XEN *Series*

65XEN ;78XEN ;

80XENS ;100XENS ;

80XEN ;100XEN ;

120XEN ;140XEN;

160XEN;160XENS;

HS1614H

Mobile elevating work platform

Maintenance manual

HANGCHA GROUP CO., LTD.

July, 2024

Preface

Thank you for purchasing and using our XEN-series Mobile Elevating Work Platform.

Before maintaining the machine, please read and understand the content of this manual carefully. You should master the operation requirements of the machine, understand and comply with the relevant safety rules and operation instructions. Only trained and authorized personnel are allowed to operate and maintain 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 mobile elevating work platform, it will guide you to repair and maintain the machine correctly. At the same time, the manual also includes the working principle and fault diagnosis of the machine. 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 products 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 the sales company of HangCha Group Co., LTD or the agent.

Contents

1 Product Specifications

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 List 65XEN, 78XEN

Parameter item		Unit	65XEN	78XEN
Overall dimensions	Length	m	1.89	1.89
	Width	m	0.81	0.81
	Height（Guardrail folded）	m	1.66	1.77
	Height（Guardrail unfolded）	m	2.09	2.20
Ground clearance		m	0.077	0.077
Ground clearance（Pothole guards deployed）		m	0.016	0.016
Machine weight		kg	1390	1470
Working dimensions	Platform height, max.	m	4.50	5.80
	Working height, max.	m	6.50	7.80
	Extended length, max.	m	0.90	0.90
Safe load capacity		kg	320	230
Safe load capacity （Extended platform）		kg	113	113
Maximum number of workers		person	Indoor 2 /outdoor 1	Indoor 2 /outdoor 1
Wheel base		m	1.365	1.365
Wheel tread		m	0.71	0.71
Turning radius	Inner	m	0	0
	Outer	m	1.64	1.64
Maximum allowable side force		N	400N	400N
Control voltage（DC）		V	24	24
Platform dimensions	Length	m	1.67	1.67
	Width	m	0.76	0.76
Tire size	Diameter	mm	305	305
	Width	mm	100	100
Hydraulic system pressure		M Pa	24	24
System voltage（DC）		V	24	24
Driving speed	Retracted, max.	km/h	3.5	3.5
	Lifted, max.	km/h	0.8	0.8
Maximum slope rating		%	25	25
Maximum wind speed		m/s	12.5	12.5
Maximum allowable inclination	Front-back	°	3	3
	Left- right	°	1.5	1.5

Parameter List 80XENS, 100XENS

Parameter item		Unit	80XENS	100XENS
Overall dimensions	Length	m	2.48	2.48
	Width	m	0.81	0.81
	Height（Guardrail folded）	m	1.77	1.91
	Height（Guardrail unfolded）	m	2.21	2.35
Ground clearance		mm	100	100
Ground clearance（Pothole guards deployed）		mm	20	20
Machine weight		kg	2000	2170
Working dimensions	Platform height, max.	m	6.00	8.00
	Working height, max.	m	8.00	10.00
	Extended length, max.	m	0.90	0.90
Safe load capacity		kg	380	230
Safe load capacity (Extended platform)		kg	113	113
Maximum number of workers		person	Indoor 2	Indoor 2
Wheel base		m	1.86	1.86
Wheel tread		m	0.71	0.71
Turning radius	Inner	m	0	0
	Outer	m	2.1	2.1
Maximum allowable side force		N	400N	400N
Control voltage （DC）		V	24	24
Platform dimensions	Length	m	2.27	2.27
	Width	m	0.76	0.76
Tire size	Diameter	mm	381	381
	Width	mm	127	127
Hydraulic system pressure		M Pa	24	24
System voltage （DC）		V	24	24
Driving speed	Retracted, max.	km/h	3.5	3.5
	Lifted, max.	km/h	0.8	0.8
Maximum slope rating		%	25	25
Maximum wind speed		m/s	0	0
Maximum allowable inclination	Front-back	°	3	3
	Left- right	°	1.5	1.5

Parameter List 80XEN, 100XEN

Parameter item		Unit	80XEN	100XEN
Overall dimensions	Length	m	2.48	2.48
	Width	m	1.15	1.15
	Height（Guardrail folded）	m	1.65	1.77
	Height（Guardrail unfolded）	m	2.23	2.37
Ground clearance		mm	100	100
Ground clearance（Pothole guards deployed）		mm	20	20
Machine weight		kg	2130	2310
Working dimensions	Platform height, max.	m	6.00	8.00
	Working height, max.	m	8.00	10.00
	Extended length, max.	m	0.9	0.9
Safe load capacity		kg	450	450
Safe load capacity （Extended platform）		kg	113	113
Maximum number of workers		person	2	2
Wheel base		m	1.86	1.86
Wheel tread		m	1.02	1.02
Turning radius	Inner	m	0	0
	Outer	m	2.2	2.2
Maximum allowable side force		N	400	400
Control voltage （DC）		V	24	24
Platform dimensions	Length	m	2.27	2.27
	Width	m	1.14	1.14
Tire size	Diameter	mm	381	381
	Width	mm	127	127
Hydraulic system pressure		MPa	24	24
System voltage （DC）		V	24	24
Driving speed	Retracted, max.	km/h	3.5	3.5
	Lifted, max.	km/h	0.8	0.8
Maximum slope rating		%	25	25
Maximum wind speed		m/s	12.5	12.5
Maximum allowable inclination	Front-back	°	3	3
	Left- right	°	1.5	1.5

Parameter List 120XEN, 140XEN

Parameter item		Unit	120XEN	140XEN
Overall dimensions	Length	m	2.48	2.48
	Width	m	1.15	1.15
	Height（Guardrail folded）	m	1.92	2.05
	Height（Guardrail unfolded）	m	2.49	2.62
Ground clearance		mm	100	100
Ground clearance（Pothole guards deployed）		mm	20	20
Machine weight		kg	2710	3000
Working dimensions	Platform height, max.	m	10.00	11.80
	Working height, max.	m	12.00	13.80
	Extended length, max.	m	0.90	0.90
Safe load capacity		kg	320	320
Safe load capacity （Extended platform）		kg	113	113
Maximum number of workers		person	Indoor 2 /outdoor 1	Indoor 2
Wheel base		m	1.86	1.86
Wheel tread		m	1.02	1.02
Turning radius	Inner	m	0	0
	Outer	m	2.2	2.2
Maximum allowable side force		N	400	400
Control voltage （DC）		V	24	24
Platform dimensions	Length	m	2.27	2.27
	Width	m	1.14	1.14
Tire size	Diameter	mm	381	381
	Width	mm	127	127
Hydraulic system pressure		MPa	24	24
System voltage （DC）		V	24	24
Driving speed	Retracted, max.	km/h	3.5	3.5
	Lifted, max.	km/h	0.8	0.8
Maximum slope rating		%	25	25
Maximum wind speed		m/s	12.5	0
Maximum allowable inclination	Front-back	°	3	3
	Left- right	°	1.5	1.5

Parameter List 160XEN, 160XENS

Parameter item		Unit	160XEN	160XENS
Overall dimensions	Length	m	2.84	2.84
	Width	m	1.4	1.25
	Height（Guardrail folded）	m	2.05	2.05
	Height（Guardrail unfolded）	m	2.62	2.62
Ground clearance		mm	100	100
Ground clearance（Pothole guards deployed）		mm	20	20
Machine weight		kg	3240	3240
Working dimensions	Platform height, max.	m	13.7	13.7
	Working height, max.	m	15.7	15.7
	Extended length, max.	m	0.90	0.90
Safe load capacity		kg	230	230
Safe load capacity (Extended platform)		kg	113	113
Maximum number of workers		person	Indoor 2 /outdoor 1	Indoor 2 /outdoor 1
Wheel base		m	2.23	2.23
Wheel tread		m	1.27	1.12
Turning radius	Inner	m	0	0
	Outer	m	2.70	2.65
Maximum allowable side force		N	400	400
Control voltage（DC）		V	24	24
Platform dimensions	Length	m	2.64	2.64
	Width	m	1.14	1.14
Tire size	Diameter	mm	381	381
	Width	mm	127	127
Hydraulic system pressure		MPa	24	24
System voltage（DC）		V	24	24
Driving speed	Retracted, max.	km/h	3	3
	Lifted, max.	km/h	0.8	0.8
Maximum slope rating		%	25	25
Maximum wind speed		m/s	0	0
Maximum allowable inclination	Front-back	°	3	3
	Left- right	°	1.5	1.5

Parameter List HS1614H

Parameter		Unit	HS1614H
Dimensions	Length	m	2.84
	Width	m	1.4
	Height (folded guardrail)	m	2.23
	Height (unfolded guardrail)	m	2.77
Ground clearance		mm	100
Ground clearance (with enabled anti-rollover device)		mm	20
Total weight		kg	3670
Working size	Max. platform height	m	13.7
	Max. working height	m	15.7
	Max. horizontal length	m	0.90
Safe working load		kg	350
Safe load for extended platform		kg	120
Max. working staff		Number of people	Indoors only - 2
Wheelbase		m	2.22
Wheel track		m	1.27
Turning radius	Inner wheel	m	0
	Outer wheel	m	2.70
Max allowable lateral force		N	400
Control voltage (DC)		V	24
Platform size	Length	m	2.64
	Width	m	1.14
Tire size	Diameter	mm	381
	Width	mm	127
Hydraulic system pressure		MPa	24
System voltage (DC)		V	24
Vehicle speed	km/h	km/h	3
	km/h	km/h	0.8
Gradeability		%	25
Max allowable wind speed		m/s	0
Max allowable tilt angle	Front/Rear	°	3
	Left/Right	°	1.5
Normal working noise		dB	≤80

1.2 Power System Specifications

Power System Specifications

Item	Parameter	Specification
Hydraulic oil	Normal temperature region(0℃～40℃)	L-HM46
	Cold region(-25℃～25℃）	L-HV32
	High temperature region(＞40℃)	L-HM68
	Extremely cold region(＜-30℃[-22℉])	Need special customization
Gear pump	Flow	5 ml/r
	Rated working pressure	21MPa
Drive power	Displacement 65/78XEN	235 ml/r
	Displacement 80/100XENS	300 ml/r
	Displacement 80/100/120/140/160XEN,160XENS,HS1614H	375 ml/r
Function valve	Lifting relief valve pressure	21MPa
	Steering relief valve pressure	12MPa

Note: The machine can be filled with hydraulic oil according to customer's requirements in the factory, different specifications of hydraulic oil cannot be mixed.

1.3 Installation Instructions for Hydraulic Hoses and Fittings

1.3.1 Hydraulic Hose Torque

Note: Install or remove hydraulic hoses in strict accordance with the following table below.

Hydraulic Hose Torque

Metric thread	L（Light）	S（Heavy）
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 Fitting Torque

Note: Install or remove hydraulic hoses in strict accordance with the torque specified below.

Hydraulic Fitting Torque-SI

Thread specification	Material: Aluminum	Material: Steel	
	ED and O-ring +snap ring	ED and O-ring + snap ring	O-ring seal
L (Light)			
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 (Heavy)			
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 Fitting Torque-BSP

Thread specification	Material: Aluminum	Material: Steel	
	ED and O-ring + snap ring	ED and O-ring + snap ring	O-ring seal
L (Light)			
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 (Heavy)			
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 Fitting Torque- UNC/UNF

Thread specification	Material: Aluminum	Material: Steel
	O-ring seal	O-ring seal
L (Light)		
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 (Heavy)		
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 Fitting Tightening Procedures

Install hydraulic hoses and fittings in strict accordance with the following requirements.

1. Replace the O-ring when the seal is damaged or the seal leaks oil. Do not reuse the O-ring once the fitting or hose tightening torque exceeds the specified tightening torque value.

2. Lubricate the O-ring before installation.

3. Install the O-ring correctly.

4. When connecting the hose nut to fitting, align the fitting, hose and nut, and tighten the nut according to the torque requirements.

5. Tighten the nut or fitting according to the torque requirements.

6. Perform all functions of the machine and check the hoses, fittings, and related parts to ensure there are no leaks.

1.4 Installation Instructions for Fasteners

Unless there is a special torque requirement in the manual or other instructions, the general bolt tightening torque is performed according to the table below.

Fastener Tightening Torque- SI

Nominal diameter(in)	Screw pitch （mm）	Metric thread 8.8 Grade	Metric thread 10.9 Grade	Metric thread 12.9 Grade
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

Fastener Tightening Torque- UNC

Nominal diameter(in)	Opposite dimension of nut（s）	UNC 5A	UNC 8A
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

Fastener Tightening Torque-UNF

Nominal diameter(in)	Opposite dimension of nut（s）	UNF 5A	UNF 8A
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 section covers how to operate your machine properly and safely in most applications. To achieve this purpose, we have established a set of daily inspection flow sheet, which is mandatory for qualified quality inspection personnel to strictly follow the flow sheet for daily maintenance, to ensure the trouble-free and safe operation. You should read, understand and comply with safety rules, work site requirements and government regulations.

Whether you are the owner, user or operator of the machine, before operating it for the first time, you must read through and thoroughly and properly understand the contents of this manual, and operate the machine according to the operation procedures under the supervision of qualified personnel with practical operating experience before operating it independently. If you have any questions , please promptly call the HANGCHA GROUP CO., LTD. for consultation.

Most of the accidents that occur during the operation, maintenance and repair process are caused by the failure to follow the basic safety operation procedures and precautions. If the potential safety hazards are analyzed and corresponding safety measures taken before operation, most accidents can be completely avoided.

Therefore, before operation, an evaluation should be made by a safety officer who is trained with the ability to analyze the potential safety hazards and remind the operator to take the necessary countermeasures to avoid them.

Improper operation, lubrication, maintenance and repair are very dangerous, and can even cause personal injury or death. Therefore, only after you read the manual and fully understand the knowledge and information about operation, lubrication, maintenance and repair, can you operate the machine.

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 Instructions on signs

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

This safety warning sign is contained in most safety statements. It means that precautions should be taken at all times otherwise your safety will be at risk. Read and follow the information contained in the safety warning signs.

It is used to indicate that there is an emergency hazard which may cause death or serious injury.

It is used to indicate that there is a potential hazard which may cause death or serious injury.

It is used to indicate that there is a potential hazard which will cause minor or moderate injury.

NOTICE

It is used to indicate that there a risk of damage to the power unit, personal property or environment, or improper operation of the machine.

2.3 Accident notice

Immediately notify our company if any accidents related to the machines from Hangcha Group Co., Ltd. occur. Contact us and tell us all necessary details related to the accident by telephone even if no personal injuries or property damage were caused by the accident. In case of any failure to notify the manufacturer within 48 hours after an accident related to our machines, it may invalidate the product warranty.

Caution

After any accident, the machine should be thoroughly checked. Test all functions from the ground controller first and then from the platform controller. The lifting height should not exceed 3m until all damage is repaired and all controllers act correctly.

2.4 Risk of electrical shock

This machine is not insulated and has no electric shock protection.

All operators and managers should follow the relevant national or local regulations on the minimum safety distance of live conductors above ground. If there are no

such requirements, the operators and managers should follow the requirements on the minimum safety distance listed in the table.

Risk of electrical shock

★Follow the relevant government rules and always keep a safe distance from power cables and electrical equipment, as shown in the following table.

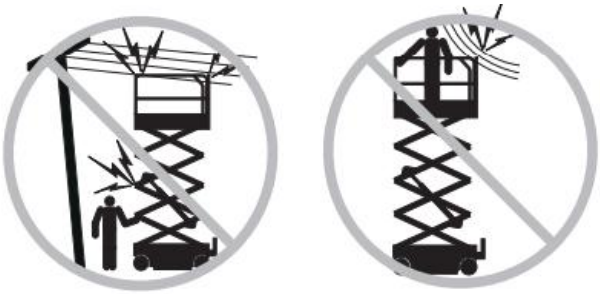
★Take the platform movement and wire swinging or sagging into account, take care in strong or gusty winds, and do not operate the machine in lightning or heavy rain.

★Stay away from the machine if the machine contacts live wires. Before the power is cut off, personnel on the ground or platform are must not touch or operate the machine.

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

Min. safe distance of live conductors

Voltage range （Phase-Phase，kV）	Min. 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 Danger of rollover

Max. load capacity of the platform

Model	Max Load Capacity	Max Load Capacity of Extensible Platform	Max Number of People	Max Manual Operating Force
65XEN	320kg	113kg	Indoors - 2 / Outdoors - 1	Indoors - 400N / Outdoors - 200N
78XEN	230kg	113kg	Indoors - 2 /	Indoors - 400N /

			Outdoors - 1	Outdoors - 200N
80XENS	380kg	113kg	Indoors only - 2	Indoors only - 400N
100XENS	230kg	113kg	Indoors only - 2	Indoors only - 400N
80XEN	450kg	113kg	Indoors - 2 / Outdoors - 1	Indoors - 400N / Outdoors - 200N
100XEN	450kg	113kg	Indoors - 2 / Outdoors - 1	Indoors - 400N / Outdoors - 200N
120XEN	320kg	113kg	Indoors - 2 / Outdoors - 1	Indoors - 400N / Outdoors - 200N
140XEN	320kg	113kg	Indoors only - 2	Indoors only - 400N
160XEN	230kg	113kg	Indoors only - 2	Indoors only - 400N
160XENS	230kg	113kg	Indoors only - 2	Indoors only - 400N
HS1614H	350kg	120kg	Indoors only - 2	Indoors only - 400N

Danger of rollover

★The total weight of personnel, equipment and materials on the platform must not exceed the maximum load capacity of the platform.

★The platform can only be lifted 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 severely tilted. If the tilt alarm sounds, the operator should lower the platform very carefully and then move it to a solid and flat surface. Do not alter the level or limit switch.

★When the platform is lifted, the driving speed should not exceed 0.8 km/h.

★Do not drive the platform on an uneven or unstable ground/surface or in other dangerous conditions when the platform is lifted.

★Do not operate the machine or increase the surface area of the platform or load during strong or gusty winds. The machine stability will be reduced if the area exposed to the wind is increased.

★Take care and drive the platform slowly when it is traveling on uneven ground or on a gravelly, unstable or slippery surface, close to an entrance or on a steep slope.

★Do not drive the machine on slopes where the maximum gradeability of the machine will be exceeded. For the machine in the retracted state, 25% of the maximum gradeability (14°) applies.

★Do not push or pull any objects outside the platform. The allowable maximum lateral force: indoors - 400N; outdoors - 200N.

★Do not change any parts that may affect the safety and stability of the machine.

★Do not use replacement parts of weights or specifications which are different from the original key parts as it may affect the machine stability.

★Do not modify or alter the mobile elevating work platform without the manufacturer's prior written permission.

★It will increase the platform weight or surface area or carrying load if the operator installs any additional devices for placing tools or other materials on the platform and guardrail.

★Do not place or tie any overhanging loads on any part of this machine.

★Do not place ladders or scaffolds against the platform or lean against any part of the machine.

★Do not use the machine on moving or movable surfaces or vehicles. Ensure that all tires are in good condition and the tire nuts are tightened.

★Do not use the platform to push other machines or objects.

★Do not let platform contact any adjacent objects.

★Do not tie the platform with ropes or other materials to any adjacent objects.

★Do not place the load outside the platform.

★Do not use the platform controller to lower the platform if it is caught, stuck, or unmovable because of other objects nearby. If it is intended to use the ground controller to lower the platform, no operation should be taken before all personnel have left the platform.

★Do not use a battery of a lower weight than the original one. The battery not only provides power, but also acts as a counterweight, so it is essential to maintain the machine stability.
The weight of each battery for 65/78XEN and 80/100XENS models must be at least 28kg.
The weight of each battery for 80/100/120/140/160XEN ,160XENS and HS1614H models must be at least 35kg.

★Do not operate the machine when the left/right side door is open.

2.6 Hazards in the work environment

Check the workplace for possible hazards before or during operating the machine and pay attention to the hazards in the work environment including flammable and explosive gases or dust, etc.

Unsafe workplace

★**Do not operate the machine on the surface, edges or other places which cannot bear the machine weight.** The platform can only be lifted or extended when the machine is on solid and flat ground.

★**Do not use the tilt alarm as a level indicator. The tilt alarm will sound only when the machine is severely tilted.**

★If the tilt alarm sounds when the platform is lifted, the operator should lower the platform very carefully, rather than operate the horizontal or limit switch.

★When the platform is lifted, the driving speed should not exceed 0.8 km/h.

★Do not operate the machine in strong or gusty winds if the machine is used outdoors. Do not lift the platform when the wind speed exceeds 12.5m/s. Immediately lower the platform if the wind speed exceeds 12.5m/s when it is lifted and do not continue operation.

★Do not drive the platform on an uneven or unstable ground/surface or in other dangerous conditions when the platform is lifted.

★Take care and drive the platform slowly when it is retracted and traveling on an uneven ground or on a gravelly, unstable or smooth surface, close to an entrance or on a steep slope.

★Do not drive or lift the machine on slopes, steps or arches where the maximum gradeability of the machine may be exceeded.

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 and 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.

Caution

Maximum gradeability - 25% The maximum gradeability applies to the machine with the platform retracted.

The gradeability refers to the maximum allowable tilt angle when the machine is on solid ground and the platform is carrying only one person. The rated gradeability of the slope will be reduced when the platform increases in weight.

2.7 Danger of unsafe operation

The machine should be operated in strict accordance with the requirements of this manual and the maintenance manual, or if there are stricter industrial or local regulations, the latter shall prevail.

Danger of unsafe operation

★Do not push or pull any objects outside the platform. Maximum allowable lateral force: indoors - 400 N; outdoors - 200N.

★Do not change any parts that may affect the safety and stability of the machine.

★Do not use replacement parts of weights or specifications which are different from the original key parts as it may affect the machine stability.

★Do not modify or alter the mobile elevating work platform without the manufacturer's prior written permission.

★It will increase the platform weight or surface area or carrying load if the operator installs any additional devices for placing tools or other materials on the platform and guardrail.

★Do not place ladders or scaffolds against the platform or lean against any part of the machine.

★Do not use the machine on moving or movable surfaces or vehicles. Ensure that all tires are in good condition and the tire nuts are tightened.

★Do not place or add any overhanging loads on any part of this machine.

★Do not use the machine as a crane.

★Do not use the platform to push other machines or objects.

★Do not make platform contact or tie it to any adjacent objects.

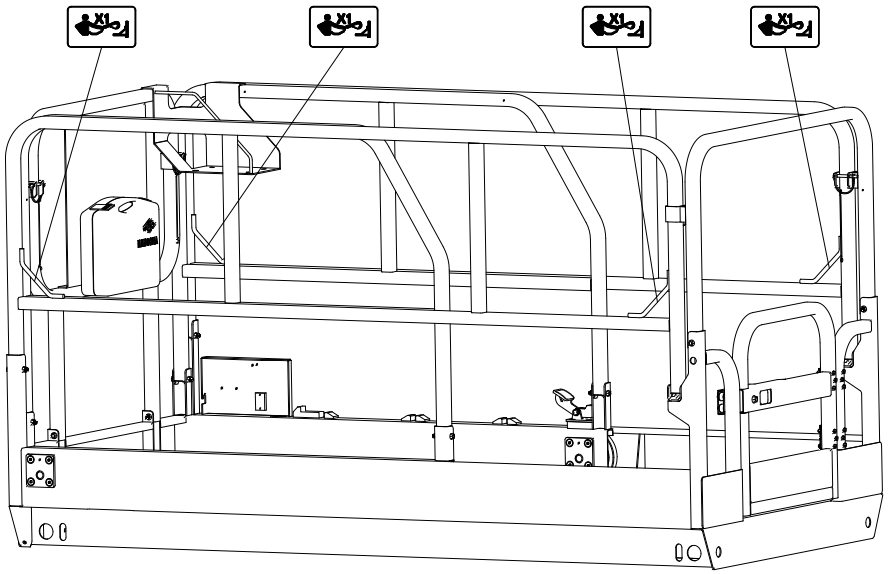
★Do not place the load outside the platform.

★Do not use the platform controller to lower the platform if it is caught, stuck, or unmovable because of other objects nearby. If it is intended to use the ground controller to lower the platform, no operation should be taken before all personnel have left the platform.

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

2.8 Danger of falling

The machine should be operated in strict accordance with the requirements of this manual and the maintenance manual, or if there are stricter industrial or local regulations, the latter shall prevail.



Seat belt hook layout

Danger of falling

★People on the platform must wear safety belts or use safety facilities that comply with government regulations. Tie the lanyard to the tie-down point of the platform, only one person should perform this operation at each tie-down point.

★Do not sit, stand or climb on the platform guardrail. Stand on the platform floor firmly at all times.

★Do not get down from the platform when the platform is lifted.

★Keep the platform floor unobstructed.

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

★Close the access door before operation.

★Do not operate the machine if the guardrail is not installed correctly or the access door is not closed.

2.9 Danger of collision

The machine should be operated in strict accordance with the requirements of this manual and the maintenance manual, or if there are stricter industrial or local regulations, the latter shall prevail.

Danger of collision

★Pay attention to the sight range and blind spots when moving or operating the machine,

★Check the workplace to avoid obstacles or other possible hazards above your head.

★**Take care when using the platform controller and ground controller.** The colored direction arrows indicate the driving, lifting/lowering and steering function of the machine.

★The user must abide by the rules on personal protective equipment for users, workplace rules and government rules (on safety helmets, safety belts and gloves).

★The machine must be placed on a level surface or fixed securely before the brake is released.

★The platform can only be lowered when there are no people and obstacles under it.

★Control the driving speed based on ground conditions, congestion, gradient, location of people, and any other factors that may cause a collision.

★Do not operate the machine on the possible traveling route of any crane or moving gantry unless the crane controller is locked or precautions have been taken to prevent any potential collision.

★Do not put your hands and arms close to parts where they may get jammed or stuck.

★Do not operate under the platform or near the scissor arms when the safety bar is not in the proper position.

★Use good judgment and planning when using the controller to operate the machine on the ground. Maintain a proper distance between the operator, machine and fixed objects.

★Do not drive in a dangerous manner when operating the machine.

2.10 Danger of jamming

There is a potential danger of jamming when the machine is moving. Keep your body and clothes a safe distance away from the machine when the machine is running.

Danger of jamming

★Do not put your hands and arms close to parts where they may become jammed or stuck.

★Do not operate under the platform or near the scissor arms when the safety bar is not in the proper position.

★Use good judgment and planning when using the controller to operate the machine on the ground and keep a safe distance between the operator and the machine/fixed objects.

2.11 Danger of explosion/fire

Danger of explosion/fire

★Do not use the machine, charge the battery or refuel the lift in a dangerous area or where flammable and explosive gases or particles may exist.

2.12 Danger of machine damage

he operators should follow the requirements for the use and maintenance of parts in this manual and the maintenance manual, otherwise it will cause damage to the machine.

Danger of machine damage

★ Do not use damaged or malfunctioning 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 storage container located on the platform.

2.13 Danger of physical injury

The operators should follow the requirements for the use and maintenance of parts in this manual and the maintenance manual, otherwise it will cause damage to the machine.

★Unsafe operation can be dangerous.

★Do not operate the machine when there is hydraulic oil leakage. Hydraulic oil leaks may penetrate and burn the skin.

2.14 Battery hazards

★The battery contains sulfuric acid and can produce an explosive mixture of hydrogen and oxygen. Keep all objects (including cigarettes/materials which can produce smoke) that can cause sparks or flames away from the battery to prevent an explosion.

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

★Wear protective clothing and glasses when working on the battery. Take off all rings, watches and other jewelry.

★Prevent the acid in the battery from spilling or contacting the skin. If the battery acid leaks out, please use soda to neutralize it; if the battery acid contacts the skin, please rinse it with plenty of water and seek medical attention immediately.

★When lifting the battery, the number of operators and lifting methods should be correct and proper.

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

★The charger can only be connected to a grounded two-phase AC power socket.

★Check whether the wires are damaged daily, and replace damaged ones before operation.

2.15 Hydraulic system hazards

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

★Clean any spilled hydraulic oil thoroughly after the machine is shut down. Do not spill hydraulic oil on the floor. Clean any hydraulic oil off your skin once the maintenance and repairs are completed. Dispose of the used hydraulic oil in accordance with legal requirements.

★Do not plug leaking hydraulic oil with your hands. If there is a hydraulic oil leakage, relieve the system pressure first and carry out maintenance after the hydraulic oil has cooled down. Seek medical attention immediately in the event of any injuries caused by the hydraulic oil. Serious complications may occur if treatment is not provided immediately.

2.16 Welding and grinding safety

Before welding and polishing operations, welders must obtain permission from the authority which is responsible for the workplace management.

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

★Connect wires or cables for welding or polishing operations only after the power is turned off.

★The welding and polishing operation can only be carried out after the cables or wires are correctly connected.

★The machine should not be used as a ground wire during welding operations.

★Always make sure that the electric tools are all placed inside the work platform, never hang their wires on the guardrail of the work platform or in the work area outside the platform, never hang the electric tools directly by their wires.

2.17 Lockout after Use

1. Choose a safe parking location, which should be a solid and flat surface with no obstacles or heavy traffic.
2. Ensure the scissors are lowered to the bottom and all covers and doors are closed and fastened securely.
3. Do not fully extend the hydraulic cylinder when the machine is powered off or idle for a long time.
4. Press and turn the “Emergency Stop Switch “on the platform control box to the “OFF” position.
5. Press and turn the “Emergency Stop Switch “on the ground control box to the “OFF” position.
6. Turn the “Key Switch “on the ground control box to the “OFF” position and pull the key out to avoid unauthorized operation.
7. Turn off the power switch.
8. Charge the battery.

Caution

The power switch must be turned off after each use.

3 Principle and System Introductions

3.1 Power System

The 65/78XEN and 80/100XENS consist of four 6V lead-acid batteries in series or one 24V lithium battery to drive a 24V AC motor.

80/100/120/140/160XEN ,160XENS and HS1614H consist of two 12V lead-acid batteries in series and two 12V lead-acid batteries in parallel or a 24V lithium battery to drive a 24V AC motor.

The gear pump is connected with the output shaft of the motor by spline to provide power to the system.

3.2 Hydraulic System

The whole hydraulic system of the machine can be divided into two parts. One part is used for driving and steering function, the other part is used for platform lifting function.

When the motor is working, the hydraulic pump sends the pressure oil to the functional valve block, which is equipped with directional switching valves for different actions. To protect related components and avoid system pressure overload, the valve block is equipped with an overflow valve.

3.3 Electrical System

The 65/78XEN and 80/100XENS consist of four 6V lead-acid batteries in series or one 24V lithium battery to drive a 24V AC motor.

80/100/120/140/160XEN ,160XENS and HS1614H consist of two 12V lead-acid batteries in series and two 12V lead-acid batteries in parallel or a 24V lithium battery to drive a 24V AC motor.

The battery is charged by external power supply.

3.4 Control System

The system has two controllers to control the function of the machine. One is installed on the right side door to control the lifting of the scissor; the other is

installed on the platform to control the movement of the machine and the lifting of scissor. The controller performs data interaction through a CAN bus.

3.5 Security Measures

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

1. Horizontal sensors measure the angles of the X-axis and Y-axis of the frame. An alarm will sound when the X-axis Angle exceeds 1.5° or the Y-axis Angle exceeds 3°, and limit the lifting, driving, and steering functions.
2. The pothole guard switch is used to confirm whether the pothole guard is developed in place. If the platform lifted to about 2m from the ground, the pothole guard is not deployed, and no signal is detected by the sensor, the platform will stop rising.
3. The weighing system (if any) is used to limit the carrying weight of the platform. When the carrying weight exceeds the maximum capacity, the lifting height is greater than 1m or 10% of the maximum lifting height (whichever is larger), the overweight indicator will light up and alarm will sound at the same time. No movement of the working platform is allowed. You cannot start moving again until you have removed the overloaded item.

4 Maintenance

4.1 Overview

This section provides detailed operating procedures for regular maintenance inspections.

Warning

Unsafe Operation Hazard

Unsafe operation hazard may result in death,
serious injury or machine breakdown.

★Carry out maintenance inspection by professionally trained and qualified personnel.

★Routine maintenance inspection is a daily check item during normal operation. Check and maintain the machine according to the maintenance check report and fill in the report in detail.

★Carry out regular maintenance inspection quarterly, semi-annually and annually. Check and maintain the machine according to the maintenance check report and fill in the report in detail.

★Stop operating the faulty machine, remove and mark it in time.

★Repair the damaged or malfunctioning machine before operating it.

★Keep all inspection records for at least 10 years or until the machine is out of service or as required by the machine owner/company/keeper.

★Machines that have not been maintained for more than three months must be inspected quarterly.

★Parts replaced during maintenance should be the same or equivalent to the original.

Unless otherwise specified, maintenance procedures shall be carried out in accordance with the following terms.

★Placed the machine is on a flat, level solid ground.

★The machine is not in working condition.

★Place the key switch of the ground controller in the OFF position and remove the key to leave the machine in a non-starting state.

★Place the red emergency stop switch on the platform controls and ground controller in the OFF position to avoid accidental start-up of the operating system.

★Disconnect the power-off switch.

★Disconnect all AC power supplies of the machine.

★Lock all tires to prevent the machine from moving.

Maintenance Schedules

There are four maintenance cycles for this machine including daily, quarterly, semi-annually and annually. Definitions are listed as follows:

Maintenance Item	Maintenance Cycle
A	Once every 8 working hours (or daily)
A+B	Once every 250 working hours (or quarterly)
A+B+C	Once every 500 working hours (or semi-annually)
A+B+C+D	Once every 1,000 working hours (or annually)

Maintenance Inspection Report

★The Maintenance Report is divided into four sections (A, B, C, and D) based on the maintenance items, maintenance cycle and requirements.

★The Maintenance Report contains all the maintenance record sheets.

★Copy the Maintenance Report for each check. The maintenance report should be kept for at least 10 years or until the machine is out of service or as requested by the machine owner/company.

★Use the table below to record the results. After completing each section of the report, check the corresponding box to mark it.

★If it is “Fail” for any check item, the operator must stop the machine, recheck it after repair and check the "Pass After Repair”box to mark it. Select the check items based on the check type.

Maintenance Record Sheet A			
Item	Pass	Fail	Pass After Repair
A-1 Check the manual			
A-2 Check the labels and signs			
A-3 Check the parts and components			
A-4 Check the hydraulic oil			
A-5 Check the battery level			
A-6 Check the functions			
A-7 Check the emergency lowering function			
A-8 Check the braking function			
A-9 Check the tilt protection system			
A-10 Check the pothole protection system			
A-11 Check the limit switch			
A-12 Test the lifting/lowering time			
A-13 Test the driving speed			

A-14 Test the overload device (optional)			
A-15 Carry out maintenance every 30 days			

Maintenance Record Sheet B			
Item	Pass	Fail	Pass After Repair
B-1 Check the wires			
B-2 Check the wheels and tires			
B-3 Check the battery			
B-4 Check the hydraulic oil			
B-5 Check the hydraulic oil tank			
B-6 Check the manual brake release function			

Maintenance Record Sheet C			
Item	Pass	Fail	Pass After Repair
C-1 Replace the air filter			

Maintenance Record Sheet D			
Item	Pass	Fail	Pass After Repair
D-1 Replace the oil return filter			
D-2 Change the hydraulic oil			
D-3 Check the bushings and sliding blocks			
D-4 Check the key structural parts			

4.2 Maintenance Procedure A

A-1 Check the manual

Place the operation and maintenance manual in the storage container on the platform. The appropriate place is essential for safe operation of the platform. Illegible or missing manuals do not provide necessary safety and operational information.

★Check and confirm that the storage container is installed in the appropriate place on the platform.

★Check and confirm that the operation and maintenance manual are intact in the storage container on the platform.

★Check the page of each manual to make sure the handwriting is clear and intact.

★Put the manual back in the storage container after use.

NOTICE
If you need to replace the manual, please contact HANGCHA GROUP CO., LTD.

A-2 Check the labels and signs

Ensure that safety and prompts performance labels are critical to safe platform operation. The label not only indicates the dangers that may be encountered during operation, but also provides the user with operation and maintenance information. Labels with blurred handwriting cannot properly instruct the operator and may result in unsafe operating conditions.

★Check the "Label" section of the operation manual and use the label list and diagrams to determine the correct placement of the labels.

★Check all labels for legibility and damage, and replace damaged or illegible labels in time.

NOTICE
If you need to replace the labels, please contact HANGCHA GROUP CO., LTD.

A-3 Check the parts and components

Check the platform status daily is important for platform security. Failure to identify and repair damaged, loose or missing parts timely may result in unsafe operation. Observe the entire machine for damaged, improperly installed or missing parts.

Check the following parts.

——Electrical components, wires and electrical cables

——Hydraulic hoses, fittings, cylinders and valve blocks

——Hydraulic oil tank

——Battery pack and connections

——Drive motor and brake

——Scissor slider

——Limit switch and horn

——Tires and wheels

——Floodlight and alarm（If equipped）

——Pothole guards

——Platform guardrail and gate

——Scissor pins

——Cracking of structural components and welds

——Nuts, bolts and other fasteners

NOTICE
If components are found to be damaged, improperly installed or missing, new parts should be replaced immediately and installed correctly. If the fastener is shedding or loosening, tighten it immediately.

A-4 Check the hydraulic oil

Maintain the hydraulic oil at the proper level is essential to machine operation. Improper oil level may damage hydraulic components. Undetected leaks can result in hazardous conditions, which will weaken the platform performance and damage parts. Daily inspection can be fully aware of oil level changes to find problems in the hydraulic system.

★ Check hydraulic oil level

1、Open the right tank door of the frame and observe the scale on the side panel. The hydraulic oil level should be at the tank's mark.

Model	Scale line（L）
65/78XEN	7
80/100XENS	15
80/100XEN	18
120/140/160XEN,160XENS	20
HS1614H	25

2、Add oil as needed, do not overfill.

NOTICE
Different hydraulic oil can be filled according to customer's requirements, different hydraulic oil cannot be mixed.

★ Check hydraulic oil leakage

Preventing hydraulic oil leakage is critical to the safe operation and proper functioning of the machine. Leakage can be dangerous if not detected in time, and will weaken the machine performance, damage parts.

Observe for hydraulic oil spills, drips or residuals on or around the following components.

——Hydraulic oil tanks, filters, fittings, oil hoses, and auxiliary power units
——All hydraulic cylinders, blocks, and pumps
——Boom
——Slewing bearing
——Drive chassis
——Areas around the machine

Customer requirements	Hydraulic oil trademark
Normal temperature area 0℃～40℃ (32℉～104℉)	L-HV46
Cold areas -25℃～25℃ (-13℉～77℉)	L-HV32
High temperature area ＞40℃(104℉)	L-HM68
Extreme cold area ＜-30℃ (-22℉)	Specific solutions need to be identified

A-5 Check the battery Level

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

Handle power indication	Power ratio	Description
6 grid	90-100%	Fully charged
5 grid	70%	Battery level 70%
4 grid	50%	Battery level 50%
3 grid	30%	Battery level 30%
2 grid	20%	Low battery power, charge immediately
1 grid	10%	Extremely low battery power causes the platform to slow down or even stall.

A-6 Check the functions

The purpose of the function check is to detect any functional defects or faults before starting to use the machine. Checking each function is essential for safe operation. Abnormalities in any of the functions can lead to unsafe conditions. Each function should work smoothly and reliably, without shaking, jerking and abnormal noise. Once a functional defect or malfunction is detected, the machine must be marked and taken out of service.

For complete operating procedures, please refer to the "Function Test" section of the operation manual.

A-7 Check the emergency lowering function

NOTICE
Perform this operation when the platform is unloaded.

1、Pull out the red "emergency stop" switch of the platform and ground to the ON position.

2、Turn the key switch to ground control position.

3、Activate the up function and lift the platform to a certain height.

4、Pull out the emergency lowering handle (rear of the frame).

Result: The platform should be lowered and stops lowering after releasing the handle.

A-8 Check the braking function

The correct braking device is essential for the normal and safe operation of the platform. Braking requires smoothness, no shock and no noise. The machine is braked by the rear wheel brakes. The test should be conducted on a solid, level and unobstructed surface with the machine in its lowest position and the extension platform retracted.

★Perform the procedure as follows.

1、Draw a reference line on the ground and select a point on the machine as the reference point.

2、Turn the key switch to the platform control position.

3、Operate the handle to drive the vehicle at maximum speed, and release the handle quickly at the moment when the reference point coincides with the reference line.

4、Measure the horizontal distance between the reference point and the reference line.

Result: The vehicle must be able to stop on the maximum allowed slope and the braking distance required is less than 0.5m.

If the measured value is less than the required distance, the machine is normal; if the measured value is greater than the required distance, you need to contact the after-sales personnel for repair or replacement of the brake device.

5、Repeat the above test steps after repairing or replacing the brakes.

A-9 Check the tilt protection system

Normal tilt sensor is very important to the performance and safe operation of the machine. A defective tilt sensor can have a major impact on the performance of the machine and may pose a safety hazard to the operator.

★Perform the procedure as follows.

1、 Move the machine to a ramp that is tilted beyond the maximum allowable angle of the tilt sensor and turn the key switch to ground control.

2、Control platform lifting with ground manipulation panel to lift the machine on the ramp to a height of more than 2 m.

Result: If the platform stops lifting, the alarm sounds and the LED display shows the error code LL, the tilt sensor is normal; if the platform continues to lift, there is no alarm sound and the LED display does not show the error code LL, the tilt sensor is faulty.

3、Repeat the above test steps after adjusting or replacing the tilt sensor.

A-10 Check the pothole protection system

NOTICE
The pothole guards should automatically deploy when the platform is lifted. The pothole guards activate two limit switches to limit the drive of the machine. When the platform is lifted to the machine leaves the pothole guards pressure lever, the pothole protection device is activated. if the pothole guards do not deploy, an alarm sounds, and the machine will not lift or drive.

★Perform the procedure as follows.

1.When the platform is lifted to the machine leaves the pothole guards pressure lever, the pothole guards should deploy automatically.

2.Push the left/right pothole guards plate hard.

Result: If the pothole guard plate does not flip up, the pothole guard system is normal. If the pothole protection plate can be flipped upward, the pothole protection system is faulty.

3. Lower the platform, and the pothole guards will recover automatically.

4.Place a 50 x100 x50mm piece of wood under a pothole guard. Lift the platform.

Result: When the platform is lifted to the machine leaves the pothole guards pressure lever, an alarm sounds, platform and ground control panel displays 18.

5.Lower the platform and remove the wood, and the machine will not lift or drive at this time.

A-11 Check the limit switch

Good limit switch is very important to the performance and safe operation of the machine. A defective limit switch will have a major impact on the performance of the machine and may pose a safety hazard to the operator.

★Perform the procedure as follows.

1、Prop up the maintenance arm. Refer to "Maintenance Arm Use" in the manual for operation mode.

2、Open the limit switch cover on the chassis, and then retract the maintenance arm.

3、Control platform with ground manipulation panel to lift the machine to the highest position until the platform can no longer be raised, test the height of the platform at this time.

Results: The height of the platform should be consistent with the parameter table, otherwise the limit switch should be adjusted or replaced.

4、Control platform with ground manipulation panel to lower the machine to about 2-2.5m height from the ground, the machine should automatically stop lowering.

Results: The machine should stop lowering automatically, otherwise the limit switch should be adjusted or replaced.

5、Relax the control handle and return it to the middle position, reactivate the lowering function, the platform will continue to lower after 5 seconds.

6、Prop up the service arm, reinstall the limit switch cover on the chassis, and then withdraw the maintenance arm.

7、Repeat the above test steps after adjusting or replacing the limit switch.

A-12 Test the lifting/lowering time

Appropriate lift and lower speeds are critical to the safe operation of the platform. Control and execution should respond quickly and smoothly to operators' actions. No shaking, no shock and no abnormal noise. Testing needs to be conducted on a solid, level and unobstructed surface.

★Perform the procedure as follows.

1、Release the emergency stop switch and switch the key to the lower control.

2、Toggle the platform up/down switch to the up position until the platform lifts to the maximum height, record the time.

3、Toggle the platform up/down switch to down position until the platform lowers to the lowest position, record the time.

Results: The lift and lower time refer to the model specification

A-13 Test the driving speed

Normal drive speed is essential for safe platform operation. The drive function should respond quickly and smoothly to the operator's operation without shaking, shock and abnormal noise. The test should be performed on a solid, level and unobstructed ground with the machine in its lowest position and the extended platform retracted.

★ Perform the procedure as follows.

1、Draw two lines on the ground with the distance(≥ 10M)from the starting point to the end point

2、Turn the key switch to the platform control.

Fast state: the platform is kept in the lowest position, and the speed switch indicator on the control handle is always off.

Slow state: the platform keeps the lowest position, press the speed switch button on the joystick, the indicator light on;

Lifting state: Lift the platform approximately 2m until the pothole guards deploy.

3、Operate the control handle, maintain full speed, drive the vehicle to run from the starting point to the end point, record the time.

4、Calculate the driving speed according to the distance and driving time.

Result: lift and lower time refer to the model specification

A-14 Test the overload device (Optional)

Overload device is optional, please ensure that your machine has this protection function when checking this function.

1、Placed the machine on a flat, level and unobstructed solid ground. The bearings and slides are well lubricated.

2、Operate on the ground controller, lift the platform unloaded twice, no obvious shaking and abnormity.

3、Lower the platform to the lowest, scissor arm is in full retracted state, gradually load to the platform.

4、Lifted the lifting platform to the maximum height when the load capacity of the platform does not exceed the rated load capacity.

5、Lift the platform when the load capacity of the platform is increased to more than 10% of the rated load.

Result: If the platform lifting height is greater than 1 m or 10% of the maximum lifting height (the larger one), the overload indicator will light up and alarm will sound at the same time, the working platform will not be able to move. Remove the excess weight and the working platform can continue to lift, which means the overload device is normal. Otherwise, it is necessary to recalibrate or replace the overload device.

A-15 Carry out maintenance every 30 days

30 day maintenance is a one-time maintenance performed after 30 days or 40 hours of use of new equipment. After performing this maintenance, perform relevant maintenance according to the normal time interval.

★Perform the procedure as follows.

B-2 Check the wheels and tires

D-1 Replace the oil return filter

4.3 Maintenance Procedure B

B-1Check the wires

Maintaining the wires is essential to the proper working and safe operation of the platform.

Failure to promptly detect and replace burned, damaged, corroded or broken wires may result in unsafe operation or even serious injury.

Electrictrocution Hazard

Disconnect the battery from the machine and the charger from the AC outlet before checking the wiring; contact with live wires may result in death or serious injury.

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

1.Check the following areas for burned, frayed, corroded and loose wires.

-- Battery wiring harness

-- Charger wiring harness

-- Scissors arm wiring harness

-- Power unit wiring harness

--Ground controller junction box

--Platform controller junction box

2.Check that the movable joints are not loose and the sensor wires are not damaged.

Before checking the wiring harness in the boom, the maintenance arm needs to be supported. The operation mode refers to the part of "Maintenance arm use" in the overload manual.

B-2Check the wheels and tires

Well maintained wheels and tires are critical to proper and safe execution of the platform.

Problems with wheels or tires can cause the platform to tip over, and can also cause damage to components if not detected and repaired in a timely manner.

This product series use solid tires that do not require inflation.

★Perform the procedure as follows.

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

2. Check and confirm that each wheel without damage, distortion and weld cracking phenomenon.

3. Take off the cotter pin, check and confirm that the mounting nut has been tightened with the correct torque (≥300Nm).

4. Replace the cotter pin and bend it to the locking position.

B-3Checking the battery

Proper battery condition is essential to good engine performance and operational safety. Improper fluid levels or damaged cables and connections can result in engine component damage and hazardous conditions.

Electrocution Hazard

Contact with live circuits may result in death or serious injury.

Remove all rings, watches and other jewelry.

Bodily Injury Hazard

Batteries contain acid. Avoid spilling or contacting battery acid.

Neutralize battery acid spills with baking soda and water.

NOTICE

1. Put on protective gloves for inspection.
2. Ensure that the battery cable connections are free of corrosion.
3. Ensure that the battery hold downs and cable connections are tight.

The battery is divided into lead-acid battery, lead-acid maintenance-free battery and lithium battery, among which lithium battery and lead-acid maintenance-free battery are both maintenance-free batteries.

★Check the lead-acid battery:

1、Wear protective clothing and goggles.

2、Ensure that the battery cable connection is not corroded.

3、Ensure that the battery is firmly fixed and the cable connection is tight.

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

5、Check the acid liquid level of the battery. If necessary, add distilled water 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: The addition of terminal protectors and anti-corrosion sealants will help to eliminate corrosion of 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 the spilled electrolyte.

★Check maintenance-free batteries:

1. Wear protective gloves.
2. Ensure that the battery cable connection is not corroded.
3. Ensure that the battery is firmly fixed and the cable connection is tight.
4. Connect the battery charger cable to the correct terminal post of the battery (red is connected to the positive terminal, black is connected to the negative terminal).
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、Use a wrench with a rubber handle when removing or installing the battery.

2、Tightening torque of cable retaining nut.

M8 Tightening torque 9～11/N.m.

M10 tightening torque 18～23/N.m

If terminals are not kept clean and dry, they may be corroded continuously. To prevent corrosion, apply a thin layer of Vaseline or use a terminal protector.

B-4 Evaluate the hydraulic oil

Evaluation of hydraulic oil is essential for proper platform operation and extended service life. Dirty hydraulic oil may cause abnormal operation of the platform, and continued use may damage the hydraulic components. Particularly harsh operating environments require frequent hydraulic oil changes.

Burn Hazard

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

In any of the following cases, it is necessary to replace the hydraulic oil in time:

1. The hydraulic oil is milky white and cloudy.
2. The hydraulic oil is black in color.

3. View a portion of the removed hydraulic oil in the sunlight and find metal luminous spots. Or rub the oil with fingers, there is a clear sense of particles.
4. Hydraulic oil stinks

★Refer to procedure D-2 for replacement procedure

B-5 Check the hydraulic oil tank

The hydraulic oil tank of the machine is a ventilated tank, and the impurities in the air are filtered through the air filter inside the tank vent cover. If the air filter fails or is damaged, it may cause impurities to enter the hydraulic oil circuit, which can cause damage to the hydraulic components. Working in harsh conditions may require frequent filter replacement.

NOTICE
This procedure must be performed with the drive motor/hydraulic motor stopped.

★Perform the procedure as follows.

1、Remove the hydraulic oil tank air filter.

2、Check the ventilation holes.

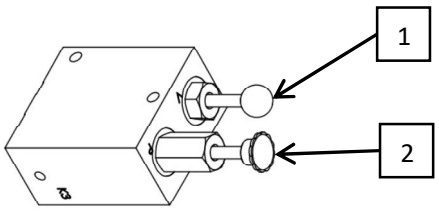
Result: The air should pass through the air filter smoothly. If cannot, the filter must be cleaned according to the following steps. Clean the air filter with a neutral solvent and blow dry with an air gun. Repeat step two.

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

B-6 Check the manual brake release function

In the event of a loss of power to the torque hub, the parking brake will engage as a safety measure. If the machine needs to be towed or pushed to a location where it can be serviced or charged, the operator will need to manually release the brake.

1. Pad the tires with wedges to prevent the machine from rolling.
2. Ensured that there are no obstructions in the passageway.
3. Locate the manual brake release valve mounted at the rear of the chassis.
4. Press the reversing valve 1, then push and pull the manual pump 2 repeatedly until it does not move.
5. Release the brake, and move the machine human power.
6. Pull out the reversing valve 1.
7. Machine can brake.



4.4 Maintenance Procedure C

C-1 Replace the air filter

The hydraulic oil tank of the machine is a ventilated tank, and the impurities in the air are filtered through the air filter inside the tank vent cover. If the air filter fails or is damaged, it may cause impurities to enter the hydraulic oil circuit, which can cause damage to the hydraulic components. Working under harsh conditions may require frequent filter replacement.

NOTICE

This procedure must be performed with the drive motor/hydraulic motor stopped.

Burn Hazard

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

★Perform the procedure as follows.

1. Unscrew the air filter on the upper part of the tank.
2. Install new air filter.
3. Clean all oil spillage during the replacement.
4. Check the filter and related components to ensure that there is no leakage.

4.5 Maintenance procedure D

D-1 Replace oil return filter

Replacing the hydraulic oil tank return filter is essential for the platform to work properly and extend its service life. A dirty or clogged filter may cause the platform to operate improperly and continued use may result in damage to hydraulic components. Particularly dirty working environments require frequent hydraulic oil changes.

Burn Hazard

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

NOTICE

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

High Pressure Hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure.

Hydraulic oil with excessive pressure may penetrate the skin.

If injured, seek immediate medical attention.

Burn hazard

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

The hydraulic oil return filter is external and located in the middle of the valve block and oil tank.

★Perform the procedure as follows.

1、Unscrew the filter with a wrench.

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

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

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

5、Manipulate the platform to lift and lower.

6、Wipe the overflowing hydraulic oil around the filter and check if there is any hydraulic oil overflowing around the filter.

D-2 Change the hydraulic oil

Inspection and replacement of hydraulic oil is critical to proper platform operation and extended service life. Dirty hydraulic oil and screens may cause the platform to operate improperly and continued use may result in damage to hydraulic system components. Particularly dirty working environments require frequent hydraulic oil changes.

NOTICE
This procedure must be performed with the scissor arm in the fully retracted position

High Pressure Hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure.

Excessive pressure of hydraulic oil may penetrate the skin.

If injured, seek immediate medical attention.

Burn hazard

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

★Perform the procedure as follows.

1、Disconnect the power, remove the ring, watch and other accessories when operating.

2、Open the side door of the fuel tank on the right side of the frame and drain the oil plug to the bottom of the tank.

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

4、Disconnect and plug the oil suction pipe with a plug.

5、Disconnect and plug the return pipe with a plug.

6、Remove the hydraulic oil tank retaining bolt and take out the tank.

7、Remove the suction filter from the tank, flush the inside of the tank with a suitable liquid, and dry it.

8、Install a new oil suction filter and screw on the oil drain plug.

9、Fit the hydraulic oil tank back to the side door of the tank and tighten the retaining bolt

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

11、Fill the tank with hydraulic oil.

12、Turn on the power switch, manipulate the platform to the highest position, observe the height of the liquid level in the tank and replenish the appropriate amount of hydraulic oil until the liquid level completely submerges the suction filter.

D-3 Check the bushings and sliding blocks

Maintaining the scissor arm mounting bushings and moving sliders is critical to the safe operation of the platform. Continued use of old bushings may lead to component damage and unsafe operating conditions. The bottom slider slides on the surface of the channel steel to form friction. Unsuitable sliders or continued use of old sliders may result in damage to the scissors, which in turn may cause property damage and personal injury or death.

NOTICE
This procedure must be performed with the scissor arm in the fully retracted position.

★Perform the procedure as follows.

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 axle of the fixed end and the installation base plate.

3、Compare the difference between the above two distances.

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

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

5、Measure the fit clearance between the shaft and the bushing with a filler gauge.

Note: Replace the bushing when the fit clearance is greater than 0.1mm or the service life is more than 10 years.

D-4 Check the key structural parts

The maintenance of critical structural components is essential to the safe operation. Use of cracked or deformed critical structural components that may result in component damage and unsafe operation.

Components	Inspection requirements
Work platform	Ensure that the platform is not deformed or broken.
Scissor	Ensure that the scissor arm assembly is not deformed or broken, and that each cushion between the scissors is not deformed or damaged.
Lifting cylinder	Ensure that there are no oil leaks from the cylinders, valve blocks or hydraulic hoses, and that the parts are not deformed, cracked or damaged. Ensure that there is no interference between cylinders and other components.
Chassis	Ensure that the chassis is not deformed or broken, and that there are no oil stains or accumulated debris. Ensure that all hardware is tight.
Pothole guard	Pothole guard cannot be pushed in from the outside when fully lowered.

5 Maintenance Procedures

- Maintenance procedures must be carried out by professionally trained and qualified personnel.
- Replace or repair damaged parts immediately and do not operate the machine with damaged parts.
- Maintain the machine properly before operating it.
- Before starting the machine:
  - Read, understand and follow the safety rules and instructions in the operation manual.
  - Read all the procedures and rules.
  - Unless otherwise specified, maintenance procedures for this machine shall be carried out in the following circumstances.
    - Place the machine on a flat, level, firm ground.
    - The platform is in the stowed position
    - Place the key switch in the OFF position and remove the key.
    - Secure all wheels.

5.1 Platform Components

5.1.1 Platform Controller Disassembly

Electrocution Hazard

Always disconnect the battery from the machine and the charger from the AC outlet before performing this procedure.
Contact with charged conductors may result in death or serious injury.

NOTICE

This procedure can only be performed when the scissors arm is fully retracted.

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

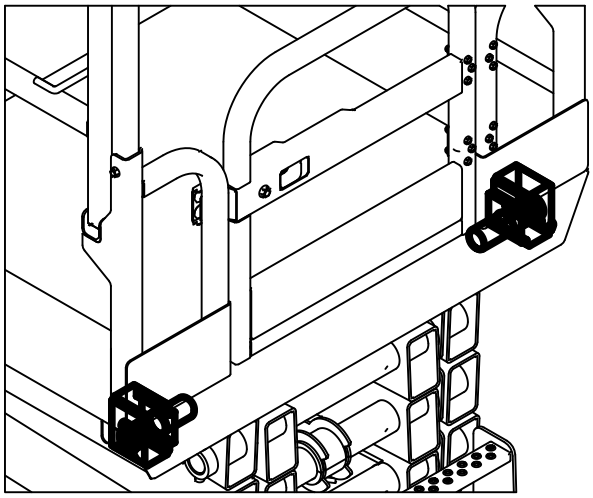
5.1.2 Platform Disassembly

1.Remove the platform control box from the platform.

2.Remove the bolts that hold the slider at the bottom of the platform at both ends of the slide.

3.Screw the bolt into the threaded hole of the slider retaining pin, then pull out the pin rod.

4.Lift the platform vertically with lifting equipment and move it to a flat place.

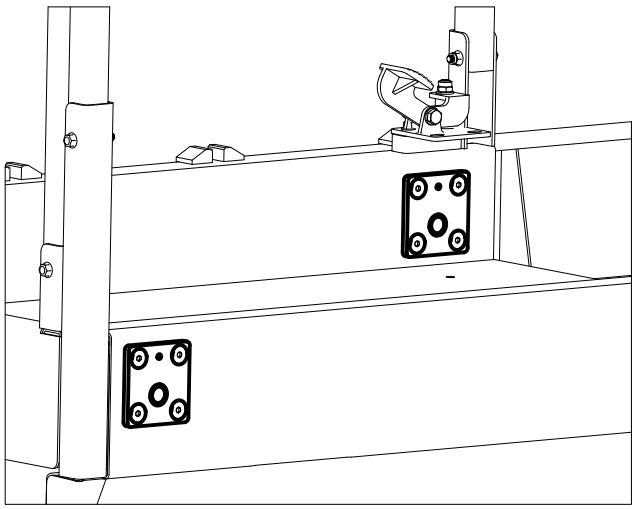


5.1.3 Mobile Platform Disassembly

1. Remove the platform from the machine.
2. Loosen each guardrail fastening bolt and remove the guardrail.
3. Loosen the bolts and pin rods on the extension platform pulley bracket.

4. Loosen the bolts and pin rods on the fixed platform pulley bracket, and remove the pulley bracket.

5. Lift the extension platform from the front and rear ends of the extension platform and remove it.



5.2 Scissor Components

5.2.1 Scissor Disassembly

NOTICE
This procedure can only be performed when the scissor is fully retracted

Crushing hazard

Keep body parts and clothing away from moving machine parts.

1.Remove the platform from the machine.

2.Disconnect the wiring and fuel lines connected to the chassis from the scissor**.**

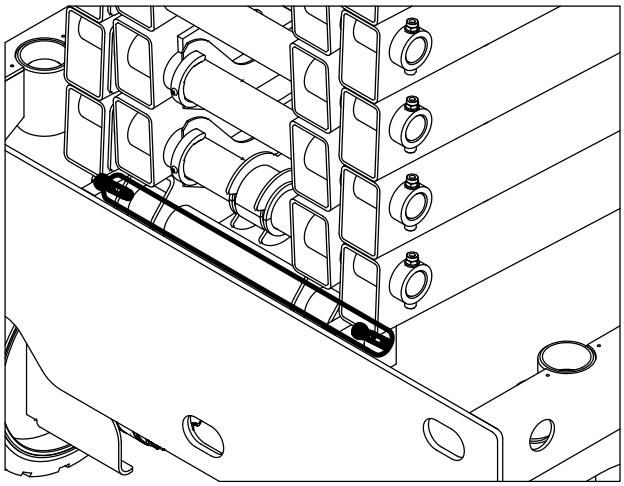
3.Secure the scissor with the lifting equipment.

4.Unscrew the bolt holding the pin rod.

5.Pull out the pin rod with an auxiliary tool.

6.Pan the lifting equipment and move the slider out of the slide.

7.Remove the scissor arm in one piece.



5.2.2 Lifting Cylinder Disassembly

NOTICE

Be careful when disassembling the cylinder to prevent damage caused by falling.

High Pressure Hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure.

Excessive pressure of hydraulic oil may penetrate the skin.

If injured, seek immediate medical attention.

Moving Object Hazard

Wear goggles when striking the brass rod with the mallet.

1.Lift the scissor arm with lifting equipment until it can hold up the maintenance arm.

2. Support the scissor frame with maintenance arm, and the lifting equipment holds the lifting cylinder to avoid falling.

3.Disconnect and plug the hoses and fittings on the lift cylinder.

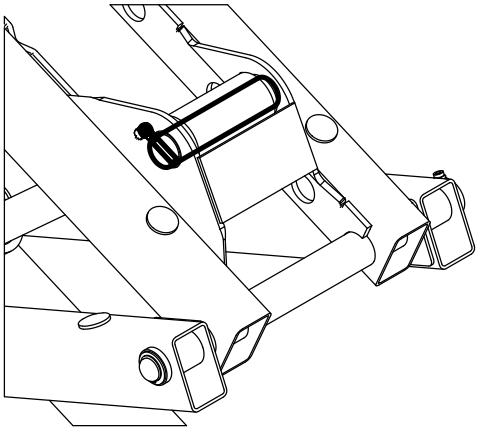
4. Loosen and remove the retaining bolt for the piston rod end pin of the lifting cylinder.

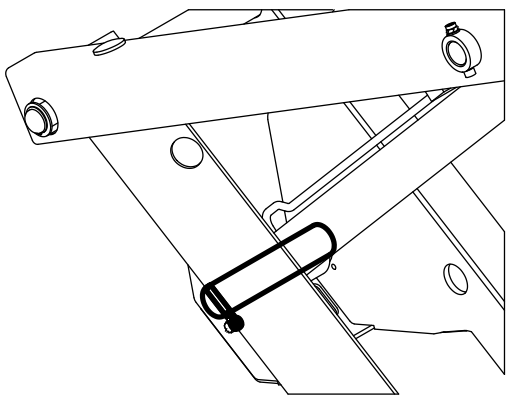
5. Hammer out and remove the piston rod end pin rod with a mallet and copper rod.

6. Loosen and remove the retaining bolt for the end pin of the lifting cylinder.

7. Hammer out and remove cylinder end pin rod with mallet and copper rod.

8. Lift the cylinder with the lifting equipment and transfer to the flat.





5.3 Chassis Components

5.3.1 Drive Motor Disassembly

The drive motor plays the role of both driving and a front wheel mounting fixation.

Before removing or installing the drive motor, secure the unit to a suitable shelf or place a jack of sufficient capacity under the frame.

NOTICE
Removed cotter pins cannot be reused and must be replaced. When installing the removed hoses and fittings, they must be tightened to the specified torque.

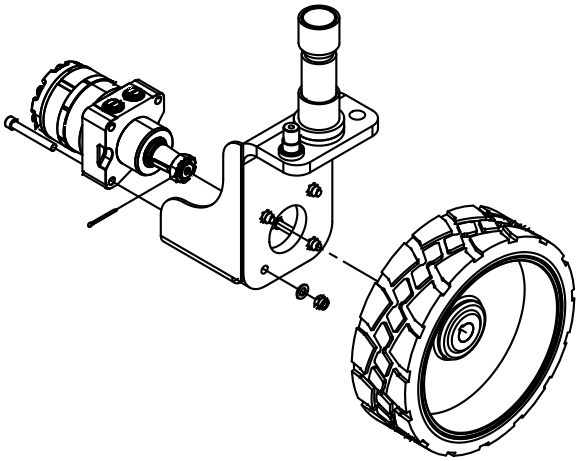
1.Remove cotter pins from front wheel motors.

2.Remove the slotted nut used to secure the tire and remove the tire mounted on the drive motor.

3.Disconnect and plug the hoses and fittings on the drive motor, and mark.

4. Remove the retaining bolt that connect the drive motor to the frame.

5. Remove the drive motor.



5.3.2 Brake Disassembly

The brake plays the role of both braking and rear wheel mounting fixation, so the equipment should be fixed on the appropriate shelf or a jack with sufficient capacity placed under the frame before removing the brake.

NOTICE
Removed cotter pins cannot be reused and must be replaced. When installing the removed hoses and fittings, they must be tightened to the specified torque.

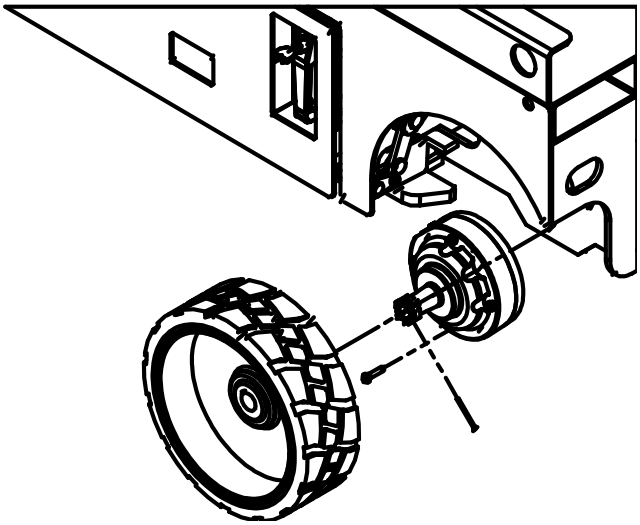
1. Remove the cotter pin from the rear wheel brake.

2. Remove the slotted nut used to secure the tire and remove the tire mounted on the brake.

3. Disconnect and plug the hose and joint on the brake, and mark.

4. Remove the retaining bolt that connect the brake to the frame.

5. Remove the brake.



5.3.3 Front Wheel Bracket Disassembly

Ensure that the lifting equipment for the chassis is of sufficient capacity and that the lifting equipment is placed in the appropriate position on the frame.

1.Remove the drive motor.

2.Remove the bolts connecting the front wheel steering pull rod.

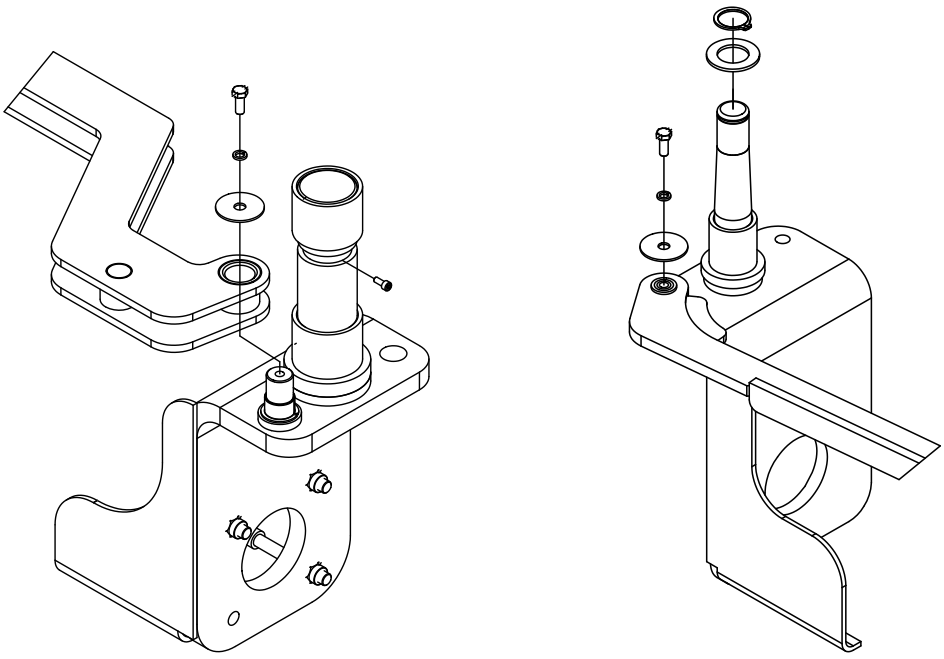
3.Remove the steering pull rod.

4.Remove the snap ring securing the front wheel bracket to the frame. （65/78XEN,80/100XENS）

5. Remove the screws securing the front wheel bracket to the frame.

（80/100/120/140/160XEN,160XENS,HS1614H）

6. Remove the front wheel bracket.



5.3.4 Steering Cylinder Disassembly

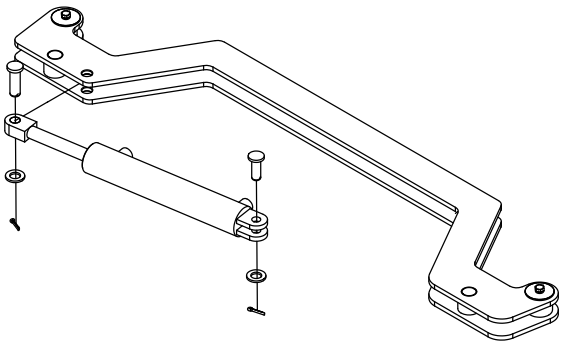
NOTICE
When installing the removed hoses and fittings, they must be tightened to the specified torque.

1.Disconnect and plug the hoses and fittings on the steering cylinder, and mark.

2.Remove the cotter pin and pin rod from the steering cylinder and the steering pull rod.

3.Remove the cotter pin and pin rod connecting the steering cylinder to the frame.

4. Remove the steering cylinder.



5.3.4 Battery Disassembly

NOTICE
Cut off the power supply of the charger and the whole machine before removing the battery.

1.Open the left battery door and locate the battery.

2.Mark and disconnect the wire connected to the battery.

3. Remove the battery with the assistance of a lifting equipment.

5.4 Hydraulic System

5.4.1 Hydraulic Pump Disassembly

NOTICE
When installing the removed hoses and fittings, they must be tightened to the specified torque.

1.Disconnect the power supply and open the right tank side door.

2.Unscrew the oil drain at the bottom of the hydraulic tank to empty the hydraulic oil.

3.Disconnect and plug the hoses and fittings on the hydraulic pump, and mark.

4. Remove the retaining bolt of the hydraulic pump and take out the pump.

5.4.2 Hydraulic Tank Disassembly

Burn Hazard

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

High Pressure Hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure.
Hydraulic oil with excessive pressure may penetrate the skin.
If injured, seek immediate medical attention.

NOTICE

When installing the removed hoses and fittings, they must be tightened to the specified torque.

1.Disconnect the power supply and open the right tank side door.

2.Unscrew the oil drain at the bottom of the hydraulic tank to empty the hydraulic oil.

3.Disconnect and plug the hose and fittings on the hydraulic tank, and mark.

4.Remove the retaining bolt at the bottom of the hydraulic tank and take out the pump.

5.4.3 Hydraulic Valve Block Disassembly

Burn hazard

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

High Pressure Hazard

Remove hydraulic components slowly to reduce hydraulic oil pressure.
Hydraulic oil with excessive pressure may penetrate the skin.
If injured, seek immediate medical attention.

NOTICE

When installing the removed hoses and fittings, they must be tightened to the specified torque.

1.Disconnect the power supply and open the right tank side door.

2.Disconnect and plug the hoses and fittings on the hydraulic valve block, and mark.

3.Remove the retaining bolt of the hydraulic valve block and take out the hydraulic valve block.

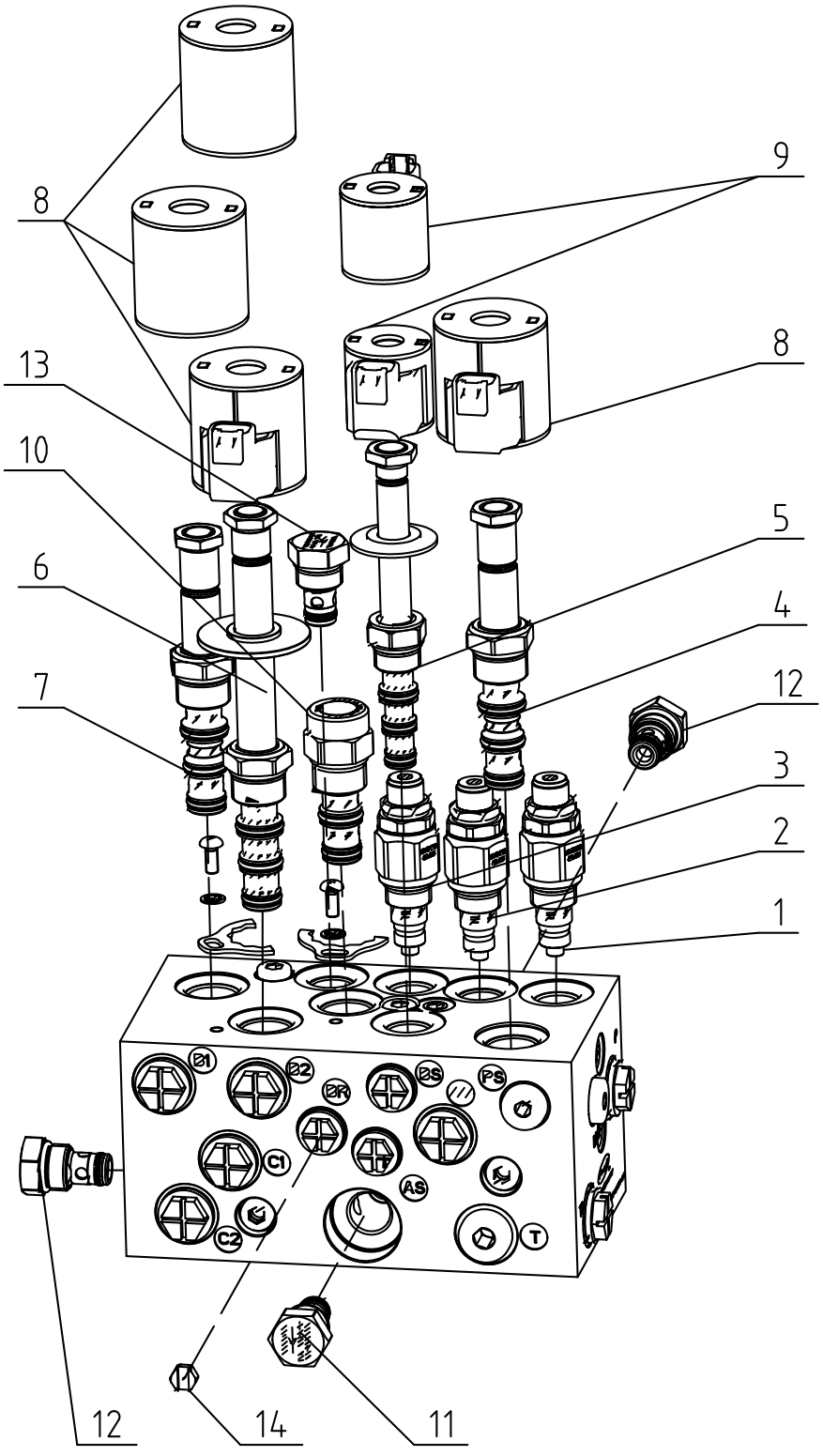
5.4.4 Valve Spool and Coil Assembly

1.Immerse the valve in clean oil and lubricate the O-ring.

2.Screw the cartridge valve in by hand until the O-ring touches the valve and torque it to the specified torque.

3.Install the valve solenoid coil on the valve rod, and install the coil nut, torque it to the specified torque.

No.	**Item**	**Function**	**Tightening torque**
1	Relief valve	System pressure limit	27 Nm
2	Relief valve	Lifting pressure limit	27 Nm
3	Relief valve	Steering pressure limit	24 Nm
4	Solenoid directional valve	Lifting and lowering control	34 Nm
5	Solenoid directional valve	Left and right steering control	34 Nm
6	Solenoid directional valve	Forward and reverse control	34 Nm
7	Solenoid directional valve	High and low speed switching	34 Nm
8	Solenoid Coil	Control valve spool	
9	Solenoid Coil	Control valve spool	
10	Flow valve	Hydraulic flow limit	
11	Check valve	Hydraulic direction restrictions	
12	Check valve	Hydraulic direction restrictions	
13	Check valve	Hydraulic direction restrictions	
14	Orifice	Hydraulic flow limit	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5.4.5 Lifting Relief Valve Adjustment

NOTICE
Ensure that the hydraulic oil in the tank is sufficient before performing this operation. Do not run the machine all the time when the oil pump has a suction void to avoid damaging the hydraulic pump.

1.Place the maximum rated load on the platform and ensure that it is properly placed.

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

3. Unscrew the nut on the end of the lifting relief valve with a wrench.

4. Toggle the lift switch on the control panel. If the platform cannot be lifted, twist the hexagonal socket at the end of the relief valve clockwise until the platform rises to the highest position.

5. Lower the platform completely.

6. Increase the weight to 1.1 times the rated load on the platform and place it properly.

7. Try to lift the platform, and if the platform lifts, twist the hexagon socket counterclockwise until the platform stops lifting.

8. Lower the platform completely and install the nut on the end of the relief valve.

9. Remove the weight from the platform.

10. Lower the platform completely and install the nut on the end of the relief valve.

5.4.6 Steering Relief Valve Adjustment

NOTICE
Ensure that the hydraulic oil in the tank is sufficient before performing this operation.

1.Connect a 0 - 40 MPa pressure gauge to the main valve pressure gauge fitting.

2.Take the platform control box 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 controls to the ON position.

3.Hold the platform controller and press the steering button to turn the tire to the right limit. position. Keep stable and note down the pressure value on the pressure gauge.

4.Hold the platform controller and press the steering button to turn the tire to the left limit position. Keep stable and note down the pressure value on the pressure gauge.

5.If the measured value does not match the specified value, perform steps 6-9.

6.Press the emergency stop button.

7. Loosen the steering relief valve nut.

8. Adjust the hexagonal sleeve on the end of the steering relief valve. Turn it clockwise to increase pressure, or counterclockwise to decrease pressure.

9. Repeat steps 3-5.

10. Loosen the steering relief valve nut and remove the pressure gauge.

5.4.7 Emergency Descent Adjustment

NOTICE

Ensure that the platform is empty before performing this operation.

Crushing Hazard

As the platform lowers, ensure that body parts are kept away from the scissor arms.

1. Lift the platform enough to support the maintenance arm.

2. Prop up the maintenance arm.

3. Lower the platform until the service arm is in contact with the scissor arms.

4. Pull out the emergency lowering puller located at the rear of the base frame.

5. Measure the distance between the handle end and the mounting nut.

6. If the measuring distance is less than or equal to 3 mm, turn to step 8; if the measuring distance is greater than 3 mm, turn to step 7.

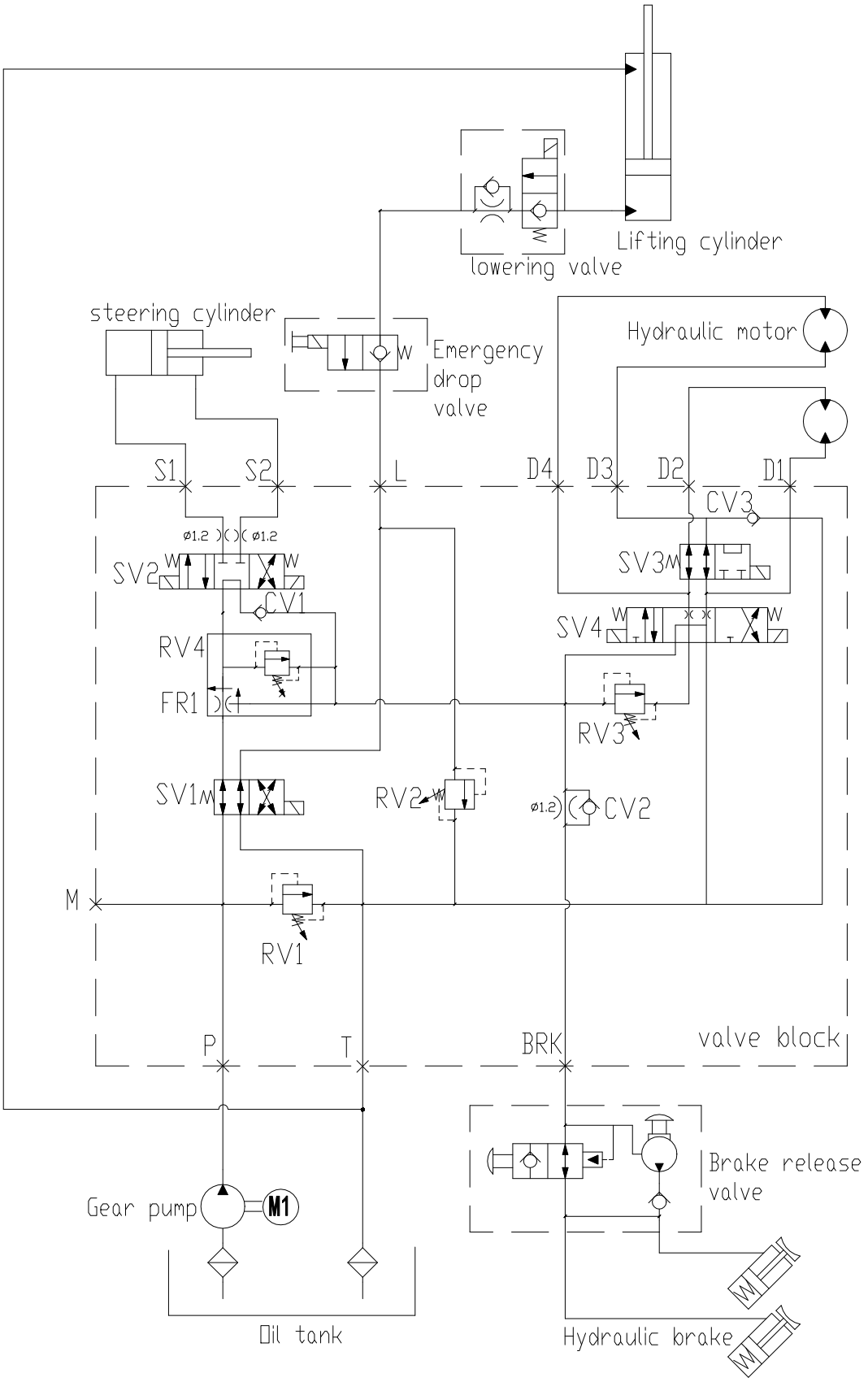
7. Adjust the mounting nut so that the distance to the mounting nut is not greater than 3 mm(0.12 in)。

8. Retract the maintenance arm.

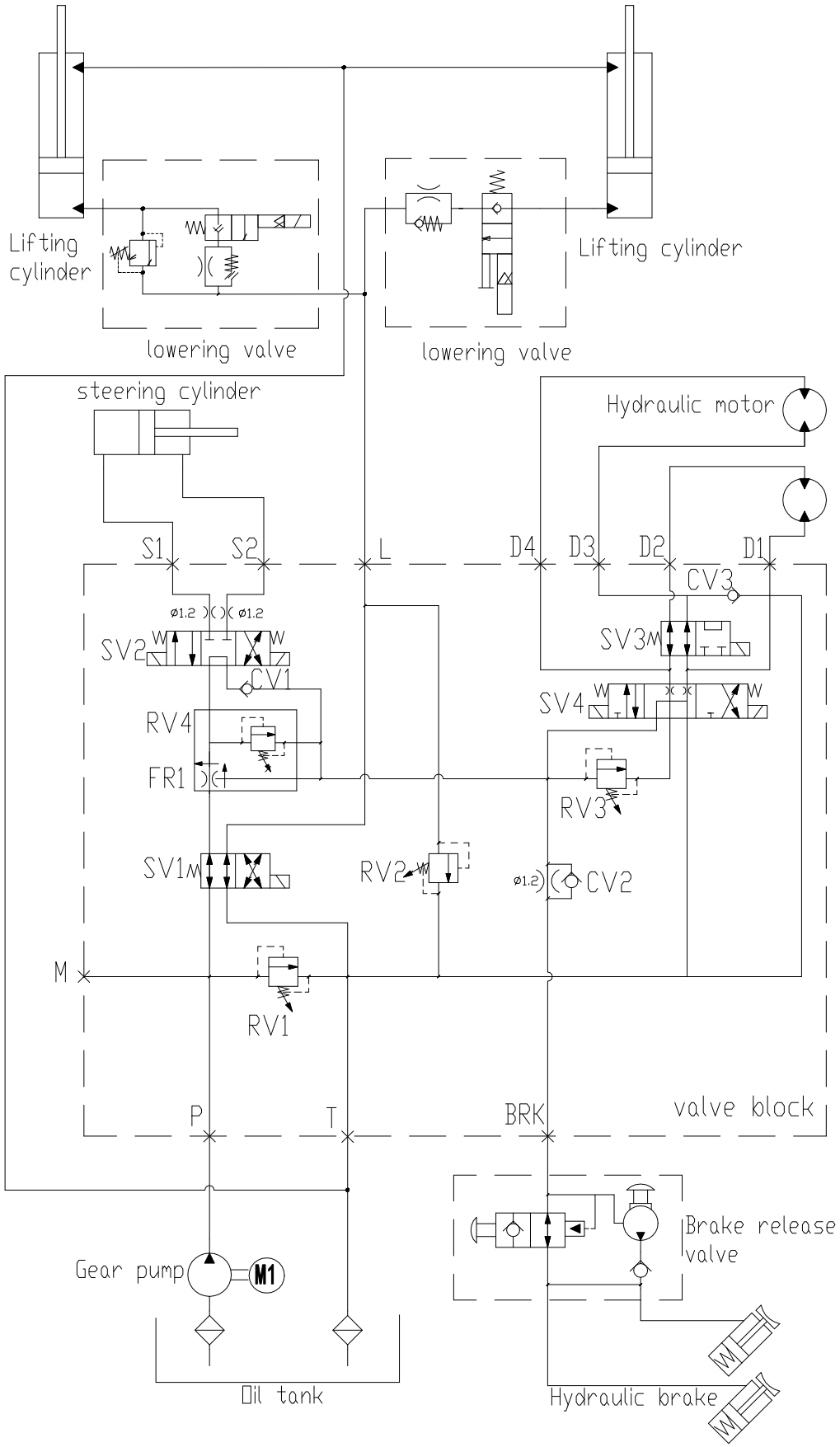
9. Pull the emergency lowering puller outward 2 to 3 times to ensure proper action.

5.4.8 Hydraulic Schematic Diagram

★65/78XEN；80/100XENS；80/100XEN Hydraulic Schematic Diagram



★120/140/160XEN,160XENS,HS1614H Hydraulic Schematic Diagram



5.4.9 Hydraulic Troubleshooting

The following table lists the possible faults of the hydraulic system, 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.

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
		Air 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
	Motor not working	Faulty solenoid valve or wrong pipeline connection	Check the solenoid valve and piping
Unable to drive and steer	Motor is working	Faulty electrical components or wiring	Check electrical components and wiring
		Insufficient steering pressure	Check and adjust the pressure with pressure gauge
	Motor not working	Faulty solenoid valve or wrong pipeline connection	Check the solenoid valve and piping
		Faulty electrical components or wiring	Check electrical components and wiring
Unstable or falling pressure		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
		Gear pump wear	Repair or replace gear pump

5.5 Electrical System

5.5.1 Fault Diagnosis

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
01	System initialization fault	All operations	ECU may fault, replace the ECU.
02	System communication fault	All operations	Check the handle wire. If normal, need to replace the ECU and the PCU.
03	Invalid mode setting fault	All operations	Set the correct machine configuration parameters.
12	Chassis lift switch is not in the middle before power on	Chassis operation	Check the wiring harness of the chassis lift switch. Check whether the switch is stuck.
18	Pothole guard fault	Lifting and driving	Check if the pothole guard plate is deployed, Check the pothole guard switch and wiring harness.
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 pressure sensor and its wiring harness. Confirm that the platform mode correct.
42	The left turn button switch of the platform handle fault before power 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	The right turn button switch of the platform handle fault before power on	Alert only	Confirm that the left turn button is released before power on. If it is released, consider replacing the handle or PCU.
46	The enable button switch of the platform handle fault before power on	Alert only	Confirm that the enable button is released before power on. If it is released, consider replacing the handle or PCU.

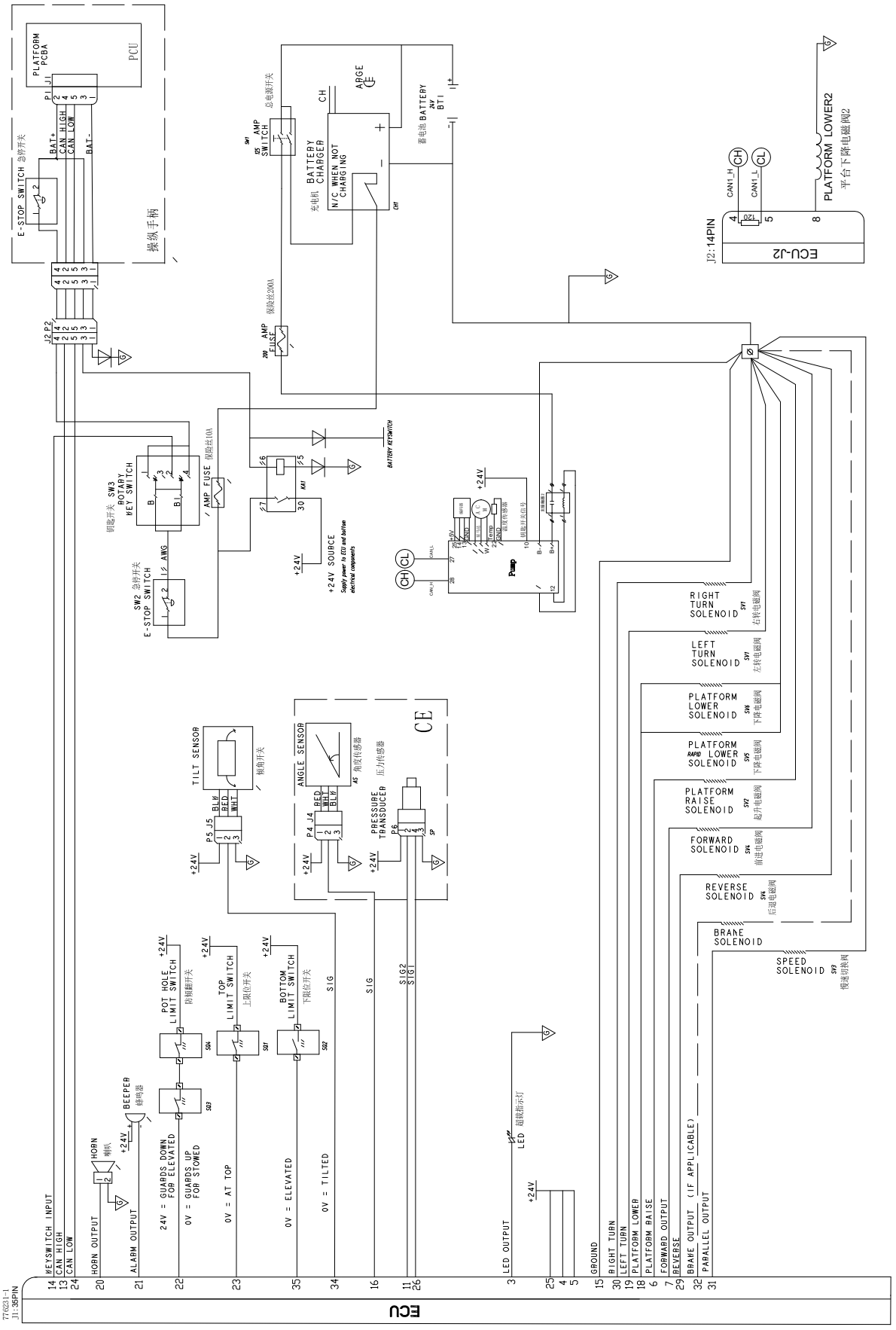
47	The handle is not in the middle before power on	Alert only	Confirm that it is in middle before power on. Check if the handle middle parameters are normal through LabView. If normal, consider replacing the handle or PCU.
52	Forward solenoid valve fault	Lifting and driving	Check whether the wire harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
53	Backward solenoid valve fault	Lifting and driving	Check whether the wire harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
54	Lifting solenoid valve fault	Lifting and driving	Check whether the wire harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
55	Lowering solenoid valve fault	Lifting and driving	Check whether the wire harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
56	Right turn solenoid valve fault	Lifting and driving	Check whether the wire harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
57	Left turn solenoid valve fault	Lifting and driving	Check whether the wire harness connected to the solenoid valve connector has been inserted tightly. If normal, check whether the solenoid valve short-circuited
68	Low voltage fault	All operations	Check the battery voltage and charge it. Check whether the battery cable is securely connected.
80	Alerts for 80% load	Alert only	Platform load close to rated weight. It is recommended not to increase the load.
90	Alerts for 90% load	Alert only	Platform load is very close to the rated weight. It is recommended not to increase the load.
99	Alerts for 99% load	Alert only	Platform load has reached the rated weight It is recommended not to increase the load.
OL	Platform overload fault	All operations	Platform overload, remove the excess weight.
LL	Tilt safety limit fault	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

Fault description	Cause analysis	Inspection measures
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 controls 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 chassis 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 the platform controller is restarted without power off after re-downloading 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 chassis control position. 2. Whether the chassis controller is restarted without power off after re-downloading the program 3. Whether the chassis 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	Lifting valve fault	1. Whether the switch input plug is inserted correctly and firmly.

lift		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 drive switch	Whether the drive 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 pothole guard	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 stage 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



6 Maintenance Record Form

Date	Maintenance contents	Personnel

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