HS RP *Series*

Mobile elevating work platform

HS1523RP

HS1823RP

Maintenance Manual

HANGCHA GROUP CO., LTD.

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Preface

Dear customers, thank you for choosing to purchase the mobile elevating work platform of HANGCHA GROUP CO., LTD.

Before maintaining the machine, please read and understand the content of this manual carefully. You should understand and abide by the relevant safety rules and operation instructions, and better grasp the use and operation requirements of the machine. Only trained and authorized personnel are allowed to operate the machine. This manual should be part of the machine and always kept with the machine.

This manual is the correct maintenance instruction of the aerial work platform, it will guide you on how to perform safe operation and maintenance. It also includes the working principle of the machine and fault diagnosis and other aspects. In order to ensure the safety and give full play to the performance of the product, relevant operators and maintenance personnel must read this manual thoroughly before use.

The design of our product is constantly being updated and improved, so there may be some differences between the contents of this manual and the machine you are currently using.

If there is any uncertainty, please contact HANGCHA GROUP CO., LTD. sales department or the agent.

Contents

1 Specification

1.1 Main performance parameters

The following technical data are all standard. We reserve the right to make changes and additions to the data.

Parameter item		Unit	HS1523RP	HS1823RP
Overall dimensions	Length	m	4.88	4.88
	Width	m	2.28	2.28
	Height（Guardrail folded）	m	2.22	2.44
	Height（Guardrail unfolded）	m	2.98	3.19
Ground clearance		m	0.36	0.36
Machine weight		kg	8000	8600
Working dimensions	Platform height, max.	m	13.1	16.2
	Working height, max.	m	15.1	18.2
	Extended length, max.	m	1.5/1.2	1.5/1.2
Safe load capacity		kg	680	680
Safe load capacity （Extended platform）		kg	230	230
Maximum number of workers （indoor/outdoor）		Person	7/4	4/4
Wheel base		m	2.84	2.84
Wheel tread		m	1.96	1.96
Turning radius	Inner	m	2.3	2.3
	Outer	m	5.3	5.3
Maximum allowable side force		N	400N	400N
System voltage（DC）		V	80	80
Platform dimensions	Length	m	3.96	3.96
	Width	m	1.82	1.82
Tire size	Diameter	mm	848	848
	Width	mm	320	320
Hydraulic system pressure		M Pa	24	24
Control voltage（DC）		V	12	12
Driving speed	Retracted, max.	km/h	5	5
	Lifted, max.	km/h	1	1
Maximum slope rating		%	50	40
Maximum wind speed		m/s	12.5	12.5
Maximum allowable inclination	Front-back	°	3	3
	Left- right	°	2	2
Normal working noise		dB	≤80	≤80

1.2 Power system specification

Power system specification

Item	Parameter	Specification
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℉]）	Special customization required
Gear pump	Flow	5 ml/r
	Rated working pressure	21MPa
Function valve	Lifting relief valve pressure	21MPa
	Steering relief valve pressure	12MPa

Note: The machine can be filled with hydraulic oil according to customer demand; different specifications of hydraulic oil cannot be mixed.

1.3 Installation instruction for hydraulic hose and pipe joint

1.3.1 Hydraulic hose torque

Note: When removing or installing hydraulic hose, it must be operated according to the torque specified in the table below.

Hydraulic hose torque

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	-

1.3.2 Hydraulic pipe joint torque

Note: When removing or installing hydraulic pipe joints, it must be operated according to the torque specified in the table below.

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 ± 12 Nm	100 ± 7 Nm
M30×2	140 ± 8 Nm	245 ± 15 Nm	135 ± 8 Nm
M33×2	180 ± 10 Nm	320 ± 20 Nm	160 ± 10 Nm
M42×2	240 ± 15 Nm	450 ± 25 Nm	210 ± 13 Nm
M48×2	280 ± 20 Nm	540 ± 30 Nm	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 ± 20 Nm	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

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	-

Hydraulic pipe joint torque - American system（UNC/UNF）

Thread specification	Al	Steel
	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
1-1/16-12	110 ± 8 Nm	140 ± 10 Nm
1-5/16-12	160 ± 10 Nm	210 ± 15 Nm
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

1.3.3 Hydraulic hose and pipe joint tightening procedure

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 pipe joint 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.

1.4 Installation instructions for 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.

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
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

Tightening torque of fasteners – American system（UNC）

Diameter（in）	**Opposite dimension of nut（s）**	**Grade 5**	**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

Tightening torque of fasteners – American system（UNF）

Diameter（in）	Opposite dimension of nut（s）	Grade 5	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

2 Safety rules

2.1 Overview

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. Personnel should read, understand and comply with safety rules and government regulations.

Whether you are the owner, user, or operator of the machine, you must read through and correctly understand the contents of this manual before operating for the first time. You can operate the machine independently only after you independently operate the whole process 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 construction safety hazards and take corresponding safety measures before each operation; most accidents in practice can be completely avoided. Therefore, before each use and operation, it should be evaluated by the safety personnel who has been trained and has the experience and ability to analyze safety risks, 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.

Before operating the machine, it is necessary to confirm that the personal protective devices listed in the table below are properly worn and intact.

Anti-falling safety rope	Protective gloves	Helmet	Safety shoes

2.2 Symbol description

The symbols, color codes and txt meanings used in the product labels of Hangcha Group co., Ltd. are as follows.

Safety-warning symbol appears in most safety statements. It means your safety will be affected, so you need to pay attention and be vigilant at all times. Please read and follow the relevant information of safety warning symbol.

Indicates an emergency hazard. If not avoided, will result in death or serious injury.

Indicates a potential hazard. If not avoided, will result in death or serious injury.

Indicates a potential hazard. If not avoided, will result in minor or moderate injury.

NOTICE

Indicates potential hazard to damage the power unit, personal property and environment, or improper operation of the equipment.

2.3 Accident notification

In case of any malfunction of machine, please contact Hangcha Group co., Ltd.

Immediately. Even if there was no personal injury or property damage in the accident, please be sure to contact us by phone and provide all necessary details. If you failure to notify the manufacturer within 48 hours after the accident, the warranty period of the product maybe invalid.

NOTICE
After the accident, the operator should check the machine and its functions thoroughly. All functions should be tested first from the ground controller and then from the platform controller. Lifting height shall not exceed 3m until all damage has been repaired and all controllers can be operated correctly.

2.4 Electrocution hazard

The machine is not electrically insulated and has no electrocution protection function.

All operators and managers shall comply with national or local regulations regarding the minimum safe distance of charged conductor above ground. In the absence of such regulations, operators and managers should follow the minimum safe distance requirements in this manual.

Electrocution hazard

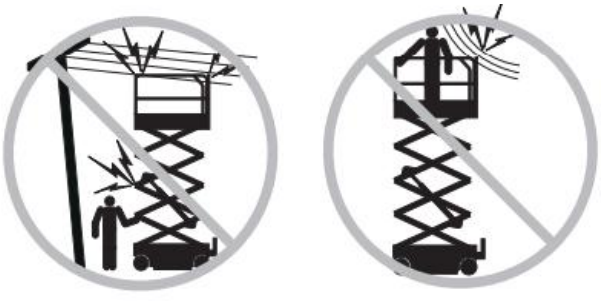
★ Follow relevant government regulations and always keep a safe distance from power cord and electrical equipment, as shown in the table below.

★ Consider platform movement, wire swing or sag. Beware of strong winds or gusts, and do not operate machine during lightning or storms.

★ Keep away from the machine if it touches charged wires. Do not touch or operate the machine before the power is cut off.

★ Do not use the machine as grounded wire when welding and grinding.

Minimum safe distance from



charged conductor

Voltage range （phase，kV）	Minimum safe 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 Tip-over hazard

Maximum rated load capacity

Model	Safe load capacity	Safe load capacity (Platform extension)	Number of person	Maximum manual operation force
HS1523RP	680kg	230kg	7	400N
HS1823RP	680kg	230kg	4	400N

Tip-over hazard

★ Do not allow personnel, equipment and materials on the platform to exceed the maximum load capacity.

★ Only when the machine is on firm, level ground can the platform be lifted or extended.

★ Do not use the tilt alarm as a level indicator. The tilt alarm on the platform sounded only when the machine tilted heavily. If the tilt alarm sounds, carefully lower the platform and move the machine to firm, level ground. Do not change the level or limit switch.

★ Do not drive over 1 km/h with the platform lifted.

★ Do not drive the machine on uneven, unstable surfaces or other dangerous conditions with the platform lifted.

★ Do not operate the machine in strong winds or gusts. Do not increase the surface area of the platform or load. Increase the area exposed to wind will decrease the stability of the machine.

★ Take special care and slow down when driving on uneven or gravelly ground, or other unstable surfaces, and near holes and steep slopes.

★ Do not drive on slopes that exceed the maximum slope rating of the machine. Maximum slope rating applies to machine in the retracted state.

HS1823RP: 40%（22°），HS1523RP: 50%（26.5°）

★ Do not push or pull any object outside of the platform.

Maximum allowable side force：400N.

★ Do not alter any machine parts that may affect safety or stability.

★ Do not replace parts critical to machine stability with parts of different weights or specifications.

★ Do not modify or alter the aerial work platform without the prior written permission of the manufacturer.

★ Do not install additional devices to hold tools or other materials on the platform or guardrail. It will increase the weight and surface area of the platform or the load.

★ Do not place or fix any overhang load on any part of the machine.

★ Do not place ladder or scaffolding inside the platform or against any part of the machine.

★ Do not use machines on moving or mobile surfaces, or on vehicles. Ensure that all tires are in good condition and the tire nuts are properly tightened.

★ Do not push the machine or other objects with the platform.

★ Do not contact adjacent components with the platform.

★ Do not tie the platform to adjacent components with ropes or other binding materials.

★Do not place loads outside the platform perimeter.

★ Do not use the platform controller to lower the platform when it is tripped, stuck, or blocked from normal movement by other nearby objects. If the platform is to be lowered by ground controllers, the operation can be performed only after all

personnel have left the platform.

★ Do not use batteries that lighter than the original equipment. The battery not only provides power, but also acts as a counterweight, which is essential for maintaining the stability of the machine.

HS1823RP & HS1523RP: Each battery pack must weigh 190kg.

★ Do not operate the machine when the left and right side doors open.

2.6 Working environment hazard

Before using the machine or during its operation, inspect the workplace for possible hazards, and pay attention to environmental restrictions, including inflammable and explosive gases or dusts.

Working environment hazard

★ Do not operate on surfaces, edges, or potholes that cannot support the machine. Only when the machine is on firm, level ground can the platform be lifted or extended.

★ Do not use the tilt alarm as a level indicator. The tilt alarm on the platform sounded only when the machine tilted heavily.

★ If the tilt alarm sounds, carefully lower the platform. Do not change the level or limit switch.

★ Do not drive over 1 km/h with the platform lifted.

★ Do not operate the machine outdoors when there are strong winds or gusts. Do not lift the platform when the wind speed exceeds 12.5m/s. If the wind speed exceeds 12.5m/s after lifting the platform, immediately retract the platform and stop the operation.

★ Do not drive on uneven terrain, unstable surfaces, or other dangerous conditions with lifted platform.

★ Take special care and slow down when driving the machine with retracted platform on uneven or gravelly ground, or other unstable surfaces, and near holes and steep slopes.

★ Do not drive or lift the machine on slopes, steps, or arched ground that exceed its maximum slope rating.

Beaufort scale	m/s	mile/h	Description	Ground conditions
0	0～0.2	0～0.5	Clam	No wind, smoke vertically up.
1	0.3～1.5	1～3	Light breeze	Smoke indicates wind direction.
2	1.6～3.3	4～7	Light breeze	Bare skin feels windy. Leaves rustle slightly.
3	3.4～5.4	8～12	Gentle breeze	Twig began to shake.
4	5.5～7.9	13～18	Moderate breeze	Dust and scraps of paper kicked up. Twigs began to shake.
5	8.0～10.7	19～24	Fresh breeze	Saplings shook.
6	10.8～13.8	25～31	Strong breeze	Swaying branches, whistling overhead power lines, and difficult to open an umbrella
7	13.9～17.1	32～38	Near gale	Tree shakes. Difficulty walking against the wind.
8	17.2～20.7	39～46	Gale	Broken branches. Vehicle offset direction.
9	20.8～24.4	47～54	Strong gale	Minor damage to the building.

NOTICE

Maximum slope rating : 40%（HS1823RP） /50% （HS1523RP）

Maximum slope rating applies to machines in the retracted position.

Gradeability refers to the maximum slope rating when the machine is on firm ground and the platform is carrying only one person. The rating of the ramp decreases as the platform increases in weight.

2.7 Unsafe operation hazard

The operation shall strictly comply with the requirements of this manual and maintenance manual. If the industry or local has more stringent regulations, the latter shall be followed.

Unsafe operation hazard

★Do not push or pull any object outside of the platform.

Maximum allowable side force: 400N.

★Do not alter any machine parts that may affect safety or stability.

★Do not replace parts critical to machine stability with parts of different weights or specifications.

★Do not modify or alter the aerial work platform without the prior written permission of the manufacturer.

★Do not install additional device to hold tools or other materials on the platform or guardrail. It will increase the weight and surface area of the platform or the load.

★Do not place ladder or scaffolding inside the platform or against any part of the machine.

★Do not operate machine on moving or mobile surfaces, or on vehicles. Ensure that all tires are in good condition and the tire nuts are properly tightened.

★Do not place or fix any overhang load on any part of the machine.

★Do not use the machine as a crane.

★Do not push the machine or other objects with the platform.

★Do not contact or tie adjacent components with the platform.

★Do not place loads outside the platform perimeter.

★Do not operate the platform controller to lower the platform when it is tripped, stuck, or blocked from normal movement by other nearby objects. If the platform is to be lowered by ground controllers, the operation must be performed only after all personnel have left the platform.

★When one or more tires are off the ground, evacuate all personnel before stabilizing the machine, and use crane, forklift, or other suitable equipment to stabilize the machine.

2.8 Fall hazard

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

Fall hazard

★Wear seat belts or use safety facilities in accordance with government regulations. Attach the lanyard to the anchor on the platform, and only one person can tie on each anchor.

★Do not sit, stand or climb on the platform guard rails. Maintain a firm footing on the platform floor at all times.

★Do not climb down from the platform when lifting.

★Keep the platform floor unobstructed.

★Do not enter or exit the platform unless the machine is fully retracted.

★ Close the entrance door before operation.

★ Do not operate the machine unless the guard rails are properly installed and the entry is secured.

2.9 Collision hazard

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

Collision hazard

★ Be careful about limited sight distance and blind spots when driving or operating.

★ Check the work area for overhead obstacles or other possible hazards.

★ Be careful when using the platform controller and ground controller. Color-coded directional arrows indicate driving, lifting, and steering functions.

★ Comply with employer, job site and governmental rules regarding the use of personal protective equipment (hard hats, seat belts, gloves, etc.)

★ The machine must be on level surface or secured before releasing the brake.

★ The platform can be lowered only when the area below is clear of personnel and obstacles.

★ Limit the drive speed according to the condition and slope of the ground, the degree of congestion, the location of the personnel and any other factors that may cause a collision.

★ Do not operate machine in the path of any crane or moving overhead machinery unless the crane controller is locked or precautions have been taken to prevent any potential collision.

★ Do not place your hands and arms near where they may be squeezed.

★ Do not work under the platform or near the scissor arms without the safety bar in place.

★ Please maintain correct judgment and planning when operating the machine with the ground controller and keep a proper distance between the operator, the machine and the fixed object.

★ No dangerous driving or horseplay when operating machine.

2.10 Crushing hazard

There is a potential crushing hazard when moving the machine. Body parts and clothing should be kept at a safe distance from the machine at all times during operation.

Crushing hazard

★Do not place your hands and arms near where they may be squeezed.

★Do not work under the platform or near the scissor arms without the safety bar in place.

★Please maintain correct judgment and planning when operating the machine with the ground controller and keep a proper distance between the operator, the machine and the fixed object.

2.11 Explosion and fire hazard

Explosion and fire hazard

★ Do not charge the battery, operate or fuel the machine in places that are dangerous or where flammable and explosive gases may exist.

2.12 Damaged machine hazard

Comply with the operation and maintenance requirements of the parts in this manual and the maintenance manual, otherwise the machine may be damaged.

Damaged machine hazard

★ Do not use damaged or faulty machines.

★Conduct a thorough pre-operation inspection of the machine and test all functions before each work shift. Damaged or faulty machines should stop work and be marked immediately.

★ Ensure that all maintenance operations have been performed according to this manual and related maintenance manual.

★ Ensure that all labels are properly positioned and easily identifiable.

★Ensure that the operation and maintenance manual are complete, legible and kept in the file box located on the platform.

2.13 Bodily injury hazard

Comply with the operation and maintenance requirements in this manual and the maintenance manual, otherwise the machine may be damaged.

★Hazards of unsafe and improper operation.

★Do not operate the machine with a hydraulic oil leak. Hydraulic oil leak can penetrate or burn skin.

2.14 Battery hazard

★The battery contains sulfuric acid and can produce an explosive mixture of hydrogen and oxygen. Any device that can cause sparks or flames (including cigarettes/smoke materials) should be kept away from the battery to prevent explosion.

★Do not contact the battery terminals or the cable clamps with tools that may cause sparks.

★Always wear protective clothing and goggles when working with batteries. Remove all rings, watches and other jewelry.

★Avoid spilling or contacting battery acid. Neutralize battery acid spills with baking soda water. If battery acid comes into contact with skin, rinse immediately with plenty of water and seek medical attention immediately.

★Lift the battery according to the instructions.

★Use the charger specified by the manufacturer to charge the battery.

★Only connect the charger to a grounded two-phase AC power outlet.

★Inspect daily for damaged cables, please replace the damaged parts before operation.

2.15 Hydraulic system hazard

★Do not touch the hydraulic system when it is at high temperature. Hot hydraulic oil can cause serious injury.

★Thoroughly clean the spilled hydraulic oil after the equipment stops working. Do not spill hydraulic oil on the ground. Wash any hydraulic oil off the skin as soon as maintenance and repair are completed. Dispose of used hydraulic oil according to legal regulations.

★Do not plug the leaking hydraulic oil by hand. If leakage occurs, the system pressure should be released first, and the hydraulic oil should be cooled before maintenance. Injuries caused by ignoring the dangers of hydraulic oil require immediate medical attention. Serious complications may occur if immediate treatment is not performed.

2.16 Welding and grinding safety

Before performing welding, grinding and polishing operations, the welder must obtain permission from the responsible department at the workplace.

★ Follow the welding manufacturer's recommendations for proper welding procedures.

★ Only after the power is turned off can connect the wire or cable for welding or grinding operations.

★ Only after the wire or cable is properly connected can welding and grinding be carried out.

★ Do not use the machine as ground wire during welding operations.

★ Ensure that power tools are fully stored in the working platform at all times. Do not hang its wires on the guardrail of the work platform and the work area outside the platform, or hang power tools directly with the wires.

2.17 Lockout after each use

1. Select a safe parking location—firm level surface, clear of obstruction and heavy traffic
2. Ensure that the scissors are lowered to the lowest position and that all panels and doors are closed and secured.
3. Before shutting down or not using for a long time, the hydraulic cylinder is forbidden to be in a fully extended state.
4. Press the emergency stop button of the platform controller to the off position.
5. Press the emergency stop button of the ground controller to the off position.
6. Turn the key switch of the ground controller to the off position and remove the key to secure from unauthorized use.
7. Turn off power-off switch.
8. Charge the batteries.

NOTICE
The power-off switch must be turned off after each use.

3 Principle and system introduction

3.1 Power

The power source consists of one 80V lithium batteries in series to drive the 80V permanent magnet synchronous walking motor and oil pump motor. The walking motor and the wheel reducer are connected by splines to drive the moving motion of the machine. The gear pump and the output shaft of the motor are connected by splines to provide power to the hydraulic system.

3.2 Hydraulic system

When the oil pump motor is working, the hydraulic pump sends the pressure oil to the function valve block, which is equipped with a direction switching valve for different actions. In order to protect related components and avoid system pressure overload, the valve block is equipped with an overflow valve.

3.3 Electrical system

One 80V lithium batteries in series drive 80V permanent magnet synchronous motor to achieve driving function or hydraulic system action.

Equipped with a 12V backup battery and emergency power unit. When the main control system fails, the platform can realize the emergency descent function.

The machine comes with a charger, which needs an external power supply to charge the battery.

3.4 Control system

The system consists of two controllers to control the functions of the machine. A controller is installed on the right door of the machine, which controls the lifting of the scissors and the emergency descent function. Another controller is mounted on the platform to control driving and steering, as well as the lifting and lowering of the scissors and outrigger. The controller interacts with data through a CAN bus.

3.5 Safety measures

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

1. The horizontal sensor measures the angle of X-axis and Y-axis of the vehicle body. When the angle of the X axis exceeds 2° or the angle of the Y axis exceeds 3°, an alarm will be sent out, and the functions of lifting, walking and steering will be limited.

2. The outrigger limit switch is used to check whether the outrigger is opened in place. If the platform lifts to the set height, the limit switch does not detect the signal, the platform will stop lifting.

3. The weighing system is used to limit the bearing weight of the platform. When the platform load exceeds the rated bearing capacity, the lifting height of the platform is greater than 1m or 10% of the lifting height (the larger one), the overweight indicator will light up and alarm will be given at the same time. The working platform is prohibited to move. Only after the overloaded items are removed can the platform start to move again.

4 Maintenance

4.1 Overview

This section provides detailed operation procedures for the periodic maintenance check.

⚠ Warning

Unsafe operation hazard

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

★Maintenance inspection must be carried out by professionally trained and qualified personnel.

★Routine maintenance inspection is the daily inspection items during normal operation of the machine. Inspectors must perform maintenance according to the maintenance inspection report and fill in the report in detail.

★Regular maintenance inspection is carried out daily, quarterly, semi-annually and annually. Inspectors must perform maintenance according to the maintenance inspection report and fill in the report in detail.

★Remove the damaged or malfunctioning machine in time and mark it timely, and stop the operation.

★Any broken or malfunctioning machine must be repaired before operation.

★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 replacement parts in the maintenance process should be the same as or equivalent to the parts of the original machine.

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

★The machine is placed on a flat, level, solid ground.

★The machine is in a non-working state.

★Set the key switch of the ground controller to the OFF position and remove the key, so that the device cannot be started.

★Set the red emergency stop switch on the platform controller and ground controller to the OFF position to avoid accidental startup of the operating system.

★Disconnect the power off switch.

★Disconnect all DC power from the machine.

★Lock all tires to prevent the machine from moving.

Maintenance schedule

There are four types of maintenance that must be performed according to the schedule: daily, quarterly, semiannual, and annual.

Maintenance procedures	Interval time
A	Every 8 hours of operation (or daily)
A+B	Every 250 hours of operation (or quarter)
A+B+C	Every 500 hours of operation (or semiannual)
A+B+C+D	Every 1000 hours of operation (or annual)

Maintenance inspection report

★The maintenance inspection report is divided into four sections (A, B, C, and D) according to the According to maintenance procedures and time requirements.

★The maintenance inspection report contains a checklist for each type of periodic inspection.

★Copy the maintenance inspection report for each inspection. The report should be kept for at least 10 years or until the machine ceases to be used or at the request of the machine owner/company.

★Use the following table to record the results. After completing each section, mark

it in the corresponding space.

★If inspection results are "unqualified", you must stop using the machine. Reinspect the machine after repair and mark it in the space marked “Qualified after repair”. Select the appropriate inspection procedure based on the type of inspection.

Maintenance Inspection Report A			
Item	**Qualified**	**Unqualified**	**Qualified after repair**
A-1 Check manual			
A-2 Check labels			
A-3 Check parts			
A-4 Check hydraulic oil			
A-5 Check battery power			
A-6 Check the function			
A-7 Perform 30 days maintenance			

Maintenance Inspection Report B			
Item	**Qualified**	**Unqualified**	**Qualified after repair**
B-1 Check wires			
B-2 Check wheels and tires			
B-3 Check the battery			
B-4 Check hydraulic oil			
B-5 Check hydraulic oil tank			

Maintenance Inspection Report C			
Item	**Qualified**	**Unqualified**	**Qualified after repair**
C-1 Replace air filter			

Maintenance Inspection Report D			
Item	**Qualified**	**Unqualified**	**Qualified after repair**
D-1 Replace return oil filter			
D-2 Replace hydraulic oil			

D-3 Replace the gear oil of the reducer			
D-4 Check bushings and slides			
D-5 Check critical structural parts			

4.2 Maintenance procedure A

A-1 Check manuals

Putting the operation manual and maintenance manual in the 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. Manuals that are illegible or missing cannot provide the necessary safety and operational 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.

NOTICE
If the manual needs to be replaced, please contact Hangcha Group Co., Ltd. in time.

A-2 Check labels

Ensure that all labels are in good condition is essential for the safe operation of the machine. Labels remind operators of the hazards 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 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 intact, and replace the damaged and illegible labels in time.

NOTICE
If the label needs to be replaced, please contact Hangcha Group Co., Ltd. in time.

A-3 Check parts

Daily checks on platform conditions are important for safety. Failure to detect and repair damaged, loose or missing parts in a timely manner may result in unsafe operation. Observe the whole machine to check whether any parts are damaged, improperly installed or missing. Check the following parts:

——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 brake device
——Scissors slider
——Limit switch and horn
——Tires and rims
——Alarms and lights (if equipped)
——Outrigger
——Platform guardrails and doors
——Scissors pin
——Cracking of structural parts and welds
——Nuts, bolts and other fasteners

NOTICE
If the parts are damaged, improperly installed or missing, replace them immediately and install them correctly. If fasteners fall off or become loose, tighten them immediately.

A-4 Check the hydraulic oil

Ensure that hydraulic oil level properly and prevent the leakage of hydraulic oil is very important to normal operation. Improper hydraulic oil levels can damage hydraulic components, and undetected leaks can lead to hazardous conditions that degrade platform performance and damage components. Daily checks allow the observer to learn about oil level changes and identify problems with the hydraulic system.

★Check the hydraulic oil level

1、Open the right 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.

Model	Scale line（L）
HS1523RP	50
HS1823RP	60

2、Add hydraulic oil as needed, do not add excessive.

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

NOTICE
Factory can add different hydraulic oil according to customer's request, but different hydraulic oil cannot be mixed.

★Check hydraulic oil leakage

Preventing hydraulic oil leakage is essential for the safe operation and normal work of the machine. A leak that goes undetected can cause a dangerous situation and impair machine performance and damage components.

Observe whether hydraulic fluid spills, drips, or remains on or around the following parts:

——Hydraulic oil tank, filter, pipe joint, oil pipe, auxiliary power unit
——All hydraulic cylinders, hydraulic valve sets, pumps
——Scissors
——Outrigger
——Driving chassis
——Area around the machine

A-5 Check the battery power

Check the battery level through the LED display on the platform control handle.

Handle power display	Proportion	Description
20-100	20-100%	Battery level 20-100%
10-20	10-20%	The battery level is low and must be charged immediately
10	10%	The battery is low, and the platform moves slowly or even stops

A-6 Check function

The purpose of a functional check is to find out if there is a functional defect or malfunction before you start using the machine. Checking the functions of the machine is very important for the safe operation. Any function that does not work properly will be unsafe. Any function should work smoothly and reliably, without shaking, violent and abnormal noise. Once a functional defect or malfunction is found, the machine must be marked and taken out of use. For complete procedures, refer to the "function test" section of the operation manual.

A-7 Perform 30-day maintenance

30-day maintenance is a one-time maintenance that is performed after 30 days or 40 hours of use of the new equipment. After the completion of the maintenance, perform the relevant maintenance at normal intervals.

★Follow the procedure below:

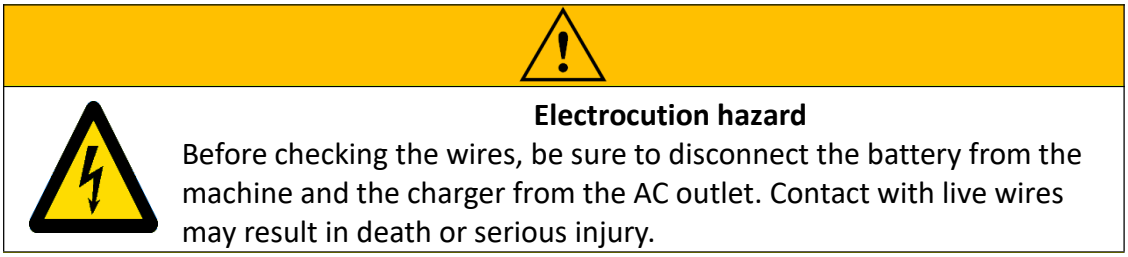
B-2 Check the rims and tires

D-1 Replace the return oil filter

4.3 Maintenance procedure B

B-1 Check the wires

Maintaining the wires is essential for the normal work and safe operation of the platform. Failure to detect and replace burned, damaged, corroded or broken wires in time result in unsafe operation or even serious injury.



Electrocution hazard

Before checking the wires, be sure to disconnect the battery from the machine and the charger from the AC outlet. Contact with live wires may result in death or serious injury.

Exposure to live wires may result in serious injury or death. Remove all earrings, watches and other jewelry.

1. Check the following areas for burns, wear, corrosion, and loose wires:

——Battery wiring harness

——Charger wiring harness

——Scissors boom harness

——Power unit wiring harness

——Ground controller junction box

——Platform controller junction box

2. Check each movable connector to ensure that it is not loose and the sensor circuit is not damaged.

Support the maintenance boom before checking the wiring harness inside the boom. Refer to "Use of maintenance arm" in overload manual for operation mode.

B-2 Check the rims and tires

Maintaining rims and tires is essential for proper and safe platform operation. A faulty rim or tire can cause the platform to tip over. If not detected and repaired in time may also cause component damage.

This series of products use solid tires, do not need to inflate.

★Follow the procedure below：

1、Check all tires for cuts, cracks, punctures and abnormal wear.

2、Check and verify that each rim is free of damage, distortion and weld cracking.

3、Remove the cotter pin and check to make sure the nut is tightened with the correct torque (≥300Nm).

4、replace the cotter pin and bend to lock position.

B-3 Check the battery

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

Electrocution hazard

Exposure to live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

Bodily injury hazard

Batteries contain acidic substances. Avoid leakage and contact with them.

If battery acid leaks, use soda water to neutralize the leaking acid.

NOTICE

After the battery is fully charged, wear protective gloves for inspection.

Ensure that battery cable connections are not corroded.

Ensure that battery is securely installed and cables are securely connected.

Batteries are divided into lead-acid battery, lead-acid maintenance-free battery and lithium battery. Lithium battery and lead-acid maintenance-free battery are maintenance-free battery.

★Check lead-acid battery:

1、Wear protective clothing and safety goggles.

2、Ensure that battery cables are not corroded.

3、Ensure that battery is securely installed and cable connections are secured.

4、Remove the battery ventilation cover and check the density of each battery electrolyte with a liquid densitometer. If the electrolyte density of any battery group is less than 1.24, the battery must be replaced.

5、Check the acidic liquid level of battery. If necessary, the distilled water is replenished through the battery filling port. Do not add too much.

6、Install the ventilation cover.

7、Connect the charging plug to the 220V socket.

Results: The charging indicator lights up and the battery can be charged normally.

Note: Adding terminal protectors and anti-corrosion sealants will help eliminate corrosion on battery terminals and cables. The battery electrolyte is corrosive. Do not touch the spilled electrolyte with your hands or other body parts to avoid injury. Use baking soda to neutralize spilled electrolyte.

★Check maintenance-free battery:

1、Wear protective gloves.

2、Ensure that battery cables are not corroded.

3、Ensure that battery is securely installed and cable connections are secured.

4、Connect the battery charger cable to the correct terminal of the battery (red for positive, black for negative).

5、Connect the charging plug to the 220V socket.

Results: The charging indicator lights up and the battery can be charged normally.

★Battery replacement precautions:

1、A wrench with a rubber handle should be used when removing or installing the battery.

2、Tightening torque of cable fixing nut:

M8 Tightening torque 9～11/N.m，

M10 Tightening torque 18～23/N.m。

2、If the terminal is not kept clean and dry, it may be continuously corroded. To

prevent corrosion, apply a thin layer of Vaseline or use a terminal protector.

B-4 Check hydraulic oil

Checking hydraulic oil is very important to the normal operation and prolongs the service life of the platform. Dirty hydraulic oil may cause platform action cannot be performed normally, and continued use may cause damage to hydraulic parts. Especially harsh working environment requires frequent replacement of hydraulic oil.

Burn hazard

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

When any of the following situations occur, the hydraulic oil should be replaced in time:

1 The hydraulic oil is milky white and cloudy.

2 The hydraulic oil color is black.

3 Take out a part of the hydraulic oil in the sun to check, there are metal luminous spots. Or dip two fingers in hydraulic oil and rub it, there is an obvious sense of granularity.

4 The hydraulic fluid stinks.

★Refer to the procedure D-2 for replacing the hydraulic oil.

B-5 Check hydraulic tank

The hydraulic oil tank of the machine is ventilated. Impurities in the air are filtered through the air filter in the tank exhaust cap. If the air filter is faulty or damaged, it may cause impurities to enter the hydraulic oil circuit, which can cause damage to the hydraulic components. Harsh working conditions require frequent filter replacement.

NOTICE

This procedure can only be performed when the drive motor/hydraulic motor is stopped.

★Follow the procedure below：

1、Remove hydraulic tank air filter.

2、Check the vent.

Results: The air should pass through the air filter smoothly. If the air does not pass through smoothly, the air filter must be cleaned in the following steps. Clean the air filter with a neutral solvent and blow dry with an air gun. Repeat the second step.

3、Install the air filter back into the tank cover.

4.4 Maintenance procedure C

C-1 Replace the air filter

The hydraulic oil tank of the machine is ventilated. Impurities in the air are filtered through the air filter in the tank exhaust cap. If the air filter is faulty or damaged, it may cause impurities to enter the hydraulic oil circuit, which can cause damage to the hydraulic components. Harsh working conditions require frequent filter replacement.

NOTICE
This procedure can only be performed when the drive motor/hydraulic motor is stopped.

Burn hazard

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

★Follow the procedure below：

1、Unscrew the air filter on top of the tank.

2、Install a new air filter.

3、Clean all oil spills during the replacement process.

4、Check the filter and related components to ensure no leakage.

4.5 Maintenance procedure D

D-1 Replace the return oil filter

Replacing the return oil filter of the hydraulic tank is very important for the normal operation and prolongs the service life of the platform. A dirty or blocked filter may cause the platform to work improperly, and continued use may cause damage to hydraulic components. Harsh working conditions require frequent filter replacement.

Burn hazard

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

NOTICE

This procedure can only be performed when the hydraulic pump is stopped.

High pressure hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure. High hydraulic pressure may penetrate the skin. If injured, seek medical attention immediately.

Burn hazard

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

The hydraulic oil return filter is external and located between the valve block and the oil tank.

★Follow the procedure below：

1、Remove the filter with a wrench.

2、Apply a layer of hydraulic oil to the seal ring of the new filter.

3、Install the new filter and tighten it with a wrench.

4、 Turn on the power switch and emergency stop switch, and turn the key to the ground control.

5、Operate platform lifting and lowering.

6、 Clean up spilled hydraulic oil around the filter. Check whether hydraulic oil spills around the filter.

D-2 Replace hydraulic oil

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

NOTICE
This procedure must be executed when the scissor arm is in full retracted state.

High pressure hazard

Slowly remove the hydraulic components to reduce the hydraulic oil pressure. High hydraulic oil pressure may penetrate the skin. If injured, seek medical attention immediately.

Burn hazard

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

★Follow the prescribed procedures:

1、Disconnect the power supply and remove rings, watches and other accessories when operating.

2、Open the oil tank cover on the right side of the frame and find the oil drain plug at the bottom of the tank.

3、Remove the oil drain plug and drain all the oil into a suitable container

4、Disconnect and plug the oil suction pipe.

5、Disconnect and plug the oil return pipe.

6、Remove the hydraulic tank fastening bolts and remove the hydraulic tank.

7、Remove the suction filter from the tank, rinse the inside of the tank with neutral solvent, and dry the tank.

8、Install new oil filter and screw drain plug.

9、Reinstall the hydraulic tank and tighten the fastening bolts.

10、Connect and tighten the suction pipe and return pipe.

11、Fill the tank with hydraulic oil.

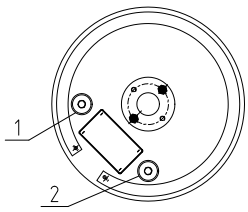
12、Turn on the power switch and lift the platform to the highest position. Observe the liquid level in the tank and add appropriate amount of hydraulic oil until the liquid level is completely immersed in the oil suction filter.

D-3 Replace the gear oil in the reducer

Regular inspection and replacement of reducer gear oil is very important to improve the working performance of the machine and extend the service life of the reducer.

★Follow the prescribed procedures:

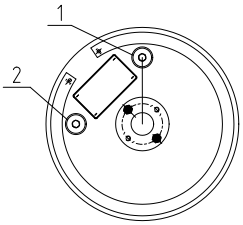
1、The motor rotates the reducer to the position below. Drain port 2 is in the lowest position.



2、Remove the oil drain port screw and drain the gear oil to the appropriate container.

3、After draining the gear oil, tighten the drain screw.

4、The motor rotates the reducer to the position below. Refueling port 1 is in the highest position.



5、Remove the screw of refueling port and drain port, fill gear oil from the refueling port until flush with the drain port.

6、After filling the gear oil, tighten the screws refueling port and drain port.

7、Clean residual gear oil on the surface of the reducer.

D-4 Check bushings and sliders

Maintaining the scissors boom installation bushing and moving slider is very important for the safe operation of the platform. Continued use of old bushings may lead to component damage and unsafe operation. The bottom slider slides on the surface of the channel steel to form a friction pair. Improper sliders or continued use of old sliders may result in damage to the scissors boom, which in turn can cause property damage and injury.

NOTICE
This procedure can only be executed when the scissors boom is in full retracted state.

★Follow the procedure below：

1、Measure the distance between the bottom surface of each slider at the sliding end and the center of the mounting shaft.

2、Measure the distance between the fixed end axis and the mounting base plate.

3、Compare the values of the difference between the above two distances.

Results: When the distance difference value is greater than 2mm, the slider needs to be replaced.

4、Apply grease between the slider and its contact surface.

5、Use a feeler gauge to measure the fit clearance of shaft and shaft sleeve.

Results: The bushing should be replaced when the fit clearance is more than 0.1mm

or the service life is more than 10 years.

D-5 Check critical structural components

Maintaining critical structural components is essential for the safe operation of the machine. The use of critical structural components that are already cracked or deformed may result in component damage and unsafe operation.

Critical structural components	Inspection requirements for critical structural components
Working platform	Ensure that the platform is not deformed or cracked.
Scissors	Ensure that the scissors boom assembly and the cushion between the scissors are not deformed or damaged.
Lifting cylinder	Ensure that there is no oil leakage in the cylinder, valve block or hydraulic pipe; Ensure that the parts are not deformed, cracked or damaged; Ensure that there is no interference between the cylinder and other components
Chassis	Ensure that the chassis is free of oil stains, accumulated debris and is not deformed or cracked. Ensure that all hardware is securely installed.

5 Maintenance procedures

- Maintenance procedures must be carried out by trained and qualified personnel.
- Replace or repair damaged parts immediately and do not operate the machine with damaged parts.
- Perform proper maintenance on the machine before operating it.
- Before starting the machine:
  - Read, understand, and follow the safety rules and operation instructions in the operation manual.
  - Read all the procedures and rules.
  - Unless otherwise specified, the maintenance procedure for this machine should be performed under the following conditions.
  - Place the machine on a flat, level solid ground.
  - The platform is in the retracted state.
  - Set the key switch to the OFF position and remove the key.
  - Secure all wheels.

5.1 Platform components

5.1.1 Remove platform controller

Electrocution hazard

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

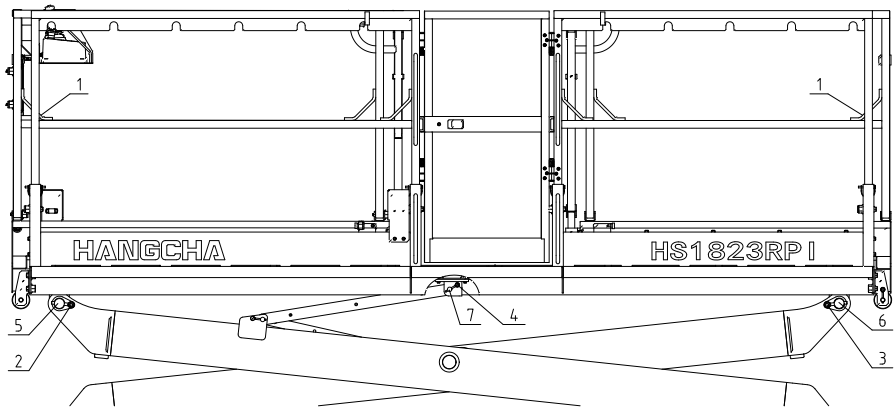
NOTICE

This procedure must be executed when the scissor boom is in full retracted state.

1. Disconnect the external power supply, and set the emergency stop switch of the platform controller and ground controller to the OFF position.
2. Locate the cable that connects to the bottom of the platform controller.
3. Disconnect cable from bottom of platform controller and mark.
4. Remove the platform controller and mounting bracket.
5. Remove the platform controller and mounting bracket from the platform.

5.1.2 Remove platform

1. Remove the platform controller from the platform.
2. Lift the platform to a certain height until the connecting pin roll between the scissors and the platform can be removed.
3. Use the hook of the lifting equipment to hang the lifting steel bars at the four corners of the platform (No. 1).
4. Remove the fixed pin bolts that connect the bottom of the platform to the scissors.（No.2、3、4）。
5. Knock out and remove the connecting pin with mallet and copper rod. (No. 5、 6、 7)
6. Lift the platform vertically with lifting equipment and move it to the level for placement.



5.1.3 Remove mobile platform

1. Remove the platform from the machine, place it to a certain height and support it reliably.

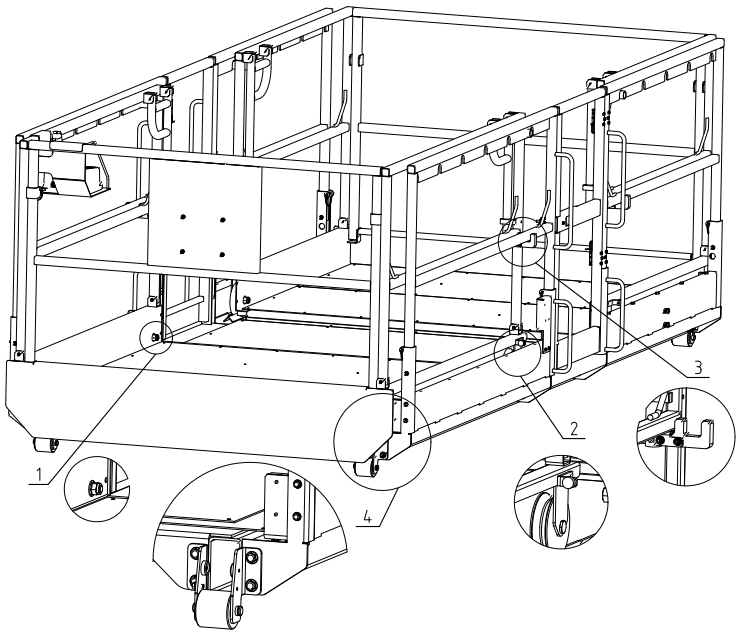
2. Remove the screws fixing the rolling wheels of the moving platform (No. 1), and remove the rolling wheels.

3. Remove the screws (No. 2) fixing the limit bracket of the moving platform, and remove the bracket.

4. Remove the screws (No. 3) fixing the limit buckle of the moving platform, and remove the limit buckle.

5. Remove the screws (No. 4) fixing the supporting roller on the moving platform and remove the supporting roller.

6. Lift the extension platform from the front and rear ends of the moving platform and slowly pull the moving platform forward to remove the moving platform.



5.2 Scissors components

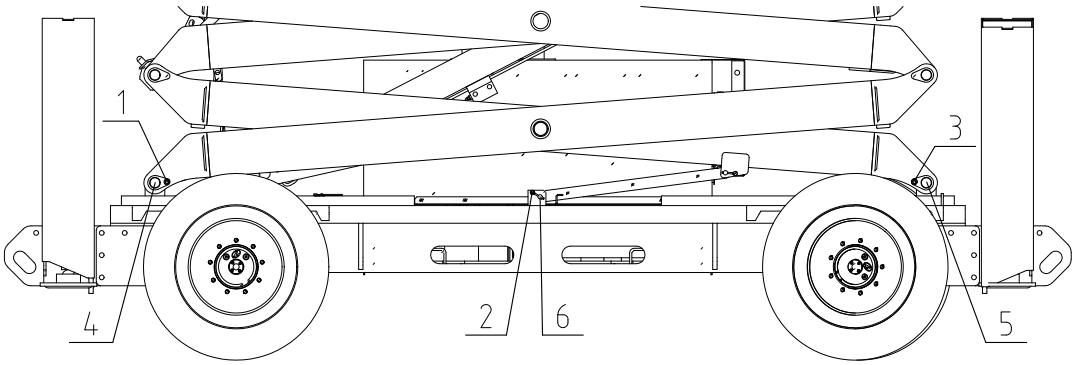
5.2.1 Remove scissor boom

NOTICE
This procedure can only be performed with the scissors boom in full retraction.

Crushing hazard

Keep any body parts and clothing away from moving machine parts.

1. Remove the platform from the machine.
2. Disconnect the wiring and oil tubing connected with the chassis from the scissors boom.
3. Secure the scissors boom with lifting equipment.
4. Remove the pin bolts connecting the frame to the scissors boom. (No. 1、2、3)
5. Use a mallet and copper rod to knock out and remove the connecting pin roll.（No. 4、5、6）
6. Lift the platform vertically with lifting equipment and move it to the level for placement.



5.2.2 Remove the lifting cylinder

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

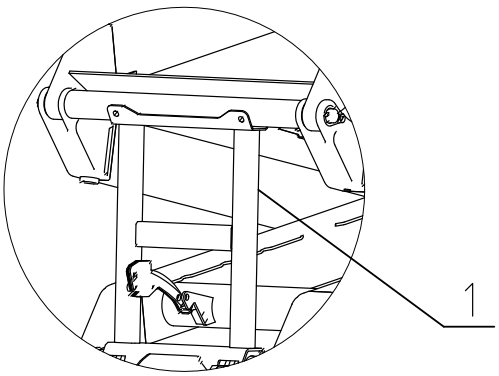
High pressure hazard

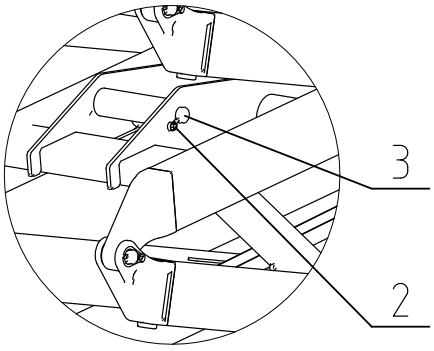
Remove hydraulic components slowly to reduce hydraulic oil pressure. High hydraulic pressure may penetrate the skin. If injured, seek medical attention immediately.

Moving object hazard

Wear safety goggles when striking the copper rod with a mallet.

1. Use lifting equipment to lift the scissor boom enough to support the maintenance boom.
2. The maintenance boom is used to support the scissor boom, and the lifting equipment will lift the lifting cylinder to avoid falling. (No. 1)
3. Disconnect and plug the hoses and joints on the lifting cylinder.
4. Loosen and remove the fixing bolt of the lifting cylinder piston rod end pin.（No.2）
5. Use a mallet and copper rod to knock out and remove the piston rod end pin.（No.3）
6. Loosen and remove the fixing bolt for the cylinder end pin roll of the lifting cylinder.
7. Use a mallet and copper rod to knock out and remove the cylinder end pin roll.
8. Lift the cylinder with lifting equipment and transfer it to the level.





5.3 Chassis components

5.3.1 Removal and installation of tires

Hangcha Group Co., Ltd. recommends using the same size, grade and brand of the machine's original tires for replacement. Please refer to the Parts Catalog of the specific machine for the tire part number. If the replacement tire recommended by Hangcha Group is not used, the replacement tire shall have the following characteristics:

1.Grade/load rating/size equal to or better than the original tire.

2. Tread contact width equal to or better than the original tire.

3. Wheel diameter, width and compensation size equal to the original tire.

4. Tire manufacturers permit such applications (including application range and occasions, maximum speed and maximum tire load, etc.).

Unsafe operation hazard

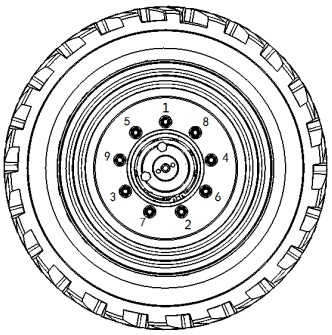
The tires and rims on the machine are selected after strict design according to the overall performance and load stability requirements of the machine. Therefore, its model specifications, rim width, installation center surface, diameter, etc., shall not be changed, otherwise it will lead to serious risk of operation instability.

Unsafe operation hazard

- Only tire specific nuts that match the rim bolts can be used. The nuts must meet the tightening torque requirements, and anti-loosening measures must be taken to prevent rim loosening, bolt breakage and tire detaching from the axle. Be sure to use nuts that match the wheel cone angle.
- Tighten the nut to the appropriate torque to prevent wheel loosening. Use a torque wrench to tighten the fasteners. If you do not have a torque wrench, use a socket wrench to tighten the fasteners and immediately ask the service station or dealer to tighten the nut to the correct torque. Excessive tightening will cause the bolt to break or permanently deform the bolt hole in the wheel.

★The correct steps to tighten the tire nut are as follows:

1. Apply Loctite 272 glue to the bolts and nuts first, and then screw on all nuts by hand to prevent threads disorder. Do not use lubricating oil on threads or nuts first.
2. Tighten the nuts in the order shown below.

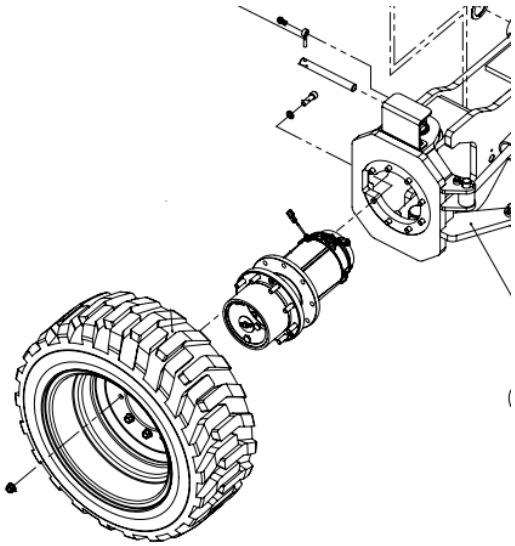


3. Nuts should be tightened in steps. Tighten the nuts according to the recommended torques in the table below and in the recommended sequence.

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

5.3.2 Removal and installation of walking reducer

The walking reducer is an integrated design of the reducer and the walking motor, which plays the role of driving and fixing the tire. Before removing the walking reducer, the machine should be fixed on a suitable shelf or a jack with sufficient capacity should be placed under the chassis platform.



★Remove walking reducer

1. Place the machine on solid, level ground.
2. Place the jack with sufficient capacity on the side to be removed below the chassis of the machine. Lift the jack to lift the wheel off the ground.
3. Remove the tire nuts used to secure the wheel to the reducer. Remove the wheel using appropriate lifting equipment.
4. Mark and disconnect wires connected to the motor.
5. Remove the bolts and washers securing the walking reducer and flange. Remove walking reducer and lift it off the chassis.

★Install walking reducer

1. Use lifting equipment of sufficient capacity to support the outriggers.
2. Clean the mounting surface, lift the travelling reducer, correct the position of the reducer (align the motor wire end of the reducer with the flange notch), and fit the reducer with the flange mounting surface.
3. Install bolts and washers one by one with Loctite 272 thread glue.
4. Tighten the bolts with a torque wrench.
5. Clean the mounting surface, lift the motor, and correct the position of the reducer：The spline shaft of the motor engages with the inner teeth of the reducer, slowly rotates the motor housing, and the motor mounting slot is aligned with the mounting screws of the reducer.
6. Pay attention to the direction of the tire when installing the tire.
7. Install tire nuts sequentially (refer to 5.3.1).
8. Connect the wires on the motor.
9. Check gear oil in reducer, add gear oil if necessary (refer to inspection procedure D-3)

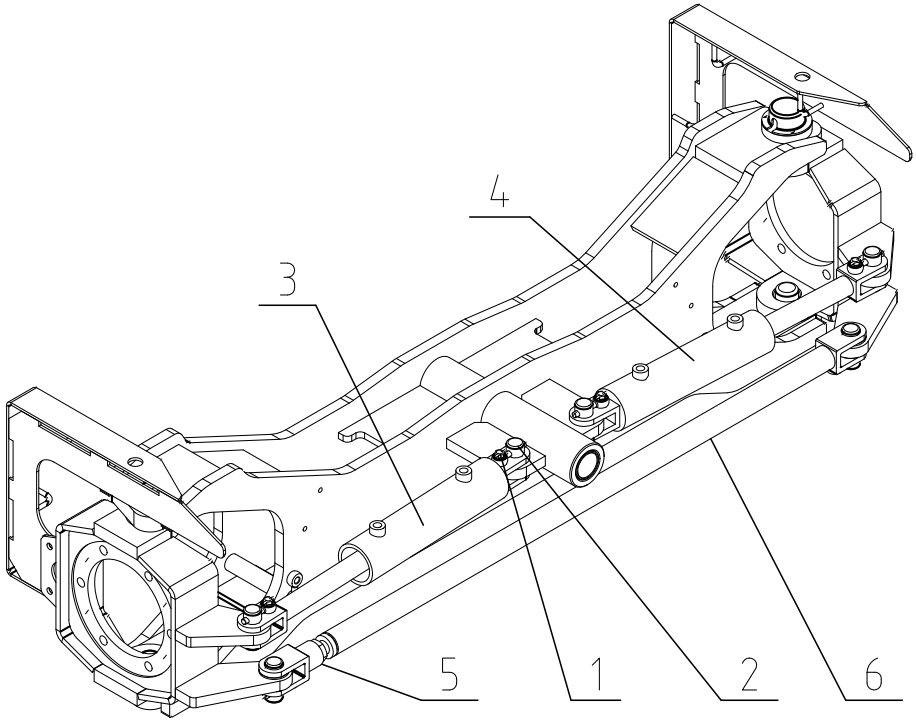
5.3.3 Remove steering cylinder and pull rod

NOTICE
When installing the removed hose and pipe joints, tighten them according to the specified torque.

Moving object hazard

Wear safety goggles when striking the copper rod with a mallet.

1. Disconnect and plug the hose and joints on the steering cylinder and mark them.
2. Remove bolts connecting steering cylinder/tie rod and knuckle/steering axle (No. 1).
3. Use a mallet and copper rod to knock out and remove the connecting pin (No. 2).
4. Remove steering cylinder (No. 3、4).
5. Remove the steering pull rod and connecting base (No. 5、6).

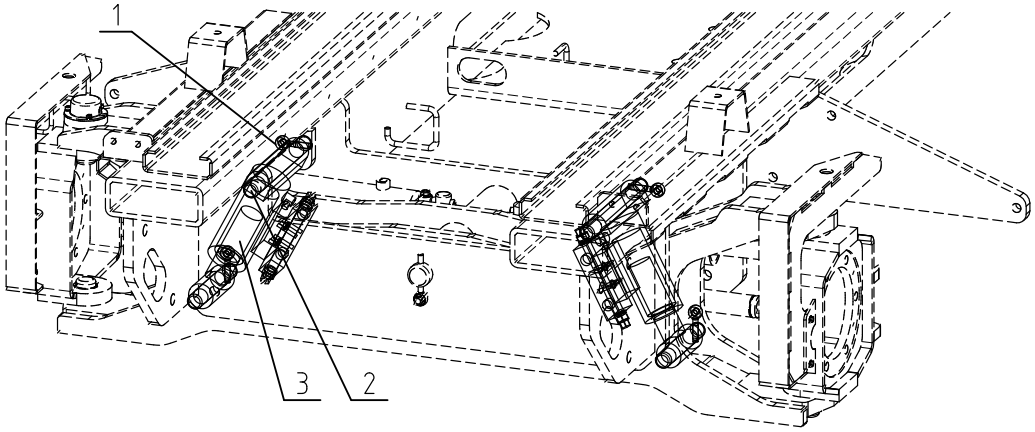


5.3.4 Remove floating cylinder

NOTICE

When installing the removed hose and pipe joints, tighten them according to the specified torque.

1. Disconnect and plug the hose and joints on the floating cylinder and mark them.
2. Remove bolts for floating cylinder and front axle/frame connection (No. 1).
3. Use a mallet and copper rod to knock out and remove the connecting pin (No. 2).
4. Remove floating cylinder (No. 3).



5.3.5 Remove the battery

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

1. Open the side doors and find the batteries.
2. Mark and disconnect the wires attached to the battery.
3. Remove the bolts that connect the battery baffle to the box.
4. Remove the battery with the assistance of lifting equipment.

5.4 Hydraulic system

5.4.1 Remove the hydraulic pump

NOTICE
When installing the removed hose and pipe joints, tighten them according to the specified torque.

1. Disconnect the power and open the left door.
2. Unscrew the oil drain port at the bottom of the hydraulic tank to drain the hydraulic oil.
3. Disconnect and plug the hose and joint on the hydraulic pump, and mark.
4. Remove the fixing bolts of the hydraulic pump and take out the hydraulic pump.

5.4.2 Remove hydraulic oil tank

Burn hazard

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

High pressure hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure. High hydraulic pressure may penetrate the skin. If injured, seek medical attention immediately.

NOTICE
When installing the removed hose and pipe joints, tighten them according to the specified torque.

1. Disconnect the power and open the right door.
2. Unscrew the oil drain port at the bottom of the hydraulic oil tank to drain the hydraulic oil.
3. Disconnect and plug the hose and joint on the hydraulic oil tank, and mark.
4. Remove the fixing bolts of the hydraulic oil tank and take out the tank.

5.4.3 Remove hydraulic valve block

Burn hazard

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

High pressure hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure. High hydraulic pressure may penetrate the skin. If injured, seek medical attention immediately.

NOTICE

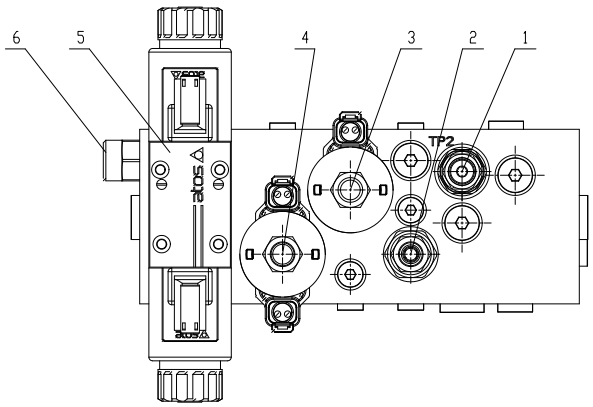
When installing the removed hose and pipe joints, tighten them according to the specified torque.

1. Disconnect the power and open the left door.
2. Disconnect and plug the hose and joints on the hydraulic valve block and mark them.
3. Remove the fixing bolts of the hydraulic valve block and take out the hydraulic valve block.

5.4.4 Spool and coil installation

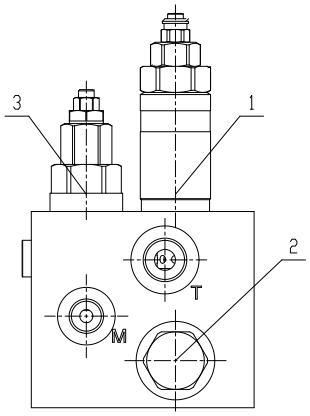
1. Hand screw in cartridge valve until O ring touches valve and tighten at specified torque.
2. Install the valve solenoid coil to the valve stem, install the coil nut, and tighten according to the specified torque.

5.4.4.1 Lifting control valve



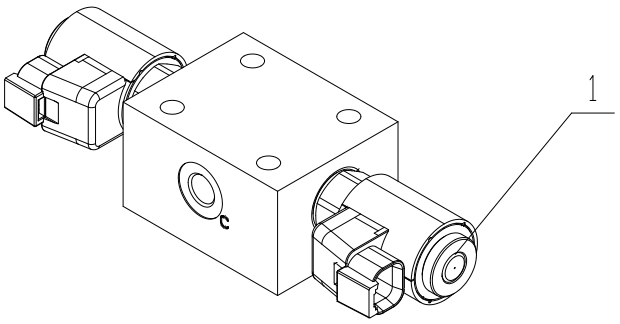
No.	Name	Function	Tightening torque
1	Overflow valve	Lifting pressure control	60Nm
2	Relief valve	Steering outrigger pressure control	34Nm
3	Solenoid valve	Lifting direction control	38Nm
4	Solenoid valve	Steering direction control	34Nm
5	Plate valve	Outrigger direction control	8Nm
6	Flow valve	Oil flow control	27Nm

5.4.4.2 Floating reducing valve



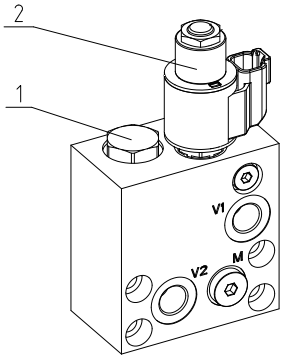
No.	Name	Function	Tightening torque
1	Reducing valve	Floating pressure control	40Nm
2	Check valve	Oil direction control	42Nm
3	Compensating valve	Oil compensation control	75 Nm

5.4.4.3 Axle floating valve



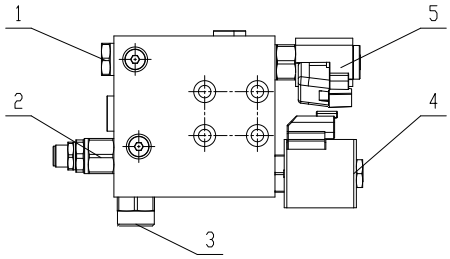
No.	Name	Function	Tightening torque
1	Solenoid valve	Axle floating control	42Nm

5.4.4.4 Outrigger solenoid valve



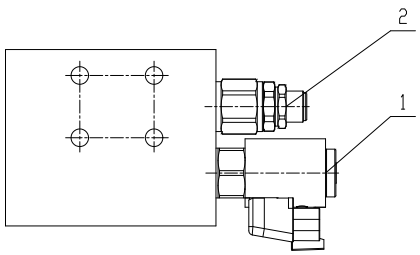
No.	Name	Function	Tightening torque
1	Check valve	Outrigger direction control	35Nm
2	Solenoid valve	Outrigger direction control	27Nm

5.4.4.5 Lower lifting cylinder valve



No.	Name	Function	Tightening torque
1	Check valve	Lifting direction control	42Nm
2	Relief valve	Lifting pressure control	42Nm
3	Compensating valve	Oil compensation control	34Nm
4	Solenoid valve	Proportional descend control	47Nm
5	Solenoid valve	Lifting direction control	40Nm

5.4.4.6 Upper lifting cylinder valve



No.	Name	Function	Tightening torque
1	Solenoid valve	Lifting direction control	40Nm
2	Relief valve	Lifting pressure control	42Nm

5.4.5 Adjust lifting overflow valve

NOTICE
Before performing this operation, ensure that the hydraulic oil in the tank is sufficient. Do not run the machine when the oil pump is empty to avoid damage to the hydraulic pump.

1. Place the maximum rated load on the platform. Ensure it is properly placed.
2. Switch the key switch to the ground control, and pull out the emergency stop switch button ON the ground controller and platform controller to the ON position.
3. Unscrew the nut at the end of the lifting overflow valve with a wrench.
4. Turn the lifting switch on the control panel. If the platform cannot continue to lift, turn the hex socket at the end of the overflow valve clockwise until the platform lifts to the highest position.
5. Lower the platform completely.
6. Add 1.1 times the rated load to the platform and place it properly.
7. Try lifting the platform again. If the platform can still rise, twist the hex socket counterclockwise until the platform cannot rise.
8. Lower the platform completely and install the nuts at the end of the overflow valve.
9. Remove heavy objects from the platform.

5.4.6 Adjust the steering relief valve

NOTICE
Before performing this operation, ensure that the hydraulic oil in the tank is sufficient.

1. Connect a pressure gauge with a range greater than 30 MPa to the main valve pressure measuring fitting.
2. Take the platform controller off the platform and operate it on the ground. Turn

the key switch to the platform control, and pull out the emergency stop switch button on the ground controller and platform controller to the ON position.

3. Hold the platform controller， operate the machine to retract the legs into position and keep them stable， Write down the pressure reading on the pressure gauge. The pressure value should be 13 ~ 14 MPa.
4. If the measured value is inconsistent with the specified value, perform Step 6-9.
5. Press the emergency stop button.
6. Loosen the steering overflow valve nut.
7. Adjust the hex socket at the end of the steering overflow valve by rotating it clockwise to increase the pressure or counterclockwise to reduce the pressure.
8. Repeat Steps 3-4.
9. Loosen the steering relief valve nut and remove the pressure gauge.

5.4.7 Adjust the floating overflow valve

NOTICE
Before performing this operation, ensure that the hydraulic oil in the tank is sufficient.

1. Remove the plug of the pressure measuring port M on the floating control valve. Connect a pressure measuring joint with a range greater than 30 MPa.
2. Take the platform controller off the platform and operate it on the ground. Turn the key switch to the platform control, and pull out the emergency stop switch button on the ground controller and the platform controller to the "ON" position.
3. Remove the platform controller and operate the machine on the ground at low speed to move forward or backward. Record the pressure reading on the pressure gauge. The pressure should be 3.7～ 4.2Mpa。
4. If the pressure value is incorrect, adjust the floating low pressure overflow valve pressure：

（1）Use a wrench to seize the floating low pressure overflow valve and loosen the nut.

（2）Adjust the pressure of the overflow valve with a hex wrench. Increase the

overflow valve pressure by turning it clockwise or decrease it by turning it counterclockwise until the gauge reads 5.7 to 6.3Mpa.

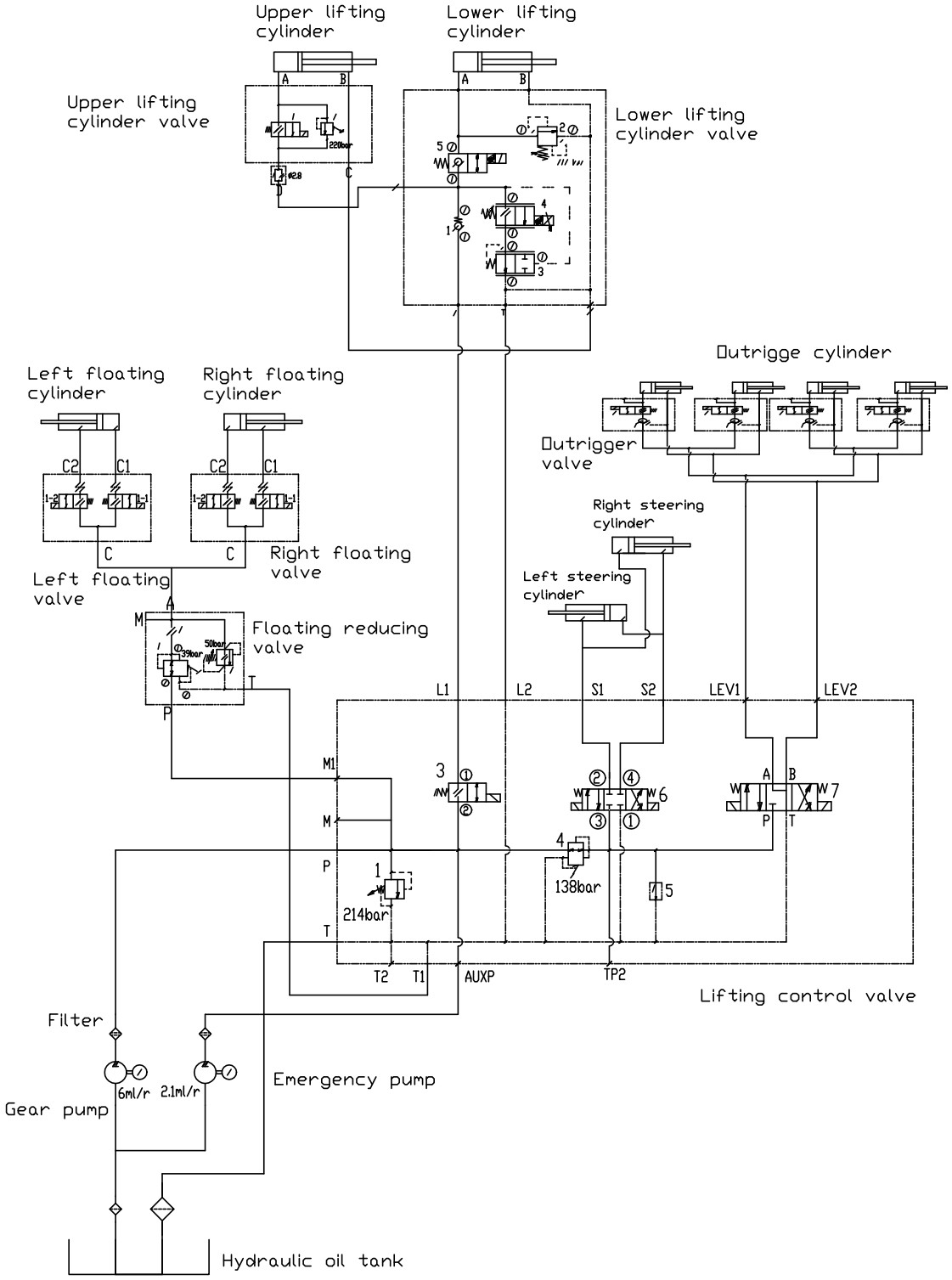
（3）Use a hex wrench to lock the floating low pressure overflow valve and lock the nuts on the overflow valve.

（4）Repeat step 3 to confirm the relief valve pressure.

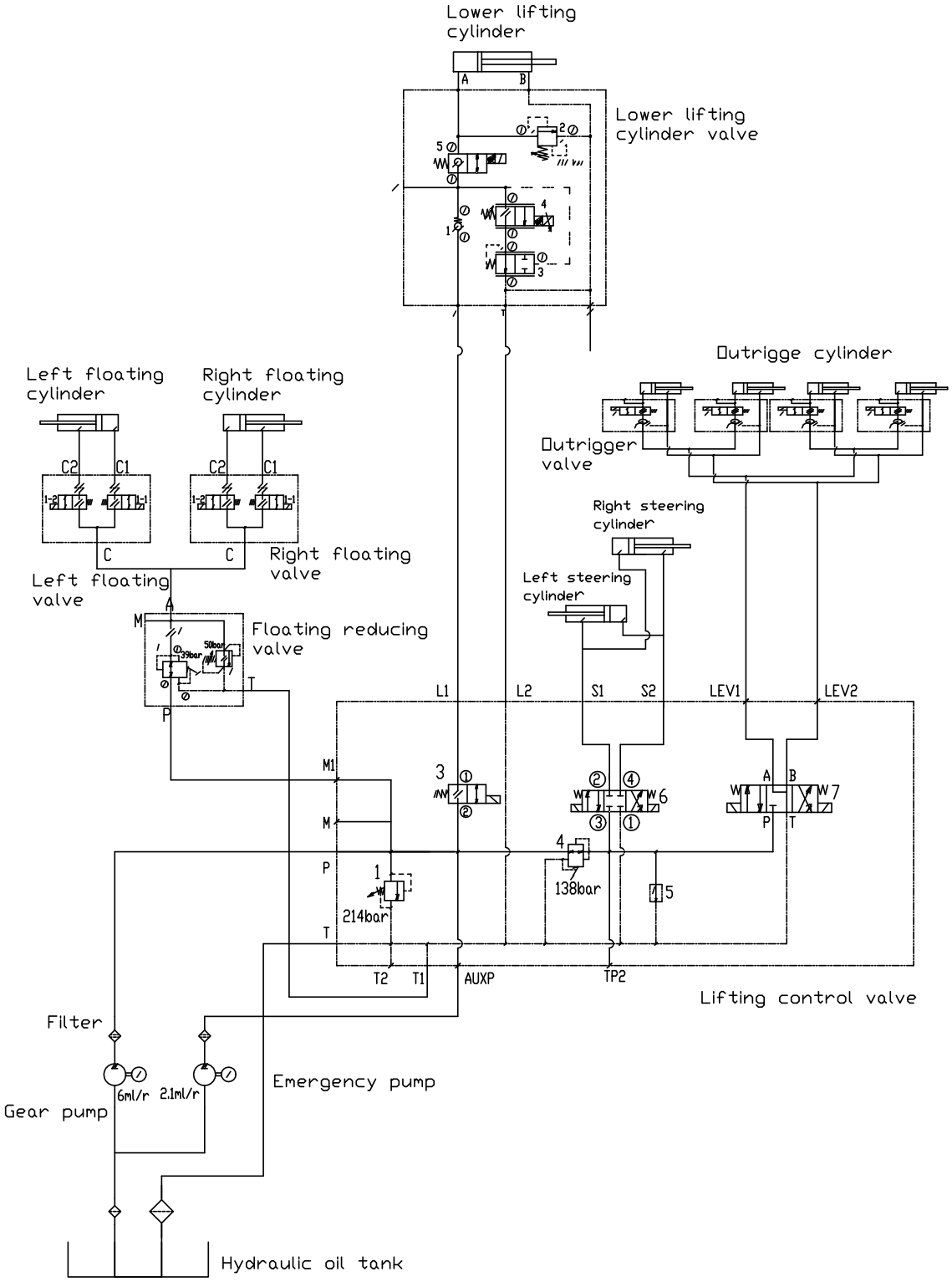
5. Remove the pressure gauge and gauge joint. Install the plug.

5.4.8 Hydraulic schematic diagram

★HS1823RP Hydraulic schematic diagram



★HS1523RP Hydraulic schematic diagram



5.4.9Hydraulic troubleshooting

The following table lists possible hydraulic system failure situations to help operators or maintenance personnel locate the fault. Check the fault parts according to the corresponding measures, and adjust or replace the parts according to the check results.

Fault description		Cause analysis	Inspection measures
Low oil pump output pressure		Damaged gears and O-rings	Replace faulty parts
		Wrong adjustment of overflow valve	Check and adjust the pressure with pressure gauge
		Bubbles in the oil pump	Add hydraulic oil to the tank and use the pump after the bubbles disappear
Oil pump with noise		Clogged filter leads to the cavitation	Adjust or replace the hose and clean the filter
		Excessive hydraulic oil viscosity leads to cavitation	Use new hydraulic oil with viscosity suitable for the operating speed of the pump for replacement, and work only when the oil temperature is normal
		Insufficient hydraulic oil	Add hydraulic oil to the tank and use the pump after the bubbles in the tank disappear
Platform cannot lift	Motor is working	Insufficient lifting pressure	Check and adjust the pressure with pressure gauge
		Faulty solenoid valve or wrong pipeline connection	Check the solenoid valve and pipeline
	Motor is not working	Faulty electrical components or wiring	Check electrical components and wiring
Unable to drive and steer	Motor is working	Insufficient steering pressure	Check and adjust the pressure with pressure gauge
		Faulty solenoid valve or wrong pipeline connection	Check the solenoid valve and pipeline
	Motor is not working	Faulty electrical components or wiring	Check electrical components and wiring
Pressure instability or pressure drop		Loose pressure regulating screw	Reset the pressure and lock
		Deformed or damaged pressure regulating spring	Replace
		Worn or jammed safety valve spool	Replace or disassemble and reassemble
		Worn gear pump	Repair or replace gear pump

5.5 Electrical system

5.5.1 Electrical system

When a fault occurs in the electrical system, the corresponding fault code will be displayed on the chassis panel and platform joystick screen. The following table lists the fault conditions corresponding to the fault code, which can help the operator or maintenance personnel determine the fault location. Then check the parts and connecting accessories of the malfunction, and decide to adjust or replace the new parts according to the inspection results.

Code	Fault description	Operation restrictions	Inspection measures
1	System Initialization Fault	All operations	ECU may fault, replace the ECU.
2	System Communication Fault	All operations	Check the handle wire. If normal, replace the ECU and the PCU.
3	Invalid Option Setting Fault	All operations	Set the correct machine configuration parameters.
4	Calibration Incomplete	All operations	The weighing is not calibrated, and it is calibrated again.
10	Drive Communication Fault	All operations	Check whether the communication line is normal. If so, replace ECU and motor controller.
11	Steering Angle Not Calibrated	Alert only	Recalibrate the median steering angle.
12	Chassis Up or Dn Switch ON	Chassis operation	Check the wiring harness of the chassis lifting switch. Check whether the switch is stuck.
19	Foot Pedal Fault	All operations	Check the wiring of the foot switch.
20	BMS Comm Fault	All operations	Check lithium battery communication
31	Pressure Sensor Fault	All operations	Check the pressure sensor and its wiring harness. Confirm that the platform mode correct.
32	Angle Sensor Fault	All operations	Check the angle sensor and its wiring harness. Confirm that the platform mode correct.
33	Anti-Collision Fault	Lifting and driving	Check the anti-collision switch
35	Pressure Sensor2 Fault	Lifting and driving	Check the pressure sensor.
36	Low Battery Limp	Lifting and driving	Please charge in time.
37	Battery Sleep	All operations	If the alarm is not operated for a long time, it will automatically recover after restarting.
42	Platform Left Button ON	Alert only	Confirm that the left turn button is

			released before power on. If it is released, consider replacing the handle or PCU.
43	Platform Right Button ON	Alert only	Confirm that the right turn button is released before power on. If it is released, consider replacing the handle or PCU.
46	Platform Enable Button ON	Alert only	Confirm that the enable button is released before power on. If it is released, consider replacing the handle or PCU.
47	Joystick Not In Neutral	Alert only	Confirm that it is in middle before power on. Check if the handle middle parameters are normal through LabView. If normal, consider replacing the handle or PCU.
54	Lift Up Coil Fault	Lifting and driving	Check whether the wiring harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
55	Lift Down1 Coil Fault	Lifting and driving	Check whether the wiring harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
56	Steer Right Coil Fault	Lifting and driving	Check whether the wiring harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
57	Steer Left Coil Fault	Lifting and driving	Check whether the wiring harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
68	Total Voltage Low Fault 2	All operations	Check the battery voltage and charge it. Check whether the battery cable is securely connected.
75	MC Pump Fault	Lifting	Check the pump motor, and replace the motor controller normally.
76	MC LF Fault	Driving	Check the left front motor, and replace the motor controller normally.
77	MC RF Fault	driving	Check the right front motor, and replace

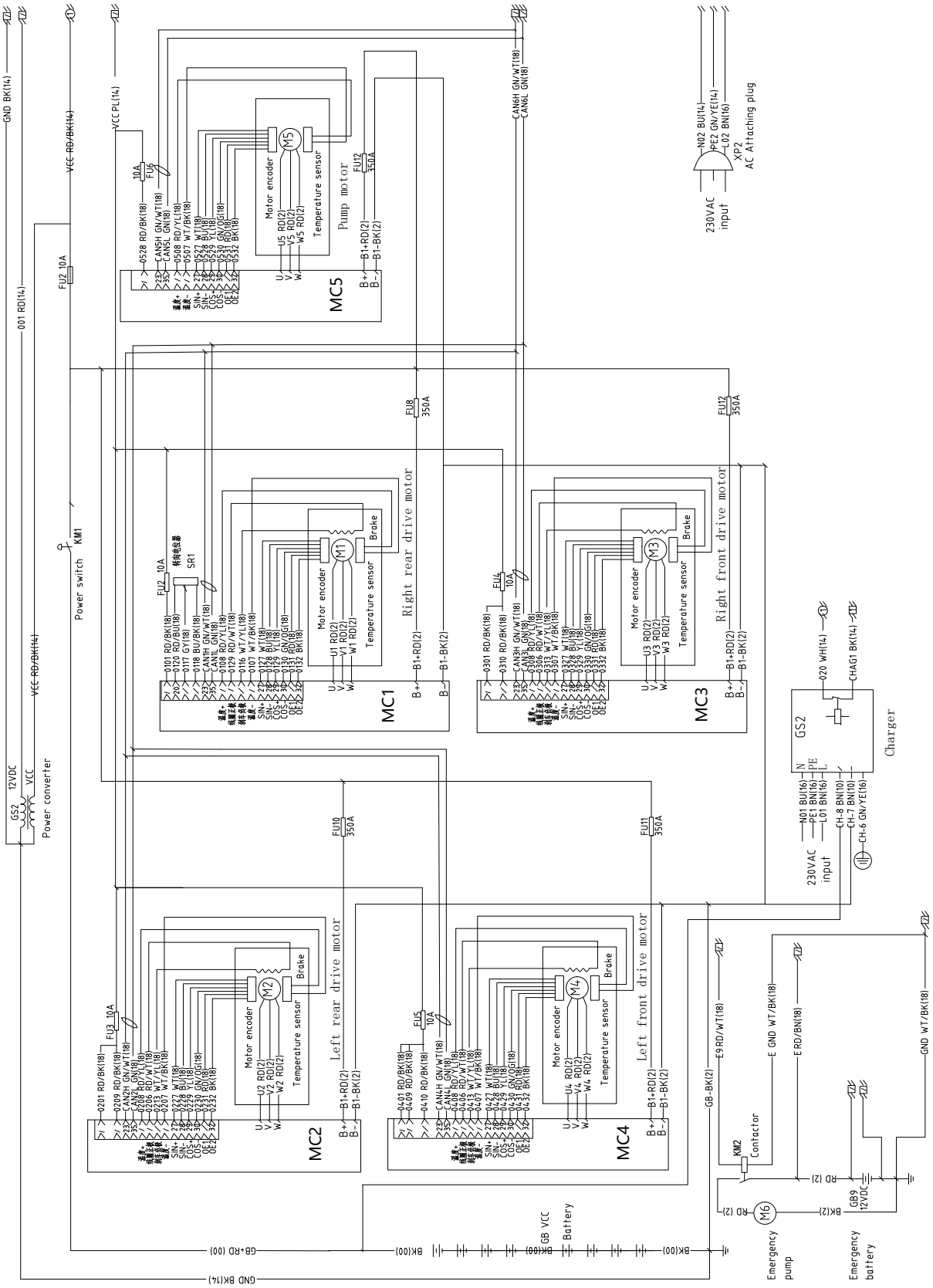
			the motor controller normally.
78	MC LB Fault	driving	Check the left rear motor, and replace the motor controller normally.
79	MC RB Fault	driving	Check the right rear motor, and replace the motor controller normally.
80	Platform Load is over 80%	Alert only	Platform load close to rated weight. It is recommended not to increase the load.
90	Platform Load is over 90%	Alert only	Platform load is very close to the rated weight. It is recommended not to increase the load.
93	Down2 Coil Fault	Lifting and driving	Check the descending valve
99	Platform Load is over 99%	Alert only	Platform load has reached the rated weight It is recommended not to increase the load.
OL	Platform Overloaded	All operations	Platform overload, remove the excess weight.
LL	Machine Inclined	Lifting and driving	If the machine is tilted, adjust the machine to level. If the machine is level, check the tilt switch and wiring harness for faults.

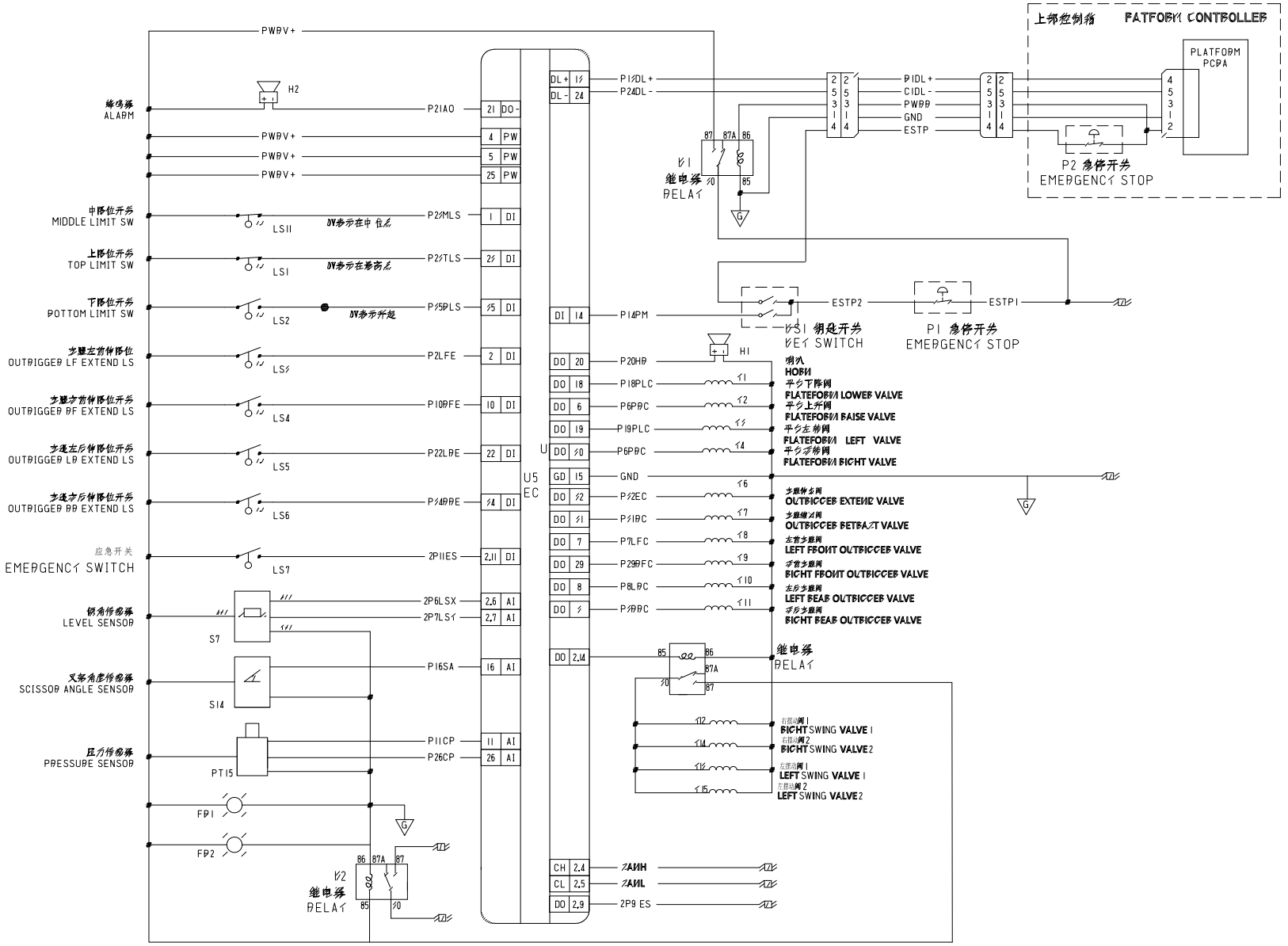
5.5.2 Basic Troubleshooting

Basic	Troubleshooting	Basic
Power indicator light off	Equipment not powered on	1. Whether the key switch is centered. 2. Whether the upper and lower control emergency stop switch is pressed. 3. Whether the upper and lower controller is normal. 4. Whether the program is updated without power-off restart.
	CAN device offline	1. Whether the power and communication leads are inserted correctly and firmly 2. Whether the wiring of Deutsch plug connected the upper and lower controller consistent with the drawings 3. Whether the upper control plug or upper and lower control connecting cable plug is in good contact 4. Whether the platform controller is normal 5. Whether the ground controller Deutsch plug is firmly and correctly connected.
Upper control operation fails	Key switch not turned to the upper control	1. Whether the key switch is on the platform control position. 2. Whether to power off and restart after the platform controller redownloads the program. 3. Whether the platform controller is normal.
Lower control operation fails	Key switch not turned to the lower control	1. Whether the key switch is on the ground control position. 2. Whether to power off and restart after the ground controller redownloads the program. 3. Whether the ground controller is normal.
Tilt alarm in horizontal state	Abnormal tilt switch	1. Whether the horizontal switch is inserted correctly or firmly. 2. Whether the horizontal switch is normal.
Unloaded and level, but cannot lower	Lowering valve fault	1. Whether the switch input plug is inserted correctly and firmly. 2. Whether the plug switch wiring is normal. 3. Whether the lowering valve is abnormal and whether its leads are connected wrongly.
Unloaded and level, but cannot lift	Lifting valve fault	1. Whether the switch input plug is inserted correctly and firmly. 2. Whether the plug switch wiring is normal. 3. Whether the lifting valve is abnormal and

		whether its leads are connected wrongly
Cannot lift to maximum height when unloaded	Wrong setting of travel switch	Whether the travel switch is normal after restarting.
No alarm No driving function	Abnormal driving function	1. Whether the controller plug is inserted correctly and firmly. 2. Whether the forward valve is connected correctly or normally. 3. Whether the controller is normal.
No alarm at the lowest position. Unable to drive at high speed	Abnormal speed switching valve	Whether the wiring of speed switching valve is wrong or abnormal.
	Abnormal lower limit switch	Whether the limit switch is installed correctly or normally
Tilt alarms	Abnormal tilt switch	1. Whether the horizontal switch is wired correctly or firmly. 2. The lower controller is abnormal.
No overload alarms	Uncalibrated load or incorrect height	1. Whether the sensor is calibrated. 2. Whether the load sensor wiring is normal. 3. Whether the sensor is faulty

5.5.3 Electrical schematic diagram




上部控制箱 PLATFORM CONTROLLER
PLATFORM PCBA
P2 急停开关 EMERGENCY STOP
P1 急停开关 EMERGENCY STOP
ESTP2
ESTP1
KS1 钥匙开关 KEY SWITCH
K1 继电器 RELAY
K2 继电器 RELAY
HI
H2
ALARM 蜂鸣器
PWRV+
GND
ESTP
U5 ECU
MIDDLE LIMIT SW 中限位开关
TOP LIMIT SW 上限位开关
BOTTOM LIMIT SW 下限位开关
OUTRIGGER LF EXTEND LS 支腿左前伸限位
OUTRIGGER RF EXTEND LS 支腿右前伸限位开关
OUTRIGGER LR EXTEND LS 支腿左后伸限位开关
OUTRIGGER RR EXTEND LS 支腿右后伸限位开关
EMERGENCY SWITCH 应急开关
LEVEL SENSOR 倾角传感器
SCISSOR ANGLE SENSOR 叉架角度传感器
PRESSURE SENSOR 压力传感器
LS1 0V表示在中位点
LS1 0V表示在最高点
LS2 0V表示开起
HOOK 勾头
PLATFORM LOWER VALVE 平台下降阀
PLATFORM RAISE VALVE 平台上升阀
PLATFORM LEFT VALVE 平台左转阀
PLATFORM RIGHT VALVE 平台右转阀
OUTRIGGER EXTEND VALVE 支腿伸出阀
OUTRIGGER RETRACT VALVE 支腿缩回阀
LEFT FRONT OUTRIGGER VALVE 左前支腿阀
RIGHT FRONT OUTRIGGER VALVE 右前支腿阀
LEFT REAR OUTRIGGER VALVE 左后支腿阀
RIGHT REAR OUTRIGGER VALVE 右后支腿阀
RIGHT SWING VALVE 1 右摆动阀1
RIGHT SWING VALVE 2 右摆动阀2
LEFT SWING VALVE 1 左摆动阀1
LEFT SWING VALVE 2 左摆动阀2
CANH
CANL
2P9 ES

6 Maintenance record forms

Date	Maintenance items	Personnel

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