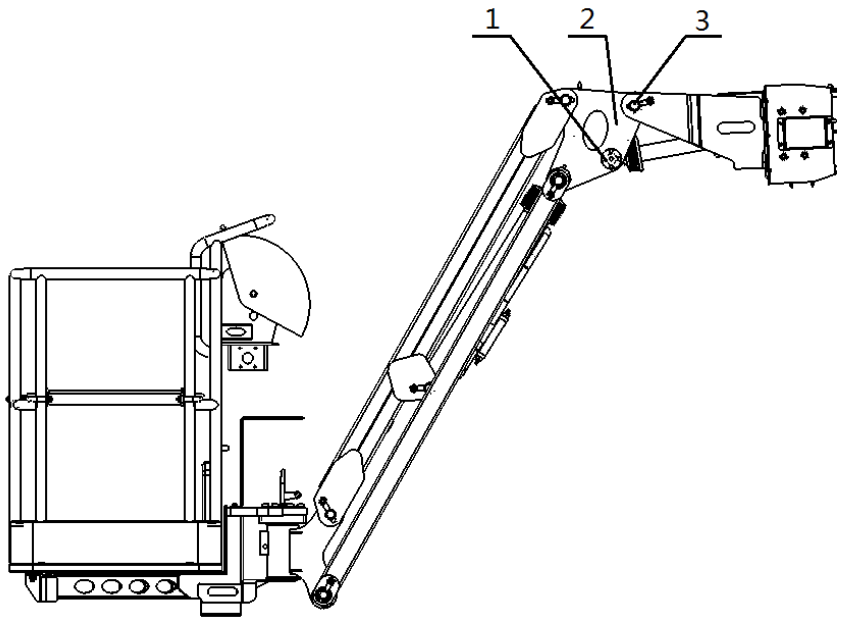
Danger of moving objects

Please wear goggles when hitting the brass rod with a wooden mallet.

Attention

When the end of the rubber hose or the O-ring of the rubber hose is removed, it is necessary to remove the rubber hose.

Be careful when removing the oil cylinder to prevent the oil cylinder from falling and causing damage.



1. Disassemble the platform (see 6.1.3)
2. Use a suitable support to support the swing oil cylinder, and tie the swing arm joint 2 with a suitable lifting equipment sling.
3. Disconnect and plug the rubber hose of the two oil ports on the jib cylinder and plug the pipe connector on the valve block.
4. Remove the fastening screws and end caps at the pin shaft #1, and knock out the pin shaft #1 with a brass rod and a mallet.
5. Remove the stop pin at the pin shaft #3, and knock out the pin shaft #3 with a brass rod and a mallet.
6. Use lifting equipment to slowly remove the jib .

6.1.5 Platform swing motor--remove

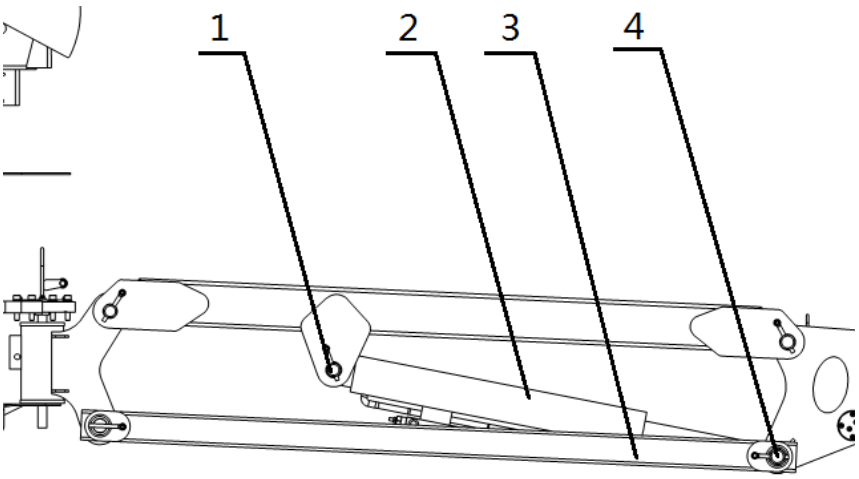
Danger of moving objects

Please wear goggles when hitting the brass rod with a wooden mallet.

1. Remove the jib assembly (see 6.1.4);
2. Place the jib assembly stably;
3. Disconnect and plug the rubber hoses of the two oil ports on the swing cylinder and label them, and plug the pipe joints on the valve block.
4. Support the forearm with a suitable support.
5. Remove the fixing bolts and nuts at the connecting pin shaft between the swing cylinder and the jib.
6. Remove the swing cylinder.

6.1.6 jib cylinder--remove

1. Remove the jib (see 6.1.4);
2. Place the jib assembly stably;



3. Remove the stop pin at the pin shaft #1 of the jib cylinder, and knock out the pin shaft #1 with a brass rod and a mallet.
4. Use a suitable support to support the jib cylinder \2.
5. Remove the stop pin at the pin shaft #4, and knock out the pin shaft #4 with a brass rod and a mallet.
6. Remove the jib cylinder.

6.1.7 Platform leveling cylinder--remove

Danger of moving objects

Please wear goggles when hitting the brass rod with a wooden mallet.

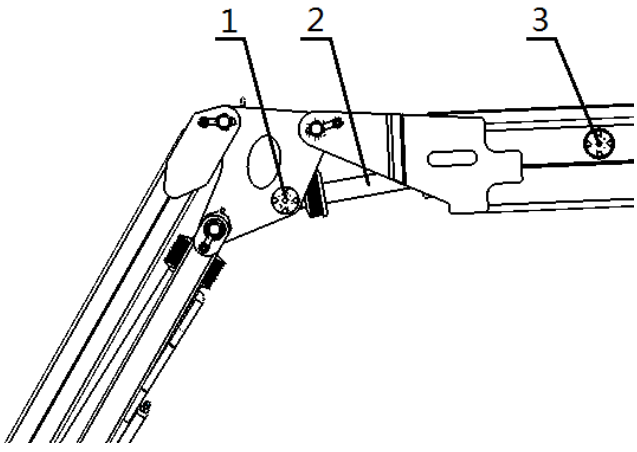
Attention

Be careful when removing the oil cylinder to prevent the oil cylinder from falling and causing damage.

The machine has two platform leveling cylinders, which are located above and below the boom.

The platform leveling cylinder ensures that the platform is kept horizontal within the whole movement range of the boom. The platform remains level relative to the turntable.

1. Extend the boom until the connecting pin at the end of the platform leveling cylinder can be reached.
2. Raise the boom slightly and place the support under the platform.
3. Lower the boom until the platform falls on the support. Be careful not to press the whole weight of the boom on the support.
4. Label, disconnect and plug the hydraulic hose on the oil cylinder located in the boom. Plug the pipe joint.



5. Remove the fastening screws and end caps at the connecting pin shaft #1 of the piston rod end of the leveling cylinder. Do not move the pin at this time.
6. Remove the fastening screws and end caps at the shaft #2. Do not move the pin at this time.

7. Use appropriate supporting equipment to support the platform leveling oil cylinder. Protect the piston rod from damage.
8. Knock out the pin shaft #1 with brass rod and mallet.
9. Knock out the shaft #3 with brass rod and mallet.
10. Carefully remove the oil cylinder from the boom.

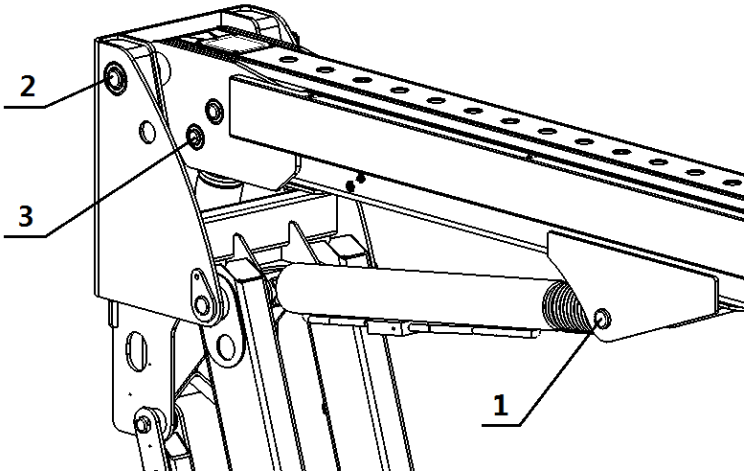
6.1.8 Main boom--remove

Danger of moving objects

Please wear goggles when hitting the brass rod with a wooden mallet.

Attention

When removing the rubber hose and pipe joint, the O-ring at the end of the rubber hose or pipe joint must be removed and marked at the same time.



1. Place the equipment on a firm and level ground.
2. Raise the boom slightly until the main boom luffing cylinder and platform leveling cylinder can reach it completely.
3. Mark and remove the hydraulic hose and cable connected to the underframe / turntable.
4. Use suitable lifting equipment (lifting capacity not less than 2 tons) and tie the end of the main boom with sling.
5. Remove the fixing bolts and stop pin at the pin shaft #1 where the piston rod end of the luffing cylinder of the main boom is connected with the main boom.

Unsafe operation hazard

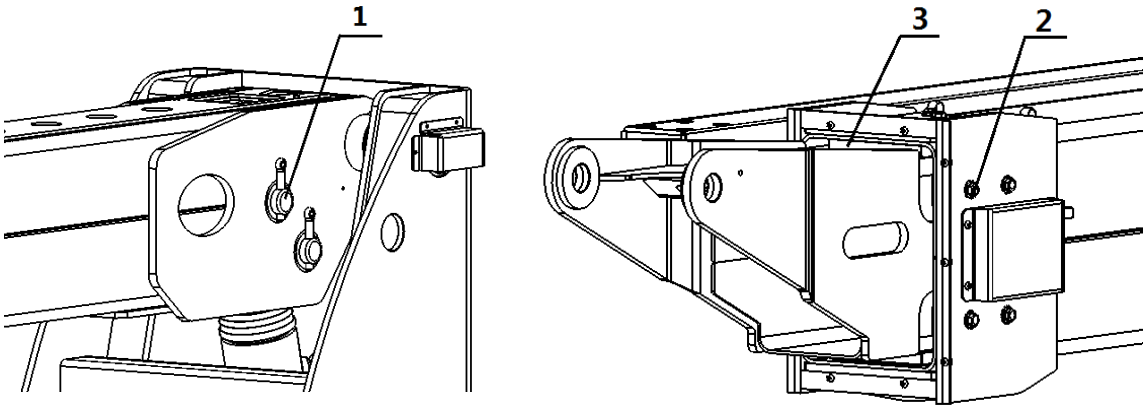
In this process, use appropriate support equipment to reliably support the luffing cylinder of the main boom to avoid injury or machine damage caused by the movement of the cylinder.

6. Knock out the pin shaft #1 with brass rod and mallet.
7. Remove the fixing bolts and nuts at the pin shaft #3 where the piston rod end of the platform leveling cylinder is connected with the main arm.
8. Use suitable lifting equipment (lifting capacity not less than 2 tons) and tie the lower end of the main boom with sling.
9. Remove the fixing bolts and nuts at the pin shaft #2 where the boom assembly is connected with the upper connecting frame.
10. Knock out the pin shaft #2 and #3 with brass rod and mallet.
11. Use lifting equipment to slowly remove the boom assembly from the turntable.

6.1.8 Telescopic boom and telescopic cylinder --remove

Attention

When removing the rubber hose and pipe joint, the O-ring at the end of the rubber hose or pipe joint must be removed and marked at the same time.



1. Remove the fixing bolts and stop pin at the pin shaft #1 where the piston rod end of the telescopic cylinder is connected with the main boom.
2. Knock out the pin shaft #1 with brass rod and mallet.
3. Remove the screws and gaskets on the upper surface and both sides #2 of the

boom tail, and the sliding blocks and gaskets at #3.

4. Pull out the telescopic boom together with the telescopic cylinder of the main boom from the tail of the main boom and place it on a suitable support.

Unsafe operation hazard

Pay attention to prevent the telescopic cylinder from rotating.

5. Remove the fastening screws and end caps of the pin shaft at the end of the telescopic cylinder barrel, and knock out the pin shaft with a brass rod and a mallet.
6. pull the telescopic cylinder out of the head of the telescopic arm.
7. Place the telescopic cylinder on a suitable support.

6.1.9 Folding arm--remove

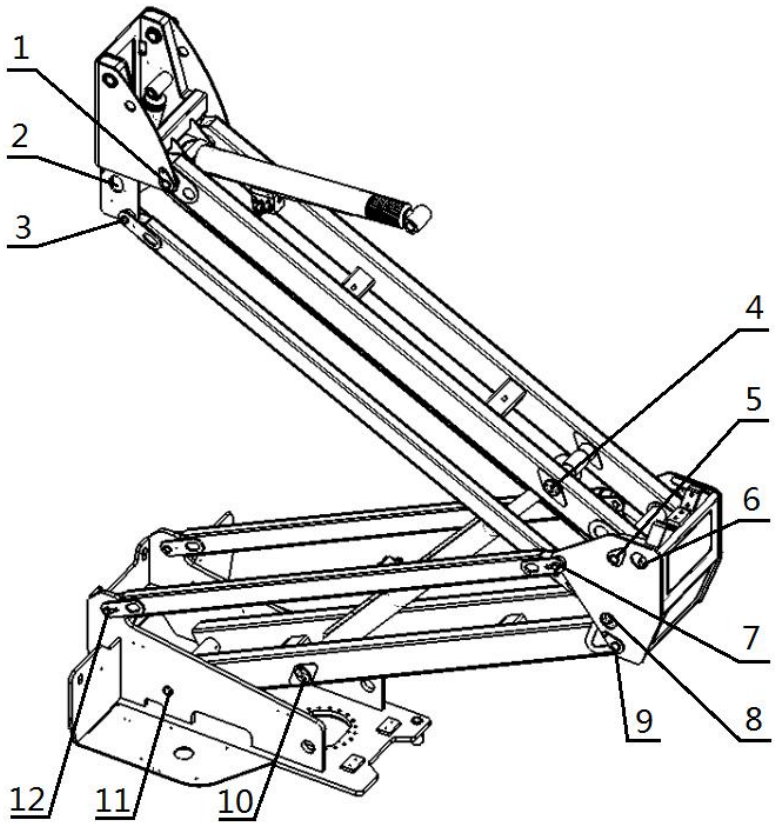
Danger of moving objects

Please wear goggles when hitting the brass rod with a wooden mallet.

Attention

When removing the rubber hose and pipe joint, the O-ring at the end of the rubber hose or pipe joint must be removed and marked at the same time.

1. Remove the main boom.
2. Use suitable lifting equipment to support the middle boom head, lower luffing cylinder, upper luffing cylinder and upper connecting rod.
3. Remove the fixing bolts and stop pins at the pin shaft #1 connected between the cylinder end of the upper luffing cylinder and the upper joint, and remove the fixing bolts and stop pins at the pin shaft #2 connected between the cylinder end of the leveling cylinder and the upper joint.
4. Support the upper joint with a suitable support.
5. Use brass rod and mallet to knock out pin shafts #1 and #2.
6. Use suitable lifting equipment to lift the upper luffing cylinder and the lower leveling cylinder away in turn.



7. Remove the fixing bolts and stop pins at the pin shaft #3 where the joint is connected with the upper connecting rod.
8. Use brass rod and mallet to knock out the pin shaft #3.
9. Use lifting equipment to lift the lower joint away.
10. Remove the fixing bolts and stop pins of the pin shaft connected between the upper connecting rod and the central joint, and remove the pin shaft.
11. Use lifting equipment to lift the upper connecting rod away.
12. Remove the screws and end caps at the pin shaft #4 connected between the cylinder end of the lower luffing cylinder and the middle arm, remove the fixing bolts and stop pins at the pin shaft #5 connected between the middle arm and the middle joint, and remove the screws and end caps at the pin shaft #6 connected between the middle arm and the distribution support.
13. Use a brass rod and mallet to knock out the pin #4, pin #5 and pin #6.
14. Use lifting equipment to lift the middle boom away.
15. Remove the screws and end caps at the pin shaft #8 connecting the distribution support and the lower arm.
16. Use lifting equipment to lift the distribution support away.
17. Use suitable lifting equipment to support the lower arm, lower connecting rod

and centering joint.

18. Remove the fixing bolts and stop pins at the pin shaft #7 connected between the lower connecting rod and the center joint, and remove the fixing bolts and stop pins at the pin shaft #9 connected between the lower arm and the center joint.
19. 19. Use brass rod and mallet to knock out the pin shaft #7 and pin shaft #9 in turn.
20. Use lifting equipment to lift the center joint away.
21. Remove the fixing bolts and stop pins at the pin shaft #12 connecting the lower connecting rod and the turntable.
22. Use brass rod and mallet to knock out the pin shaft #12.
23. Use lifting equipment to lift the lower connecting rod away.
24. Remove the screws and end caps at the pin shaft #10 connecting the lower luffing cylinder and the lower arm.
25. Use brass rod and mallet to knock out the pin shaft #10.
26. Use lifting equipment to lift the lower luffing cylinder away.
27. Remove the fixing bolts and nuts at the pin shaft #11 connecting the turntable and the lower arm.
28. Use brass rod and mallet to knock out the pin shaft #11.
29. Use lifting equipment to lift the lower arm away.

6.2 Underframe and turntable components

6.2.1 Tires and rims

Tire and rim replacement

Hangcha Group Co., Ltd. recommends using tires with the same size, grade and brand as the original tires of the machine for replacement. For the tire part number of a specific machine model, please refer to the parts manual of the corresponding machine. If the replacement tire recommended by Hangcha Group Co., Ltd. is not used, the replaced tire shall have the following characteristics:

1. The grade / rated load and size are equal to or better than the original tires.
2. The tread grounding width is equal to or better than the original tire.
3. The wheel diameter, width and compensation size are equal to the original tires.
4. The tire manufacturer allows such applications (including application range, application occasion, maximum speed and maximum tire load, etc.).
5. Due to the size difference between tires of different brands, two tires on the same axle should use the same brand.

Unsafe operation hazard

The tires and rims on the machine are strictly designed and selected according to the requirements of the overall performance and load stability of the machine, so their model and specification, rim width, installation center surface and diameter shall not be changed,otherwise it will lead to serious danger of operation instability.

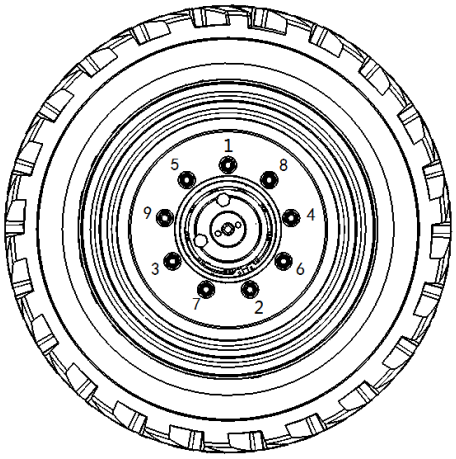
Tire and rim installation

It is very important that the bolt pre tightening torque of the rim meets the requirements.

Unsafe operation hazard

- special tire nuts matching with rim bolts must be used. The nuts must meet the pre tightening torque requirements, and anti loosening measures must be taken to prevent the risk of rim looseness, bolt fracture and tire separation from the axle. Always use only nuts that match the wheel cone angle.
- tighten the nut to the appropriate torque to prevent the wheel from loosening. Use a torque wrench to tighten the fasteners. If you do not have a torque wrench, use a socket wrench to tighten the fastener, and then immediately ask the service station or dealer to tighten the nut to the correct torque. Over tightening will cause the bolt to break or permanently deform the bolt hole on the wheel.

The correct steps for tightening tire nuts are as follows:



1. Apply loctite 272 on the bolts and nuts first, and then screw on all nuts by hand to prevent disordered threads. Do not use lubricant on threads or nuts.

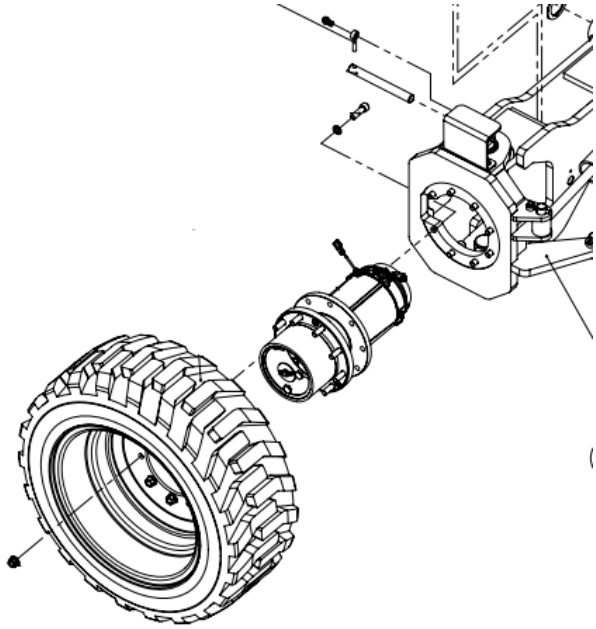
2. Tighten the nuts in the sequence shown below.
3. The fastening of nuts shall be carried out step by step. Refer to the recommended torque in the following table and tighten the nuts in the recommended sequence.

Step 1	Step 2
150N. m	250N. m

Attention
Tire nuts should be tightened before first use and after each tire is removed. Check and adjust the torque every 3 months or 150 hours of operation.

6.2.2 Installation of reducer and traveling motor

Disassembly of Walking Reducer



1. Place the machine on a firm, level ground.
2. Place the jack with sufficient capacity on the side to be removed under the chassis of the machine. Lift the jack to lift the wheel off the ground.
3. Remove the tire nut used to secure the wheel to the reducer. Remove wheel using appropriate lifting equipment.
4. Mark and disconnect the wire connected to the motor.
5. Remove the bolts and washers that fix the walking reducer and the fixed flange, remove the traveling reducer and lift it off the base frame.

Installation of Traveling Reducer

1. Use lifting equipment with sufficient capacity to support the outriggers.

2. Clean the mounting surface, lift the traveling reducer, align the reducer position (the motor wire end on the reducer is aligned with the flange notch), and fit the reducer with the flange mounting surface.
3. Apply loctite 272 thread sealant to the bolts, and install the bolts and washers one by one.
4. Tighten the bolts with a torque wrench.
5. Clean the mounting surface, lift the motor, and align the reducer position: the motor spline shaft engages with the internal teeth of the reducer, slowly rotate the motor housing, and align the motor mounting groove with the reducer mounting screws.
6. When installing the wheel, pay attention to the orientation of the tire
7. Install the tire nuts in turn (refer to 6.2.1.2).
8. Connect the wires on the motor.
9. Check the gear oil in the reducer and add gear oil if necessary (refer to inspection procedure C-1)

6.2.3Battery

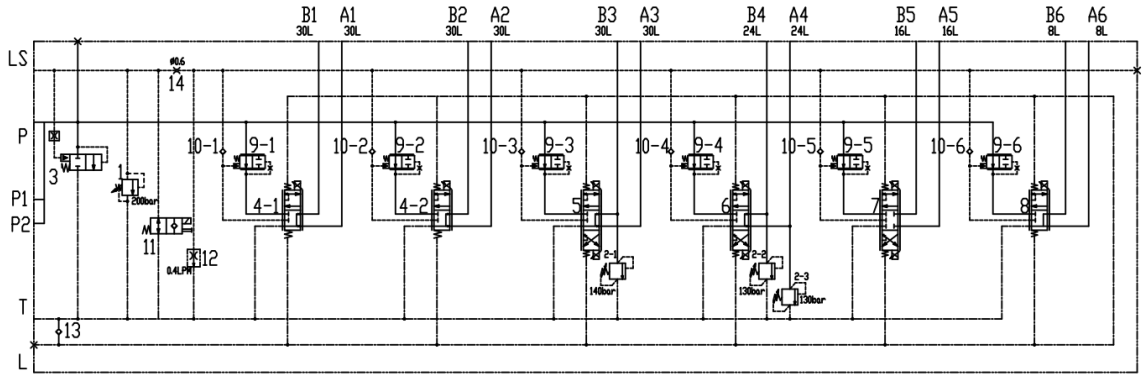
Attention
Before removing the battery, the power supply of the charger and the working power supply of the whole machine must be cut off.

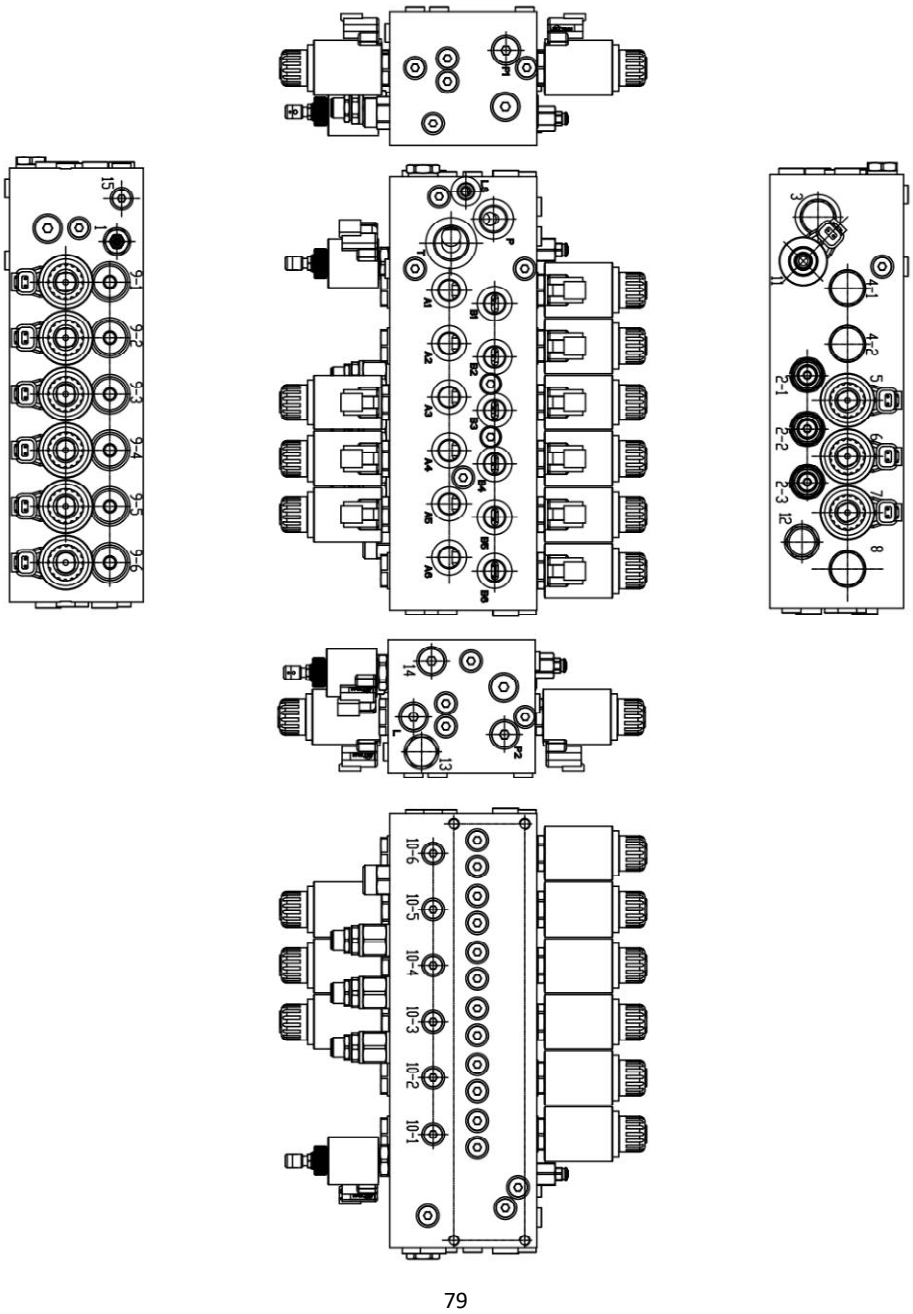
The batteries are located on both sides of the turntable.

1. 1.Open the turntable cover and find the battery.
2. Mark and disconnect the wire connected to the battery.
3. With the help of hoisting equipment, remove the battery.

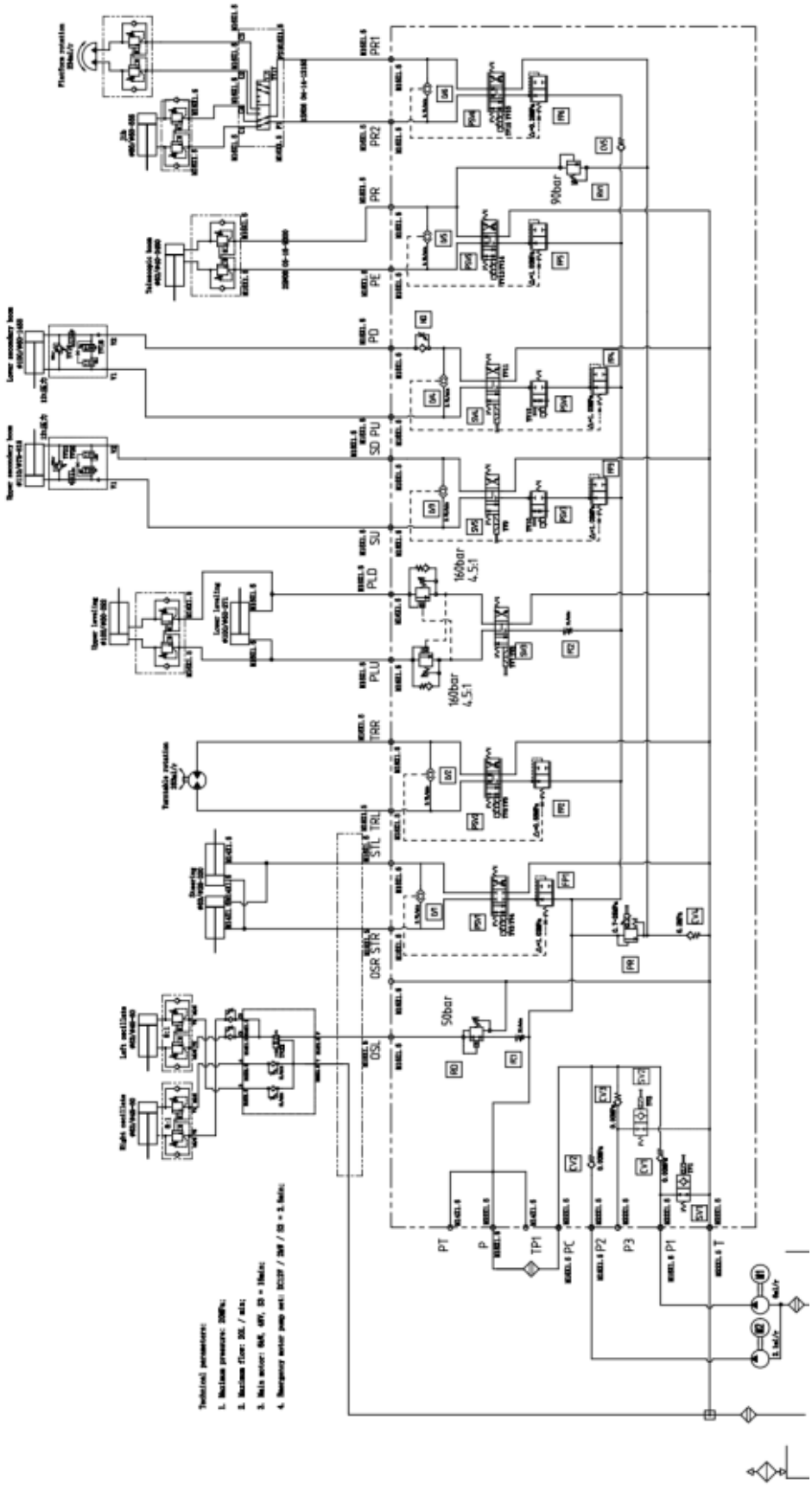
6.3 Hydraulic system

6.3.1 Main valve



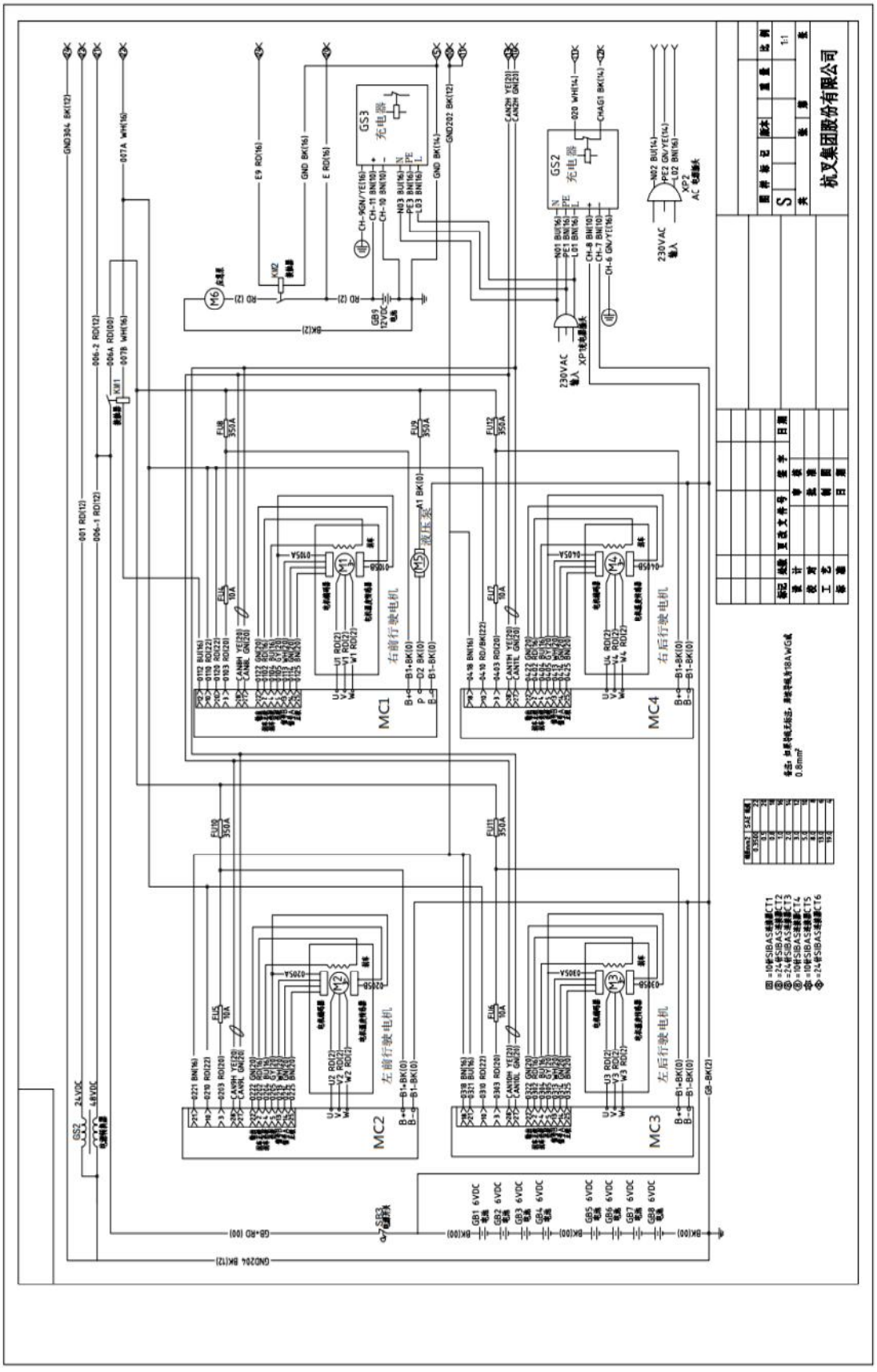


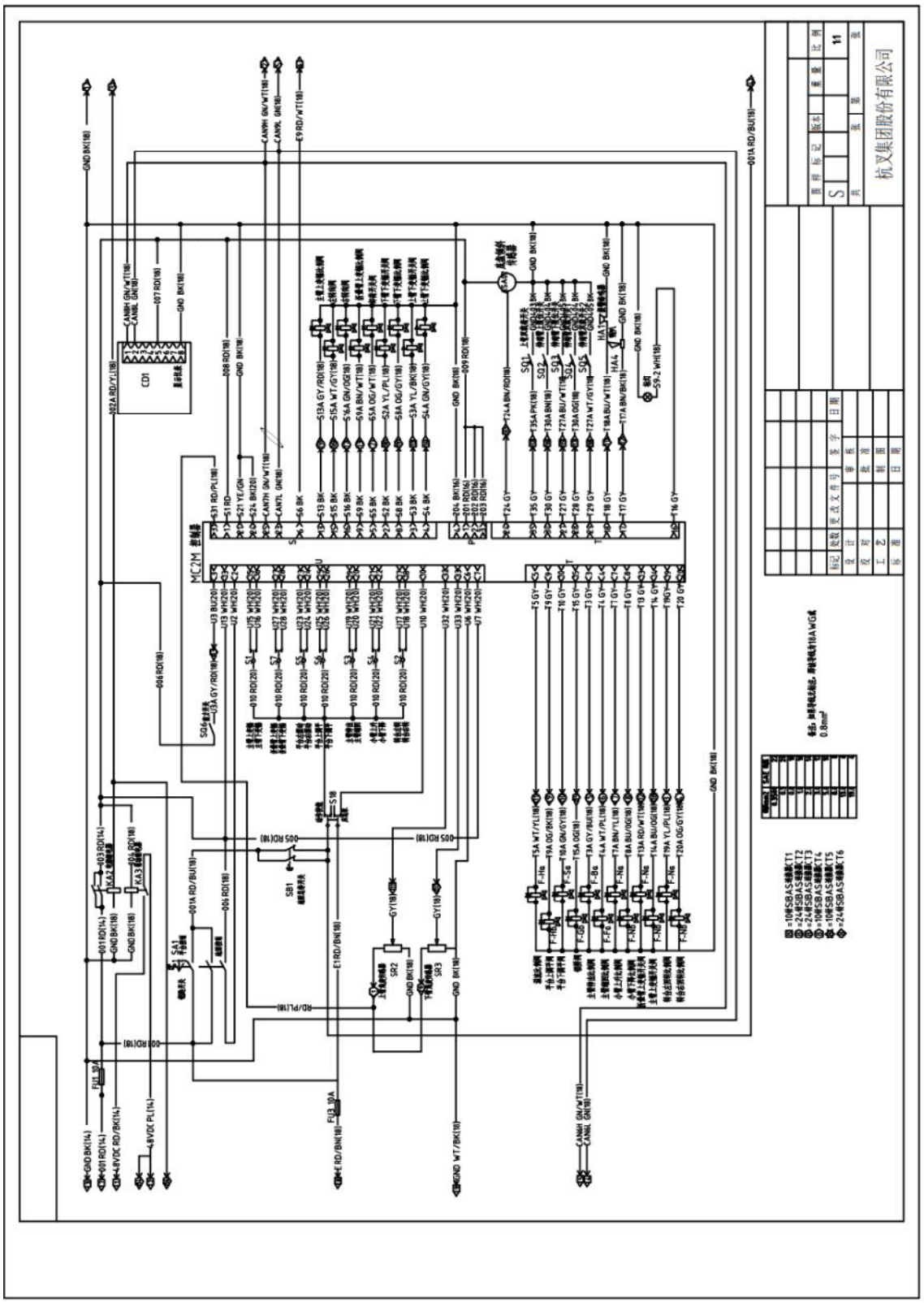
6.3.2 Hydraulic schematic diagram

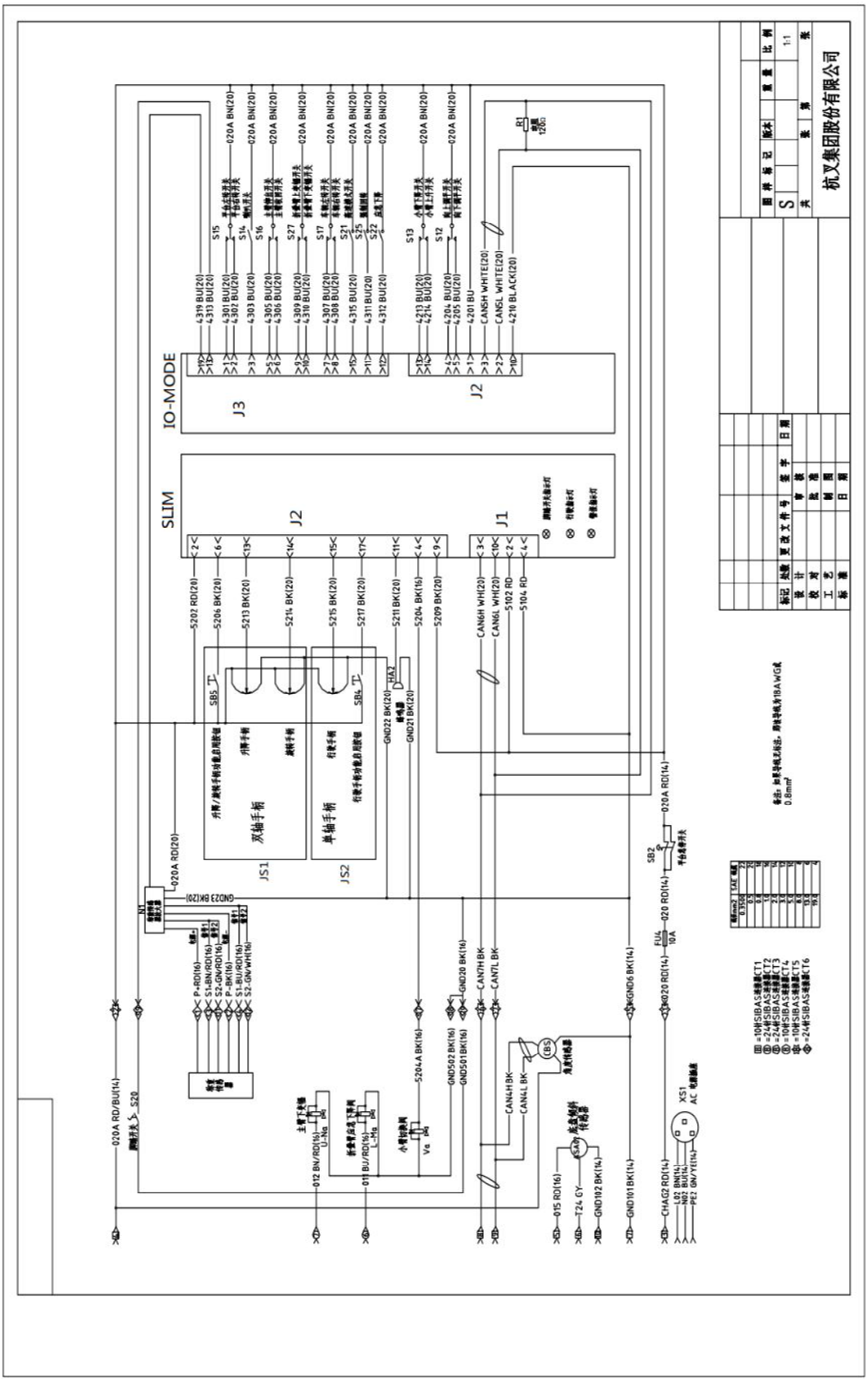


6.4 Electrical system

6.4.1 Electrical schematic diagram






IO-MODE
SLIM
J3
J2
J1
JS1
JS2
双轴手柄
单轴手柄
杭叉集团股份有限公司

6.4.2 Fault code description

In case of fault, the fault code can be queried on the fault query interface of turntable control box

Table 6-7 description of machine fault codes

Fault code	Fault description
001	Controller output power supply 1 open circuit
007	Controller output power supply 2 open circuit
008	Controller output power supply 34 open circuit
009	Platform electric box expansion module bus disconnected
010	The display bus of the lower vehicle electric box is disconnected
011	Load cell 1 fault
012	Left handle failure
017	Middle handle failure
040	Right handle failure
041	Boom angle sensor failure
042	Luffing swing handle bus disconnected
043	The bus of folding arm luffing handle is disconnected
044	The bus of travel and steering handle is disconnected
045	Front left driver bus off
046	Front right driver bus off
047	Rear left driver bus off
048	Rear right driver bus off
049	Oil pump driver bus disconnected
050	Front left driver failure
068	Front right drive failure
070	Rear left drive failure
071	Rear right drive failure
072	Oil pump driver failure
073	Chassis tilt
074	Rear drive not enabled
094	The platform is overweight
104	Low battery
105	Amplitude limit

6.5 Use and maintenance of lead-acid battery (maintenance required)

6.5.1 Required equipment

- Protective goggles and gloves
- Rubber handle wrench
- baking soda
- pole protector (i.e. Vaseline, anti-corrosion spray, etc.)
- Voltmeter (for liquid rich / wet batteries, colloidal and AGM batteries)
- distilled water and purified water (i.e. water treated by ion, reverse osmosis, etc.)
- discharge tester (if any)
- hydrometer (for liquid rich / wet

6.5.2 Safety instructions for battery installation

- Always wear protective clothing, gloves and goggles when handling batteries.
- Do not smoke near the battery and keep the battery away from sparks, flames and metal objects.
- When connecting the battery, use a rubber handle wrench.
- Electrolyte is a mixed solution of acid and water, so avoid contact with skin.
- If the acidic solution comes into contact with skin or eyes, rinse immediately with clean water.
- Please check whether the cable connection with the terminal is firm. Too tight or too loose connection may cause pole damage, melting or fire.
- To prevent short circuit, please do not put objects above the battery.

- Wet lead-acid batteries will release a small amount of gas during use, especially during charging, so the battery must be charged in a well ventilated area.
- Do not add acid to the battery.
- Always keep the battery upright. If the battery is placed sideways or obliquely, the liquid in the battery may overflow.

6.5.3 Battery connection instructions

Battery cable and torque value:

- the battery cable provides the connection between the battery, the device and the charging system. Soft cables shall be used to connect the battery, charging system and equipment. Improper connection may cause performance degradation and terminal damage, melting or fire.
- The tightening torque of cable fixing nut is as follows:

Nut model	Tightening torque
M8	9～11Nm(80～97ft-lb)
M10	18～23Nm(160～204ft-lb)

- Too tight connection with the terminal may lead to terminal damage, and too loose connection may lead to melting or fire.
- If the terminal is not kept clean and dry, it may be corroded continuously. To prevent corrosion, please apply a thin layer of Vaseline or use terminal protector.

6.5.4 Preventive maintenance

Inspect

- Check the appearance of the battery. The top, terminal and connection parts of the battery shall be clean, free of dust, corrosion and dry.
- If there is liquid on the top of the battery, it may mean that there is too much water in the battery.
- Check the connection of battery cable and other parts and tighten all loose connections.
- Replace damaged cables.

Check that all ventilation covers are properly secured to the battery.

Clean

- Clean the top, terminals and connecting parts of the battery with a cloth or brush and the mixture of baking soda and water. Do not let the cleaning solution enter the interior of the battery.
- Wash with water and dry with a cloth, apply a thin layer of Vaseline or use a terminal protector.
- Keep the area around the battery clean and dry.

- Add distilled water
- Depending on the use of distilled water and the frequency of battery operation, check the battery regularly. Generally, the longer the battery is used, the more frequently water is added.
- Please fully charge the battery before adding distilled water. If the plate is exposed, please only add distilled water to the discharged or partially charged battery; In this case, distilled water is only added just above the plate, and then charge the battery according to the following steps:
- Before removing the breather cover, please clean it first to prevent the ash layer and debris from entering the battery. Check the electrolyte level, add water when it is higher than the plate, and add distilled water or deionized water when it is lower than the plate.
- For standard batteries, add water to 3 mm (0.12 in) below the exhaust well (referring to the plastic cover in the exhaust hole).
- After adding water, please fix the breathable cover on the battery again.

6.5.5 Charge

Proper charging is a prerequisite for maximizing battery performance. Under charging or over charging may greatly shorten the service life of the battery. Most chargers are automatic and pre programmed. Some chargers allow the user to set the values of voltage and current. The information about correct charging is as follows:

- The charger of this equipment is automatic and pre programmed, and there is no need for users to intervene in the charging process.
- The battery should be fully charged after each use.
- Lead acid batteries have no memory effect, so they do not need to be fully discharged before recharging.
- Please check the electrolyte level to ensure that the positive and negative plates are covered by water during charging.
- Before charging, please check whether all ventilation covers are properly fixed on the battery.
- Charge only in a well ventilated area.
- avoid charging at temperatures above 49 ° C (120 ° f). The following figure shows the state diagram of battery charging process:

6.5.6 Equilibrium

Equalization is the overcharge of a liquid rich / wet battery after it is fully charged. It is recommended to perform equalization only when the specific gravity of the battery is low (less than 1.25) or the specific gravity range is large (greater than 0.030) after the battery is fully charged. Do not equalize other batteries. The following are the conditions for performing equilibrium:

- Confirm that the battery is liquid rich / wet.

- Check the electrolyte level to ensure that the positive and negative plates are covered by water before charging.
- Before charging, make sure that all ventilation covers are properly fixed on the battery.
- Set the charger to equalization mode.
- The battery will emit gas (bubbling) during the equalization process.
- Measure the specific gravity every hour, and stop equalizing charging when the specific gravity is no longer increased.

6.5.7 Storage

- Charge the battery before storing it.
- Store the battery in a cool, dry place that is not affected by the weather.
- Disconnect the power-off plug to eliminate the potential danger of battery leakage.
- The battery will gradually self discharge during storage. The specific gravity or voltage is monitored every 4-6 weeks. The comparison of charging state with specific gravity and open circuit voltage is shown in the table below.
- The stored battery should be charged once quickly when it is at 70% or lower.
- After the battery is removed from the storage, it should be recharged before use.

Storage in thermal environment (higher than 32 ° C [90 ° F]): Avoid directly exposing the battery to the thermal environment during storage. The self discharge speed of the battery in high temperature environment is faster. If the battery is stored in hot summer, monitor the specific gravity or voltage more frequently (about every 2 ~ 4 weeks).

Storage in a cold environment (below 0 ° C [32 ° F]): Avoid placing the battery in a place where the temperature is expected to reach the freezing point during storage. If it is not fully charged, the battery may freeze at low temperature. If the battery is stored in cold winter, it is important to fully charge the battery.

6.5.8 Troubleshooting

The following battery test steps are only guidelines for determining whether the battery needs to be replaced.

Voltage test during charging

1. Disconnect and reconnect the DC plug to restart the charger.
2. When charging the battery, please record the current during the last half hour of charging (if possible) and measure the voltage of the battery pack.
3. If the current is lower than 5A at the end of charging and the voltage of the battery pack is higher than the following values: 56V for 48V system， 28V for 24V system， 14V for 12V battery， 7V for 6V batteries, proceed to the next step. Otherwise, please check whether the output of the charger is correct and recharge the battery as needed. If the voltage of the battery pack is still Low, the battery may be faulty.

4. When the battery is charged, please measure the voltage of each battery. If the voltage of any battery is lower than the following values, the battery may be faulty:7V for 6V battery, and the voltage difference between the battery and any other battery in the battery pack is greater than 0.5V; 14V for 12V batteries, the voltage difference between the battery and any other battery in the battery pack is greater than 1.0V.

Specific gravity test

1. Fill up the hydrometer and drain it two or three times, and then take a sample from the battery.

2. Measure the specific gravity readings of all battery cells.

3. When the temperature is above 27 ℃ (80 ° f), add 0.004 every 5 ℃ (40 ° f) higher to correct the specific gravity reading; when the temperature is below 27 ℃ (80 ° f), subtract 0.004 every 5 ℃ (40 ° f) lower to correct the specific gravity reading.

4. If each battery cell in the battery pack is lower than 1.250, the battery pack may be under charged, please recharge.

5. If the specific gravity difference between any battery cells in the battery pack exceeds 0.050, please perform equalization for this battery pack.

6. If there are still differences, the battery in the battery pack may be faulty.

Relevant technical parameters:

Input voltage: AC100 ~ 240V

Output voltage: 24V

Precautions:

- Input low voltage protection: when the input AC voltage is lower than 85V, the charging protection is closed, and the work will be resumed automatically after the voltage is normal.
- Reverse connection protection: when the battery is reversed, the charger will cut off the connection between the internal circuit and the battery, will not start charging, and will not be damaged.
- Output short circuit protection: in case of accidental short circuit in the charger output, the charger will automatically turn off the output. After troubleshooting, restart the charging with a delay of 10 seconds.
- Charging indication: during charging, the indicator light is yellow, the charging completion indicator light is green, and the fault indicator light is red.
- Charging braking device: all actions of the machine are cut off during charging.

6.6 Use and maintenance of lithium battery

The use and maintenance requirements of lithium battery are as follows:

preparation in advance

- Before checking the fault, operators must wear insulating gloves, safety helmets and other necessary safety supplies, and prepare special tools such as multimeter, communication tool (can) and computer.
- Check the appearance of the battery system box, such as deformation of the box, rupture of the positive and negative terminal block, loosening of the communication aviation plug, etc.
- Check whether the harness on the communication aviation plug-in socket is misplaced.
- The system is powered on and the battery information is read through can communication.
- Check and confirm the fault phenomenon and analyze the cause.

matters needing attention

- During driving (walking or lifting), if there is no emergency, do not disconnect the key at will and forcibly cut off the main relay of the battery system.
- When the low battery alarm is displayed on the display screen, please charge the battery in time to prevent over discharge of the battery.
- After long-term continuous use of the battery, please charge the battery in time before long-term use to prevent over discharge of the battery caused by self consumption of the battery system for a long time.
- In case of heating, deformation, liquid leakage, peculiar smell or smoke during the use of the battery, the battery must be stopped immediately and placed in an open place away from the crowd.
- The battery is only suitable for supporting equipment. Do not use the battery in other occasions.
- It is forbidden to use wires to directly short circuit the output port of the battery pack.
- Do not immerse the battery in water, acidic, alkaline or salt solution to avoid rain.
- Do not use or store the battery in corrosive, explosive, high temperature (heating, close to fire source or sun exposure, etc.).
- When charging, please use a special charger and avoid charging in direct sunlight. Do not charge the battery repeatedly after the battery is full. Do not let children touch the charger in charging.
- If the battery system is not used for a long time, it should be placed in a suitable environment (the temperature is lower than 40 ℃, the humidity is less than 90%), the battery power should be maintained at more than 50%, and it should be charged with a special charger at least once every three months.

- Waste batteries may cause danger to people or the environment. Please dispose of batteries according to workplace rules and local regulations.
- Do not apply external force to the battery or make it fall from a height.

Lithium battery has automatic protection function: if the unit voltage is higher than 3.4V, the battery system is activated for a long time without output current (≤ 5a) for 36h, or the unit voltage is lower than 3.4V, the battery system is activated for a long time without output current (≤ 5a) for 8h, BMS will automatically cut off the contactor protection. At this time, it is necessary to turn the key again to activate the battery.

Chapter 7 Inspection and maintenance record form

Maintenance inspection report				
Product model				
Factory number				
Inspection procedure A				
Project	**Yes** the machine is in good condition	**NO** Machine damage or failure	**REPAIRED** The machine has been repaired	**Problem description**
A-1 Check each manual				
A-2 Check each label				
A-3 Check for damaged loose or missing parts				
A-4 Check the hydraulic oil level				
A-5 Check hydraulic oil leakage				
A-6 Function check				
A-7 Check the battery level				
A-8 Perform 30 day maintenance				

Inspection procedure B				
Project	**Yes** the machine is in good condition	**NO** Machine damage or failure	**REPAIRED** The machine has been repaired	**Problem description**
B-1 Check and replace the hydraulic oil tank return filter element				
B-2 Check the rims and tires and their fasteners				
B-3 check hydraulic oil				
B-4 Replace the high-pressure filter element				
B-5 Check the angle sensor and travel switch				
B-6 Check the oil level in the drive reducer				
B-7 Check the oil level in the swing reducer				
B-8 Check the connecting bolts of slewing support				
B-9 Remote lubrication swing support				
B-10 Check the platform swing cylinder fasteners				
B-11 Check the cylinder offset				
B-12 Inspection for air exhaust of floating oil cylinder and locking of balance valve				
B-13 Check the wires				
B-14 Check the battery				
B-15 Test travel speed				
B-16 Check the tilt protection system				

Maintenance manual Chapter7 Inspection and maintenance record form

Inspection procedure C				
Project	**Yes** the machine is in good condition	**NO** Machine damage or failure	**REPAIRED** The machine has been repaired	**Problem description**
C-1 Replace the gear oil in the drive reducer				
C-2 Lubricate worm gear reducer				
C-3 Change hydraulic oil				
C-4 Replace the hydraulic oil tank suction filter				
C-5 Check the boom slider				
User				
Signature of inspector				
Inspection date				
Inspector post				
Inspector unit				

Explain:

1.The maintenance inspection report shall include a checklist for each type of periodic inspection.

2.Copy the maintenance inspection report for each inspection. The completed form shall be kept for at least 10 years or until the machine is out of use or at the request of the machine owner / company / custodian.

3.Use this form to record the results. After completing each inspection procedure, tick the corresponding box.

4.Record the inspection results. If any inspection result is "no", you must stop using the machine, recheck the machine after maintenance, and tick the mark in the box of "repaired".

Select the appropriate inspection procedure according to the inspection type.