Service Manual

T72J
Telescopic boom Mobile Elevating Work Platform

⚠WARNING
Operators and maintenance personnel must read and understand this manual before operating and maintaining this machine, otherwise it may lead to casualties! This manual shall be properly kept for reference and check by relevant personnel.

LINGONG HEAVY MACHINERY CO., LTD.

Telescopic boom Mobile Elevating Work Platform

Service Manual

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Foreword

Thanks for purchasing the products produced by Lingong Heavy Machinery Co., Ltd. This Manual introduces the technical parameters and maintenance and adjustment data of T72J straight-arm lifting platform, and explains the troubleshooting and repair process for qualified maintenance personnel.

The relevant content in this manual is correct at the time of publication. Due to continuous improvement of product structure and performance, we may change the description on design, operation and maintenance without prior notice. For the latest machine information and questions about this manual, please consult our company. At the same time, we encourage readers to give error feedback to Lingong Heavy Machinery Co., Ltd. and make suggestions for improvement. All suggestions will be carefully considered in the future publishing and printing of this manual.

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⚠ WARNING

- Only specially trained and qualified personnel can operate, repair and maintenance this machine.
- Incorrect operation, maintenance and repair are in danger and may result in personal injury or death.
- Before operating or maintaining this machine, the operator shall read this manual carefully at first. Do not operate, maintain or repair this platform without reading and understanding this manual.
- Please load the machine in strict accordance with the rated load. The user shall be responsible for any consequences caused by overload or modification without permission.
- The operation regulations and prevention provided by this manual are only applicable for the purposes intended for this machine. For operations outside the specifications but not prohibited, make sure that the operation will not cause harm to you or others.

Safety notices

Operators shall understand and abide by the current national and local safety provisions. If there are no national or local provisions, the safety instructions in this manual shall apply.

Most of the accidents are caused by failure to comply with the operation and maintenance regulations of machine. In order to avoid accidents, please read, understand and observe all warning requirements and precautions in this manual and on the machine before operation and repair. Failure to comply with the instructions and safety rules in this Manual and on the machine will result in death or serious injury.

Since it is not possible to foresee all possible dangers, the description on safety in this manual and on the machine may not include all safety precautions. If steps and actions not recommended in this manual are used, you must ensure the safety of yourself and others and prevent damage to the machine. If you are not sure about the safety of some operations, please contact our company or dealer.

Most operations require basic mechanical, hydraulic and electrical skills, and some operations require specialized skills, tools, lifting equipment and suitable workshops. In these cases, we strongly recommend that the maintenance and repair shall be carried out at the service center of the dealer authorized by Lingong Heavy Machinery Co., Ltd.

The prevention measures for maintenance and repairing given in this manual apply only when the machine is used for the specified purposes. If the machine is used for the purpose not listed in this manual, then our company will not assume any safety liability, and the safety liability in such operations shall be borne by the user and the operator.

Under no circumstances shall the operations prohibited in this manual be carried out.

The following marker words are used to identify safety information in this manual:

DANGER-indicating dangers that, if not avoided, will lead to serious injury or death. This term is also used for cases that, if not avoided, will cause serious damage to the machine.

WARNING-indicating potential dangers that, if not avoided, will cause serious injury or death. WARNING-indicating potential dangers that, if not avoided, will cause serious injury or death.

CAUTION - indicating cases that, if not avoided, may cause minor or moderate injuries. This term is also used for cases , if not avoided, may cause serious damage to the machine.

Chapter I Safety and environment

1.1 Terms and definitions

Administrator: the entity unit or individual who directly controls the use and application of the lifting platform, usually the owner, the lessor or the owner's trustee who obtains the control rights.

Operator: the personnel who have received relevant training, possess qualified knowledge and practical experience, and can manipulate lifting platform.

Qualified personnel: those have recognized academic qualifications, certificates and professional identity, or have been trained and experienced with relevant professional knowledge, can effectively prove their ability to solve difficulties met in relevant matters, works and projects.

Safety notice: safety information issued by the Lingong Heavy Machinery Co., Ltd.

1.2 Compliance

1. Maintenance procedure shall be completed by qualified personnel trained in this maintenance of the machine.

2. Immediately mark the damaged or fault machine and withdraw it out of the service.

3. Repair any faulty or damaged machine before operating it.

1.3 Before starting the repair

1. Read, understand and observe the safety rules and maintenance instructions in the corresponding operating manual on the machine.
2. Ensure that all the necessary tools and parts are ready.
3. This manual is only applicable to the machine and parts manufactured and sold by Lingong Heavy Machinery Co., Ltd.
4. Please read each step completely and carefully and follow them strictly. Try to use a shortcut to repair may cause danger.

5. Be sure to use the goggles and other PPEs when necessary.

6. When lifting or placing a load, be sure to pay attention to the potential risk of pinch injury caused by moving parts, free swinging or unstable components and parts, etc. Always wear qualified steel protective shoes.

1.4 Requirements for work site

The machine shall be able to work under the following safety conditions:

1. The environment humidity shall be less than 90%(+25 ℃).
2. The machine shall be able to work normally under the following safety conditions:

-The ambient temperature shall be -20 ℃ ~ +40 ℃;

- The wind speed shall not be greater than 12 m/s（28mph）;

- The vehicle shall never be used in corrosiveness environment with such materials as inflammable and explosive or acid and alkali.

3. During normal operation or repair, the movement of the mechanism and components and parts may cause danger to the human body, and protective device shall be set.
4. Measures shall be taken to prevent danger caused by components and parts falling on the platform.
5. When repairing, place a qualified fire extinguisher in a readily available position.
6. Keep the work site clean and tidy to prevent dirt from entering the machine and causing damage to the components and parts.
7. Please ensure that the forklift, crane or other lifting or supporting equipment are strong enough to support and stabilize the weight to be lifted.

8. During repair, please do not reuse disposal fastener (such as cotter pin and self-locking nut), so as to avoid abnormal functioning due to reuse of such parts.
9. Please dispose of the discarded fluid correctly in an environmentally friendly way.
10. Make sure the work site is well ventilated and well lit.

1.5 Maintenance and repair safety specification

1. The following precautions shall be taken before the adjustment and repair of the machine:

- Park the machine on a solid and level ground;
- Block the front and rear of the wheel to ensure that the wheel will not rotate or move;
- Cut off the power supply and ensure that the machine is in a non-start status;
- Set all control devices in the "off" status to avoid unexpected start of operating system;
- If possible, lower the platform to the lowest position, otherwise, ensure that it will not fall;
- Before loosening or removing the hydraulic component, release the hydraulic oil pressure of the hydraulic pipeline;
- Place the safety support as required.

2. Maintenance personnel training:

Maintenance personnel must be trained by qualified personnel to inspect and maintain the machine in accordance with the requirements of this manual.

3. Replacement of parts

The parts for replacement shall be genuine parts of our company, otherwise we will refuse to maintain or repair the product.

4. Service Bulletin

The machine maintenance and repair by users shall be in strict accordance with the service bulletin issued by the Lingong Heavy Machinery Co., Ltd.

5. Vehicle welding repair

1) First, shut down the engine and cut off the low-voltage power supply;
2) The worker shall have special operation certificate;
3) Clean up the surrounding flammables and apply for welding permit;
4) Protect the vehicle body to prevent splashing and fire;
5) Operate in strict accordance with the welding process;

6. Precautions of the battery maintenance

1) Battery run-out is strictly prohibited during storage. It is strictly prohibited to keep the battery in the run-out status during storage. Please charge the battery immediately after the battery runs out.
2) Correctly control the charging time. In the process of use, accurately control the charging time according to the actual situation, and control the charging frequency with reference to the usual use frequency and driving mileage.
3) Prevent exposure to the sun. Environment with too high temperature will increase the internal pressure and electrolyte loss of the battery, causing battery activity reduction and accelerating polar plate aging. Therefore, the vehicle is strictly prohibited from being exposed to the sun and should be parked in a cool place.
4) Check regularly. If there is a problem with the battery during use, please promptly go to the sales center or maintenance department of the dealer for inspection and repair. This can relatively extend the servicing life of battery pack and maximize your maintenance cost.

7. Coolant

When the radiator is overheated, it is not allowed to open the radiator cap to prevent scalding by boiling

water. Please wait until the water cools down before opening the radiator cap.

1.6 Intended purpose

This machine is only intended for lifting personnel and their tools and materials to the high-altitude work site.

1.7 Description

Most of the repair process can only be carried out by trained professional service personnel in properly equipped workshops. After the fault is eliminated, select the appropriate repair step.

Carry out the disassembly steps until the repair can be completed. Then reassemble in the order reverse to disassembly.

Maintenance and repair in authorized service center of the dealer of Lingong Heavy Machinery Co., Ltd. are strongly recommended.

Chapter II Product introduction

2.1 Machine parameters

T72J(T2218J0WND4AH2000) Machine performance parameters

Item	Parameter/description	Item		Parameter/description
Rated load	300kg/6611bs	Rotary table rotation time per cycle (stowed) (s)		78-86
	2 persons +140 kg/3091 bs object	Rotary table rotation time per cycle (extended) (s)		125-165
Limited load	450kg/9921bs	Boom lifting time (s)		60-70
	3 people+210 kg/463 Lbs object	Boom lowering time (s)		60-70
Total weight (kg/bs)	12300/27117	Boom extension time (s)		65-75
Max. working height (m/ft)	23.8/78	Boom retraction time (s)		60-70
Max. platform height (m/ft)	21.8/71.5	Jib lifting time (s)		40-50
Max. horizontal extension (m/ft)	17.5/57.4	Jib lowering time (s)		20-35
Max. travel speed (stowed) (km/h/mph)	4.8±0.25/3±0.25	Platform slewing time (s)		13-26
Max. travel speed (extended)(km/h/mph)	0.8±0.05/0.5±0.05	Maximum allowable inclination of chassis	Along boom frame	4.5°
Climbing speed (stowed)(km/h/mph)	1.2≤v≤1.5/0.7≤v≤0.9		Boom frame orthogonal	4.5°
Climbing speed (extended)(km/h/mph)	0.3≤v≤0.8/0.2≤v≤0.5	Max. operation effort (N)		400
Min. turning radius (inner wheel)(m/ft)	2.5/8.1	Maximum allowable wind speed (m/s/mph)		12.5/28
Min. turning radius (outer wheel)(m/ft)	5.5/17.8	Drive type		4WD
Theoretical maximum gradeability (no-load, stowed)	45%			Front axle steering
Max. braking distance (no-load, stowed)(m/ft)	1≤s≤1.5/3.3≤s≤4.9			

Main dimensions

Item	Parameter/description	Item	Parameter/description
Overall length (mm/in)	10600/417	Wheelbase (mm/in)	2510/99
Overall width (mm/in)	2490/98	Track width (mm/in)	2130/84
Overall height (mm/in)	2790/110	Minimum ground clearance (middle) (mm/in)	395/15.5
Working platform dimension (length × width) (mm/in)	2440×900/96×35	Tire spec.	355/55D 625

Engine system

Item	Parameter/description	Item	Parameter/description
Model	D2.9L4	Rated speed (r/min)	2600
Displacement (ml)	2900	Maximum torque (N·m)	147/1600rpm
Rated power (kW)	36.4	Emission standard	EPA Tier 4F

Engine fuel usage environment

Ambient temperature	#0 diesel fuel at ambient temperature ≥ 4 ℃	Ambient temperature	-10# diesel fuel at ambient temperature ≥-5 ℃
Ambient temperature	-20# diesel fuel at ambient temperature ≥-14 ℃	Ambient temperature	#-35 diesel fuel at ambient temperature ≥-29 ℃

Transmission system

Item		Parameter/description
Walking reducer	Rated output torque (N •	3390

	m)	
	Gear ratio	57.49：1
Slewing reducer	Rated output torque (N • m)	1690
	Gear ratio	36.13：1

Hydraulic system

Item			Parameter/description
Walking system	Type		Closed system
	Pump displacement (ml/r)		46
	Max. working pressure (MPa/psi)		28/4061
	Motor displacement (ml/r)		38
Functional system	Type		Open system
	Pump displacement (ml/r)		28
	Lifting system	Max. working pressure (MPa/psi)	23/3336
	Slewing system	Max. working pressure (MPa/psi)	23/3336
		Motor displacement (ml/r)	60
	Steering system	Max. working pressure (MPa/psi)	23/3336
Floating system	Type		/
	Pump displacement (ml/r)		/
	Max. working pressure (MPa/psi)		/

Electrical system

Item		Parameter/description
Battery	Output voltage (V)	12
	Capacity (Ah)	120 (20-hour discharge rate)
Control system	Voltage (V)	12

Filling volume of fluids

Item	Parameter/description	Item	Parameter/description
Hydraulic oil (L/gal_US)	180/47.5	Engine oil (L/gal_US)	8.5/2.2
Walking reducer gear oil (L/gal_US)	0.68×4/0.18×4	Engine antifreeze (L/gal_US)	7.7/2.0
Slewing gearbox gear oil (L/gal_US)	0.45/0.12	Fuel tank capacity (L/gal_US)	100/26.4

Table 1: Tightening torque of metric-threaded and imperial-threaded fittings and plugs (unit: N•m)

Tightening torque of metric-threaded oil port					Tightening torque of the imperial threaded oil port				
Pipe diameter	Thread specification (mm)	Joint type		Plug	Pipe diameter	Thread specification (Inch)	Joint type		Plug
		Type E	Type F	VSTI-E			Type E	Type F	VSTI-ED
6L	M10X1.0	27	22	16	6L	G1/8A	22	16	16
8L	M12X1.5	37	32	27	8L	G1/4A	37	32	32
10L	M14X1.5	58	48	37	10L	G1/4A	37	32	/
12L	M16X1.5	75	58	58	12L	G3/8A	75	58	63
15L	M18X1.5	95	75	70	15L	G1/2A	120	95	85
18L	M22X1.5	140	115	95	18L	G1/2A	120	95	/
22L	M28X2.0	190	160	140	22L	G3/4A	190	160	140
28L	M33X2.0	325	220	235	28L	G1A	325	220	210
35L	M42X2.0	470	295	380	35L	G11/4A	470	315	470
42L	M48X2.0	565	380	/	42L	G11/4A	565	380	470
6s	M12X1.5	42	37	/	6s	G1/4A	42	37	/
8s	M14X1.5	53	48	/	8s	G1/4A	42	37	/
10s	M16X1.5	75	58	/	10s	G3/8A	85	63	/
12s	M18X1.5	95	75	/	12s	G3/8A	85	63	/
14s	M20X1.5	130	85	/	14s	G1/2A	120	95	/

16s	M22X1.5	140	105	/	16s	G1/2A	120	95	/
20s	M27X2.0	190	180	/	20s	G3/4A	190	160	/
25s	M33X2.0	325	325	/	25s	G1A	325	220	/
30s	M42X2.0	470	345	/	30s	G11/4A	470	315	/
38s	M48X2.0	565	440	/	38s	G11/2A	565	380	/

Table 2:Tightening torque of UN-threaded fittings and plugs (unit: N•m)

Product series	Thread UN/UNF	Non-adjustable assembly torque N•m	Non-adjustable assembly torque N•m
EO-L	7/16-20 UN(F)	23	18
	1/2-20 UN(F)	28	28
	9/16-18 UN(F)	34	34
	3/4-16 UN(F)	60	55
	7/8-14 UN(F)	115	80
	1-1/16-12 UN(F)	140	100
	1-5/16-12 UN(F)	210	150
	1-5/8-12 UN(F)	290	290
	1-7/8-12 UN(F)	325	325
EO-S	7/16-20 UN(F)	20	20
	1/2-20 UN(F)	40	40
	9/16-18 UN(F)	46	46
	3/4-16 UN(F)	80	80
	7/8-14 UN(F)	135	135
	1-1/16-12 UN(F)	185	185
	1-5/16-12 UN(F)	270	270
	1-5/16-12 UN(F)	270	270
	1-5/8-12 UN(F)	340	340
	1-7/8-12 UN(F)	415	415

Note:

1) Table 1 includes the metric thread fitting and Imperial threaded fitting, and table 2 includes the un-threaded fitting; a +10％ error is allowed for torque value;

2) The torque values in Table 1 and Table 2 are determined based on the condition that the connected part is made of steel. The tightening torque for connected part made of aluminum is to be determined according to the 60% of values in Table 2 and Table 3. The value is to be rounded off to the integer position after calculation.

3) For Parker joint, torque value shall be selected according to the name and specification, and for common joint, torque value shall be selected according to the thread specification.

Example:

1) GE 28 L M ED OMD A3 C: GE represents straight joint, 28 represents pipe diameter, L represents common pressure, M represents metric thread, ED represents E-type elastic seal, OMD represents unavailability of nut ferrule, and A3 C represents galvanized surface; According to the 28L M ED, the torque value can be selected from Table 1, i.e. 325 N•m

2) GE O 22L R 3/4 OMDA3C : O represents the F-type O-ring, R represents the inch thread form, and 3/4 represents the thread specification G3/4; According to O 22L R3/4, the torque value can be selected from Table 2, i.e. 160 N•m;

3) GE O 20 S R OMDCF: S indicates the heavy pressure type, and the torque value selected according to O 20 S R is: 160 N•m;

2.2 Specification and tightening torque of nuts and bolts

Table 3: Tightening torque of metric-threaded nuts (Unit: N•m)

Pipe diameter	Thread specification	Tightening torque	Pipe diameter	Thread specification	Tightening torque N·m
06L	M12X1.5	16	06s	M14X1.5	27

08L	M14X1.5	22	08s	M16X1.5	42
10L	M16X1.5	32	10s	M18X1.5	53
12L	M18X1.5	42	12s	M20X1.5	63
15L	M22X1.5	58	14s	M22X1.5	80
18L	M26X1.5	90	16s	M24X1.5	85
22L	M30X2	115	20s	M30X2	125
28L	M36X2	135	25s	M36X2	180
35L	M45X2	220	30s	M45X2	260
42L	M52X2	345	38s	M52X2	370

Note:

1) Al error of + 10% is allowed for the torque in Table 2;

2) The torque value in Table 3 is determined according to the fact that the connected part is made of steel. The tightening torque of connected part made of aluminum is to be determined according to 60% of values in Table 1. After calculation, the value is to be rounded off to the integer position.

3) For Parker hose, right-angle fitting and tee fitting, the torque value should be selected according to name and spec., and for common hose, right-angle fitting and tee fitting, the torque value should be selected according to thread specification.

Example:

1) F481 CACF 2815 16: F481 represents the form of buckling and rubber hose, CACF represents the form of joint at both ends, CA represents the 24 ° cone O-type seal ring rotation nut, CF represents the 90 ° elbow of 24 ° cone O-type seal ring rotation nut , and 2815 represents the connection spec. of joint at both ends of the rubber hose. Based on this, the torque is selected: the torque at the 28 end is 135 N • m, and the torque at the 15 end is 58 N • m;

2) F412 SN CACF 1210 06: SN stands for heavy pressure hose, the torque at end 12 is 63N•m, and the torque at end 10 is 53N•m;

3) EW15 LOMDA3 C: EW indicates right-angle combined joint, and the torque value selected from table 1 according to 15 L is 32 N•m.

Table 4: Tightening torque of ordinary bolts (unit: N•m)

Bolt strength grade	Yield strength N/MM2	Nominal diameter of bolt mm				
		6	8	10	12	14
		Tightening torque N·m				
4.6	240	4～5	10～12	20～25	36～45	55～70
5.6	300	5～7	12～15	25～32	45～55	70～90
6.8	480	7～9	17～23	33～45	58～78	93～124
8.8	640	9～12	22～30	45～59	78～104	124～165
10.9	900	13～16	30～36	65～78	110～130	180～210
12.9	1080	16～21	38～51	75～100	131～175	209～278
Bolt strength grade	Yield strength N/MM2	Nominal diameter of bolt mm				
		16	18	20	22	24
		Tightening torque N·m				
4.6	240	90～110	120～150	170～210	230～290	300～377
5.6	300	110～140	150～190	210～270	290～350	370～450
6.8	480	145～193	199～264	282～376	384～512	488～650
8.8	640	193～257	264～354	376～502	521～683	651～868
10.9	900	280～330	380～450	540～650	740～880	940～1120
12.9	1080	326～434	448～597	635～847	864～1152	1098～1464
Bolt strength grade	Yield strength N/MM2	Nominal diameter of bolt mm				
		27	30	33	36	39
		Tightening torque N·m				
4.6	240	450～530	540～680	670～880	900～1100	928～1237
5.6	300	550～700	680～850	825～1100	1120～1400	1160～1546
6.8	480	714～952	969～1293	1319～1759	1694～2259	1559～2079
8.8	640	952～1269	1293～1723	1759～2345	2259～3012	2923～3898
10.9	900	1400～1650	1700～2000	2473～3298	2800～3350	4111～5481
12.9	1080	1606～2142	2181～2908	2968～3958	3812～5082	4933～6577

Chapter III Service

3.1 Description

1) Maintenance procedure shall be completed by qualified personnel trained in this maintenance of the machine.
2) Mark damaged or faulty machines and withdraw them out of the service.
3) Repair any damage and fault on the machine before operation.

Before starting the repair:

1) Read, understand and observe the safety rules and maintenance instructions in the corresponding operating manual on the machine.
2) Ensure that all the necessary tools and parts are ready.
3) This manual is only applicable to the machine and parts manufactured and sold by Lingong Heavy Machinery Co., Ltd.
4) Please read each step completely and carefully and follow them strictly. Try to use a shortcut to repair may cause danger.

Machine status:

Unless otherwise specified, carry out each repair step for the machine under the following configuration:

1) Park the machine on a solid and level ground;
2) When the key is removed, the ignition switch is in the OFF position;
3) Ensure that the red emergency stop buttons on GCU and PCU are in OFF position
4) Block the front and rear of the wheel to ensure that the wheel will not rotate or move;
5) Ensure that all external AC power supply are disconnected from the machine;
6) Ensure that the boom is in stowed state;
7) Verify that the rotary table is fixed and non-rotatable.

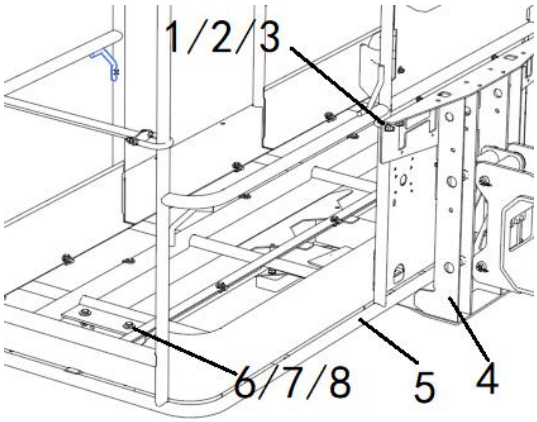
Note:

Most of the repair process can only be carried out by trained professional service personnel in properly equipped workshops. After the fault is eliminated, select the appropriate repair step. Carry out the disassembly steps until the repair can be completed. Then reassemble in the order reverse to disassembly.

Maintenance and repair in authorized service center of the dealer of Lingong Heavy Machinery Co., Ltd. are strongly recommended.

3.2 Platform component

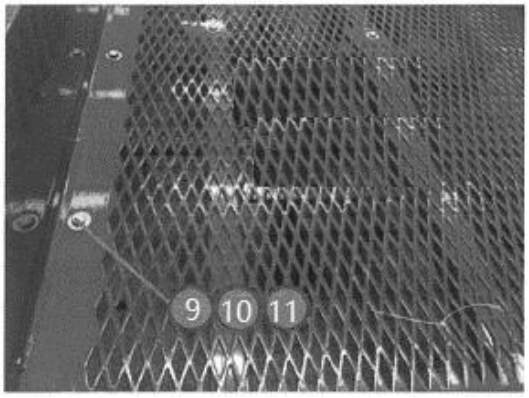
3.2.1 Assembly of platform assembly



1. U-bolt 2. Washer 3. Nut 4. Platform support

5. Platform frame assembly 6. Bolt 7. Washer 8. Nut

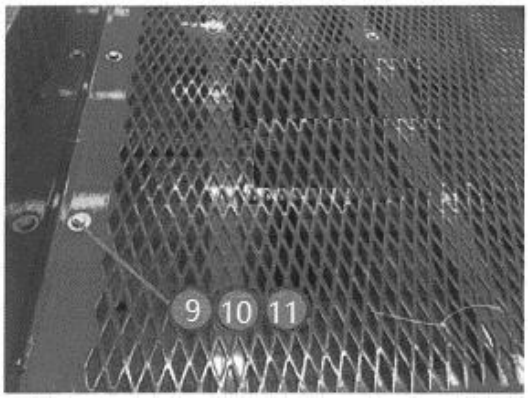
1) Hoist and place part 5 on part 4, and fix part 5 to part 4 with parts 6 (from top to bottom) / 7 / 8.
2) Secure part 5 to the part 4 with part 1/2/3.



9. Bolt 10. Washer 11. Reed nut

3) Finally, fix the bottom plate assembly with part 9/10 (for both the bolt end and the nut end)/11 to the part 5.

3.2.2 Removal of platform assembly



9. Bolt 10. Washer 11. Reed nut

1) Raise the boom frame slightly and place the support cushion block under the working platform;

2) Lower the boom frame until the working platform rests on a cushion block sufficient to withstand its weight;

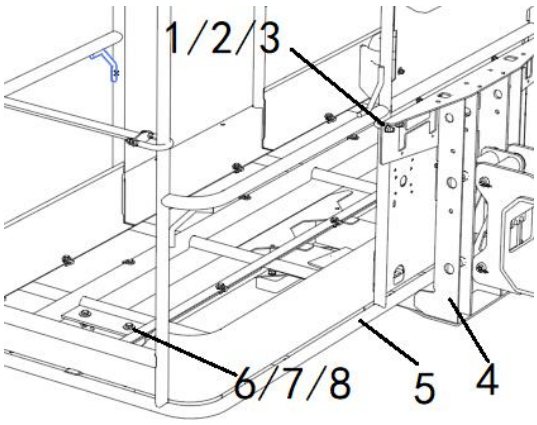
CAUTION: do not drop the entire arm rod on the cushion block.

3) Stop the machine and disconnect the harness and pipeline;

⚠WARNING: risk of personal injury

The sprayed hydraulic oil will penetrate and burn the skin, so the hydraulic connectors shall be loosened very slowly so that the oil pressure will gradually release. Do not allow oil to spray.

4) Remove fastener 9/10/11 from the working platform and take out the bottom plate assembly;



1. U-bolt 2. Washer 3. Nut 4. Platform support

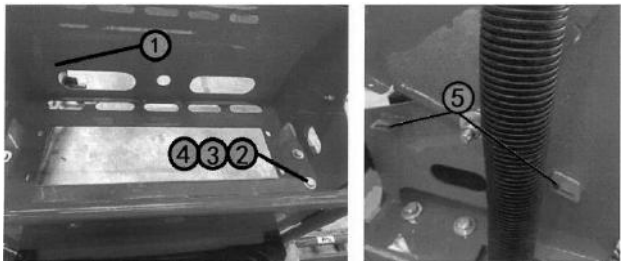
5. Platform frame assembly 6. Bolt 7. Washer 8. Nut

5) Remove fastener 1/2/3/6/7/8 from part 5, hoist part 5 from the platform support and place it in the designated area.

⚠WARNING: risk of crushing

If not hoisted correctly, the platform assembly may become out of balance and fall off.

3.2.3 Assembly of protective mount



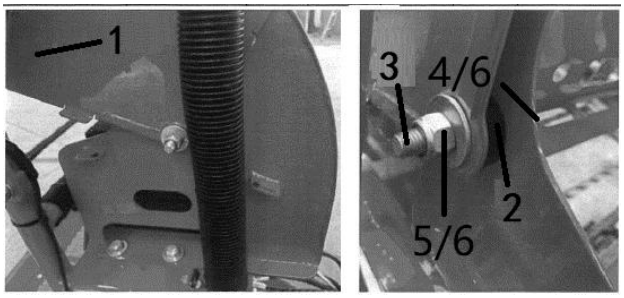
1. Protective mount 2. Bolt 3. Washer 4. Nut 5. Foot pad

1) Install part 1 with parts 2 (from top to bottom) 3/4 to the installation position of the PCU box of the platform frame assembly.

CAUTION: the opening of protective mounting seat shall face the inner side of the platform frame.

2) Install part 5 into the lug plate mounting hole on both sides of the protective mount.

3.2.4 Assembly of arc-shaped protective cover



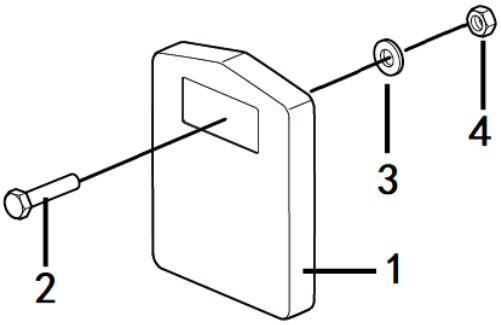
1. Arc-shaped protective cover 2. Spacer bush 3. Stud

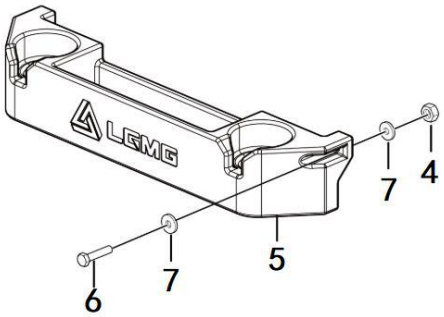
4. Washer 5. Washer 6. Nut

1) Press fit part 2 into the mounting hole of part 1 and connect part 1 to the protective mount with part 3, fasten the inner side with part 4/6 and the outer side with part 5/6.

CAUTION: the arc-shaped protective cover shall face the inside of the platform frame; Turn the arc-shaped protective cover after installation, ensuring that it rotates smoothly without stuttering.

3.2.5 Assembly of file box and tool box





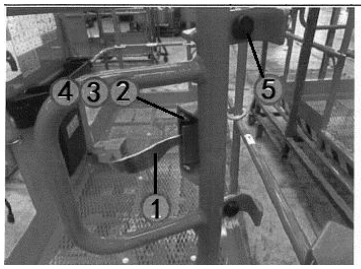
1. File box 2. Bolt 3. Washer 4. Nut

5. Platform tool kit 6. Screw 7. Washer

1) Open the cover of part 1, and assemble part 1 with part 2 (from inside out) /3/4 to the platform framework;

2) Assemble part 5 to the platform framework with part 6/7/4.

3.2.6 Assembly of door lock



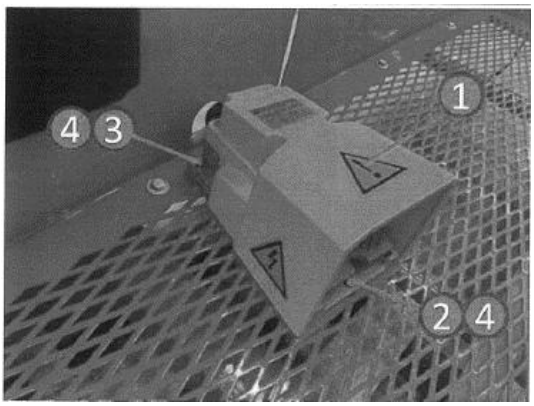
1. Rotating door lock for platform 2. Bolt 3. Washer

4. Nut 5. Three-panel door anti-collision pad 6. Dome seal plug

1) Assemble the part 1 with the parts 2/3/ onto the rotating door; Assemble the part 5 to the rotating door and the part 6 to the exposed end of the round tube on the rotating door side of the platform framework.

CAUTION: when installing the rotating door lock of the rotating door, it is required to adjust the hinge position so that the rotating door lock can be locked normally and the door latch and platform framework do not interfere with each other.

3.2.7 Assembly of foot switch



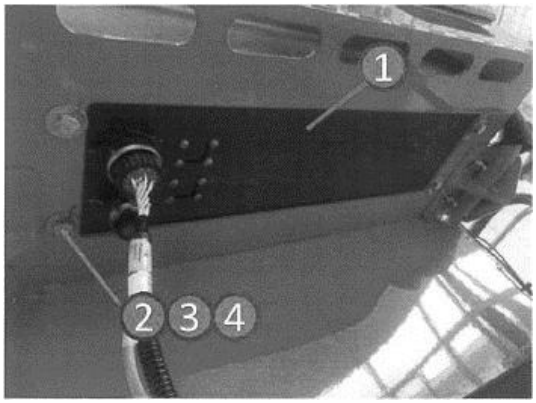
1. Foot switch 2. Screw 3. Screw 4. Washer

1) Assemble part 1 with part 2/3/4 to the assembling position on the bottom of the platform framework and tighten the screw.

Tightening torque of part 2/3: 4 N•m

CAUTION: Pay attention during assembly that different models use different foot switches.

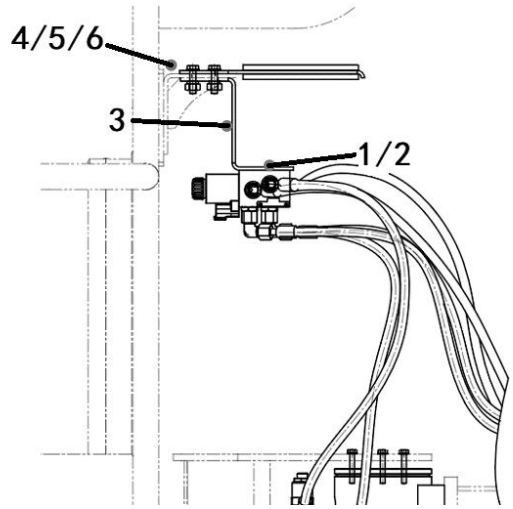
3.2.8 Assembly of PCU



1. Platform control system assembly 2. Bolt 3. Washer 4. Nut

1) Install part 1 with parts 2 (from bottom to top)/3/4 onto the platform framework and tighten it.

3.2.9 Assembly of platform valve block



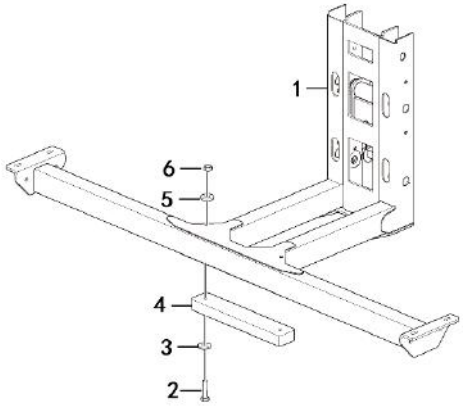
1. Screw 2. Nut 3. Curved plate

4. Bolt 5. Washer 6. Nut

1) Fix part 3 to the platform with part 4/5/6;

2) Fix platform valve block by using part 1/2 to part 3

3.2.10 Assembly of buffer rubber mount

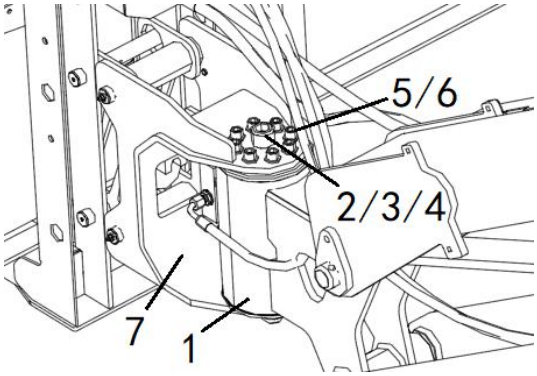


1. Platform support 2. Screw 3. Washer

4. Buffer rubber mount 5. Washer 6. Nut

1) Assemble part 4 to the assembly position of part 1 with part 2 (from bottom to top) /3/5/6.

3.2.11 Assembly of platform support



1. Saddle swing cylinder 2. Screw 3. Washer 4. Nut 5. Screw

6. Washer 7. Platform support

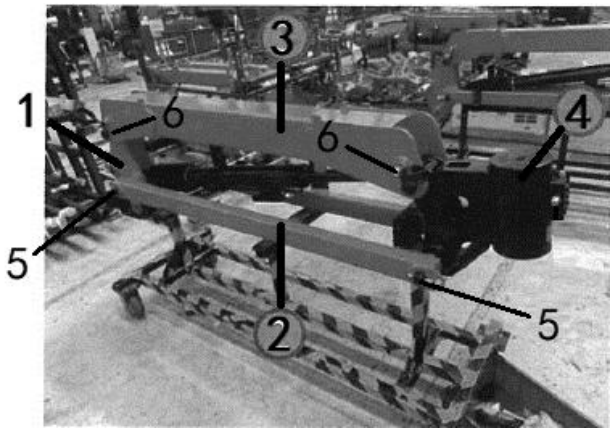
1) Lift platform support to the swing cylinder assembly, pass the part 2 through the platform support 7 and the swing cylinder (part 1), and screw the part 2/4 manually;

2) Adjust the platform so that it is perpendicular to the fly jib, and symmetrically tighten part 5 (coated with adhesive)/6 diagonally after the adjustment is completed;

3) Apply the adhesive to part 2, tighten it to specified torque, and then tighten part 5 to specified torque as well.

3.3 Jib assembly

3.3.1 Assembly of jib structural parts



1. Jib tail assembly 2. Lower link 3. Upper link

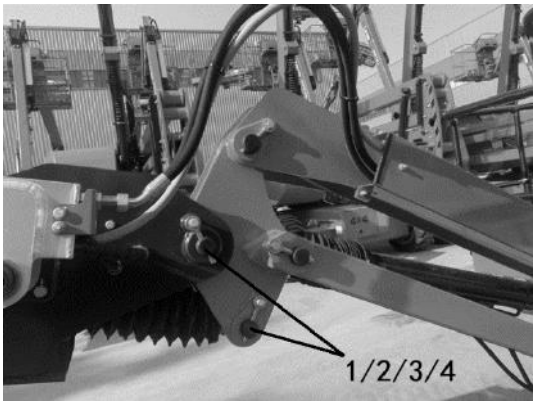
4. Saddle swing cylinder 5. Pin 6. Pin

1) Hoist part 1/2/3/4 to the jib subassembly tooling as shown.

2) Connect part 1/2/3/4 with part 5/6.

Note: Do not tighten the shaft first, instead, tighten it after the installation of fly jib cylinder.

3.3.2 Lowering and assembly of jib



1. Pin 2. Pin 3. Bolt 4. Washer

1) Hoist the subassembled jib to the mounting position on the boom frame, then connect the jib to the boom frame with parts 1/2/3/4

Note: boom frame pin is on the left side of the machine.

2) Extend the upper leveling cylinder and connect the jib with the upper leveling cylinder with parts 1/2/3/4.

3.3.3 Removal of jib

CAUTION: carry out this step when the boom is in the stowed position.

CAUTION:

When removing the hose assembly or the joint, always replace the O-ring at the joint end or the hose end (if equipped). All connections must be tightened to the specified torque during installation. See lifting platform specification for selection of tightening torque.

1) Disconnect the PCU harness.
2) Mark, disconnect and plug all hydraulic hoses on the platform valve block. Plug the joint on the hose.
3) Mark, disconnect and plug the hydraulic hose connected to the swing cylinder. Plug joint on hose and swing cylinder.

WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

4) Remove the pin fastener of saddle swing cylinder, use soft metal hammer to knock out the pin connecting the upper/lower link with the saddle swing cylinder, and lift the platform to the designated position.
5) Remove the hose and cable sleeve from the side of the fly jib.
6) Remove the hose and cable clamps from the fly jib pivot and place the removed cable hose to one side.

WARNING: Danger of component damage

Damage may occur if hoses and cables are kinked or squeezed.

7) Mark, disconnect and plug the hydraulic hose of fly jib cylinder. Cover the joint on the cylinder.

WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

8) Attach the sling from the overhead crane to the jib assembly.
10) Place the cushion block under the upper leveling cylinder for support. Protect the cylinder rod from damage.
11) Remove the pin fastener from the connecting rod end of the upper leveling cylinder and use the soft metal hammer to knock out the pin.

WARNING: risk of crushing

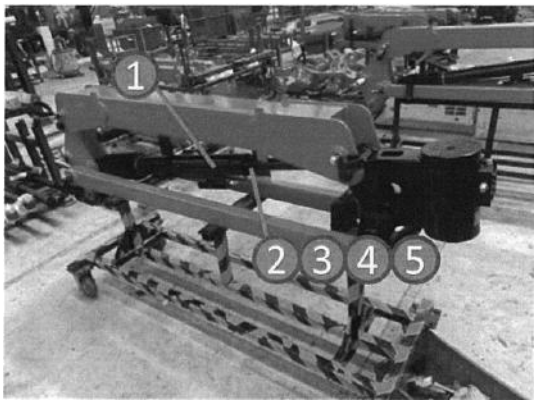
If nor properly supported by the crane, the fly jib may drop when the pin is removed from the upper leveling cylinder connecting rod end.

12) Remove the pin fastener securing the fly jib tail to the boom frame.
13) Use the soft metal hammer to remove the pin and be careful when removing the fly jib assembly from the boom.

WARNING: risk of crushing

If the crane does not support the fly jib properly, it may fall off due to loss of unbalance when being removed from the machine.

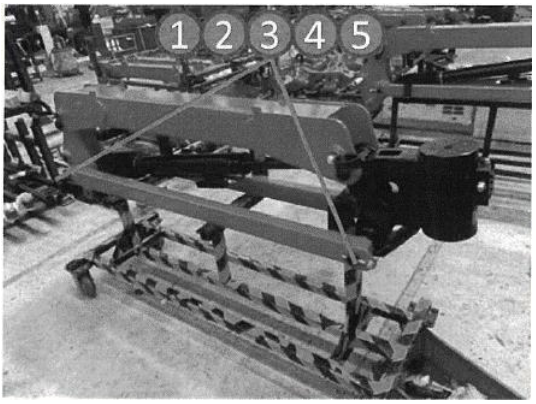
3.3.4 Fly jib cylinder assembly



1. Fly jib cylinder 2. Fly jib balance valve 3. Joint 4. Bolt 5.M6 hard gasket

1) Assemble part 2 onto part 1, and during installation, pay attention that oil port of valve block shall face left, and fasten it with part 4/5.

2) Remove the attached plugs at ports V1 and V2 of the balance valve, install part 3 to 2 ports, and tighten to the specified torque.



1. Pin 2. Pin 3. Bolt 4. Washer 5 Nut

3) Use part 1 to connect the fly jib cylinder rod end, jib tail assembly and lower link, and fix part 2/3/4/5;

4) Assemble the jib cylinder barrel end using part 1 together with the upper link and saddle swing cylinder and secure with part 2/3/4/5.

3.3.5 Removal of the fly jib cylinder

⚠CAUTION:

1. Carry out this step when the boom is stowed.

2. When the hose assembly or joint is removed, the O-rings of the joint and hose end must be replaced (if any). All connections must be tightened to the specified torque during installation. See lifting platform specification for selection of tightening torque.

1) Lift the jib slightly and place the cushion block under the platform installation weldment. Then lower the boom pole until the platform stops on the cushion block so that the cushion block is just about to support the platform.

2) Mark, disconnect and plug hydraulic hose of fly jib cylinder. Plug the joint on the cylinder.

⚠WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

3) Remove the fastener of fixing pin from the cylinder mounting shaft at the connecting rod end of fly jib cylinder and do not remove the cylinder mounting shaft.

4) Knock the shaft at fly jib cylinder connecting rod end out with a copper hammer by half. Then lower one of the lower link to the ground. Tap the shaft towards the other direction and lower the other lower link. Do not remove the cylinder mounting shaft.

5) Support the fly jib cylinder with a suitable lifting device.

6) Remove the pin fastener from the pivot at fly jib cylinder barrel end. Use the copper hammer to remove the shaft at piston cylinder end and let the cylinder hang down.

⚠WARNING: risk of crushing

If not properly supported, it may fall due to imbalance when removed from the machine.

7) Attach the sling from the overhead crane to the fly jib cylinder rod end.

8) Use the copper hammer to knock out the cylinder mounting shaft at the connecting rod end of fly jib cylinder. Remove the fly jib cylinder from the machine.

⚠WARNING: risk of crushing

If not properly lifted by the crane, it may fall due to the imbalance when being removed from the machine.

3.3.6 Removal of saddle swing cylinder

⚠CAUTION:

1. Carry out this step when the boom is in the stowed position.

2. When the hose assembly or joint is removed, the O-rings of the joint and hose end must be replaced (if any). All connections must be tightened to the specified torque during installation. See the lifting platform specification for selection of tightening torque.

1) Disconnect the electric connector for the PCU installed on the platform bracket.

2) Mark, disconnect and plug all hydraulic hoses on the platform valve block. Plug the joint on the hose.

3) Mark, disconnect and plug the hydraulic hose connected to the swing cylinder. Plug joint on hose and swing cylinder.

⚠WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

4) Remove the platform assembly.

5) Attach the sling from the overhead crane to the swing cylinder for support.

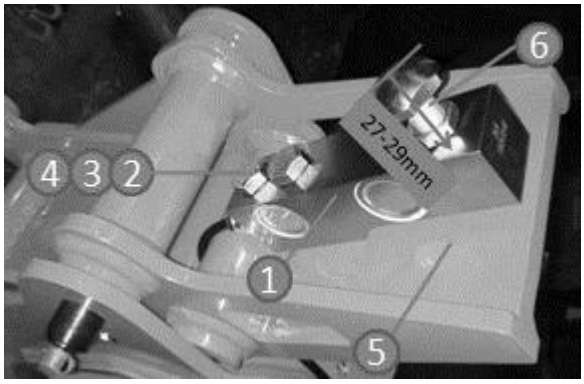
6) Remove the fastener connecting the saddle cylinder to the fly jib upper link and lower link.

⚠WARNING: risk of crushing

If not well supported by the crane, the swing cylinder may fall due to imbalance when being removed from the fly jib head connecting plate.

7) Slowly remove the saddle cylinder and clean up the spilled hydraulic oil.

3.3.7 Assembly of load cell

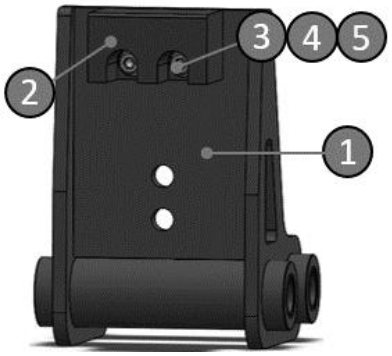


1. Load cell 2. Bolt 3. Washer 4. Nut

5. Triangular bracket assembly 6. Tumbler adjusting foot

1) Install part 1 to part 5 with part 2/3 (nut end)/4, then install part 6 to part 1, with the farthest end of part 6 27-29 mm from the load cell surface, and use the nut on part 6 to fasten part 6 on the load cell.

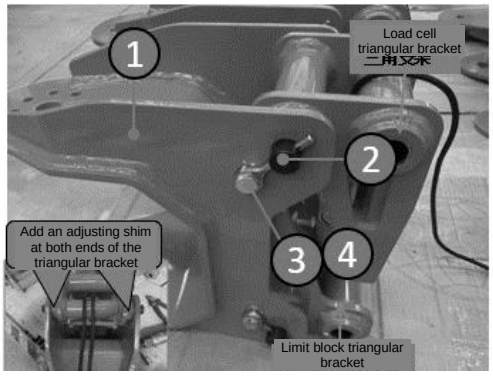
3.3.8 Limit block assembly



1. Triangular bracket assembly 2. Limit plate 3. Screw 4. Washer 5. Nut

1) Assemble part 2 to part 1 with part 3/4/5.

3.3.9 Assembly of swing motor mounting bracket



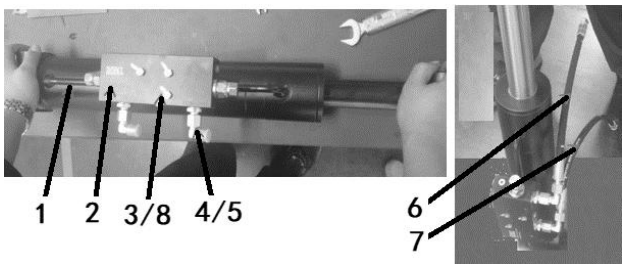
1. Swing motor mounting bracket 2. Transition bracket pin

3. Pin 4. Bolt 5. Adjusting shim

1) Assemble the subassembled triangular

bracket to part 1 using parts 2 (with pin hole facing left) /3/4, adjust the clearance between the triangular bracket and the swing motor mounting bracket with part 5, and add an adjusting shim at both ends of the triangular bracket.

3.3.10 Assembly of upper leveling cylinder



1. Upper leveling cylinder 2. Leveling balance valve 3. Bolt 4. Straight joint

5. Right-angle fitting 6. Hose 7. Hose 8. Washer

1) Remove the guard plate at the installation position of valve block (part 1) and wipe the contact surface of valve block with the wool-free paper;

2) Remove the outer package of part 2, check whether the O-ring is intact or reliable, and pre-tighten part 2 to the valve block (part 1) installation point with part 3; Tighten part 3 diagonally to the specified torque;

3) Remove the protective plug of part 2 and the protective cap of part 4, fasten part 4 to part 3 to the specified torque;

4) In the same way, adjust the angle of the part 5 as shown in the figure, and fasten the part 5 to the part 4 to specified torque;

5) Fasten part 6 and part 7 to the part 5 as shown in the figure to specified torque;

6) Extend the boom until the cylinder mounting shaft at barrel end of upper leveling cylinder is accessible.

7) Install the upper leveling cylinder barrel end to the boom frame and fix it with a retainer ring.

8) Connect the upper leveling cylinder connecting rod end to the jib. Refer to "Lowering and assembly of jib".

3.3.11 Removal of upper leveling cylinder

⚠ CAUTION:

1. Before removing the cylinder, do bleeding to the upper leveling cylinder to ensure there is no air in the closed circuit.

2. When removing hose assembly or joint, O-ring of the joint and hose end (if equipped) must be replaced. All connections must be tightened to the specified torque during installation. See the lifting platform specification for selection of tightening torque.

1) Extend the boom until the cylinder mounting shaft at barrel end of upper leveling cylinder is accessible.

2) Lift the boom slightly and place the cushion block under the platform for support.

3) Lower the boom until the platform rests on the cushion block of the supporting platform.

⚠ CAUTION: Do not concentrate all the weight of the boom on the cushion block.

4) Remove the securing fastener from the pivot at the connecting rod end of upper leveling cylinder. Knock out the cylinder mounting shaft at the connecting rod end with a soft metal hammer.

⚠ WARNING: risk of crushing

If not properly supported, the fly jib may drop during the removal of the cylinder mounting shaft at connecting rod end of slave cylinder.

5) Remove the retainer ring from the pivot pin at barrel end.

6) Knock the pin at barrel end out with a soft metal hammer.

7) Pull the cylinder out of the boom carefully until it touches the hydraulic hose.

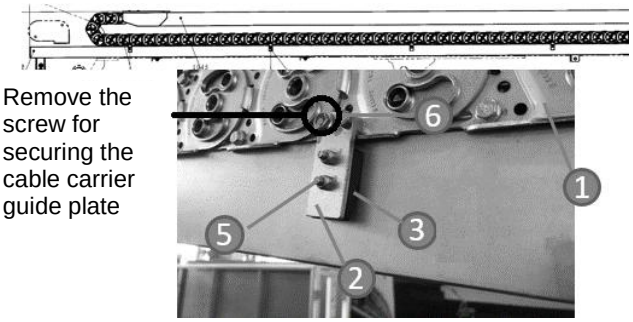
8) Mark, disconnect and plug the hydraulic hose on the upper leveling cylinder. Cover the joint on the cylinder.

⚠ WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

3.4 Cable carrier assembly

3.4.1 Assembly of cable carrier



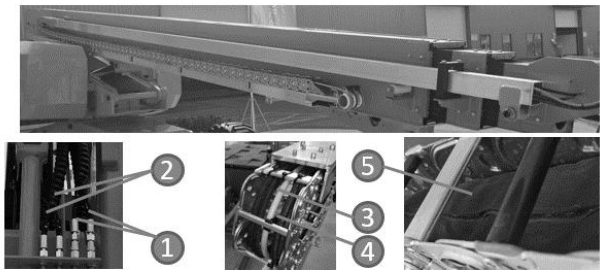
Remove the screw for securing the cable carrier guide plate

1. Cable carrier assembly 2. Cable carrier guide block mounting plate 3. Cable carrier guide block

5. Screw 6. Screw

1) Install part 3 (chamfer downward) onto part 2 with part 5, then remove the screw from part 1 as shown, and fix the subassembled guide block assembly with the screw and the bolt removed from part 1.

Note: the cable carrier guide plate is symmetrical to the cable carrier assembly.



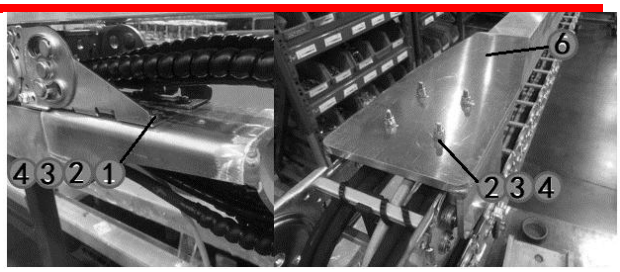
1. Hose 2. Hose 3. PCU connecting line

4. Platform power line 5. Felt lined nylon webbing

2) Insert part 5 into the cable carrier and lay it flat on the bottom of the cable carrier, 70-110 mm away from the front end (lower wiring beam) of the cable carrier; The reinforcement strap is located on the outside. After the pipeline arrangement is completed, paste the part 5 firmly.

3) Insert part 1/2/3/4 into the lower wiring beam, cable carrier and upper wiring beam in sequence. The reserved length of part 1/2 is 1200 mm, and that of part 3 is 2800 mm.

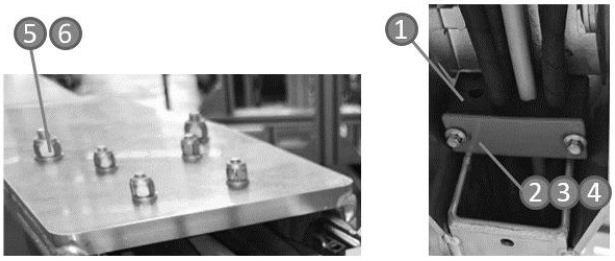
Note: please set the pipelines in sequence during the pipeline arrangement, and never make them cross.



1. Bolt 2. Washer 3. Washer 4. Nut

5. Bolt 6. Upper wiring beam assembly

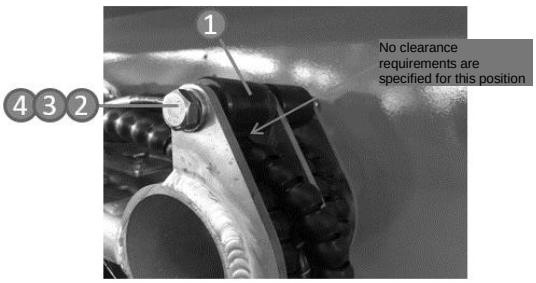
4) Install the cable carrier assembly with part 1 (from top to bottom)/2 (nut end)/3 (bolt end)/4 to the lower wiring beam assembly; Install the other end of the cable carrier assembly the same way to the upper wiring beam assembly.



1. Cable carrier pipe clamp 2. Cable carrier pipe clamp plate 3. Clamp plate

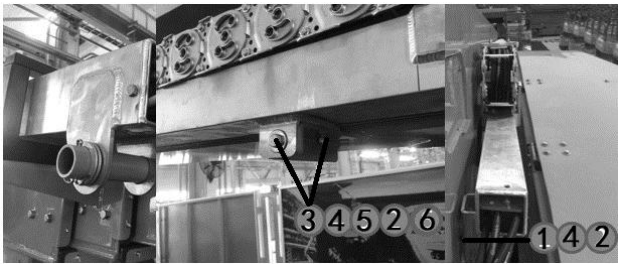
4. Bolt 5. Nut 6. Washer

5) Clip each pipeline of the cable carrier into part 1 in sequence, then use part 4 to fix parts 3/2/1 from bottom to top in sequence, and fasten it to the upper wiring beam with part 5.



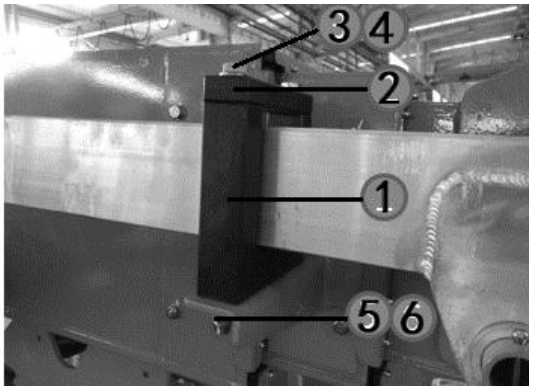
1. Nylon pipe 2. Bolt 3. Washer 4. Nut

6) Install part 1 with part 2 (from outside to inside) /3/4 on the lower wiring beam. Affected by PVC, there is no clearance requirement on the upper side.



1. Bolt 2. Nut 3. Bolt 4. Washer 5. Washer 6. Nut

7) After passing one end of the subassembled cable carrier from the platform through the upper wiring beam support, fasten it to the lower wiring beam mounting plate of the basic boom with part 3 (from outside to inside, from top to bottom) / 4 (bolt end) / 5 (nut end) / 6, and fasten the tail end of the cable carrier to the installation position at the front end of the basic boom (front end of the machine) with part 1 (passing from outside to inside) / 4 (for both bolt and nut ends) / 2.



1. Guide block 2. Guide closure plate 3. Bolt 4. Washer

5. Washer 6. Nut

8) Fix the end of cable carrier close to the platform with part 1/2, then fix the guide block together with the guide closure plate with part 3 (from top to bottom)/4 (bolt end)/5 (nut end)/6, and connect the two oil pipes in the cable carrier to the bulkhead fitting of basic boom plate according to the oil pipe mark.

3.4.2 Removal of cable carrier

Lay the boom cable carrier guide harness and hose along the boom. The cable carrier can be repaired section by section without removing the harness and hose that pass through the cable carrier. Only when the major repair involving the boom removal is carried out, the entire cable carrier needs to be removed.

⚠ CAUTION:

When removing the hose assembly or the joint, always replace the O-ring at the joint end or the hose end (if equipped). All connections must be tightened to the specified torque during installation. See lifting platform specification for selection of tightening torque.

1) Set the cable position from the cable carrier to the PCU box. Number each cable and its entrance position in the PCU box.

2) Disconnect the cable from the bottom of the PCU box.

3) Remove the hose and the cable clamp from the platform support and the fly jib.

4) Mark, disconnect and plug the hydraulic hose of the upper leveling cylinder on the side bulkhead fitting of main jib. Cover the bulkhead fitting.

⚠ WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the hydraulic fitting connection very slowly to gradually reduce the oil pressure, and do not let the fluid spout or spray.

5) Mark, disconnect, and plug hydraulic hose on balance valve's "V1" and "V2" ports of the swing cylinder. Cover the joint on the hose.

⚠ WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

6) Remove the hose and cable cover from the side of the fly jib.

7) Place all cables under the boom at pivot end entering the cable carrier.

8) Mark and disconnect the electrical connectors of all cables entering the cable carrier.

9) Remove the securing fastener from the connector of the cable entering the cable carrier.

10) Pull the cable and the joint out of the main jib carefully.

11) Mark, disconnect and plug all hydraulic hoses entering the cable carrier on the bulkhead fitting at the pivot end of boom.

⚠ WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to

squirt or spray.

12) Pull the hydraulic hose out of the main jib. Remove cotter pin from upper cable carrier of platform end of boom

CAUTION: Always replace the cotter pin with a new one.

13) Remove the cable carrier tube guide rail fastener from the cable carrier guide rail at the platform end of boom. Remove cable guide rail from the boom.

14) Place cushion block between the upper and lower cable carriers and fix the upper/lower rail together.

WARNING: risk of crushing

If the upper and lower cable carrier are not properly secured together, the cable carrier may become unbalanced and fall when removed from the machine.

15) Connect the sling from the overhead crane to the cable carrier.

16) Remove the fastener securing the lower cable carrier to the boom.

17) Remove the cable carrier carefully from the machine and place it on the structure capable of supporting it.

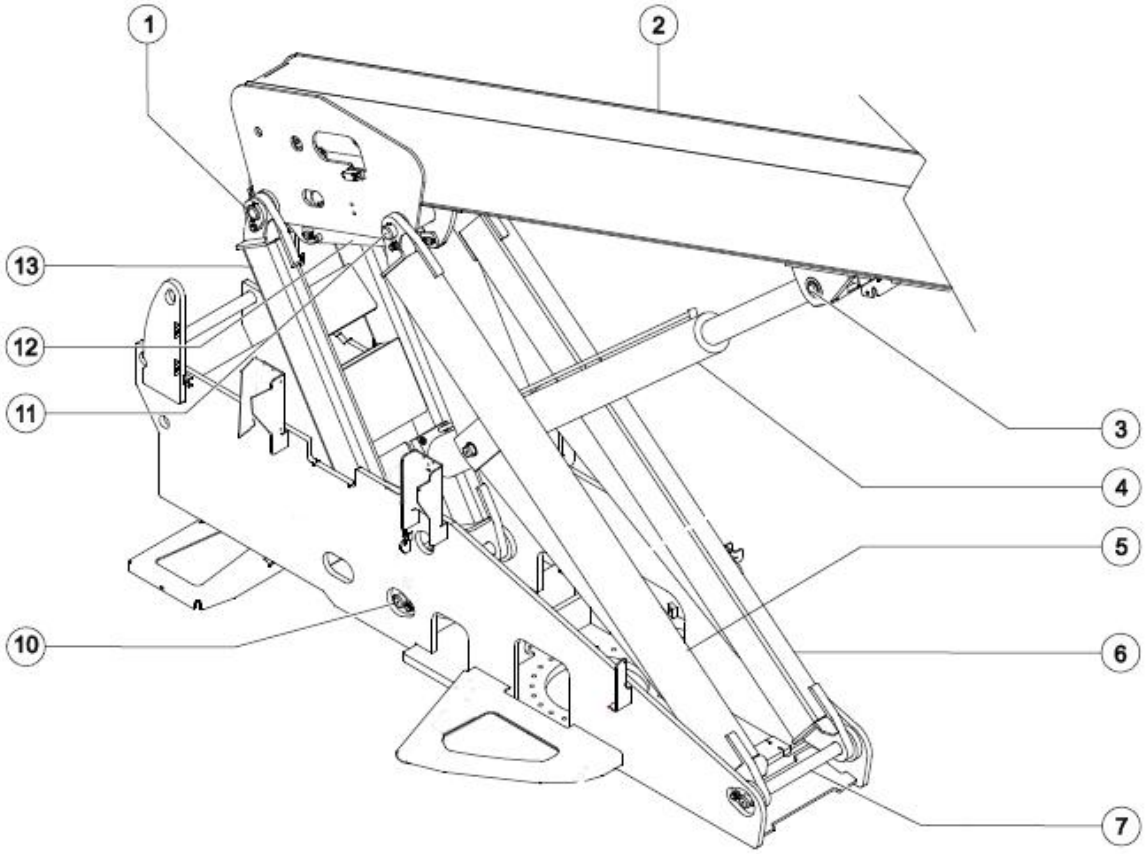
WARNING: risk of crushing

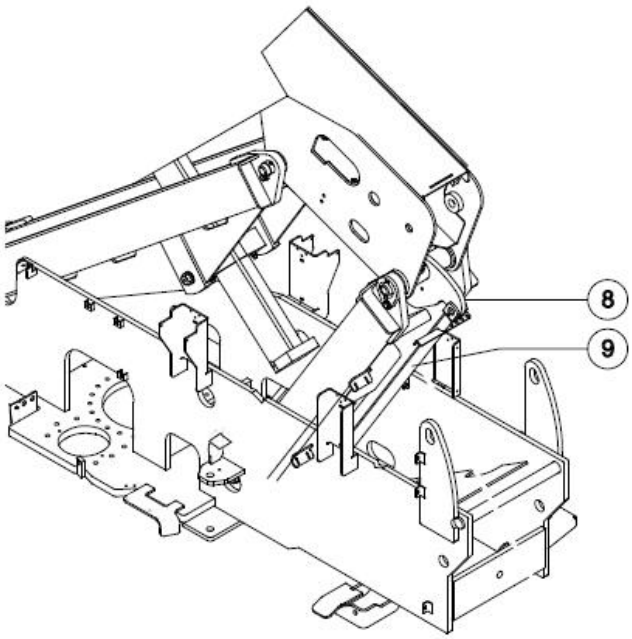
If it is not properly connected to the overhead crane, the cable carrier may become out of balance and fall.

CAUTION: Danger of component damage

Cable harness and hose may be damaged if twisted or squeezed. If the cable carrier of boom is twisted, it may be damaged.

3.5 Boom frame assembly





Boom frame assembly

1) Lower link assembly to boom pivot
2) Boom frame assembly
3) Pivot at connecting rod end of luffing cylinder
4) Luffing cylinder
5) Upper link assembly (GCU side)
6) Upper link assembly (engine side)
7) Upper link assembly to rotary table pivot
8) Leveling bracket assembly
9) Leveling link
10) Lower link assembly to rotary table pivot
11) Upper link assembly to boom pivot
12) Lower leveling cylinder

3.5.1 Assembly of boom frame

1) Use two slings to hoist the basic boom assembly to the straight arm subassembly trolley.

Be careful during hoisting.

2) Remove the outer package of the retracting rope arranger assembly, and thread the cylindrical head end of the retracting rope arranger assembly into the boom frame from the square hole at the lower side of the rear end of the basic boom until it passes out of the boom; Apply FUCHS grease to the rope surface. Adjust the length of the rope and tie the retracting rope assembly together with strap to prevent them from entering the boom during extension.

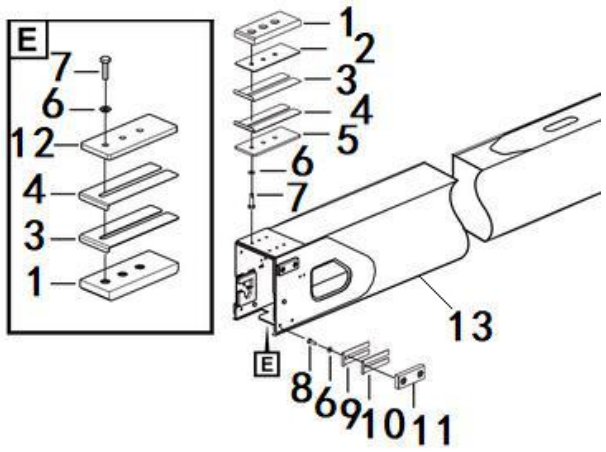
Note: 1. Before assembly of basic boom, 1st boom section and 2nd boom section, please measure the width of each component and act according to SOP.

2. Before assembly of basic boom, 1st boom section and 2nd boom section, please apply grease evenly in the slider slideway of the inner cavity and outer wall according to SOP.

⚠ WARNING: risk of crushing

Keep the lifting rope horizontal during hoisting. Never place any part of the body under the hoisted weight during hoist. If the lifting rope is damaged, replace it in time.

Tools: straight arm subassembly trolley, sling 3 t×4 m



1. Slider 180-19.5 2. Slider adjusting cushion plate 3 mm

3. Slider pad 76-180-1 4. Slider pad 76-180-2

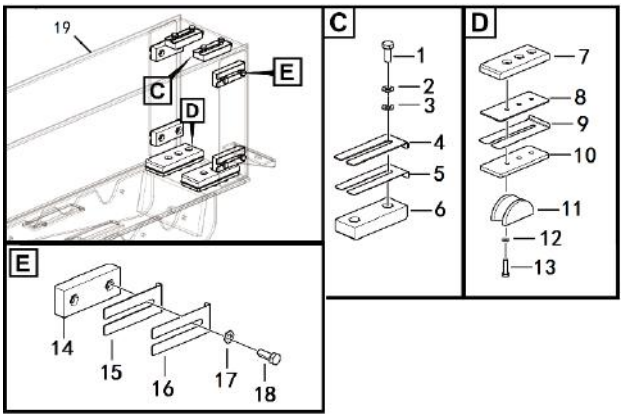
5. Slider adjusting cushion block 6 mm 6. Washer 7. Bolt 8. Bolt

9. Washer 10. Slider pad 40-1 11. Slider pad 40-2

12. Adjustment cushion block 13. 1st boom section

3) Apply adhesive to the head of part 7, and fasten part 1/3/4/12 to the bottom mounting hole of the front end of part 13 with part 6/7;

4) Use two slings to hoist the part 13 to the rear end of the basic boom, with the front end of the part 13 slightly lower and the rear end slightly higher; Adjust the position of part 13, push it into the inside of the basic boom from rear to front along the horizontal direction;



1. Bolt 2. Washer 3. Washer 4. Slider pad 40-2

5. Slider pad 40-1 6. Slider 40-30 7. Slider 180-19.5

8. Slider pad 76-180-1 9. Slider adjusting cushion plate 3 mm

10. Adjustment cushion block 11. Rope stopper 12. Washer 13. Bolt

14. Slider 40-23 15. Slider pad 40-2 16. Slider pad 40-1

17. Washer 18. Bolt 19. Basic boom assembly

5) Apply adhesive to the head of part 13, and pre-tighten parts 7/8/9/10/11 to the bottom mounting holes of the rear end inner cavity of the basic boom assembly with bolt; Apply molybdenum disulphide grease evenly with the brush on the slider surface.

6) Lower the sling, adjust the sling position to the rear end of the part 13, lift it again, keep the rear end slightly tilted, and push it into the basic boom from the rear to the front along the horizontal direction, and remove the sling.

7) At the rear end of the 1st boom section, adjust the 1st boom section position to be located in the center of the basic boom,

insert the slider from the gap, evenly coat the molybdenum disulfide grease on the surface of the slider using brush, and pre-tighten the parts 14/15/16 to the mounting hole son the side of inner cavity of the rear end of the basic boom assembly with part 18; Pre-tighten part 4/5/6 to the inner cavity top mounting hole at the rear end of part 19 with part 1/2/3;

8) Measure the clearance between the left and right slider and the outer wall of 1st boom section, select shim 15/16, and fill the clearance evenly,

Control standard: 1-2 mm clearance between the slider and the boom;

Measure the clearance between the upper/lower slider and the outer wall of 1st boom section, and select adjusting shim to fill the clearance evenly.

Control standard: 1-2 mm clearance between the slider and the boom; Add another 1-2mm for the lower adjusting shim;

9) After the clearance adjustment is completed, tighten all the bolt torques.

10) In the same way, pre-tighten the slider to the side and top mounting hole of the outer wall at the front end of the 1st boom section with bolt;

11) Measure the clearance between the left and right slider and the outer wall of 1st boom section;

Control standard: 1-2 mm clearance between the slider and the boom; Add another 1-2 mm adjusting shim;

12) The 2nd boom section is installed to the inner cavity of second arm in the same way.

3.5.2 Boom frame removal

⚠ WARNING: Risk of rollover

1. Carrying out this step requires rotary table counterweight removal. If the counterweight isn't removed before the boom assembly removal, the Machine will tip over. Do not remove the boom frame without removing the counterweight first.

2. When the boom frame is installed to the machine, install the boom frame assembly before the counterweight. If the counterweight is installed before boom frame assembly, the machine will tip over and death or serious injury may be caused.

3. Rotary table counterweight is crucial to machine stability. If the counterweight is not installed after installation of the boom frame assembly, the machine stability will be affected, and the machine will tip over and cause death or serious injuries.

⚠ WARNING: risk of personal injury

Carrying out this step requires specific maintenance skill, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury, as well as serious component damage. Dealer service is highly recommended.

⚠ CAUTION: carry out this step when the boom is in the stowed position.

⚠ CAUTION:

When removing the hose assembly or joint, always replace the O-ring at the joint and / or hose end (if equipped). All connections must be tightened to the specified torque during installation. Refer to technical specification, hydraulic hose and joint torque technical specification.

1) Remove the fly jib. Refer to removal of jib.

2) Remove the cable carrier. Refer to "Removal of cable carrier".

3) Raise the boom until upper/lower link assembly to the boom pivot pin is above the rotary table cover.

4) Place a piece of wooden block measuring 4 x 4 x 60 inch/10 x 10 x 152 cm under the upper link assembly, and insert it through the rotary table covering.

5) Slowly lower the boom until the upper link assembly contacts the wooden block. Do not concentrate all boom weight on the wooden block. Shut down the machine.

⚠ WARNING: Danger of component damage

If all boom weights are concentrated on the wooden block, the rotary table covering may be damaged.

6) Place the wooden block between the lower link assembly and the rotary table weldment for support

7) Connect a sling or chain with a min. rated loading capacity of 5 tons/5000 kg securely to the lifting point of the rotary table counterweight. Connect the sling or chain to the crane.

CAUTION: auxiliary device may be required to safely remove the counterweight.

8) Operate the crane slowly and apply tension to the sling. Do not lift the machine with crane.

9) Locate and remove counterweight fastener. Be careful when lifting up the counterweight and removing the counterweight from the machine. Put the counterweight on the ground.

WARNING: risk of crushing

If the crane does not support the counterweight correctly, the counterweight may fall and cause casualties. When removing the counterweight, people shall stay away from the area.

10) Attach the sling on the 5 ton/5000 kg overhead crane to the end of the boom frame. Support the boom frame. Do not impose any lifting force.

11) Support and secure the connecting rod end of the luffing cylinder to a second overhead crane or similar lifting equipment.

12) Remove luffing cylinder connecting rod end pivot fastener. Remove the cylinder mounting shaft by using the soft metal hammer.

WARNING: risk of crushing

When removing pivot at cylinder link end, the boom frame may fall off if it is not properly supported.

13) Using the auxiliary power supply, start the boom lowering function to retract the cylinder. Retract the cylinder until the cylinder connecting rod end leaves the mounting bracket on the boom. Shut down the machine.

WARNING: risk of crushing

If it is not properly supported and fixed to the lifting equipment, the luffing cylinder may fall.

14) Using the overhead crane, lower the luffing cylinder carefully so that it stays on the boom support washer. Protect the cylinder rod from damage.

15) Remove boom end cap fastener and end cap.

16) Mark, disconnect and plug telescopic cylinder hydraulic hose. Cover the joint on the cylinder.

WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

17) Mark and disconnect the electrical connector of cable limit switch.

18) Mark and disconnect all boom harness connectors that are located at the pivot end of boom.

19) Support the lower leveling cylinder. Remove the securing fastener of pivot at the connecting rod end of lower leveling cylinder. Thread a rod through the pin and twist to remove. Lower the lower leveling cylinder carefully.

20) Mark, disconnect and plug the hydraulic hose on the boom pivot end bulkhead fitting. Plug the bulkhead fitting.

WARNING: risk of personal injury

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow the fluid to spray or spill

21) Remove retainer ring from both boom pivot of the upper link assembly and the lower link assembly. Do not remove the pin.

22) Using overhead crane, adjust the boom as needed to release the pressure on the pivot.

23) Remove each boom pivot using the soft metal hammer. Remove the boom frame assembly carefully from the machine and place it on the structure that can support it.

WARNING: risk of crushing

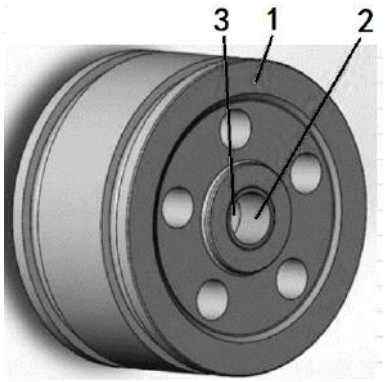
If there is no proper support from the

overhead crane, the boom frame assembly may fall.

⚠WARNING: risk of crushing

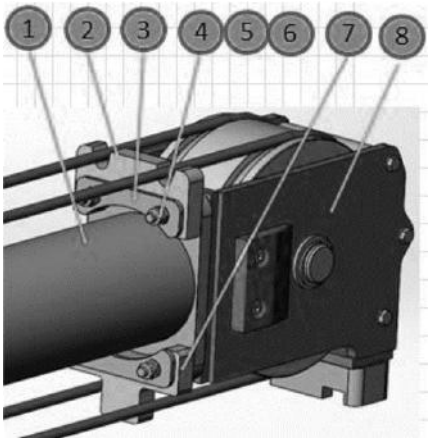
When removing boom pivot, the upper link assembly and lower link assembly may fall if they are not properly supported.

3.5.3 Subassembly of telescopic cylinder



1. Pulley 2. Shaft speed 3. Pulley spacer

1) Install part 3 into the center hole of part 1;
2) Install part 2 into both sides of the center hole of part 1, respectively, with flush outer end faces.



1. Telescopic cylinder 2. Upper nylon block 3. Irregular washer 4. Bolt

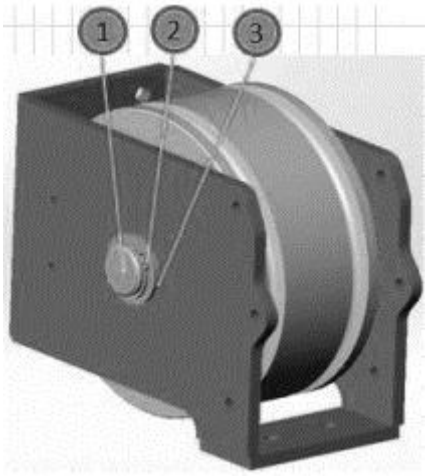
5. Nut 6. Washer 7. Lower nylon block 8. Telescopic cylinder head bracket

3) Use two slings to hoist part 1 to the subassembly trolly of telescopic cylinder;
4) Adjust the position of each part as shown in the figure, insert part 4 through the part 6/8/1/2/3 in turn, and screw in the part 5; Use an electric wrench to tighten the part 5;

⚠WARNING: risk of crushing

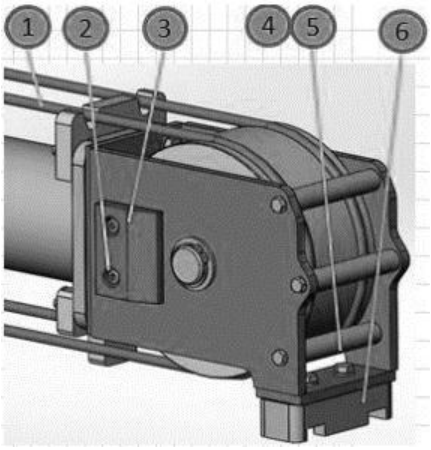
Keep the lifting rope horizontal during hoisting. Never place any part of the body under the hoisted weight during hoisting. If the lifting rope is damaged, replace it in time.

5) Refer to part 2 for the assembly method of part 7;



1. Shaft 2. Retainer ring 3. Washer

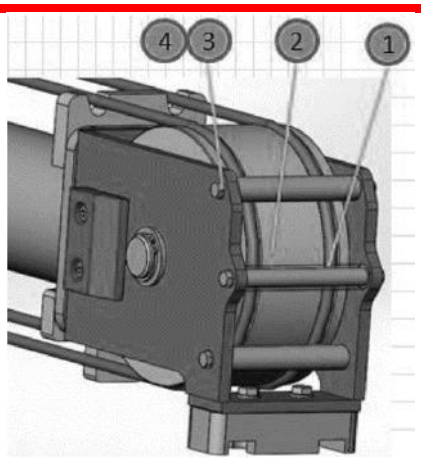
6) Put the pulley into the head bracket and adjust the center hole to be aligned;
7) Insert part 1 into the center hole of the head bracket and adjust the length of both sides;
8) Install part 3 on both sides of part 1, and clamp it firmly with part 2;



1. Extension rope 2. Screw 3. Side slider 4. Bolt

5. Washer 6. Telescopic cylinder head slider

9) Assemble the extension rope arranger, and fasten part 3 in place with part 2 on both sides of the head bracket;
10) On the lower side of the head bracket, fasten the part 6 in place with part 4 (coated with adhesive) and part 5;
11) Insert part 1 into the pulley groove from top to bottom.

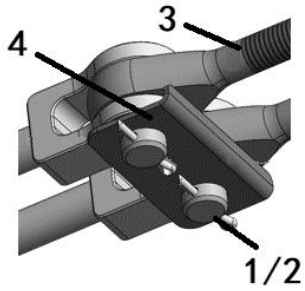


1. Inner thread tube 2. Guide tube 3. Bolt 4. Washer

12) Insert part 1 into the inside of part 2, with one side end face aligned;

13) Adjust the rope to keep it in the pulley groove, insert the part 2 into the front end of the head bracket, and align the center hole with the mounting hole;

14) Fasten part 1 to the head bracket with part 3 and part 4;

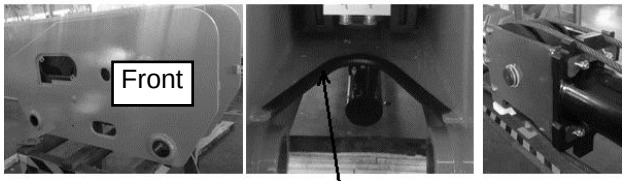


1. Extension system pin 2. Cotter pin 3. Adjusting screw

4. Anti-rotation plate

15) Insert part 3 into the extension rope U groove, insert part 1, and clip part 4 into part 1 and secure with part 2.

3.5.4 Assembly of telescopic cylinder



1. Clamp rubber strip 450-10

1) Stow all boom frame in place.

2) Arrange and extend the rope arranger to ensure consistent upper and lower lengths. Use two slings to hoist the subassembled boom telescopic cylinder to the front end of the boom frame. The cylinder direction is as shown in the figure (the slider is facing downward), and apply FUCHS grease on the rope.

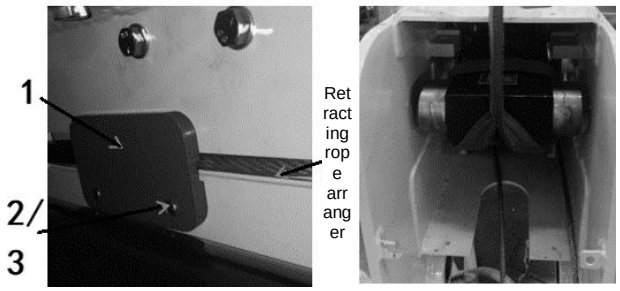
3) Apply molybdenum disulfide grease on the surface of the head bracket slider, slowly extend the cylinder into the 2nd boom section inner cavity, manually push it to the middle position of the boom, slowly lower the cylinder, drop it onto the inner arm, and install PU pad to the contact surface between the cylinder and the boom for protection;

4) Install clamp rubber strip (Part) 1 at the position in the figure.

⚠WARNING: risk of crushing

Pay attention to the safety during the hoisting process. It is strictly forbidden to place any part of the body under the lifting object during hoist. The rope is not allowed to cross during the assembly process, and the lifting rope shall be replaced in time if it is damaged.

Tools: sling 3t×4m, brush

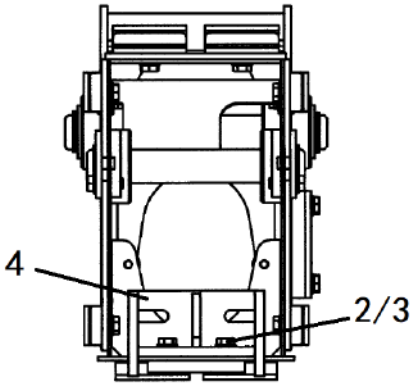


1. Wire rope pressure block 2. Bolt 3. Washer

5) Clip the front end cylindrical head of the retracting rope arranger into the 2nd boom section mounting groove, arrange the rope, and ensure that the rope is in the groove;

6) Fix part 1 in the mounting groove with part 2 (with adhesive coated on the head)/3.

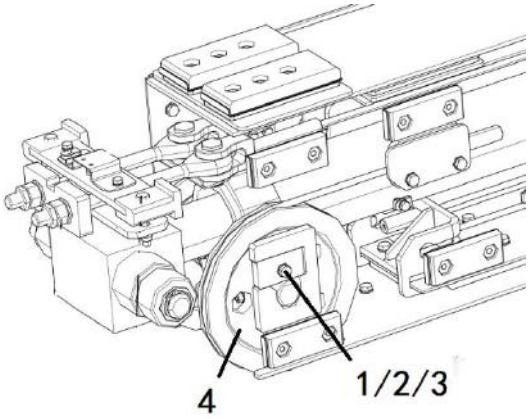
7) Attach one end of the sling to the fixed shaft at the rear end of the cylinder, and continue to push in the cylinder. When the pulley of 1st boom section at the rear end of the cylinder is flush with the basic boom port, stop pushing.



2. Bolt 3. Washer 4. Extension rope support

8) Put part 4 into the 2nd boom section from the front side of the boom frame, and pass he cylindrical end of the extension rope from the side hole of part 4 through the inside of the support, and then clip part 4 into the mounting hole at the lower side of the 2nd boom section;

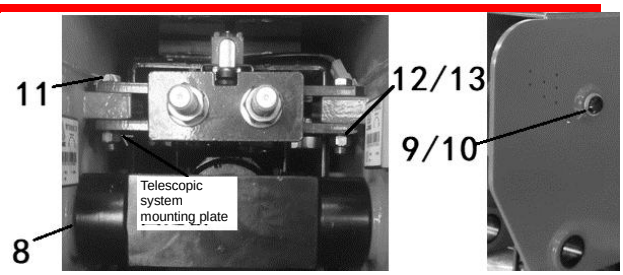
9) Pre-tighten part 4 with part 2 (with head coated with adhesive)/Part 3 and then tighten it to specified torque;



1. Bolt 2. Washer 3. Stopper 4. Second pulley section

10) Continue lifting the cylinder and push the cylinder backward. When the shaft of the telescopic cylinder is parallel to the 1st boom section port, hang the retracting rope into the rope groove of part 4 and thread part 4 into the telescopic cylinder; Continue to push in the cylinder until the cylinder shaft falls into the fixing groove on the side of the 1st boom section, and fix it with parts 1/2/3;

CAUTION: when the retracting rope is hung into the rope groove, the length of the rear end of the wire rope can be adjusted appropriately, and a large amount of pulling is not allowed.



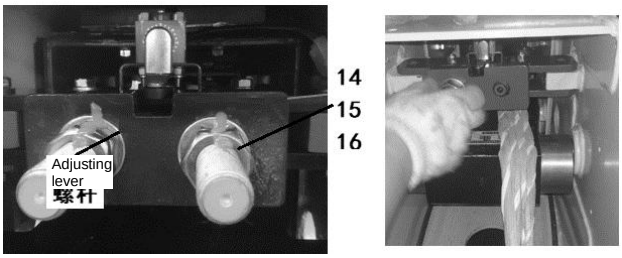
8. Shaft 9. Washer 10. Retainer ring 11. Bolt 12. Washer 13. Nut

11) Align the front side mounting hole of the cylinder with the basic boom riser mounting hole; Insert part 8 into the fixing hole from the right and fix it with part 9 / 10.

12) Tie the nylon rope in the middle of the adjusting screw and lead it to the outside of the boom;

Note: nylon ropes are loosely knotted and easy to be removed.

13) Align the telescopic system mounting plate with the mounting hole of the basic boom retainer plate and secure it with part 11 (from top to bottom)/12/13.



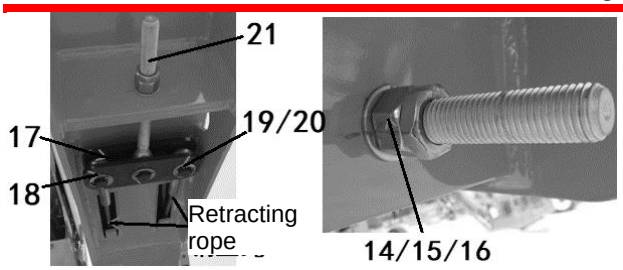
14. Washer 15. Nut 16. Nut

14) Pull the originally reserved nylon rope to pull the adjusting screw outward and adjust the screw angle to make it penetrate into the mounting hole of the extension system connecting bracket; Install the head of the adjusting screw into part 14, and pre-tighten it for 2-3 threads with part 15;

15) Assemble the other adjusting screw in the same procedure;

16) Screw in part 15, adjust the length and tension of the rope, and then assemble the part 16 and then tighten the part 16; Remove the nylon rope originally tied to the adjusting screw;

CAUTION: during assembly, the rope is not allowed to cross, and the anti-rotation plate is not allowed to contact the cylinder arm. For rope adjustment, refer to No. SOP19056 "Rope adjustment SOP"



14.Washer 15.Nut 16.Nut 17.Retraction connecting plate

18. Telescopic system pin 19. Cotter pin 20. Washer

21. Adjusting screw

17) At the end of the retracting rope, pass part 18 through part 17, retracting rope, part 17 and part 20 in turn, and then install part 19 through the hole at the top of the pin and separate it along the outer edge of the pin;

18) Assemble the other retracting rope in place in the same way;

19) Insert part 21 into the fixing plate hole on the lower side of the basic boom and pre-tighten it with part 14/15; Adjust the rope tension, screw part 15 and tighten it with part 16.

3.5.5 Removal of telescopic cylinder

⚠ WARNING: risk of personal injury

1. **This procedure requires specific maintenance skill, lifting equipment and suitable workshops. Attempting this procedure without these skills and tools may result in death or serious injury, as well as serious component damage. Operation by the dealer is strongly recommended.**
2. **When removing the hose assembly or the joint, always replace the O-ring at the joint end or the hose end (if equipped). All connections must be tightened to the specified torque during installation. See lifting platform specification for selection of tightening torque.**

1) Lift the boom to the horizontal position.

2) Remove boom end cap fastener and end cap.

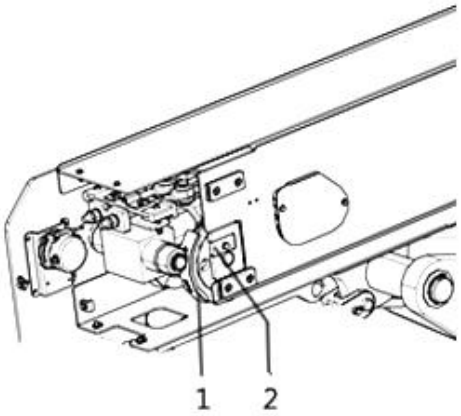
3) Remove access covers on both sides of the boom pivot end.

4) Loosen the lock nut on the extension rope assembly completely. Do not remove the nut.

5) Loosen the retracting rope assembly nut at the platform end of the boom. Pull the anchor pole off the bracket and allow it to hang down.

6) Remove the fastener of retracting pulley baffle assembly and remove the retracting pulley baffle assembly.

7) Remove the wire rope mounting plate on the inside of the second section boom tube and pull the retraction rope off the pulley. Put the rope flat and set it aside.

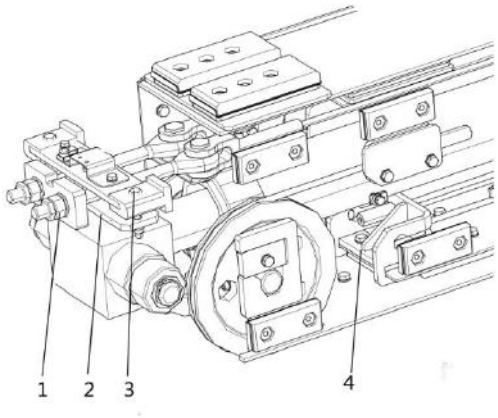


1. Retracting pulley baffle assembly 2. Stopper

8) Remove the fastener on the fixing block from the telescopic cylinder saddle. Remove stopper.

CAUTION: the fastener is accessed by access hole in the boom outside the pivot end.

9) Disconnect the wire connector of the rope break limit switch.



1. Extension rope adjusting nut 2. Extension rope mounting plate

3. Extension rope mounting plate fastener 4. Extension rope bracket

10) Remove the securing fastener securing the extension rope mounting plate to the inside

of the basic boom.

11) Pull the extension rope mounting plate back. until it leaves the stopper welded to the inside of the basic boom.

12) Lift the extension rope mounting plate and pull the extension rope towards the platform to make the slope slack. Place the rope and backet assembly on top of the telescopic cylinder.

13) Locate the lower extension rope bracket at the bottom of the 2nd boom section.

14) Remove the lower extension rope bracket, install fastener and pull the bracket back to loosen it from the second boom section.

15) While pushing the lower extension rope bracket toward the platform, pull the extension rope mounting plate toward the pivot end of boom.

16) Secure the extension rope bracket and rope to the cylinder to prevent them from falling off when the cylinder is removed.

17) Remove the outer retainer ring from the telescopic cylinder pin at the pivot end of boom.

18) Remove the pin using the soft metal hammer.

19) Mark, disconnect and plug telescopic cylinder hydraulic hose. Cover the joint on the cylinder.

⚠ WARNING: Risk of personal injury.

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

20) Connect the sling on the 5 ton/5000kg overhead crane to the telescopic cylinder connecting rod end.

21) Lift the telescopic cylinder with a crane until it is off the cylinder saddle in the 1st boom section.

22) Support the telescopic cylinder carefully and slide it out of the boom.

⚠ WARNING: risk of crushing

If the support is improper, the telescopic cylinder may fall off when being removed from the telescopic boom.

⚠ CAUTION: Danger of component damage

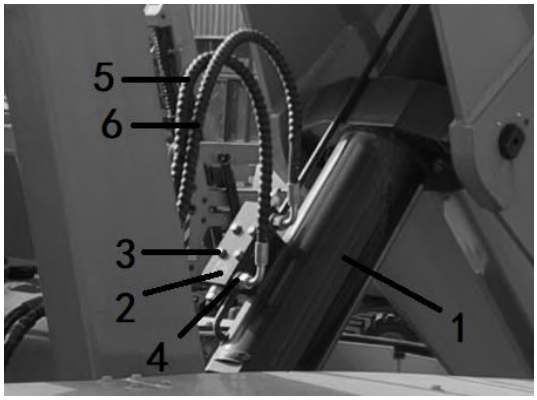
1. Be careful not to damage the rope break limit switch.

2. When removing the telescopic cylinder, be careful not to damage the balance valve on the telescopic cylinder.

⚠ CAUTION

When removing telescopic cylinder, the overhead crane sling needs to be carefully adjusted to achieve the proper balance.

3.5.6 Assembly of luffing cylinder



1. Luffing cylinder 2. Luffing balance valve 3. Bolt

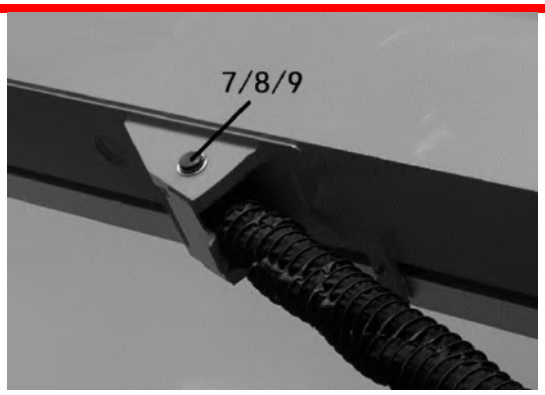
4. Joint 5. Hose 6. Hose

1) Remove the guard plate and rubber pad at the balance valve (part 1) and wipe them clean with lint-free paper;

2) Use part 3 to assemble part 2 to the installation place of valve block (Part 1), and tighten it to specified torque; The plug port (joint port) is located on the right side of the cylinder;

3) Remove the protective plug of part 2 and protective cap of part 4, and fasten the part 4 to the part 2;

4) Lift the luffing oil pipe under the boom, then slowly lift the cylinder to the position about 50mm from the bottom of the boom, and use the crane to move it slowly to the joints of boom frame cylinder;



7.Shaft with double circlips 8.Washer 9.Retainer ring

5) Adjust the cylinder to make it be aligned with the mounting hole of the boom, connect it with part 7 inserted through the mounting hole, and adjust part 7 to extend it out of the boom frame side plate evenly, and use the parts 8 and 9 to fix it;

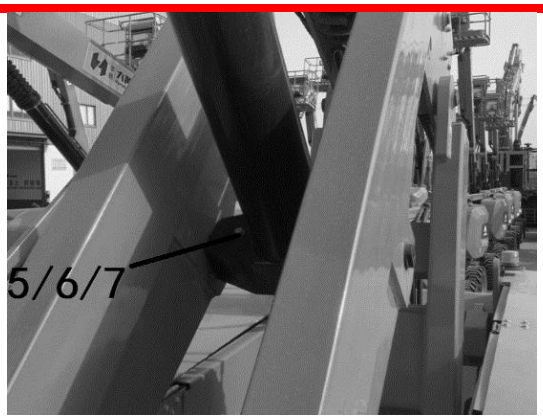
6) Remove the plug of part 5 and protective cap of part 4, fasten part 5 to part 4 and tighten to specified torque; The angle of part 5 is about 30 ° to the upper rear.

7) Install part 6 in the same way;

1.Right upper link 2.Left upper link

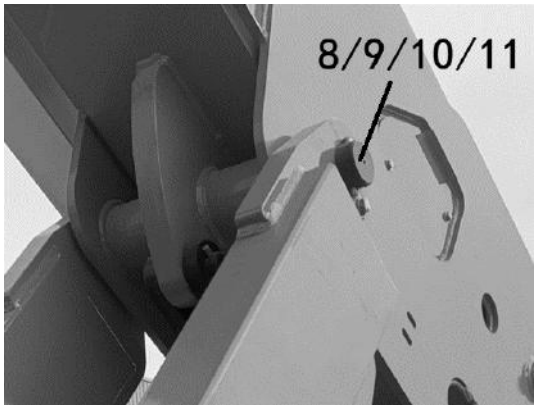
8) Assemble the shaft sleeve to the middle shaft holes of parts 1/2 separately;

9) Adjust the luffing cylinder and left and right upper links so that the middle pin hole is aligned with the luffing cylinder hole, and then insert the middle shaft of the luffing cylinder into the cylinder fixing hole;



5. Bolt 6. Washer 7. Nut

10) Adjust the penetration depth of the shaft in the luffing cylinder so that the pin shaft center hole is aligned with the bolt hole of the cylinder, and fasten it with part 5/6/7;



8. Connecting rod fixing shaft 9. Pin 10. Bolt 11. Washer

11) Lift the upper link with a sling so that its top hole is aligned with the basic boom mounting hole, insert part 8, and fasten both sides with parts 9/10/11;

3.5.7 Removal of the luffing cylinder

⚠WARNING: risk of personal injury

This procedure requires specific maintenance skill, lifting equipment and suitable workshops. Attempting this procedure without these skills and tools may result in death or serious injury, as well as serious component damage. Operation by the dealer is strongly recommended.

⚠CAUTION:

When removing the hose assembly or the joint, always replace the O-ring at the joint end or the hose end (if equipped). All connections must be tightened to the specified torque during installation. See

lifting platform specification for selection of tightening torque.

1) Lift the boom frame to the horizontal position.

2) Attach a 5 t/5000 kg overhead crane to the boom at the end of the platform for support. Do not lift the boom frame.

3) Support and fix both ends of the luffing cylinder on a second overhead crane or similar lifting equipment.

4) Remove the securing fastener from the pivot at the connecting rod end of luffing cylinder. Remove the pin using the soft metal hammer.

⚠ WARNING: risk of crushing

When removing the main jib rod end pivot, the boom frame may fall if it is not properly supported.

5) Using the auxiliary power supply, start the boom lowering function to retract the cylinder. Retract the cylinder until the cylinder connecting rod end leaves the mounting bracket on the boom. Shut down the machine.

6) Mark, disconnect and plug luffing cylinder hydraulic hose. Cover the joint on the cylinder.

⚠ WARNING: Risk of personal injury.

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the connection of hydraulic fitting very slowly to reduce the oil pressure gradually. Do not allow fluid to squirt or spray.

7) Remove the securing fastener from the luffing cylinder pivot at barrel end and use a special tool to screw out the pin.

⚠ WARNING: risk of crushing

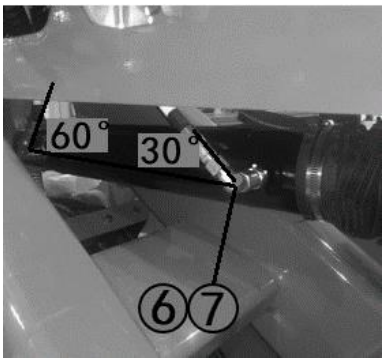
Luffing cylinder may fall in case of imbalance.

8) Be careful when removing the luffing cylinder from the machine.

3.5.8 Assembly of lower leveling cylinder

1. Lower leveling cylinder 2. Pin 3. Pin 4. Bolt 5. Washer

1) Connect part 1 with the basic boom and the leveling bracket assembly, connect the barrel end of the lower leveling cylinder with the basic boom leveling bracket assembly, and fix the lower leveling cylinder with part 2 /3 /4 (coated with adhesive) / 5.



6. Straight joint 7. Right-angle fitting

2) Install parts 6/7 (pay attention to the installation angle when tightening part 7) onto the cylinder port.

2. Pin 3. Pin 4. Bolt 5. Washer

3) Then connect the leveling cylinder rod end with the boom frame and fix it with parts 2/3/4/5.

3.5.9 Removal of lower leveling cylinder

WARNING: risk of personal injury

This procedure requires specific maintenance skill, lifting equipment and suitable workshops. Attempting this procedure without these skills and tools may result in death or serious injury, as well as serious component damage. Operation by the dealer is strongly recommended.

CAUTION:

When removing the hose assembly or the joint, always replace the O-ring at the joint end or the hose end (if equipped). All connections must be tightened to the specified torque during installation. See lifting platform specification for selection of tightening torque.

1) Raise the boom until the lower leveling cylinder is above the rotary table covering.
2) Mark, disconnect and plug the hydraulic hose on the lower leveling cylinder. Cover the joint on the cylinder.

WARNING: risk of personal injury

Sprayed hydraulic oil may penetrate and burn the skin. Loosen the hydraulic connection very slowly to dissipate the oil pressure gradually. Do not allow fluid to squirt or spray.

3) Place a piece of 2×4×48 inch/5×10×120 cm wooden block onto the rotary table covering. Locate the wooden block in place at the lower part of the cylinder.
4) Remove the securing fastener of the pin from the lower leveling cylinder connecting rod end pivot.
5) Insert a tool through the pin and twist it to remove the pin. Lower the connecting rod end of the lower leveling cylinder to the wooden block.
6) Remove the pin securing fastener from the pivot pin at barrel end.
7) Insert an appropriate tool through the pin at barrel end and rotate it to remove the pin.
8) Remove the lower leveling cylinder from the machine.

3.5.10 Rope

How to adjust boom wire rope

The boom wire rope is designed for the telescoping of boom. Regular and proper adjustment of the boom extension rope and associated components are essential for good machine performance and safety machine operation. The extension and retraction of the boom shall be smooth without lag, jitter and abnormal noise.

Caution: carry out this step when the boom is in the horizontal position.

1) The boom frame shall be fully retracted.
2) Remove boom end cap fastener and remove the end cap.
3) Check the thread end of the boom extension rope. The thread must be clean and in good condition without damage.
4) Adjust the extension rope nut until the exposed length of the adjusting screw reaches 60-80 mm.

CAUTION: If the rope has been replaced, make sure that the adjusting nut is replaced with a new one. Do not reuse.

5) Extend the boom approximately 3 feet/1 meter. Do not fully extend the boom.
6) Locate the retracting rope adjusting nut at the bottom of the basic boom at platform end.
7) Using torque wrench, tighten the retracting rope adjusting nut to 32-36 ft-lbs/43-49N • m.
8) Retract and extend the boom about 3 feet/1 meter twice, and stop during the extension cycle to relax the retraction cable.

CAUTION: do not fully extend the boom

9) Repeat step 7 and step 8 for two to three times.
10) Fully extend the boom and then retract the boom about 12 inches/30 cm.
11) In the pivot end of the boom, visually inspect whether the boom extension rope is loose or sagging.
12) Visually inspect rope break limit switch arm,

ensure that the roller of the limit switch arm is centered in the groove of the extension system connecting bracket.

⚠CAUTION: If the boom extension rope is adjusted to be flat, the roller of the limit switch arm shall be located in the center of the notch of the connecting bracket.

13) Install the boom end cover to the pivot end of the boom.

14) Fully retract and lower the boom to the stowed position.

How to replace rope

⚠CAUTION: When replacing the cable, the cable pulley must also be replaced.

1) Remove the boom telescopic cylinder.

Extend the rope assembly:

2) Remove the rope from the telescopic cylinder head bracket assembly in the 2nd boom section.

3) Remove the pin and adjusting screw from the boom extension cable located near the rope break limit switch.

4) Remove the outer retainer ring from the boom extension rope pulley pivot. Remove the pin using the soft metal hammer.

5) Remove the second pulley section and boom extension rope from the telescopic cylinder assembly. Scrap old ropes and belt pulley.

6) Put the new boom extension rope through the pulley bracket.

7) Install the new boom extension rope pulley, the pin and the snap ring.

⚠CAUTION: ensure that the boom extension rope is installed on the pulley groove on the telescopic cylinder and the upper wear washer

8) Install the boom extension rope adjusting screw and the securing fastener to the telescopic system connecting bracket near the rope break limit switch.

9) Install the boom lower extension rope to the telescopic cylinder head bracket assembly of the 2nd boom section.

Retraction rope assembly:

10) Remove the fixing pin from the boom retraction rope located at the platform end.

CAUTION: When installing U-pin, always use a new cotter pin.

11) Remove the wear washer fastener from the basic wear washer. Remove wear washer.

CAUTION: Pay attention to the location of each wear washer and the number of gaskets per wear washer.

12) Connect the sling from the overhead crane to the platform end of the boom frame.

13) Use the overhead crane to lift the boom; in order to form a clearance between the boom pipes, place a wooden block under the 1st boom section arm tube between the basic boom section tube and the 1st boom section tube for support to remove the retracting rope.

14) Connect a rope drawing tool or a rope to a retracting rope at the boom pivot end.

15) At the platform end of the boom frame, pull the retracting rope to pull the old rope out of the boom completely. Remove the rope and scrap the old rope.

16) Connect the rope firmly to the same end of the new retracting rope.

17) At the pivot end of the boom, pull the rope carefully until the new rope is at the end of the boom pipe. Remove the rope.

18) Assemble the other retracting rope in the same way.

19) On the platform end of boom, install the retracting rope and the fixing pin to the adjustment plate.

20) Remove the old rope pulley from the pivot end of the telescopic cylinder, and discard it.

21) Install new pulley to telescopic cylinder pivot end.

22) Install the telescopic cylinder assembly into the boom.

CAUTION: before lowering the telescopic cylinder into the basic boom pipe saddle, wind the retracting rope around the pulley.

23) Adjust the rope.

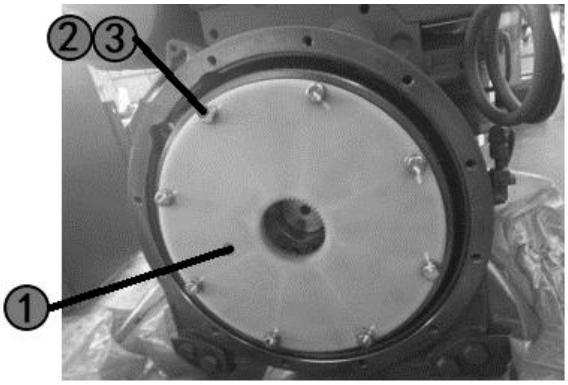
⚠CAUTION:

The servicing life of rope is 7000 hours or 10

years, whichever comes first.

3.6 Transmission component

3.6.1 Installation of flywheel coupling



1. Flywheel coupling 2. Bolt 3. Washer

1) Use part 2 (coated with adhesive)/3 to assemble the flywheel in part 1 to the engine, apply adhesive and torque tighten.

Note: The remaining fittings of the part 1 are to be well preserved for assembly of variable displacement pump.

3.6.2 Removal of flywheel coupler

1) Remove tail pipe bracket from the engine and install fastener.
2) Support the walking pump assembly with a suitable lifting equipment.
3) Remove all engine casing fastener.
4) Be careful to take the pump and hose off the engine and secure them against movement.

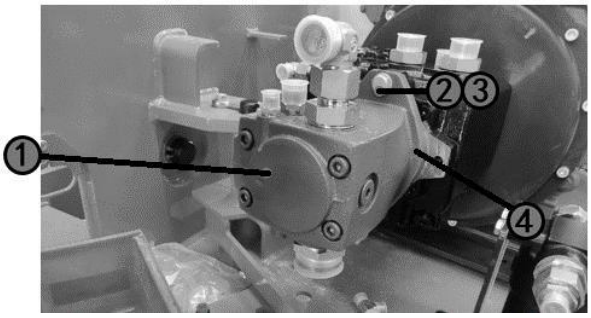
⚠WARNING: Danger of component damage

The hose may be damaged if twisted or squeezed.

5) Remove the flywheel coupling mounting fastener and then remove the flywheel coupling from the engine flywheel.

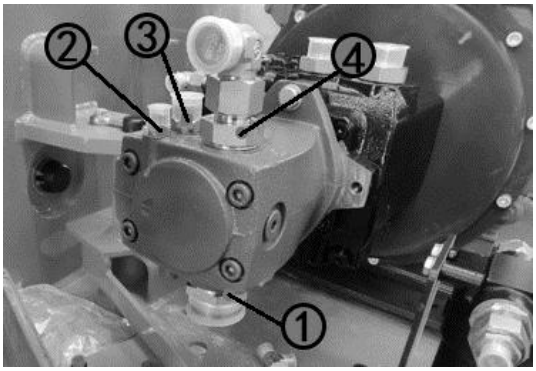
3.7 Variable displacement pump

3.7.1 Assembly of open variable displacement pump



1. Open variable displacement pump 2. Bolt 3. Washer 4. O-ring

1) Preinstall part 4 on part 1 and install part 1 onto closed pump with part 2/3.



1. Straight joint 2. Straight joint 3. Straight joint 4. Straight joint

2) Install part 1 to port S at the lower side of open-type pump, and install parts 2, 3 and 4 on the oil ports X, L1 and B at the upper side in sequence.

3.7.2 Removal of open-type variable displacement pump

⚠CAUTION:

When removing the hose assembly or the joint, always replace the O-ring at the joint end or the hose end (if equipped). All connections must be tightened to the specified torque during installation. See lifting platform specification for selection of tightening torque.

1) Locate the two hydraulic tank valves on the hydraulic oil tank through the access hole at the lower part of rotary table. Close the valve.

⚠WARNING: Danger of component

damage

When the hydraulic tank shut-off valve is in the closed position, do not start the engine, otherwise the component will be damaged. If the tank valve is closed, remove the key from the ignition switch and put a label on the machine to inform the personnel of the situation

2) Mark, disconnect and plug the hydraulic hose on open variable displacement pump. Cover the joint on the pump.

⚠ WARNING: risk of personal injury

Sprayed hydraulic oil may penetrate and burn the skin. Loosen the hydraulic connection very slowly to dissipate the oil pressure gradually. Do not allow fluid to squirt or spray.

3) Remove the mounting bolt of the pump. Be careful to remove the variable displacement pump.

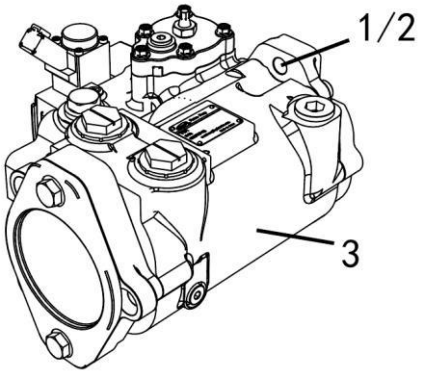
⚠ WARNING: Danger of component damage

After the installation of the pump, confirm to open the two hydraulic oil tank valves and fill the pump with oil.

3.7.3 Walking variable displacement pump assembly

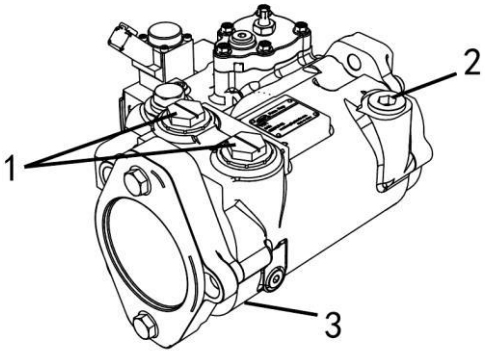
1) Before the assembly of walking variable displacement pump, open the front end cap to control oil and connect it with the oil collector, and at the same time, prepare for the assembly of open variable displacement pump. When there is no fluid flowing out, wipe off the oil stain of walking variable displacement pump.

2) Insert the non-retainer ring side of the coupling's iron core into the splined hole at the head of walking variable displacement pump, with the working variable displacement pump head in contact with the core retainer ring, and screw in the iron core clamping screw (coated with adhesive) of the coupling and tighten it.



1. Screw 2. Washer 3. Walking variable displacement pump

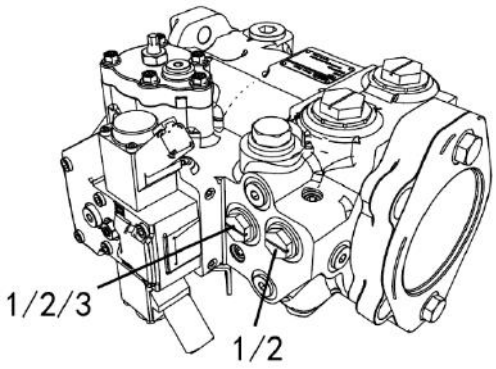
3) Install walking variable displacement pump to the assembly position on pump cover plate with part 1 (coated with adhesive)/2.



1. Straight joint 1DO-30-16 2. Straight joint 1CO-30-12

3. Joint 1CO-36-16

4) Connect part 1 to port A/B on the upper side, connect part 2 to port L2, and install part 3 to the port S at the lower side of the closed pump.



1. Joint 2. Combination fitting 3. Tee fitting

5) Install the part 1 to the oil port on the left side of the walking variable displacement pump and tighten it. Preassemble part 2/3 to the oil port on left side and preassemble part 2 to the oil port on the right side .

3.7.4 Removal of walking variable displacement pump

⚠CAUTION:

1. When removing the hose assembly or joint, always replace the O-ring at the joint and / or hose end (if equipped). All connections must be tightened to the specified torque during installation. See the lifting platform specification for selection of tightening torque.

2. The work area and surface for carrying out this procedure must be clean. If debris enters the hydraulic system, it will cause serious damage to components. Dealer service is recommended.

1) Disconnect the electrical connector on the walking variable displacement pump.

2) Position the two hydraulic tank valves on the hydraulic oil tank with reference to the access hole at the lower side of rotary table. Close the valve.

⚠ WARNING: Danger of component damage

When the hydraulic tank shut-off valve is in the closed position, do not start the engine, otherwise the component will be damaged. If the tank valve is closed, remove the key from the Ignition switch and put a label on the machine to inform the personnel of the current machine situation.

3) Mark, disconnect and plug hydraulic hose of walking variable displacement pump and open variable displacement pump. Cover the joint on the pump.

⚠WARNING: Risk of personal injury.

The sprayed hydraulic oil can penetrate and burn the skin. Loosen the hydraulic connection very slowly, allowing the oil pressure to relieve gradually. Prevent the oil from spraying.

4) Support walking variable displacement pump with lifting device and remove variable pump fastener.

5) Be careful when pulling out the variable displacement pump until the pump coupling is separated from the flywheel.

6) Remove the walking variable displacement pump from the machine.

⚠ CAUTION: Danger of component damage

1. The walking variable displacement pump may fall if improperly supported.

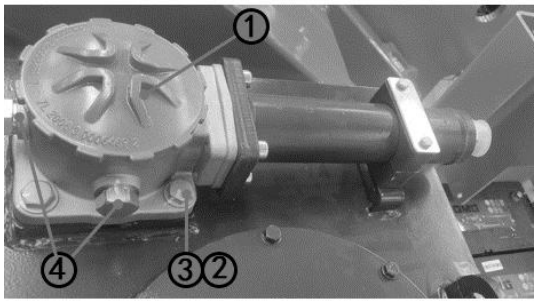
2. When installing the walking variable displacement pump, do not push the pump coupling into the flywheel, otherwise the pump shaft seal may be damaged.

3. After installing the pump, be sure to fill it with oil.

3.8 Hydraulic oil tank, fuel tank

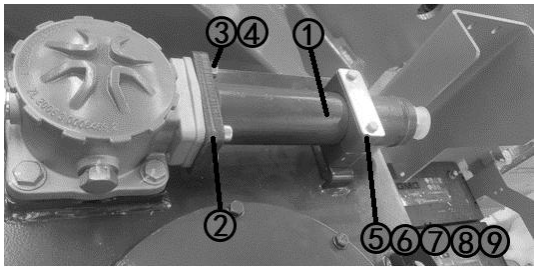
3.8.1 Assembly of hydraulic oil tank

1) Verify the material number of the received hydraulic oil tank and its delivery status, and check whether the paintwork of tank is in good condition without collision and deformation, and all oil ports of the tank body are well sealed. Do not remove the protections unless this is necessary for the assembly operation, and during the assembly, prevent tools or any other sundries from falling into the tank body.



1. Return filter 2. Washer 3. Bolt 4. Plug

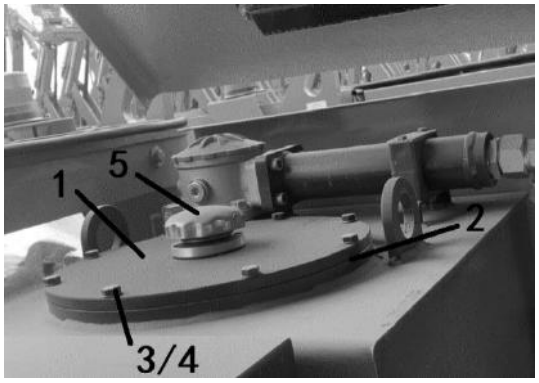
2) Assemble the return filter to the position shown on the top of the hydraulic oil tank. The assembly direction is as shown in the figure. Fasten it with part 2 / 3, and assemble the plug to the corresponding positions on both sides of the return filter.



1. Main return pipe 2. O-ring 3. Screw 4. Washer 5. Bolt 6. Cover plate 7. Clamp 8. Washer 9. Nut

3) Take the return tube to the assembly position, install part 2 in the groove at the

head of the return tube, assemble part 1 with part 3/4 to the return filter and tighten it, and fix the part 1 with part 5/6/7/8/9 on the other side.

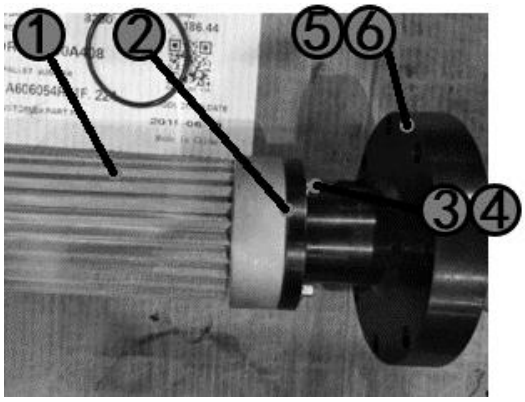


1. Cleaner hole cover 2. O-ring 3. Bolt 4. Washer

5. Air filter

4) Put part 2 into the top groove of the hydraulic oil tank and secure part 1 to the Hydraulic oil tank with part 3/4.

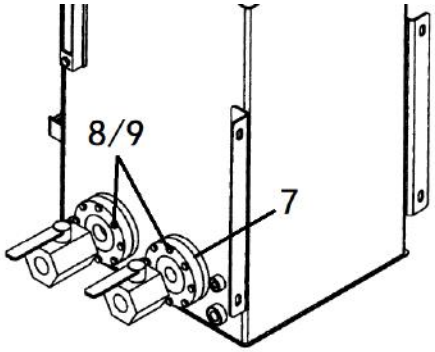
5) Assemble part 5 to part 1.



1. Suction filter 2. O-ring 3. Bolt 4. Washer

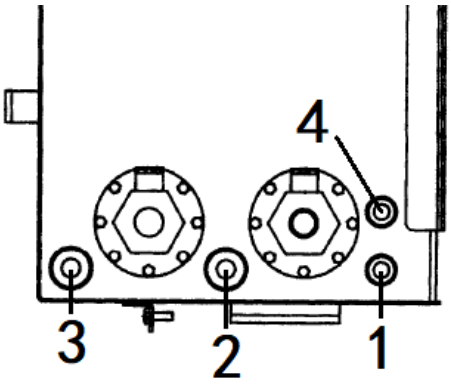
5. Suction pipe 6. Open-type pump oil suction pipe

6) Install part 2 at the connection between part 1 and part 5 (6) and fasten it with parts 3, 4.



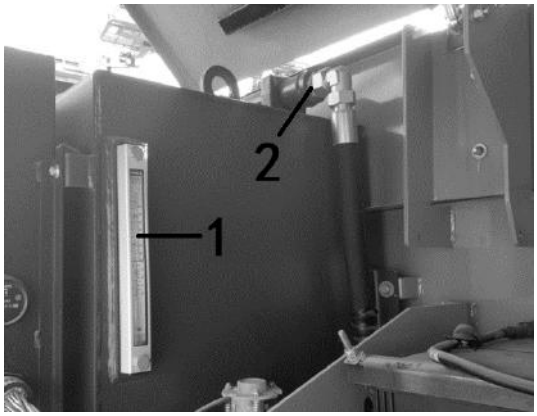
7. O-ring 8. Bolt 9. Washer

7) Install part 1 into the groove at the corresponding position of the hydraulic oil tank and tighten it to specified torque with part 8 / 9.



1. Straight joint 2. Straight joint 3. Straight joint 4. Straight joint

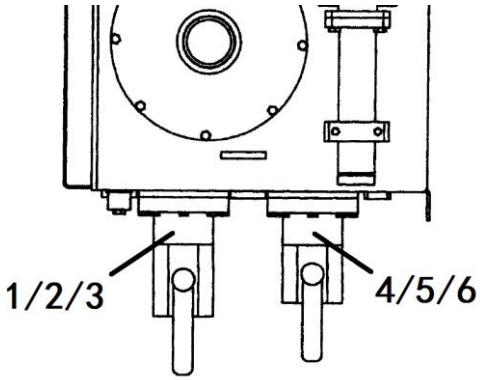
8) Assemble parts1/2/3/4 to corresponding positions of the hydraulic oil tank



1. Level gauge 2. Straight joint

9) Use the attached bolt to assemble the part 1 to the hydraulic oil tank.

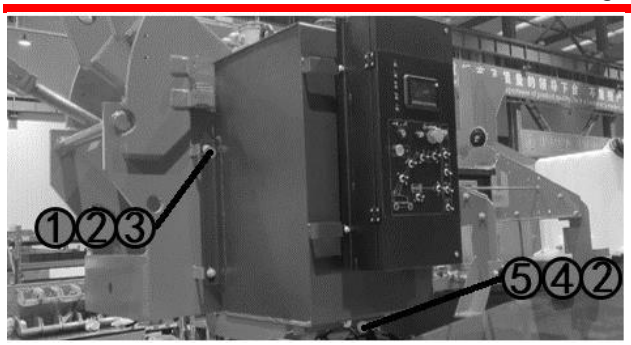
10) Fit part 2 to the end of the return tube.



1. Straight joint 2. Straight joint 3. Ball valve 4. Straight joint

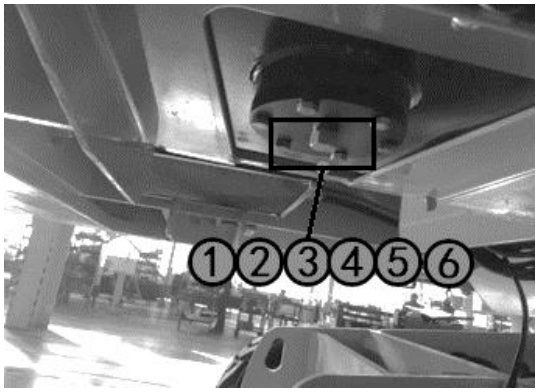
5. Straight joint 6. Ball valve

11) Assemble the fittings 1/2/3 and 4/5/6 to hydraulic oil tank in sequence.



1. Bolt 2. Washer 3. Reed nut 4. Bolt 5. Nut

12) Hoist the hydraulic oil tank to the installation position on the left side of the rotary table. Fix it with parts 1/2/3,and fix the lower side of the hydraulic oil tank with parts 2/4/5.



1. Drain cover 2. O-ring 3. Ring magnet

4. Bolt 5. Screw plug 6. Washer

13) Remove the attached protection of hydraulic oil tank body and pay attention to cleaning the edges. Assemble part 2/3 to part 1, fasten subassembly 1 to the hydraulic tank body using part 4/6, and install part 5 to the drain of part 1.

3.8.2 Removal of hydraulic oil tank

⚠Danger of component damage.

The working area and surface for carrying out this step must be clean, and if debris enters the hydraulic system, it will cause serious damage to the components. It is recommended to use the dealer service.

⚠CAUTION:

Always replace the O-ring at the joint and/or hose end, if equipped. All connections must be tightened to the specified torque during installation. Refer to technical specification, hydraulic hose and joint torque technical specification.

1) Close the two hydraulic ball valves located on the hydraulic oil tank.

⚠ CAUTION: Danger of component damage.

Do not start the engine when the valve of hydraulic oil tank is closed, otherwise the component will be damaged. If the tank valve is closed, the key shall be removed from the ignition switch and the machine shall be marked and informed.

2) Remove the screw plug from the hydraulic oil tank and drain the hydraulic oil completely into an appropriate container.

⚠WARNING: Risk of personal injury.

The splashed hydraulic oil can penetrate and burn the skin. Loosen the hydraulic connectors very slowly, allowing the oil pressure to be released gradually. Prevent fluid from splashing or spraying.

3) Mark, disconnect and plug the suction pipe connected to the hydraulic oil tank ball valve.

4) Mark, disconnect and plug the return pipe on the tank.

5) Support and secure the hydraulic oil tank to the appropriate lifting equipment.

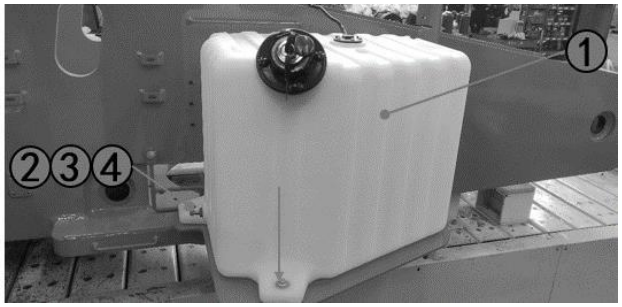
6) Remove hydraulic oil tank securing fastener.

7) Remove the hydraulic oil tank from the machine.

⚠WARNING: risk of crushing.

When removing the hydraulic oil tank fastener from the machine, the hydraulic oil tank will fall if not properly supported.

3.8.3 Fuel tank assembly

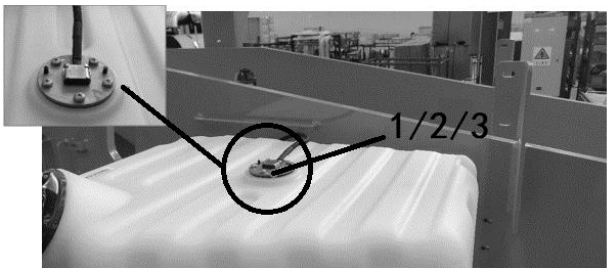


1. Rotomolded fuel tank assembly 2. Nut 3. Washer 4. Bolt

1) Install part 1 to the left of the rotary table and fasten the bottom with part 2/3 (bolt

and nut side)/4 (coated with adhesive) (from top to bottom).

2) Remove the protective cover at the top of the fuel tank.



1. Washer 2. Screw 3. Fuel level sensor

3) Install the fuel level sensor to the top of the fuel tank and fasten it with part 1/2 (coated with adhesive), with the wiring side of the sensor facing the rotary table. After assembly, place the fuel level sensor harness between the tank and the rotary table wall.

3.8.4 Fuel tank removal

⚠WARNING: Explosion and fire danger.

1. **The engine fuel is combustible. Carry out this procedure in an open, well-ventilated area away from heater, spark, flames and smoke. Always equip with qualified fire extinguisher in easily accessible places.**
2. **Never drain or store fuel in the open container for fear of possible fire.**

1) Disconnect the fuel level sensor harness.

2) Mark, disconnect and plug the fuel supply and return hoses.

3) Remove the fuel tank filler cap from the tank.

4) Remove the drain plug at the bottom of the fuel tank and discharge the fuel into the appropriate container.

⚠WARNING: Explosion and fire danger.

During fuel delivery, connect the ground wire between the machine and the pump or container.

CAUTION: ensure that only manual pump suitable for gasoline and/or diesel is used.

5) Remove fuel tank fastener.

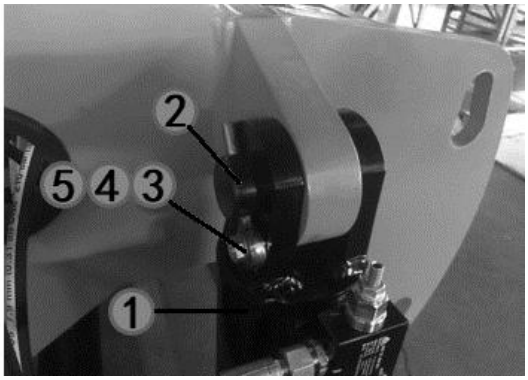
6) Support the fuel tank and fix it to the appropriate lifting equipment.

7) Remove the tank from the machine.

CAUTION: before installation, clean the fuel tank and check for crack and other damages.

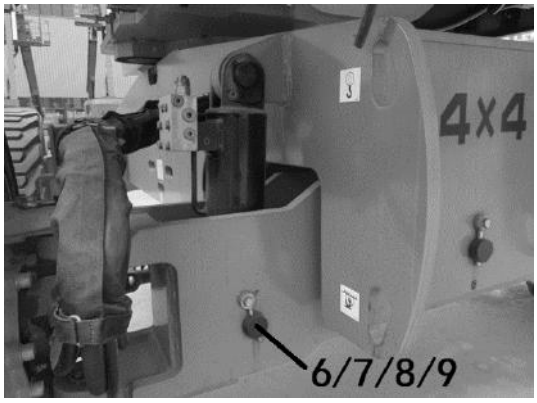
3.9 Axle assembly

3.9.1 Assembly of floating cylinder



1. Floating cylinder 2. Pin 3. Pin 4. Bolt 5. Washer

1) Hoist part 1 to the mounting position on chassis, and then fix part 1 to the mounting position on chassis using parts 2/3/4/5



6. Floating cylinder lower shaft 7. Pin 8. Bolt 9. Washer

2) Fix the lower end of the floating cylinder to the front axle with part 1, and fix part 1 with part 7/8/9.

3.9.2 Removal of floating cylinder

The floating cylinder extends and contracts between the chassis and the axle to keep the chassis level on uneven terrain. The cylinder is equipped with a balance valve to prevent the machine from moving when the hydraulic hose fails.

⚠CAUTION:

1. **Stow the boom frame and lower it to the ground, and carry out this step on a solid and horizontal surface.**

2. When removing the hose assembly or joint, always replace the O-ring at the joint and / or hose end (if equipped). All connections must be tightened to the specified torque during installation. See the lifting platform specification for selection of tightening torque.

1) Rotate the rotary table until the boom is between the steering tires.

2) Mark, disconnect and plug the floating cylinder hydraulic hoses. Cover the joint on the cylinder.

⚠ WARNING: Risk of personal injury.

Never spray the hydraulic oil. The hydraulic connectors should be loosened slowly to release the oil pressure gradually.

3) Connect the sling from the crane to the floating cylinder barrel end.

4) Remove the pin fastener from the pivot at cylinder connecting rod end. Remove the pin using the soft metal hammer.

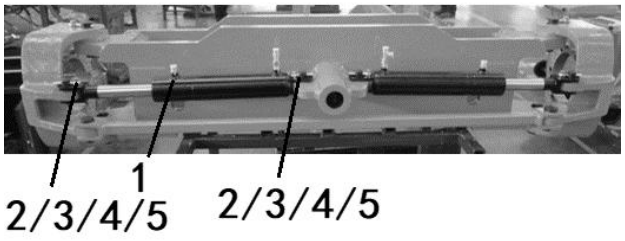
5) Remove the pin fastener from the pivot at barrel end. Remove the pin using the soft metal hammer.

6) Remove the floating cylinder from the machine.

⚠ CAUTION: Risk of crushing.

Floating cylinder will fall in case of unbalanced support.

3.9.3 Assembly of steering cylinder



1. Steering cylinder 2. Steering cylinder pin 3. Pin

4. Bolt 5. Washer

1) Take down the part 1 (steering cylinder plug). Pay attention that residual fluid of the oil cylinder will flow out during removal, and please collect the oil with an oil collector. Pull the steering cylinder rod out and install it on the front axle, insert the steering cylinder pin (part 6) from top to bottom and secure it with the part 7.

2) Secure the steering fluid reservoir end using parts 2/3/4/5 to the front axle.

3.9.4 Removal of steering cylinder

1) Mark, disconnect and plug the steering cylinder hydraulic hose. Cover the joint on the cylinder.

⚠ WARNING: Risk of personal injury.

Sprayed hydraulic oil may penetrate and burn the skin. Loosen the hydraulic connection very slowly, allowing the oil pressure to relieve gradually. Prevent the oil from spraying.

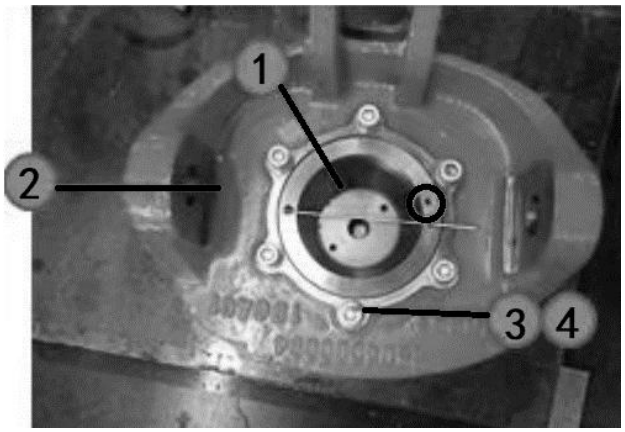
2) Attach the sling from the crane to the steering cylinder.

3) Remove the pin fastener from the pivot at cylinder connecting rod end. Remove the pin using the soft metal hammer.

4) Remove the pin fastener from the pivot at barrel end. Remove the pin using the soft metal hammer.

5) Remove the steering cylinder from the machine.

3.9.5 Subassembly of walking reducer



1. Walking reducer 2. Left steering connecting disc 3. Screw

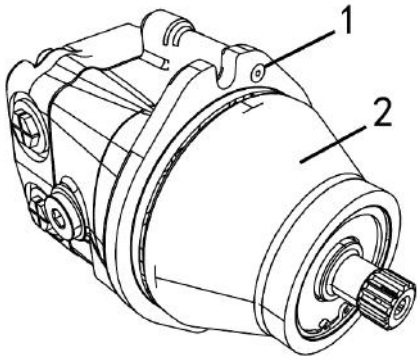
4. Washer 5. Right steering connecting disc

1) Hoist part 1 to the subassembly tooling, hoist the part 2 onto the part 1, rotate the part 2 to adjust the assembly position, and remove the plug in the ring, where the ring is located at the operator's right hand end. After adjusting the position, use the part 3 (coated with adhesive) /4 to fix the connecting disc and the walking reducer.

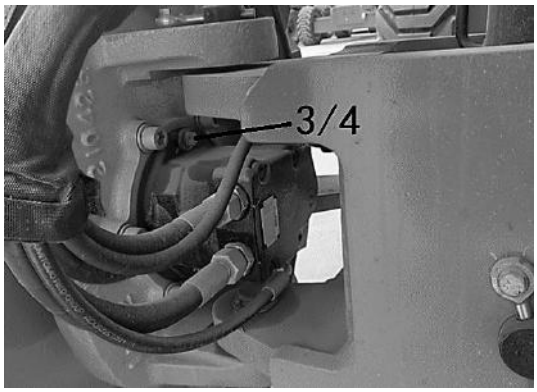
Note: The connection method of right steering connecting disc with the reducer is

the same.

3.9.6 Subassembly of walking motor



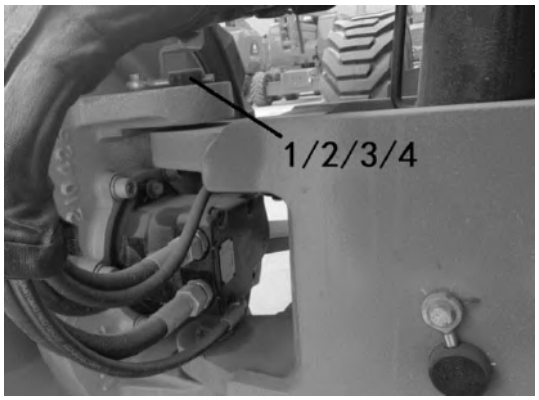
1. O-ring 2. Walking motor



3. Bolt 4. Washer

1) Take off the plug on the part 2, assemble the part 1, hoist motor to the assembly position of the front axle reducer, with the parking oil port of motor aligned with the parking oil port of reducer, and then assemble the part 2 to the steering connecting disc with the part 3 (coated with adhesive)/4.

3.9.7 Assembly of steering connecting disc



1. Front axle wheel hub connecting shaft 2. Pin 3. Bolt 4. Washer

1) Hoist the subassembled steering connecting disc to the assembling position on front axle, and assemble the wear washer on the lower contact surface between the connecting plate and the front axle weldment.

2) Insert the part 1 from top to bottom, and for the lower part, insert from bottom to top. Adjust the position of the pin. Use the part 3/4 (coated with adhesive)/5 to fix it, and use the retainer ring to fix the other end of the part 1.

3.9.8 Removal of the reducer

CAUTION:

When removing the hose assembly or joint, always replace the O-ring at the joint and / or hose end (if equipped). All connections must be tightened to the specified torque during installation. See the lifting platform specification for selection of tightening torque.

1) Secure the rotary table with a rotary table rotary lock to prevent it from turning.

2) Raise the bridge by 5 cm. Place the bracket under the chassis for support.

3) Mark, disconnect and plug the hydraulic hose of the walking reducer. Cover the joint on the reducer.

WARNING: Risk of personal injury.

Sprayed hydraulic oil may penetrate and burn the skin. Loosen the hydraulic connection very slowly, allowing the oil pressure to relieve gradually. Prevent the oil from spraying.

4) Loosen the wheel nut, remove the wheel and place it in the specified position.

5) Fix the sling connected to the crane to the reducer, and ensure that the connection is firm and reliable.

6) Remove the upper and lower pin fasteners of the steering connecting disc and remove the steering connecting disc.

7) Remove the walking motor.

8) Be careful to remove the walking reducer assembly from the machine.

DANGER: Risk of rollover

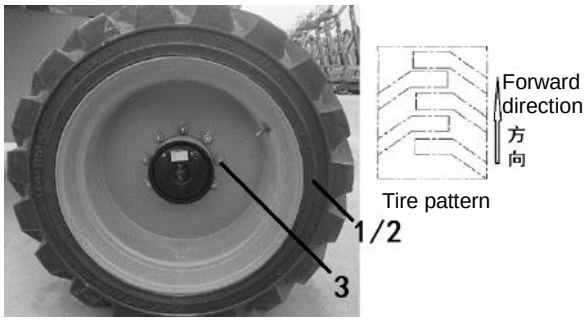
If the rotary table rotary lock is not locked, the rotary table may rotate unexpectedly

when the rotary table rotation assembly is being removed.

⚠WARNING: risk of crushing

When removing the fixing part of the steering connecting disc, it may fall due to unbalanced fixing.

3.9.9 Assembly of wheel



1. Tire (left) 2. Tire (right) 3. Nut

1) Hoist the part 1/2 with the traveling crane, adjust the tire angle, make the wheel bolt hole aligned with the walking reducer bolt, push the part 1/2 horizontally and fit it tightly, and pre-tighten it with part 3 (apply thread locking adhesive before pre-tightening of part 3); Tighten all nuts diagonally.

3.9.10 Removal of wheel

1) without removing. without removing.

2) Block the non-steered wheel and place a jack with sufficient load under the axle to raise the machine by 15 cm and place a cushion block under the chassis to support it.

⚠CAUTION: Risk of crushing.

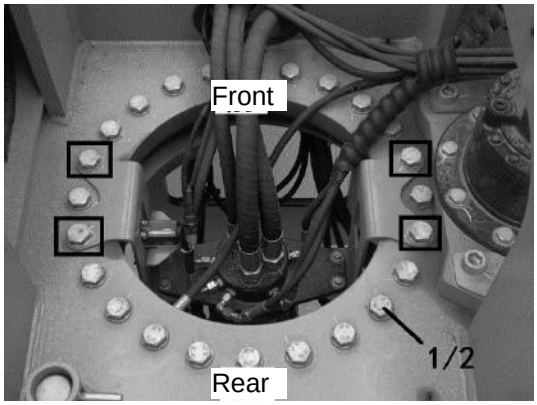
If not supported properly, the machine may fall.

3) Remove wheel nut. Remove wheels.

4) Remove hub.

3.10 Assembly of rotary table

3.10.1 Lowering and assembly of rotary table



1. Bolt 2. Washer

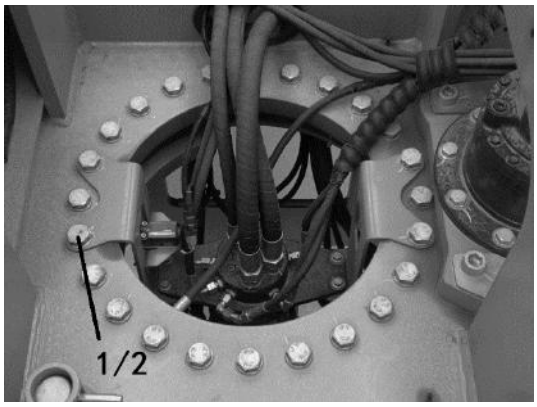
1) Use sling to hoist rotary table to the main line.

2) Assemble the locating bolt into the slewing ring mounting hole, adjust the rotary table position to be parallel to the chassis with the rotary table mounting hole aligned with the locating bolt, and open the rotary table dowel pin.

3) Use part 1 (coated with adhesive) /2 from top to bottom through the mounting hole of the rotary table, use the tool to tighten part 1 diagonally, lift the dowel pin of the rotary table after assembly.

CAUTION: Reserve mounting holes at marked positions.

3.10.2 Lowering and assembly of center slewing joint



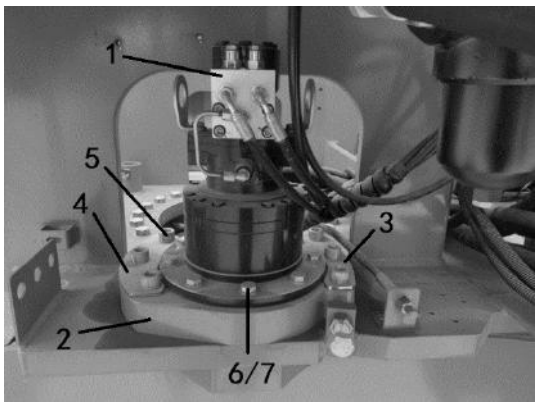
1. Bolt 2. Washer

1) Move the center slewing joint to the main line.

2) Use the sling to hoist the center slewing joint to the installation position at the center of the rotary table, with the support plate on the center slewing aligned with the reserved mounting hole of the rotary table.

3) Insert part 1 (coated with adhesive)/2 into the mounting hole from top to bottom and fasten them diagonally.

3.10.3 Lowering and assembly of slewing reducer



1. Slewing reducer assembly 2. Slewing mechanism adjusting plate

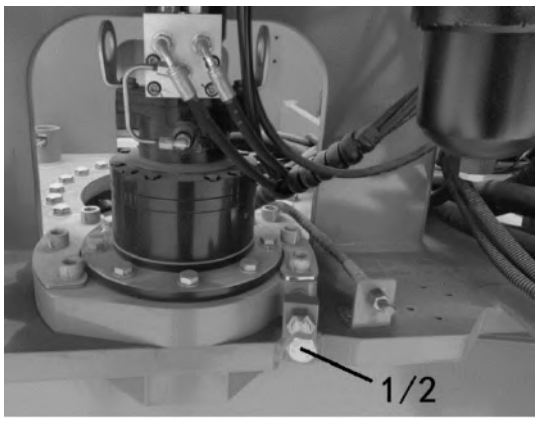
3. Adjusting shim 4. Adjusting shim 5. Screw

6. Bolt 7. Washer

1) First place the part 2 at the installation position on the right rear side of the rotary table, place the part 4 at the rear end of the upper side of the part 2, and place the part 3 at the front end, and then insert the part 5/6 from top to bottom (apply adhesive and pretighten).

2) Lift part 1 with a sling, rotate the rotary table to make the valve block of the slewing reducer face the inner side gear and mesh with the highest part of the slewing bearing gear, and fix part 1 to part 2 with part 6 (coated with adhesive) / 8.

Gear clearance: 0.2-0.3 mm



1. Bolt 2. Nut

3) At the gear meshing place, insert the brass sheet, assemble parts 1/2 to the position shown in the figure, adjust the gear clearance by rotating the part 1, and fasten the part 1 with part 2 after the clearance adjustment is completed.

3.10.4 Removal of slewing reducer

⚠ CAUTION:

When removing the hose assembly or joint, always replace the O-ring at the joint and / or hose end (if equipped). All connections must be tightened to the specified torque during installation. See the lifting platform specification for selection of tightening torque.

1) Secure the rotary table with a rotary table rotary lock to prevent it from turning.

2) Remove the securing fastener of the engine hood. Remove the engine hood from the machine.

3) Mark, disconnect and plug the hydraulic hose of the slewing reducer. Cover the joint on the reducer.

⚠ WARNING: Risk of personal injury.

Sprayed hydraulic oil may penetrate and burn the skin. Loosen the hydraulic connection very slowly, allowing the oil pressure to relieve gradually. Prevent the oil from spraying.

4) Loosen slewing mechanism adjusting plate and adjusting bolt.

5) Connect the sling of the crane or other suitable lifting devices to the slewing reducer.

6) Remove the fixing screws of the slewing reducer. Carefully remove the slewing reducer assembly from the machine.

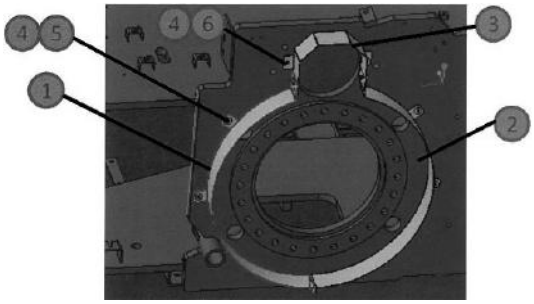
⚠ DANGER: Risk of rollover

If the rotary table rotary lock is not locked, the rotary table may rotate unexpectedly when the rotary table rotation assembly is being removed.

⚠ WARNING: risk of crushing

The slewing reducer may fall when removed from the machine.

3.10.5 Assembly of slewing mechanism guard plate

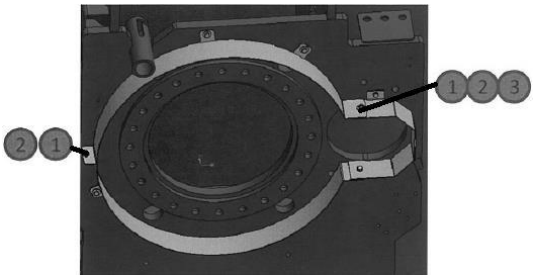


1. Left slewing guard plate 2. Right slewing guard plate

3. Slewing reducer guard plate 4. Bolt 5. Washer 6. Washer

1) Assemble part 1/2 to the lower side of the rotary table with part 4/5.

2) Assemble part 3 to the lower side of the rotary table with part 4/6.



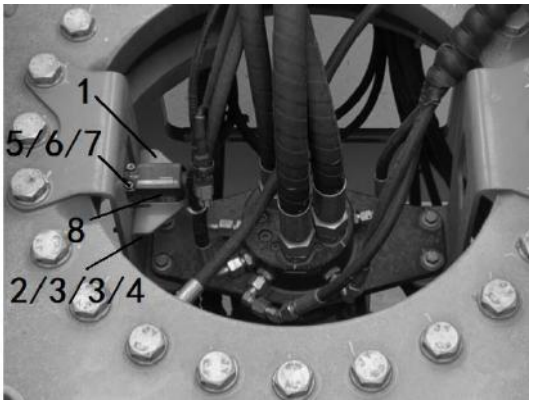
1. Bolt 2. Washer 3. Washer

3) Use part 1 (from inside to outside)/2/3 to fix the left/right guard plate with the slewing guard plate.

4) Use part 1 (from left guard plate to right guard plate)/2 to secure the left/right guard plate together.

3.11 Other component

3.11.1 Assembly of travel switch

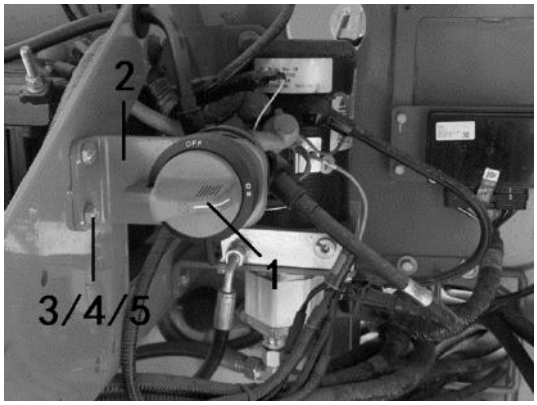


1. Travel switch mounting plate 2. Nut 3. Washer

4. Bolt 5. Screw 6. Washer 7. Nut 8. Travel switch

1) Assemble part 1 to the left bracket of center slewing joint with part 2 / 3 / 4, and install part 8 to part 1 with part 5 / 6 / 7.

3.11.2 Assembly of DC power switch



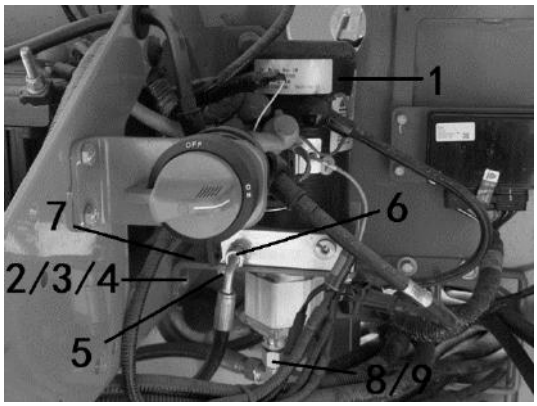
1. DC power switch 2. Power switch bracket

3. Washer 4. Nut 5. Bolt

1) Subassemble part 1 and part 2, and fasten them to the battery carrier with part 3/4/5.

2) Turn the switch to OFF.

3.11.3 Assembly of emergency power unit



1. Emergency power unit 2. Bolt 3. Washer 4. Nut 5. Bolt

6. Straight joint 7. Emergency power unit mounting bracket

8. Straight joint 9. Tee fitting

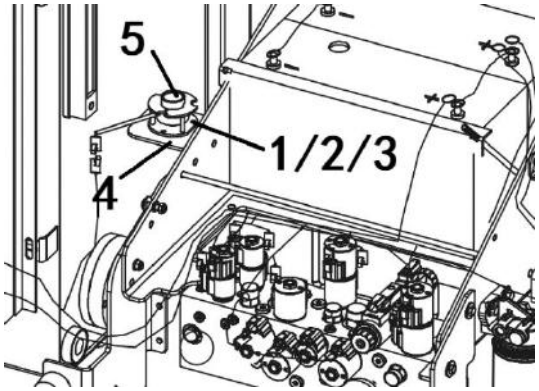
1) Use part 2/3/4 to install the part 7 to the right side of the battery bracket.

2) Use part 5 to install part 1 to part 7.

3) Assemble part 6 to the emergency power unit port P.

4) Install part 8/9 to the oil suction port at the bottom of the emergency power unit.

3.11.4 Assembly of tilt sensor



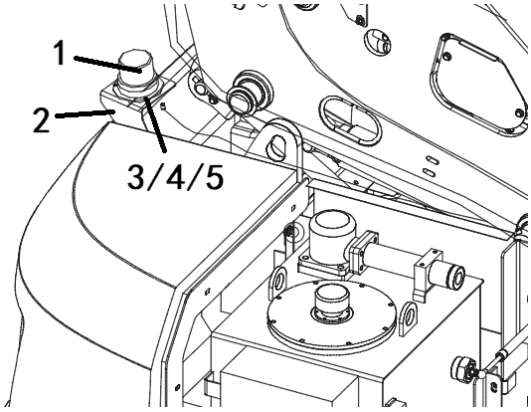
1. Bolt 2. Washer 3. Nut 4. Tilt sensor bracket

5. Tilt sensor

1) Fit part 5 with part 1/2/3 to the part 4 and secure the tilt sensor bracket to the battery carrier.

Note: the zero point of sensor faces outward after assembly.

3.11.5 Warning lamp assembly



1. Warning lamp 2. Right flasher light mounting plate 3. Screw

4. Washer 5. Nut

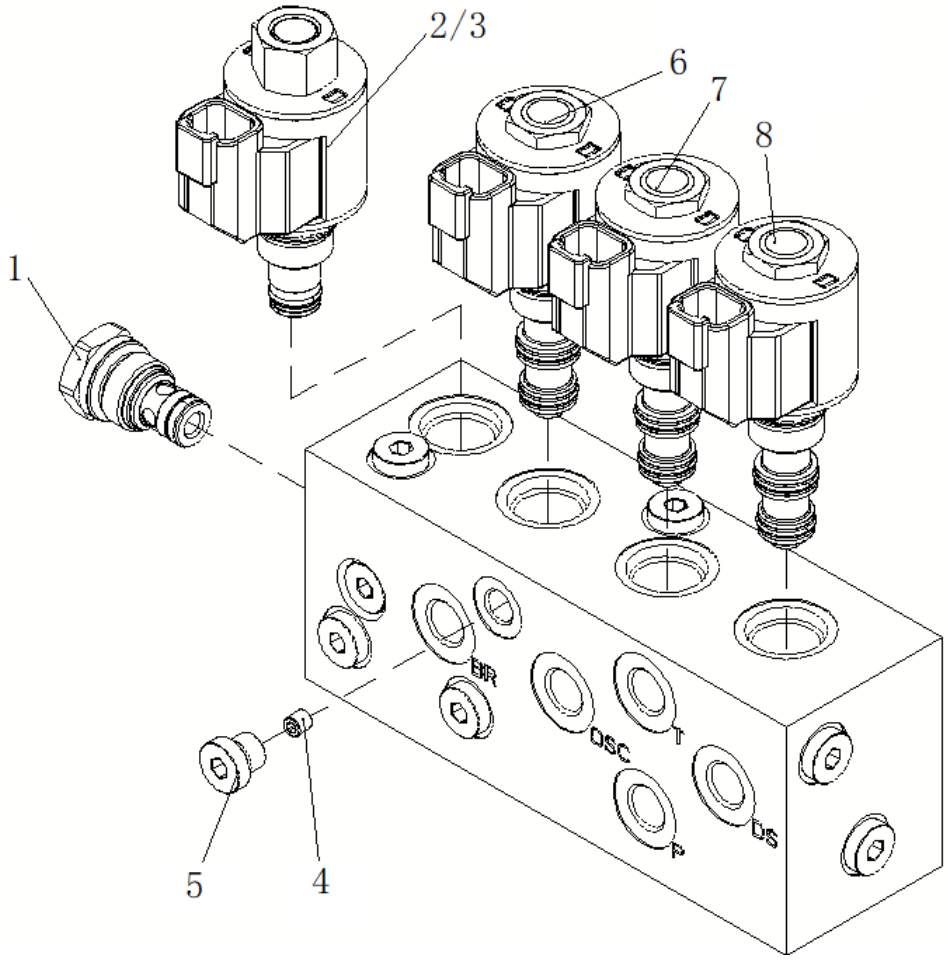
1) Assemble part 1 to part 2 with part 3/4/5.

2) Assemble the subassembled warning lamp to the rotary table counterweight end.

3) Connect the warning lamp harness firmly.

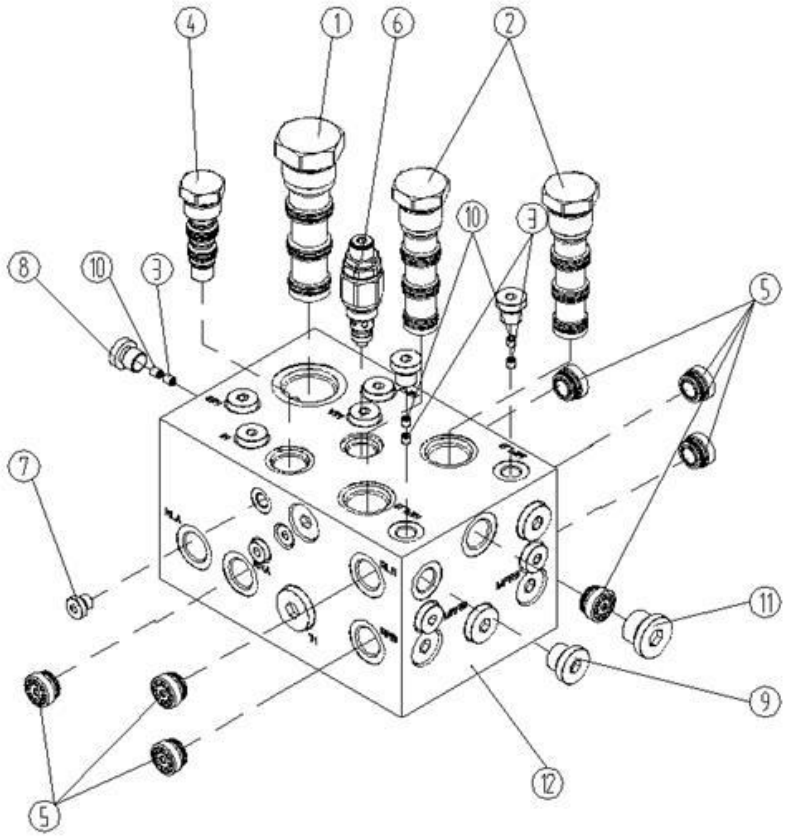
3.12 Valve

Brake two-speed flowing control valve block (4120705252)



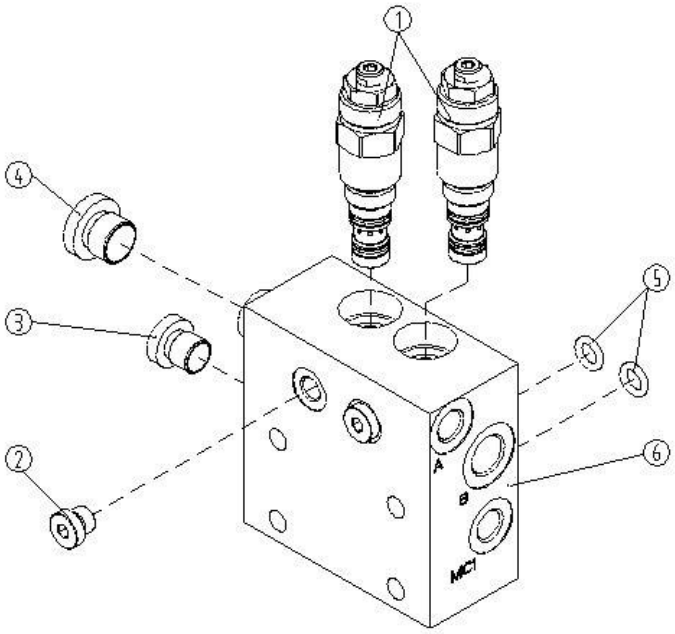
S/N	Name	Function descriptions	Torque N•m
1	Check valve STCV08-0-000A	Prevent backflow of brake fluid to port P	40-45
2	Reversing valve SV08-21-0-N-0	Pressure relief of floating mechanism	32-35
3	Coil 4303612	/	4
4	M6 damping STTY002-0.6	Control the brake fluid return speed	5
5	Plug 4BN-02WD	/	11-12
6	Reversing valve SV08-35-0-N-0	Brake action control	27.1
7	Reversing valve SV08-35-0-N-0	Floating action control	27.1
8	Reversing valve SV08-35-0-N-0	Two-speed action control	27.1

Walking control valve (4120704651)



S/N	Name	Function descriptions	Torque N•m
1	Flow diverter/combiner valve FD56-45-0-P-66	Flow control of front and rear axle	133-138
2	Flow diverter/combiner valve FD52-45-0-P-66	Flow control of left and right wheel	99-104
3	M6 damping STTY002-1.0	Control the flow rate	5
4	Flush valve HS50-43-0-P	Flush the low-pressure side of circuit	33-35
5	Check valve CVD0.G12.0N.000	Ensure one-way flow of hydraulic oil	10
6	Relief valve RVC0.S08.0Y.000	Limit the flushing overflow pressure	40-45
7	Plug 4BN-02WD	/	11-12
8	Plug 4BN-04WD	/	25-28
9	Plug BN-06WD	/	41-48
10	Damping STTY002-2.5	Control the flow rate	5
11	Plug 4BN-08WD	/	72-82

Floating balance valve (4120705253)



S/N	Name	Function descriptions	Torque N•m
1	Balance valve C02AD350155300A	Balance hydraulic oil on both sides	30
2	Plug 4BN-02WD	/	11-12
3	Plug 4BN-04WD	/	25-28
4	Plug 4BN-06WD	/	41-48
5	O-ring 10.77*2.62	/	-

3.13 Bleeding of cylinder

1) Start of vehicle

2) After checking and confirming the "Ignition switch", start the ground control mode;

3) Start the machine and run it at a low speed.

Precautions:

1. Be careful when the machine is bleeding, and avoid too large action range;

2. Apply ground control system for operation in priority.

3.13.1 Bleeding of walking variable displacement pump and gear pump

1) Shift to "Creep" gear and start the machine to keep the walking variable displacement pump and gear pump running at low speed for 1~2 minutes.

3.13.2 Bleeding of slewing reducer

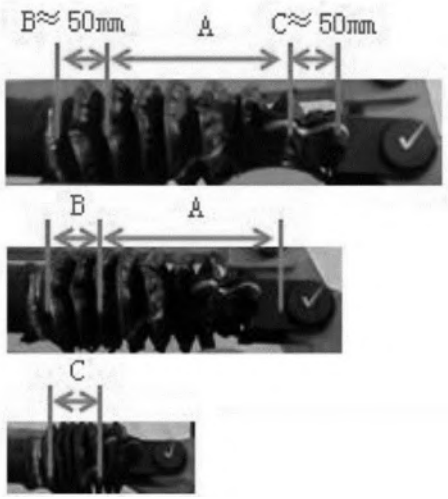
1) Keep "Creep gear", turn on the rotary table slewing button, and do left and right slewing action for 1~2 minutes. Control the swing amplitude of the machine appropriately to ensure safety.

3.13.3 Bleeding of walking motor

1) Adopt the platform control mode, and switch to the "Creep" gear;

2) Operate the machine to make it move back and forth under no-load status for 1~2 minutes.

3.13.4 Bleeding of steering cylinder



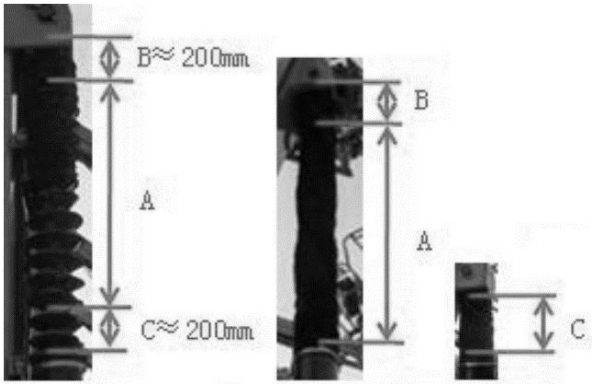
1) Adopt the platform control mode, switch to the "Creep" gear;

2) Turn on the steering button, manipulate the machine to do left and right steering actions, and divide the steering cylinder into three parts, as shown in the figure above. One extension and retraction of piston rod is counted as one time. The steps are as follows:

Step 1: Operate the machine to make the steering cylinder piston rod move slowly in area A for 5 times;

Step 2: Operate the machine to make the steering cylinder piston rod move slowly for 2 times to the minimum (C) travel and maximum (B) travel;

3.13.5 Bleeding of boom luffing cylinder and lower leveling cylinder



1) Enable "high-speed" gear to keep the machine in high-speed status;

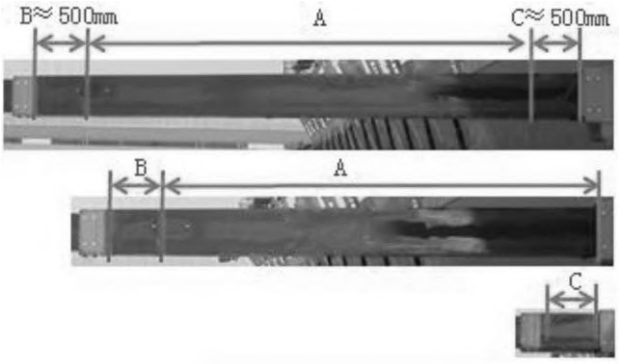
2) Turn on the boom lifting/lowering button, operate the machine to make boom luffing cylinder telescopic extend/retract, and divide the boom luffing cylinder into three parts. One extension and retraction of piston rod is counted as one time.

The steps are as follows:

Step 1: operate machine to slowly move the boom luffing cylinder piston rod 5 times in area A;

Step 2: operate machine to slowly move the boom luffing cylinder piston rod twice in the minimum (C) and maximum (B) travel areas, and in area C, the boom moves from the lowest point to the boom frame horizontal position.

3.13.6 Bleeding of boom telescopic cylinder

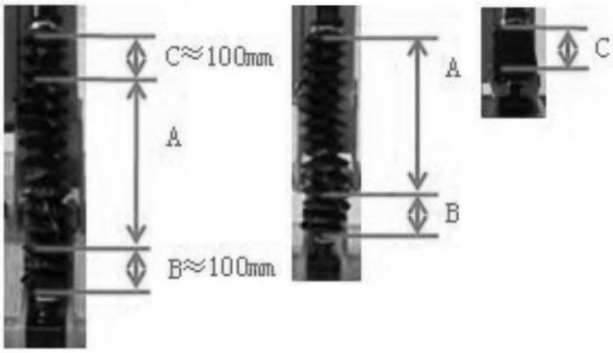


1) In boom frame subassembly area, turn on HCU button to carry out the bleeding of boom telescopic cylinder ;

2) Divide the boom luffing cylinder into three parts, and take the 1st boom section as reference, as shown in the figure. Bleeding procedure and requirements are the same as "Boom luffing cylinder bleeding" operation;

3) After the assembly of the machine is completed, repeat the bleeding action of the boom telescopic cylinder twice in areas A, B, C respectively;

3.13.7 Bleeding of fly jib luffing cylinder and upper leveling cylinder



1) Turn on fly jib luff-up button to carry out the bleeding of fly jib luffing cylinder and upper leveling cylinder;

2) Based on the fly jib luffing cylinder, it is divided into three parts, as shown in the figure. Bleeding procedure and requirements are the same as the boom luffing cylinder bleeding operation.

3.13.8 Bleeding of platform swing cylinder

1) Turn on platform rotation button, do left and right slewing action for 1~2 minutes, and ensure that the swing amplitude of the machine is not be too large for the sake of safety.

3.13.9 Bleeding of floating cylinder

1) Connect the exhaust pipe to the pressure tap and insert the return pipeline into the hydraulic oil tank cover.

2) Drive the machine through a 4.5 ° slope, and go up and down the slope with a single wheel to complete 3 cycles.

3) Keep the vehicle on the slope for 2-3 min and observe the status of the hydraulic oil.

Control standard: the hydraulic oil in the exhaust pipe flows out in a columnar shape without obvious bubbles.

Chapter V Commissioning

4.1 Safety notices

Before commissioning, commissioning personnel is required to read operation and maintenance manual to be familiar with relevant safety protections and basic operation requirements, and shall be particularly familiar with the following safety notices:

1. It is strictly forbidden for alcoholics, drug users and people taking anti-reaction drugs to approach and operate machine;
2. Before operation, please ensure that PPEs, such as safety helmet, safety harness (five-point type), safety shoes, etc., are wore and in good status;
3. Do not operate the machine when the engine hood is open. Before starting the engine, confirm the peripheral environment of the machine to ensure that the engine is not under manual operation to avoid danger due to engine start. This will not be repeated in the following part of the manual.
4. Sound the horn before the machine action to ensure that there are no people or obstacles around it, so as to avoid personal injury to others and themselves, and damage to machine or obstacles. Other people are not allowed to operate the vehicle during commissioning;
5. The machine is not insulated, and does not provide shock protection in contact with or near wire, power supply or electrical equipment.

Please maintain an adequate safe distance with the wire, power supply and power equipment in accordance with applicable laws and regulations as well as the specifications in the table below.

Voltage	Safe distance required
0 V ~ 50 KV	3.05m（10.0ft）
50 V ~ 200 KV	4.60 m（15.09ft）
200 V ~ 350 KV	6.10 m（20.01ft）
350,V ~ 500 KV	7.62 m（25ft）
500 V ~ 750 KV	10.67 m（35.0ft）
750 V ~ 1000 KV	13.72 m（45.01ft）

If the machine comes into contact with a live wire, keep away from the machine immediately. Before cutting off the wire power supply, it is not allowed for the personnel to contact or operate the machine. Do not operate or use the machine in case of lightning or storm.

6. Do not raise the arm rod when the wind speed may exceed 12.5 m/s. If the wind speed exceeds 12.5 m/s after the arm rod is raised, the arm rod shall be lowered and the machine shall not be operated;
7. The machine shall not be operated in case of strong wind or gust. Do not increase the surface area of the platform or load. Increasing the area exposed to the wind will reduce the stability of the machine;
8. When the platform is caught or stuck, or other nearby objects hinder its normal movement, do not use PCU box to operate the machine. If you intend to use the GCU box to operate the machine, it should be operated after all personnel leave the platform;
9. With boom stowed, be careful when driving the machine gravel, unstable or smooth surface, near the opening or steep slope, etc. and slow down;
10. Do not sit, stand or lie on platform guardrail. Stand steadily on the platform base plate at all times.

4.2 Commissioning process

4.2.1 Pick-up inspection

1) After receiving the vehicle, pick-up inspection is carried out on the machine to be tested according to the machine checklist: basic information, machine appearance, machine configuration, oil and water volume, electric part, etc. For specific content, refer to checklist of straight-arm lifting platform - pick-up inspection column; Any problems should be recorded in time.

2) The following electric parts should be checked carefully: Ignition switch, emergency stop button, ground control system button, PCU control button, and foot switch.

Inspection standard: effective for use;

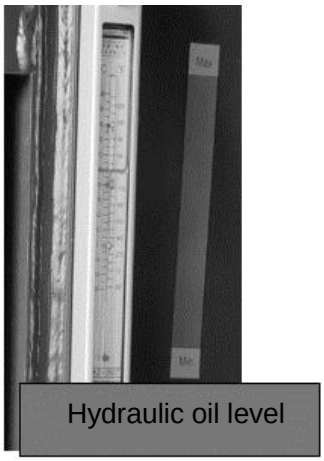
4.2.2 Liquid level detection

1) Fuel level

Control standard: The fuel level is displayed on the screen of the lower control panel through the sensor, and a level above 50% is enough.

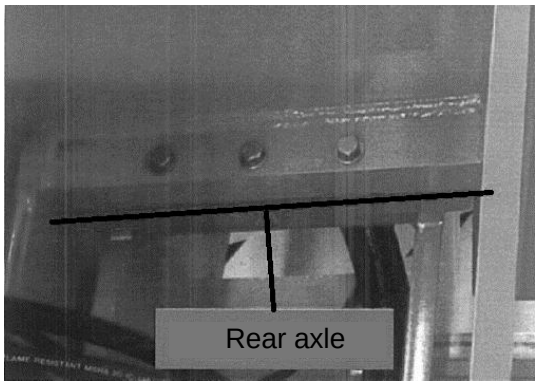
2) Hydraulic oil level

Control standard: the pointer of hydraulic oil level gauge is located at 1/2-2/3 of the level gauge.



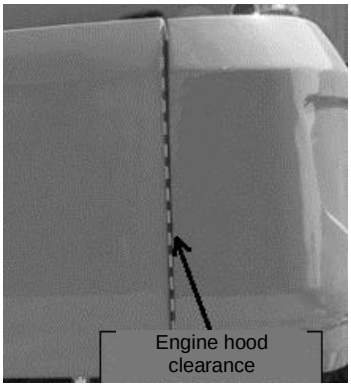
4.2.3 Clearance detection

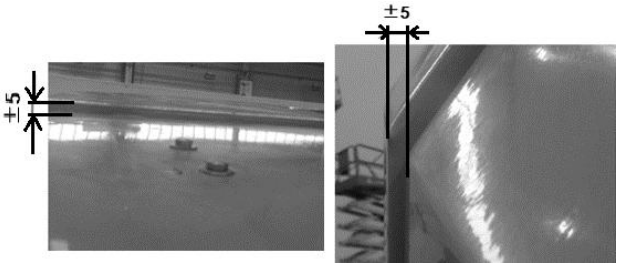
1) Rear axle clearance



Control standard: rear axle floating clearance is 0-0.5 mm.

2) Engine hood clearance



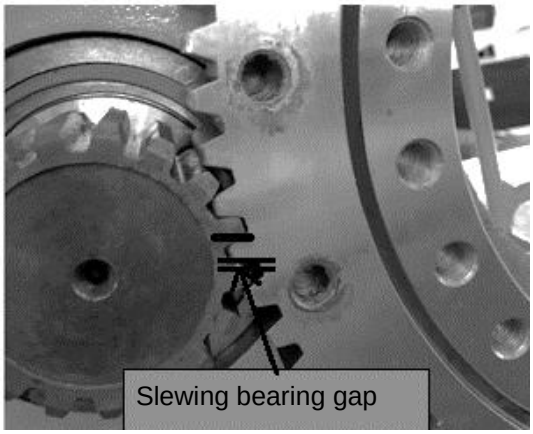


Control standard: upper and lower clearance of counterweight and engine hood: 4-10 mm

Height difference between counterweight and engine hood: ±5 mm

Flush between counterweight and engine hood: ±5 mm

3) Slewing ring and slewing motor gear backlash:



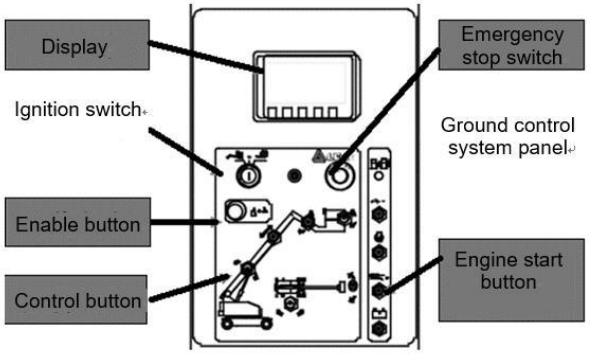
Select a pair of tightly-contacted gears and check the clearance with feeler gauge.

Control standard: 0.2-0.3 mm, optimal range: 0.23-0.28 mm.

If the clearance has been confirmed by the process inspector, no re-measurement is required.

4.2.4 Start test

1) Ignition switch:



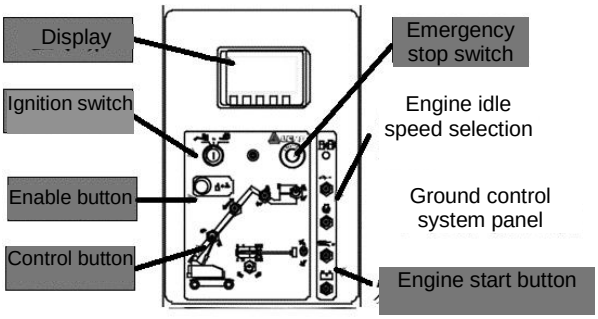
Insert the key into the ignition switch socket, turn to "platform control mode", and then the flasher light flashes, the screen goes on, and the PCU will run; Turn the ignition switch to the OFF position, the machine will be shut down, the flasher light will be turned off, and the screen will go out; Turn the ignition switch to "ground control mode", the flasher light flashes, the screen is on, and the GCU will run;

Control standard: effective during use

If there is no operation for more than 5 minutes, the display will automatically enter the sleep

status. At this time, the display will turn black, but any operation of the vehicle will not be affected. To restore the working state, press the F5 button. As shown at the bottom of the screen below, the buttons are numbered as F1, F2, F3, F4 and F5 from left to right.

2) Engine start button:



Toggle the engine start button and the engine starts smoothly without abnormal noise.

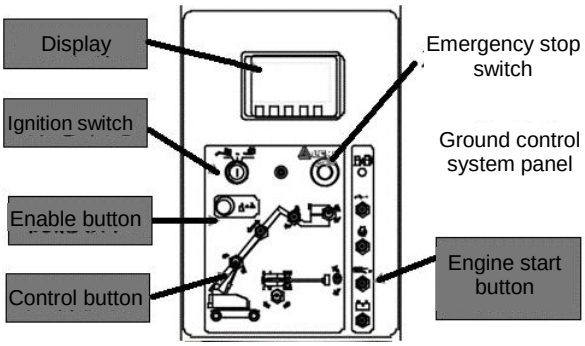
Control standard: effective use and compliance with requirements;

3) Engine high and low speed test (D2.9 L4 T4f):

At a low speed (low speed of 1,500 r/min), engine runs stably without abnormal sound (engine idle speed status); at a high speed (high speed of 2,500 r/min), engine runs stably without abnormal sound (switch to "High idle speed" gear)

Control standard: in compliance with the requirements

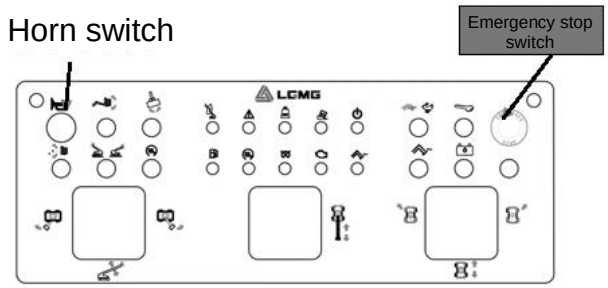
4) Emergency stop switch:



Press the emergency stop switch of the ground control system, turn the engine start button, and the engine cannot be started; Pull the emergency stop switches of PCU and GCU out and toggle the engine start button, and the engine starts normally; Only press the emergency stop switch of platform control unit and toggle the engine start button, and the engine starts normally; When the engine is under working status, press the emergency stop switch and let the engine shutdown to stop work.

Control standard: in compliance with the requirements

5) Horn switch



Press the horn button after power on, and the horn will sound;

Control standard: effective

4.2.5 Basic operation test of GCU

Enable switch test:

Press and hold the enable button and press the engine start button, and the engine cannot be started;

With the enable button not pressed, press the engine start button, and the engine will start normally;

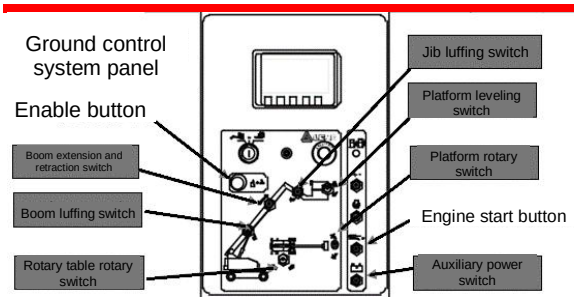
With engine in normal operation, and the enable button not pressed, push the buttons of each function, and each function of the machine does act;

With engine in normal operation, press and hold the enable button and push each function button, and each function of the machine acts normally;

With engine in normal operation, push a certain function button, and then press and hold the enable button, and this function of the machine makes no action

CAUTION:

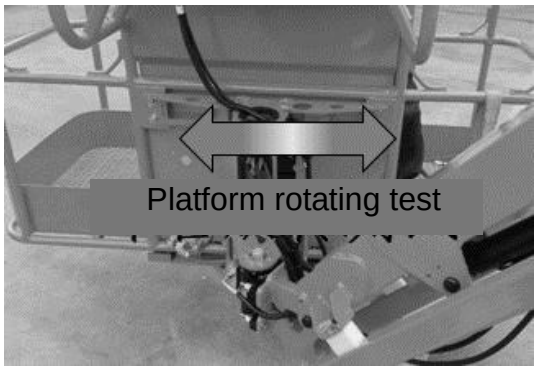
1. **Commissioning is required to be performed by special personnel. During the commissioning period, other personnel than the commissioning personnel shall not operate the vehicle.**
1. **Each action shall be commissioned separately, and two or more action shall not be commissioned at the same time.**
1. **The commissioning time of each action is 3-5 s. The action shall be visible without the aid of visual assistance tools, and shall stop immediately in case of an effective operation.**
1. **After each commissioning action is completed, the buttons and switches return to their original positions.**



GCU basic action test

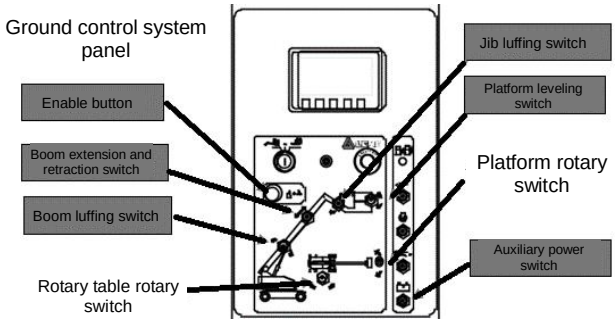
Turn the key to the ground control mode, turn on the emergency stop switch, start the engine, and press and hold the enable button.

1) Platform rotation:

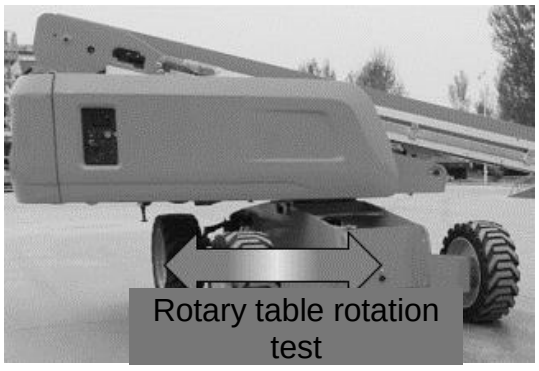


When you move the platform rotary switch to the right, the platform will rotate to the right without jitter, abnormal sound or impact;

When you move the platform rotary switch to the left, the platform will rotate to the left without jitter, abnormal sound and impact;



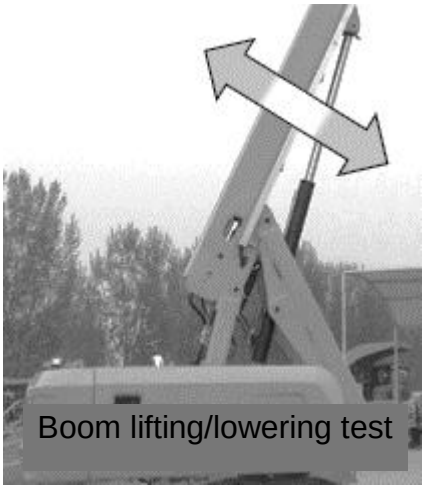
2) Rotary table rotation:



When you turn the rotary table rotary switch to the right, the rotary table will rotate to the right without jitter, abnormal sound or impact;

When you turn the rotary table rotary switch to the left, the rotary table will rotate to the left without jitter, abnormal sound and impact;

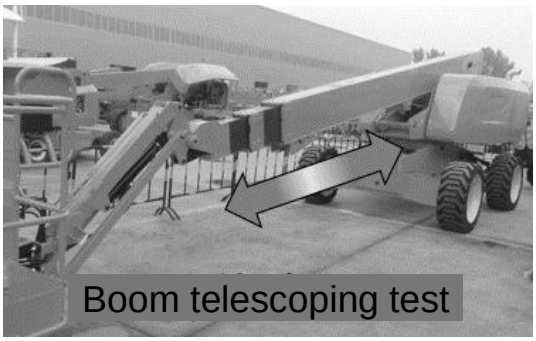
3) Boom luffing:



When you move the boom luffing switch upwards, the boom luffs upwards without shaking, abnormal sound and impact;

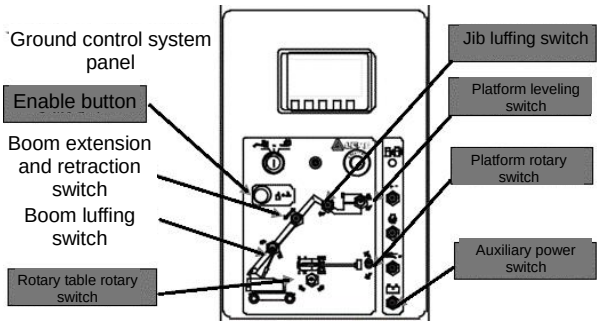
When you move the boom luffing switch downwards, the boom luffs downwards without shaking, abnormal sound and impact;

4) Boom telescoping:

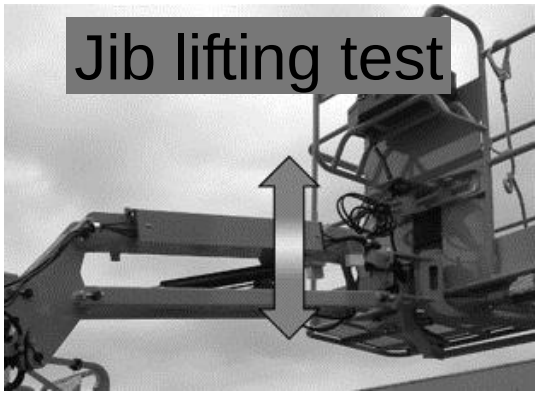


When you move the boom extension and retraction switch upwards, the arm rod extends without shaking, abnormal sound and impact;

When you move the boom extension and retraction switch downwards, the arm rod retracts without shaking, abnormal sound and impact;



5) Jib lifting:



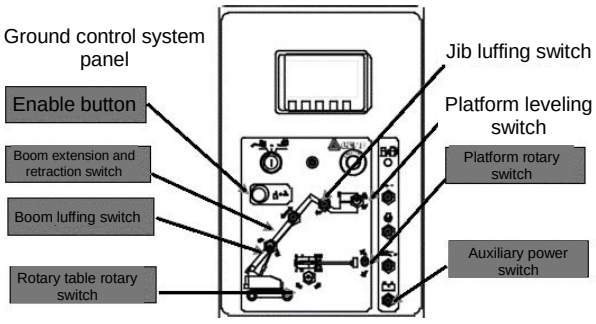
When you move the jib luffing switch upwards, the jib will be luffed upwards without shaking, abnormal sound and impact;

When you move the jib luffing switch downward, the jib will be luffed downward without shaking, abnormal sound and impact;

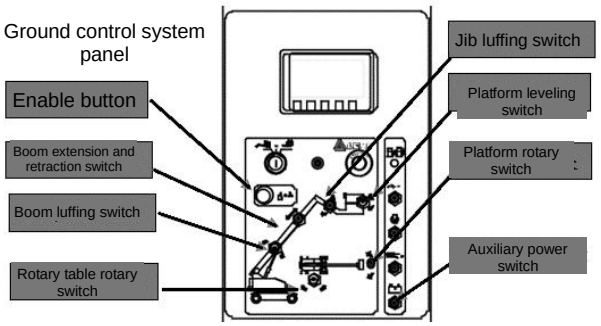
6) Platform leveling:

Pull the platform leveling switch upward, and the platform plane will rise without shaking, abnormal sound and impact;

Pull down the platform leveling switch, and the platform plane will lower without shaking, abnormal sound and impact;



7) APU:



When the engine is not working, turn the key to the ground control mode, turn on the emergency stop switch, and toggle the auxiliary power switch.

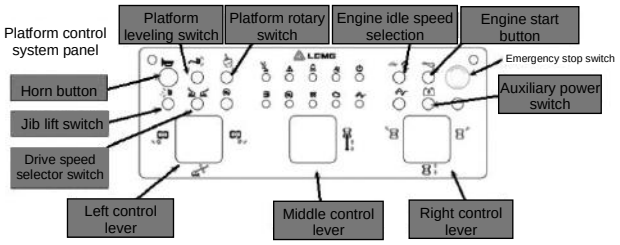
Repeat all the above actions, and check that all actions are normal.

CAUTION:

1. **To save battery electric energy, please test each function in part of the cycle;**
2. **The drive and steering functions shall not work with the emergency supply;**
3. **All arm rod functions can only act to the direction of the safety landing of the workers.**

4.2.6 Basic operation test of platform control unit

1) Emergency stop switch:



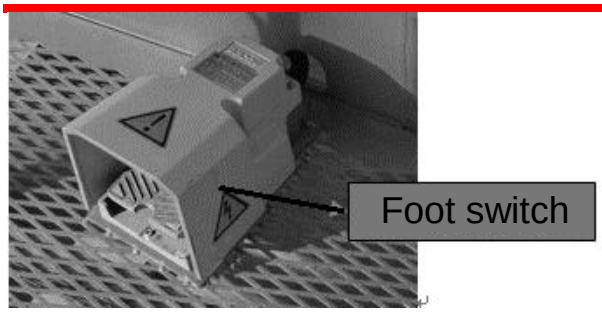
Press the emergency stop switch and toggle the engine start button, and the engine cannot be started;

Pull the emergency stop switches of PCU and GCU out and toggle the engine start button, and the engine starts normally;

Press the emergency stop switch of platform control unit, pull the emergency stop switch of ground control unit out at the same time, toggle the engine start button, and the engine cannot be started;

Control standard: in compliance with the requirements

2) Foot switch:



Depress the foot switch and push the engine start button. The engine cannot be started.

Release the foot switch, push the engine start button. The engine starts normally.

With engine in normal operation status, release foot switch, push all function control levers, and all functions of machine do not act;

With engine in normal operation status, step on foot switch, push all the function control levers, and all functions of machine act normally;

Push a function control lever, then step on the foot switch. The machine makes no action for the function.

3) Horn button

Press the horn switch after power on, and the horn will sound.

Turn the key to the platform control mode, turn on the emergency stop switch, start the engine, and step on the foot switch

1) Platform leveling:

When you move the platform leveling switch upwards, the platform plane will rise without jitter, abnormal sound and impact;

When you move the platform leveling switch downward, the platform plane will lower without jitter, abnormal sound and impact;

Note: during the boom luffing process, adaptive leveling is available for the platform;

2) Platform rotation:

When you move the platform rotary switch to the right, the platform will rotate to the right without jitter, abnormal sound or impact;

When you move the platform rotary switch to the left, the platform will rotate to the left without jitter, abnormal sound and impact;

3) Jib luffing:

When you move the jib luffing switch upward, the jib will be luffing upward without jitter, abnormal sound and impact;

When you pull the jib luffing switch downwards, the jib will luff downward without jitter, abnormal sound and impact;

4) Rotary table rotation:

When you move the left control lever to the left, the rotary table will rotate to the left without jitter, abnormal sound and impact;

When you move the left control lever to the right, the rotary table will rotate to the right without jitter, abnormal sound and impact;

The slewing speed varies according to the control lever amplitude, which is slow when the amplitude is small, and vice versa.

5) Boom luffing:

When you move the left control lever forward, the boom luffs up without jitter, abnormal sound and impact;

When you move the left control lever backward, the boom luffs down without jitter, abnormal sound and impact;

The boom luffing speed varies accordingly according to the control lever amplitude, specifically, the luffing speed is slow when the amplitude is small, and vice versa.

6) Boom telescoping:

When you move the middle control lever forward, the boom retracts without jitter, abnormal sound and impact;

When you move the middle control lever backward, the boom extends without jitter, abnormal sound and impact;

The boom telescopic speed varies according to the control lever amplitude, which is slow when the amplitude is small, and vice versa.

7) Forward and backward:

When you move the right control lever forward, the vehicle moves forward without no obvious impact during start, and after the control is released, the vehicle is braked reliably;

When you move the right control lever backward, the vehicle moves backward with no obvious impact during start; release the control lever, and the vehicle is braked reliably;

The travel speed varies with the amplitude of the control lever. When the amplitude is small, the speed is slow, and vice versa.

8) Drive speed selector switch:

Push drive speed selector switch to realize high/low speed switching for travel speed

9) Engine idle speed selection:

If the foot switch is not pressed, the engine will

idle at the lowest speed. Turtle symbol: the low idle speed by the foot switch; Rabbit symbol: the high idle speed is activated by the foot switch.

10) Steering:

Press the left button of the right control lever to turn the front axle to the left;

Press the right button of the right control lever to turn the front axle to the right;

11) APU switch test

Turn the key to the platform control mode, turn on the emergency stop switch, and depress the foot switch (the engine is not started and there is no power).

Pull the auxiliary power switch to one side and repeat all the above actions.

Control standard: all boom functions should operate normally, and the driving function should not work with the auxiliary power supply.

4.2.7 Drive enable system test

Start the vehicle, and operate with platform control system;

1) Press down the foot switch, lower the arm rod to the stowed position, and rotate the rotary table until the arm rod moves for more than one non-steered wheel (two directions);

Control standard:

As shown in the following figure, the drive indicator lamp will be on as long as the arm rod is located within the rotation range in the above figure.

Move the drive control lever away from the center position and the driving function does not work.

2) Continuously pull the drive enable toggle switch to one side, and slowly move the drive controller lever to make it deviate from the center position so that the driving function can work normally.

Rotary table rotation

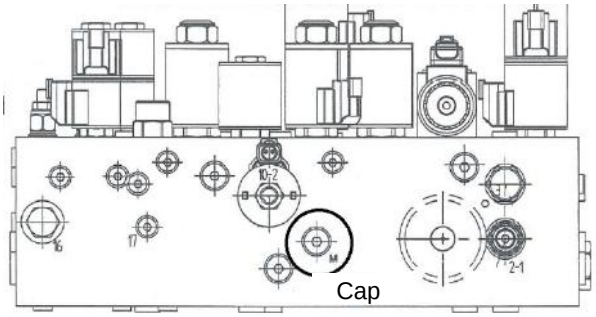
CAUTION: 1. when the drive system is used, the vehicle runs according to the opposite direction of driving and steering control lever movement;

2. Be careful during the rotation test.

4.2.8 Steering pressure test

1) Connect the pressure test joint to the boom function valve block test interface port.

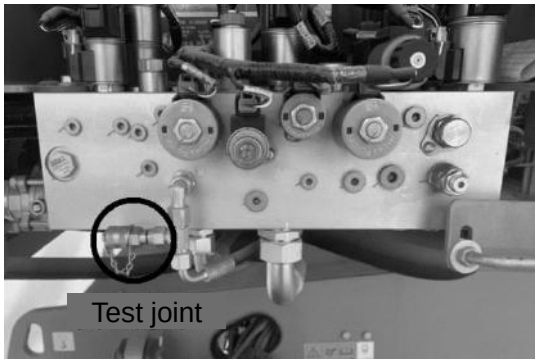
2) In platform control mode, press the enable button and steering control button at the same time to perform steering pressure build-up action (both the left and the right sides are tested) and observe the pressure gauge (two people need to work together to test, one person should observe the pressure gauge, and the other should perform steering pressure build-up).



3) If it does not meet the pressure control standard, open the cap for adjustment; Operate clockwise to increase pressure, and operate counterclockwise to decrease the pressure.

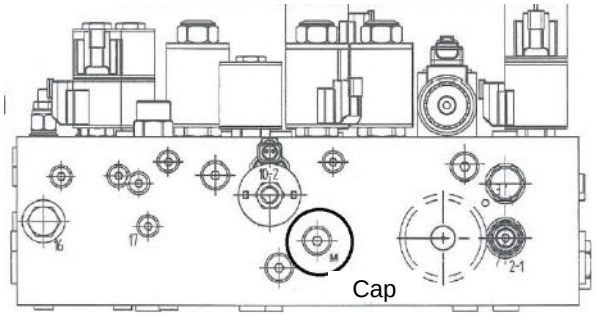
Control standard: 18-19MPa; The pressure value of 18.5 is optimal.

4.2.9 Slewing pressure test



1) Connect the pressure test joint with the pressure tap on the function valve block of the boom.

2) Adopt ground control mode, insert the pin for pressure build-up, press the enable button and the rotary table slewing control button at the same time for steering action (both the left side and the right side shall be tested), and observe the pressure gauge (two people are required for corporation, one to observe the pressure gauge, and the other to perform steering pressure build-up).



3) If it does not meet the pressure control standard, open the cap for adjustment; Operate clockwise to increase pressure, and operate counterclockwise to decrease the pressure.

Control standard: 14.5-15.5 MPa; Pressure of 15 is optimal.

4.2.10 Walking pump overflow pressure test

1) Remove the control valve pressure test joint plug and install the pressure test joint.

2) Connect the pressure gauge with the pressure tap;

3) Drive the machine for pressure buildup, and observe the walking pressure until the pressure gauge reaches the maximum value and keep it for 5 seconds. At this time, the value is the walking overflow pressure value, and record the pressure value;

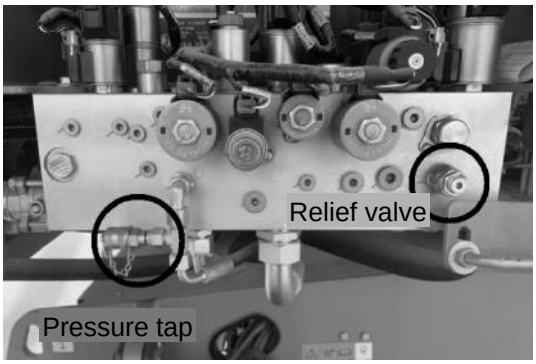
Control standard (pressure target value): 280-385 bar

4) If it does not meet the target value, correct it as follows:

Loosen the relief valve fastening nut, then increase or decrease the valve spool clockwise or counterclockwise with an Allen wrench according to the pressure condition. until the pressure meets the target value;

5) Keep the inner hexagonal position unchanged and tighten the relief valve fastening nut; Restore rocker arm to normal position.

4.2.11 Function pump overflow pressure test



1) Remove the control valve pressure test joint plug and install the pressure test joint.

2) Connect the pressure gauge with the pressure tap;

3) Lift the boom to the pressure buildup limit and observe the pressure until the reading of pressure gauge reaches the maximum value. At this time, the value is the function pump overflow pressure value, and the pressure value is recorded;

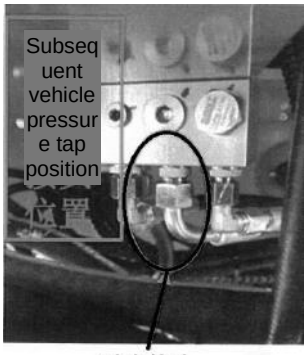
Control standard (pressure target value): 215-225 bar

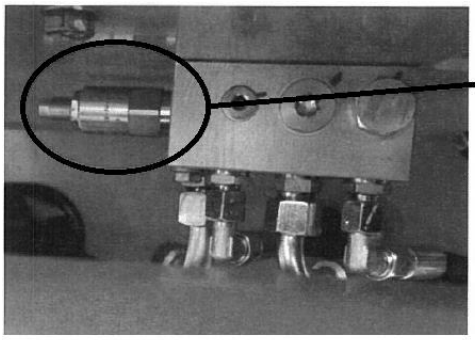
4) If it does not meet the target value, correct it as follows:

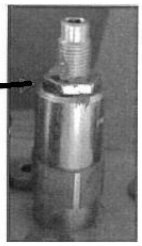
Loosen the relief valve fastening nut, then increase or decrease the valve spool clockwise or counterclockwise with an Allen wrench according to the pressure condition. until the pressure meets the target value;

5) Keep the inner hexagonal position unchanged and tighten the relief valve fastening nut; Restore rocker arm to normal position.

4.2.12 Floating test of machine







Pressure reducing valve

Floating function valve

1) Connect the pressure test joint to port A of the flowing control valve.

2) At the same time, press the enable button and boom luffing button for fly jib action, and observe the pressure on the floating function valve.

3) If it does not meet the control standard, a correction is required: operating clockwise to increase, and operating counterclockwise to decrease

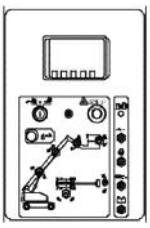
Control standard: 5.4-5.5MPa; The pressure value of 5.5 is optimal.

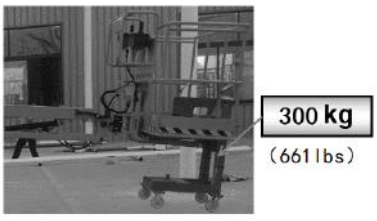
4.2.13 Calibration of rated load

1) With vehicle stopped, adopt the ground control mode, and follow the prompts to enter the system.

Calibrate the no-load of the machine as the platform is in no-load status.

Control standard: calibration is completed.

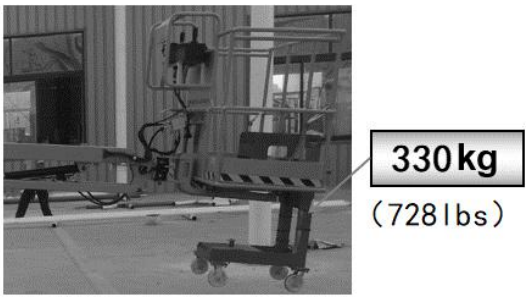




Place the rated load (300 kg) onto the working platform, with the safety harness connecting to the platform guardrail. Lift the fly jib to make the counterweight trolley 10-15 cm off the ground, and let it stay in a stable status to enter rated load calibration of system.

Control standard: calibration is completed.

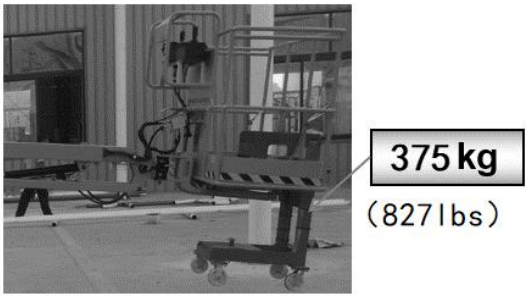
4.2.14 1.1 times rated load test



1) When the vehicle is in the stop status, place a weight of 1.1 times the rated load (330 kg) on the working platform and connect the safety harness to the platform guardrail.

Control standard: the indicator light is always on and the buzzer sounds. If the engine is overloaded under the running status at this time, the engine will shut down; If the engine is overloaded in a non-running status, the engine cannot be started. After removing the heavy objects until the standard weight is recovered, it returns to normal.

4.2.15 1.25 times load test



1) Place a weight of 1.25 times of the rated load (375 kg) on the working platform and connect the safety harness with the platform guardrail.

2) Push the emergency stop button on PCU and GCU to the ON position, turn the ignition switch to the ground control position, and control the vehicle on the ground.

3) Raise the boom and the fly jib respectively to make the platform reach the highest position, stay for 5 - 10 seconds when each boom part reaches the highest position, and check whether the vehicle has oil leakage, structural interference, and whether oil pipe/harness is squeezed or worn.

Control standard: The vehicle shall be free of oil leakage, structural interference, and the oil pipe and harness shall be free of squeezing and damage.

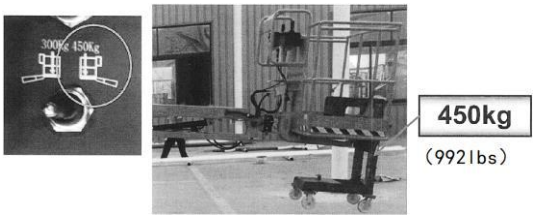
CAUTION: 1. Counterweight application safety harness is associated with the platform;

2. The commissioning is required to be performed by a special personnel, and other personnel are not allowed to walk or observe in the commissioning area.

4) Lift the platform to the highest position, use the laser range finder to measure the platform height, and wait for 60 seconds to confirm whether there is any change in the platform height. Wait for 15 min, then check the retraction of each hydraulic cylinder piston rod and the sinkage of lifting platform.

Control standard: The retraction of each hydraulic cylinder piston rod shall not exceed 5mm, and the sinkage of lifting platform shall not exceed 1% of the working platform height under this working condition.

4.2.16 Large rated load (450) test



1) Suspend a weight of 1.5 times rated load on the platform, and calibrate in the same method and operation process of the rated load;

2) Turn the "rated load mode selection switch" in the PCU assembly to the "450 kg" side;

3) Switch to the ground control mode, extend the boom frame (0°) horizontally to the "amplitude alarm" status, and check the "boom length" of the GCU display.

Control standard: boom length ≤ 16.06m (reference data);

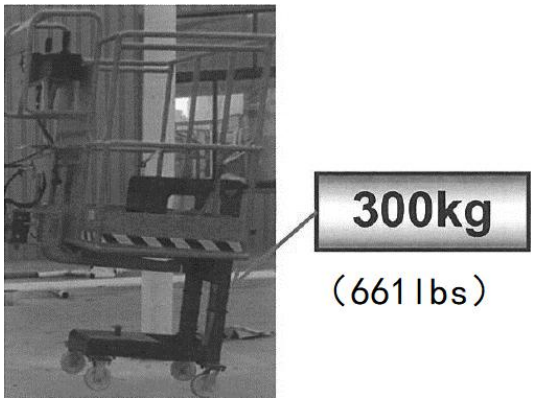
Distance reading

Timing

4.2.17 Settlement test

Caution: 1. Counterweight application safety harness shall be associated with the platform;

2. The commissioning is required to be performed by a special personnel, and other personnel are not allowed to walk or observe in the commissioning area.



1) Place the rated load of 300 kg on the working platform and connect the safety harness to the platform guardrail;

2) Push the emergency stop switch of PCU and GCU to the "on" position, turn the key to the GCU position, and control the vehicle on the ground.

3) Lift the boom and fly jib respectively to platform to the highest position, stay for 5-10 s when each boom part reaches the highest position, and check whether the vehicle has fluid leakage, structural interference, and oil pipe/harness squeezing and wear.

Control standard: the vehicle is free from oil leakage and structural interference, and the oil pipe and harness are free from squeezing and wear.

Distance reading

Timing

4) Raise the platform to the highest position, use the laser range finder to measure the platform height, wait for 60 s, confirm whether there is any change in the platform height, wait for 15 min, and detect the retraction of the hydraulic cylinder piston rod and the sinkage of lifting platform.

Control standard: the retraction of each hydraulic cylinder piston rod shall not exceed 5 mm, and the sinkage of lifting platform shall not exceed 1% of the working platform height, i.e. 0.218 m.

4.2.18 Lifting height test

1) Move the test vehicle to the horizontal ground in the test area, with load applied;

2) Use ground control mode to raise the platform to the highest point, adjust the level and measure the distance from the ground to the lower bottom surface of the platform with laser range finder;

Control standard (test target value): 21.8±0.218 (m);

Usage of laser range finder:

Distance reading

Press the upper red (MEAS) button on the laser range finder, align the laser spot with the bottom surface of the extending platform, and press the blue (Timer) button in the upper left corner of the laser range finder. Then press the red (MEAS) button one time, the height data will be displayed on the left and right screens for 5 seconds (adjustable);

CAUTION: The ground in the test area shall be solid and flat, the slope shall not be more than 1%, the ground shall not sag during the operation, and there shall be no obstacles around the straight-arm lifting platform that affect its lifting and slewing.

4.2.19 Operation time test

CAUTION:

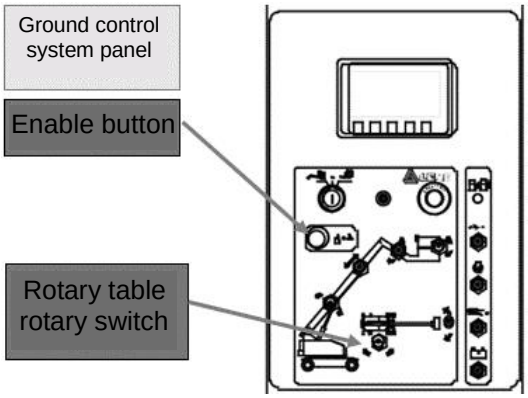
1. **The operation time test control standard is based on a fuel temperature of 40℃, and the time will be affected when the fuel temperature changes.**
2. **Test each action separately. After completion, stow each part to the original position, and then perform the next test.**

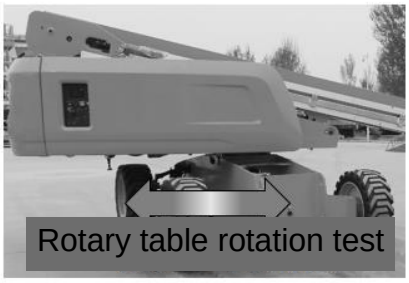
1) Operation time test—rotary table rotation

Start the vehicle, keep the in-situ status, and use ground control mode for test; Press and hold the enable button and rotary table rotary switch at the same time (to the left) to move the rotary table to the leftmost side; Then turn on the rotary table rotary switch in the opposite direction, rotate the rotary table, and start timing at the same time. When the rotary table rotates to the rightmost side, stop the rotary table and the timing.

Control standard: 78-86 s (stowed)

125-165 s (extended)





Timing

2) Operation time test-boom lifting/lowering

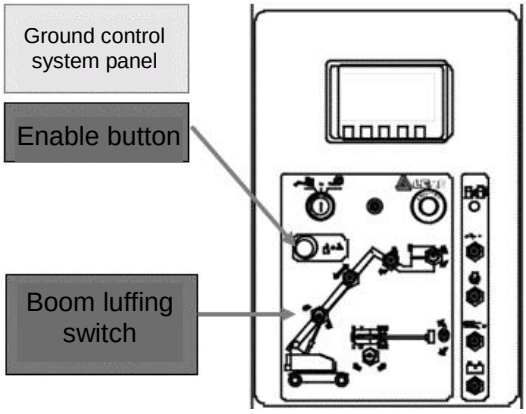
Start the vehicle, keep the in-situ status, and use ground control mode for test; Press and hold the Enable button and boom lift switch (upward) at the same time, and then, the boom

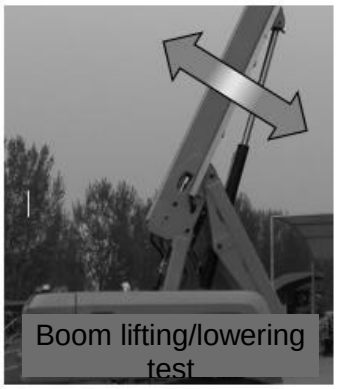
lifts and the timing starts at the same time. When the boom is lifted to the highest position, it will stop and the timing will end.

Control standard: 60-70 s

Press and hold the enable button and the boom lift switch (downward) at the same time, lower the boom and start timing at the same time; It stops lowering and the timing is stopped when the boom is lowered to stowed position.

Control standard: 60-70 s





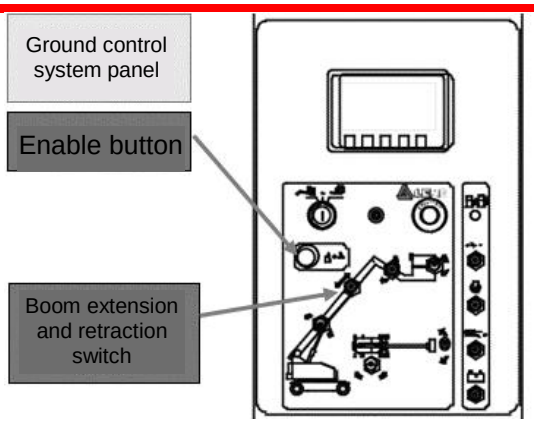
3) Operation time test-boom extension and retraction

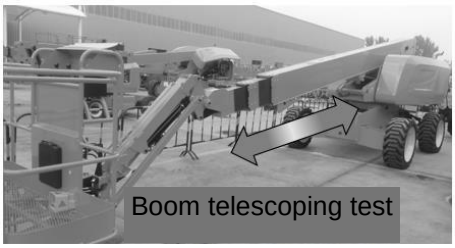
Start the vehicle, keep the in-situ status, and use ground control mode for test; Press and hold the enable button and boom extension and retraction switch (upward) at the same time to extend the main arm and start timing at the same time; When the boom is extended to the maximum position, stop extension and end timing.

Control standard: 65-75 s

Press and hold the enable button and boom extension and retraction switch (downward) at the same time to retract the boom, and start timing at the same time; When the boom is retracted to the stowed position, stop the retraction and the timing.

Control standard: 60-70 s





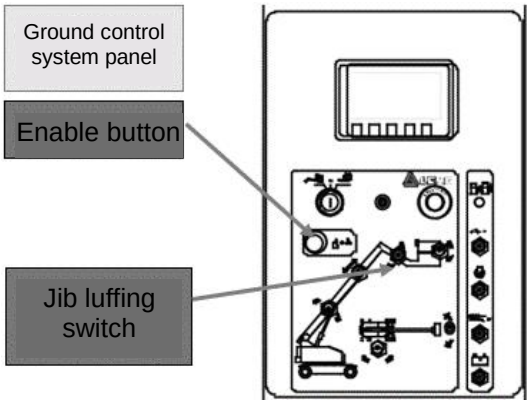
4) Operation time test-jib lifting

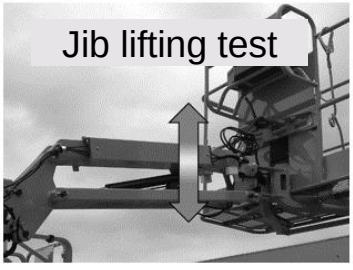
Start the vehicle, keep the in-situ status, and use ground control mode for test; Press and hold the Enable button and jib luffing switch (upward) at the same time to lift the short jib and start timing at the same time; When the short jib rises to the highest position, the lifting is stopped and the timing is cut off.

Control standard: 40-50 s

Press and hold the enable button and short jib luffing switch (down) at the same time to lower the short arm and start timing at the same time; When the short jib lowers to the stowed, stop the lowering and the timing.

Control standard: 20-35 s

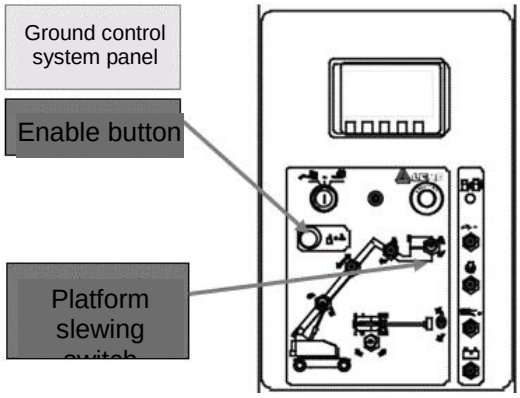


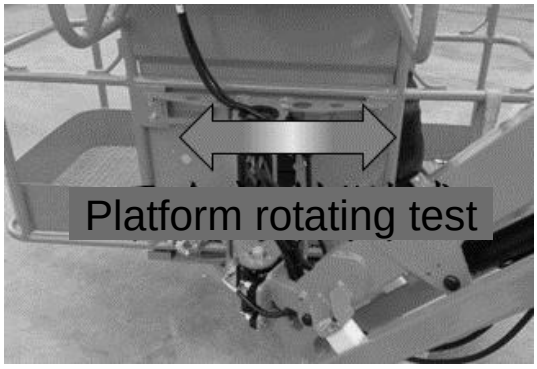


5) Operation time test-platform rotation

Start the vehicle, keep the in-situ status, use the ground control mode for test, press and hold the enable button and platform rotary switch (to the left) at the same time, and rotate the platform to the leftmost side; Then turn on the platform rotary switch in the opposite direction, rotate the platform, and start the timing at the same time. When the platform rotates to the rightmost side, then the rotating stops and the timing stops.

Control standard: 13-26 s





4.2.20 Driving speed (high speed) test

CAUTION: 1. The test vehicle is no-load and the boom is stowed.

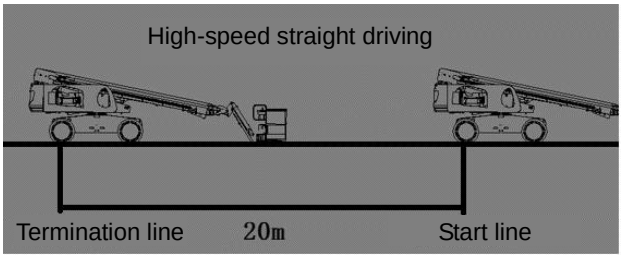
2. Pay attention to driving safety.

1) Use platform control mode, and press down the foot switch.

2) Drive the vehicle to the test road at a low speed, adjust the walking direction of the vehicle to ensure that the vehicle is upright and runs in a straight line;

3) At the position 10 m before the start line of test surface, switch the driving speed to high-speed status; Start timing when the center of the front wheel of the vehicle passes through the test start line, and stop timing until the center of the front wheel passes through the end line. In other words, the trolley passes through the test road, and the test distance is 20 meters. Stop the vehicle safely and record the time.

Control standard: 4.8±0.25 km/h



4.2.21 Braking distance test

CAUTION: 1. The test vehicle is no-load and the boom is stowed.

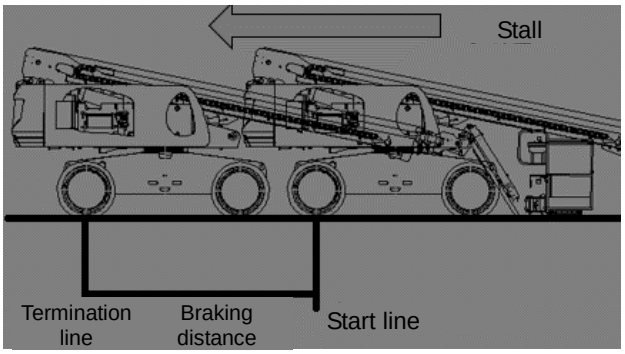
2. Pay attention to driving safety.

1) Following driving speed test

2) When the center of the front wheel of the vehicle passes through the 20 m test line, cut off the power switch and allow the vehicle to stop automatically.

3) Measure the distance from the 20 m line to the center line of the front wheel (stop status) with tape measure, which is the braking distance.

Control standard: 1.0 m-1.5 m



4.2.22 Limit driving speed test

CAUTION:

1. **One of the two item is optional for time measurement, and the rest can only be used for limited speed under specific conditions.**
2. **Except that the boom is raised, the rest are stowed.**
3. **Pay attention to driving safety.**

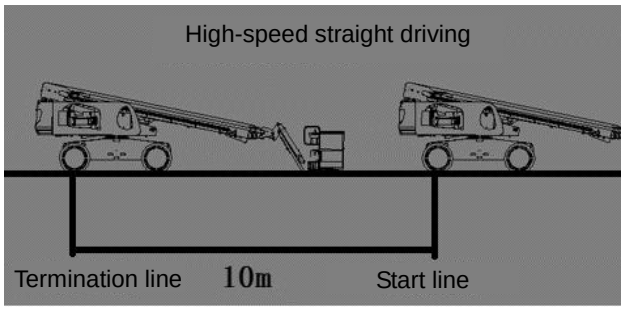
1) Adopt the platform control mode, step on the foot switch, and the boom will raise to more than 5° (the lifting height of the platform is about 81 cm).

2) Adjust the travel direction of the vehicle to ensure that the vehicle is upright and runs in a straight line;

3) Move the drive control lever slowly to the AWD position about 5 m before start line of

test surface; When the vehicle center of the front wheel passes through the test start line, the timing starts until the center of the front wheel passes through the end line, and then stop timing, that is, the trolley passes through the test road, and the test distance is 10 meters. Stop the vehicle safely and record the time.

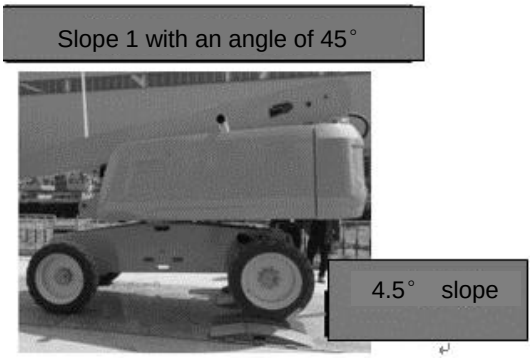
Control standard: Max. drive speed should not exceed 0.11 m/s, i.e. time: ≥ 32.8s



4.2.23 Tilt sensor test

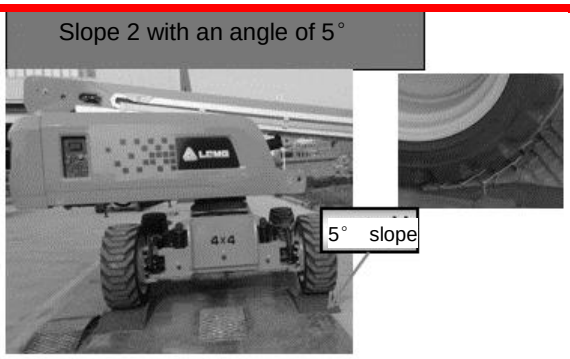
CAUTION:

1. **Choose one of the two status for test. For the other status, it is only required to measure the tilt indicator and buzzer under specific conditions.**
2. **Stow arms except for the arm for action test.**
3. **Pay attention to driving safety.**



1) Using platform control mode, step on the foot switch to lift the boom for about 90 cm (or extend the boom for 30 cm).
2) Keep the arm rod moving in the same direction as travel, and drive the vehicle to the Slope 1 along the Slope 1 direction (but not to the highest point);

Control standard: the inclination indicator does not go on, the buzzer does not sound, and all functions are normal.



3) Continue driving to the upper plane of slope 2, with an angle of 5° between the chassis and the ground.

Control standard: the inclination indicator is always on, the buzzer sounds, and the lifting, arm rod extension and walking function are restricted.

4) Continue driving to the downhill surface of Slope 1;

Control standard: the inclination indicator does not go on, the buzzer does not sound, and all functions are normal.

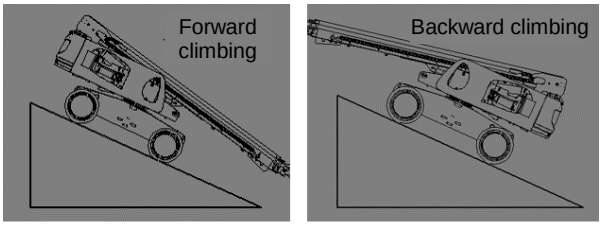
5) Apply the platform control mode, press the foot switch, stow the boom frame, and repeat the above test.

Control standard: the same as the above test control standard.

Note: Both front axle and rear axle shall be tested.

4.2.24 Climbing test (45%)

Test vehicle is under no-load, and boom frame is stowed



1) Conduct two climbing tests for forward climbing and backward climbing respectively, with forward climbing at 45% slope and backward climbing at 30% slope;

Control standard: both front and rear wheels can climb the slope;

CAUTION: due to the limited space near the climbing test bench, control the speed when going up and down the slope;

Chapter V Maintenance

5.1 Compliance

1) You are required to be trained properly in safety operation and maintenance of machine and are qualified accordingly.
2) Always read, understand and follow all safety regulations of this manual, work site safety regulations and applicable government laws and regulations.
3) Wear PPEs, such as safety helmet, safety harness, safety shoes, goggles, protective clothing, etc., and ensure that they are in good status.
4) The operator can only carry out the routine inspection and maintenance item specified in this manual.
5) Scheduled maintenance and repair shall only be completed by trained and qualified maintenance technicians.
6) The waste and scrap shall be disposed of in accordance with governmental regulations and work site regulations.
7) This manual is only applicable to the machine and parts manufactured and sold by Lingong Heavy Machinery Co., Ltd.
8) Always carry out the function test after the maintenance.

5.2 Inspection of slewing ring

1) The rotation of the rotary table shall be smooth without stuttering. Measure the backlash of slewing bearing gear and slewing reducer gear with feeler gauge, and the backlash shall be between 0.2-0.3 mm. Measure every 250 hours or quarterly, and if the measurement is out of range, please adjust.

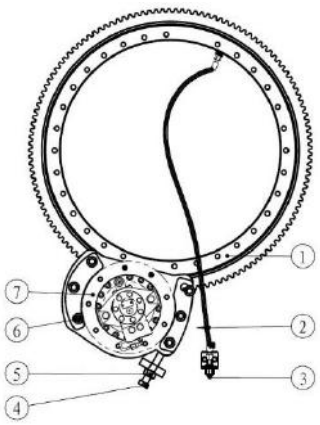


Figure 1-1 Slewing mechanism

1. Slewing ring 2. Oil pipe 3. Nozzle 4. Adjusting bolt

5. Lock nut 6. Fixing bolt 7. Slewing reducer

- Loosen fixing bolt 6 and lock nut 5
- Turn the adjusting bolt 4 to adjust the reducer position
- Measure the backlash between slewing bearing gear and slewing reducer gear with feeler gauge
- If the clearance is between 0.2-0.3 mm, tighten both lock nut 5 and fixing bolt 6
- Measure the backlash of slewing bearing gear and slewing reducer gear again to verify that the requirement is met
- Tighten fixing bolt 6 with a torque of 595±55 N•m.

2) Fill the slewing support and slewing gear with grease every 100 hours. Frequent lubrication of the slewing ring is necessary to maintain good equipment performance and maintenance life. Incorrect lubrication can lead to component damage. As shown in Fig. 1-1, find the grease filler 3 on the side of the slewing reducer, connect the grease filling machine, and rotate the rotary table several times while injecting the grease until the grease overflows from the upper and lower fixed surfaces of the slewing ring.

Grease grade: lithium base grease 2#.

3) Check the lubrication of the slewing bearing gear and the slewing reducer gear, clean the surface of the gear if necessary, and apply grease again.

⚠CAUTION: if there is too much dust in the working environment, increase the frequency of oiling.

5.3 Inspection of arm rod wear washer

1) Check the fixing and wear of wear washer every 1000 hours or every year.
2) The slider is located on the surface and inner wall of arm rod housing to reduce friction. It is necessary to keep the arm rod slider in good condition for safe machine operation. Incorrect installation or continuous use of extremely worn wear washer can lead to component damage and unsafe operating conditions.
3) Extend the arm rod to check if the slider is loose. If the slider is loose, tighten the fixing bolt.

Tightening torque of slider fixing bolt: 28 N•m.

4) Check the clearance between the slider and the arm rod. If the clearance between the slider and the arm is greater than 1 mm, please add shims to achieve zero clearance and zero resistance. Replace the slider if necessary. For the part number of the slider gasket, please refer to the part catalog and select according to the actual situation. After adding gasket, telescopic arm rod shall be operated several times to eliminate potential dead points.

5.4 Inspection of rope

After the equipment works for a long time, the telescopic rope will lengthen, and thereafter, the 2nd boom section will fail to extend and retract, the rope will fall out of the pulley, the 2nd boom section will jitter during the retraction process, and rope will whip the inner wall of arm rod or rub with the inner wall of the arm rod during the retraction process. Therefore, the rope status should be checked regularly. Check the telescopic wire rope every 250 hours or quarterly.

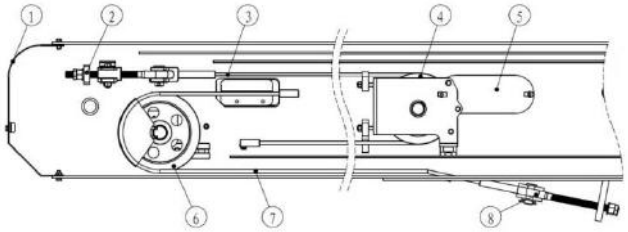


Fig. 1-2 Assembly diagram of telescopic system

1. Rear closure plate of arm rod 2. Extension rope counterweight 3. Extension rope

4. Extension pulley block 5. Side closure plate of 1st boom section

6. Retraction pulley block 7. Retraction rope 8. Retraction rope counterweight

1) Luff the arm rod to the horizontal position, extend and retract the arm rod, and check whether the 2nd and the 3rd boom sections start to act at the same time when the arm rod is extending and retracting. If the 2nd boom section lags the 1st boom section, it indicates that the wire rope is loose.

2) Luff the arm rod to be level, extend and retract the arm rod, and check whether there is jitter or whether the rope whips the inner wall of arm rod and produces whipping sound during the extension and retraction of the 2nd boom section. If the above phenomenon is present, the rope is loose.

3) As shown in Figure 1-2, open the rear closure plate 1 of arm, check whether the extension rope balance block 2 is deflected to one side, and whether the retracting rope balance block 8 is deflected to one side. If there is deflection, it means that the rope is loose.

4) Luff the arm rod to be level, fully extend the arm rod and open rear closure plate of arm rod 1 and side closure plate of 1st boom section 5. Visually inspect the working status and wear of extension pulley block 4, retraction pulley block 6, extension rope 3 and retraction rope 7. Pulleys should be fixed firmly without shaking. The pulley groove shall not be unevenly worn for more than 3 mm, and the flange wear shall be less than 10% of the original wall thickness. The rope shall be free of looseness, breakage and serious rust. There is no obvious swing of the pulley during extension and retraction. If any abnormality is found, please stop it immediately and hang the fault sign.

5) For rope adjustment, please refer to 3.5.9.

5.5 Check the oil level in the reducer

1) Check the reducer oil level every 250 hours or quarterly. Improper oil level in the reducer will cause degradation of equipment performance, and if the machine is used continuously in this case, component damage may be caused.

2) Check the walking reducer oil level

Figure 1-3

1.Oil filler 2.Sight port

- Rotate drive equipment until one plug is at a level place and the other is at high position, as shown in Fig. 1-3.
- Remove the plug at sight port 2 in level place and check the oil level.

Result: The oil level shall be flush with the sight port 2.

- When needed, add gear oil through filler 1 until the oil level is flush with the bottom of the sight port 2.

- Apply pipe thread sealant to the plug and install the plug into the gearbox.
- Repeat this step for each walking reducer.

3) Inspection of slewing reducer oil level

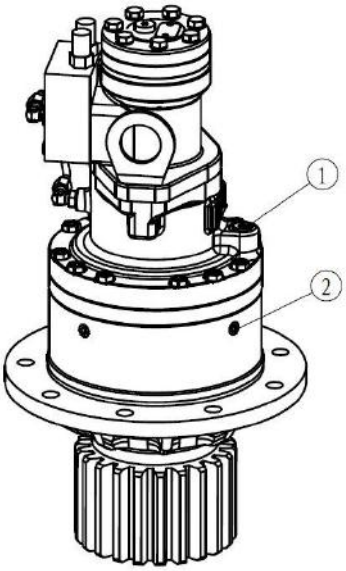


Figure 1-4 Slewing deceleration

1. Oil filler 2. Sight port

- Remove the plug on the reducer side and check the oil level, as shown in Figure 1-4, 2.

Result: the oil level shall be at the same height as the sight hole 2.

- If necessary, add gear oil through filler 1 until the oil level is at the same height as the bottom of sight hole 2.
- Apply pipe thread sealant to the plug and install the plug into the gearbox.

Replace the gearbox oil at 50 hours for the first time, and thereafter every 1000 hours or every year.

The recommended gear oil is given in the table below.

Item	Condition	Grade
Gear oil	30℃ < minimum temperature	85W/140
	-10℃ < minimum air temperature <30℃	85W/90
	-30℃ < minimum air temperature <-10℃	80W/90
	Minimum temperature <-30℃	75W

5.6 Inspection of hydraulic oil and filter

1) Check the hydraulic oil level every 8 hours or every day.

⚠CAUTION: Carry out this step when the arm rod is in the stowed position.

- Park the straight-arm lifting platform on flat ground. Retract arm rod to the stowed position.

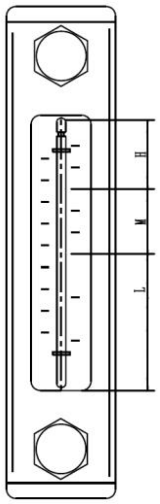


Figure 1-5 Hydraulic oil gauge

- Check the oil scale on the hydraulic oil tank. The oil level should be within M as shown in Fig. 1-5. When the oil level is lower than L, the hydraulic oil needs to be added. Select the hydraulic oil grade according to the temperature.

2) Check for hydraulic oil leakage every 8 hours or every day.

⚠CAUTION: Risk of personal injury

Splashed hydraulic oil can penetrate and burn the skin, and goggles and protective gloves must be worn.

- The leakage of high-pressure oil may not be easily visible. Hard cardboard or wood chips should be used as tools for inspection of hydraulic oil leakage. Never confirm by hand. Check for oil drip or oil residues on the following components:
- Hydraulic oil tank, filter, pump, hydraulic cylinder, motor, reducer, valve block, and hydraulic pipe
- Check for oil drips or oil residues in the following areas:
- the rear of arm rod, fly jib, upper surface the rotary table, upper surface and lower surface of drive chassis, and ground area below the equipment

3) Test or replace the hydraulic oil every 2000 hours or every two years. The grades of the hydraulic oil used are shown in Table 1-1.

Table 1-1

Item	Condition	Grade
Hydraulic oil	Minimum ambient temperature>-25 ℃	L-HV32 low temperature hydraulic oil
	-40℃ <minimum air temperature ≤-25℃	L-HS32 ultra-low temperature hydraulic oil
	Minimum air temperature ≤-40 ℃	No. 10 aviation hydraulic oil

⚠CAUTION:

If the hydraulic oil is not replaced during the two-year test, test it quarterly and replace when the test is not passed.

4) Replace the hydraulic return filter and high pressure filter every 500 hours or 6 months. When replacing the hydraulic oil, replace the suction filter. Hydraulic filter replacement is necessary to maintain good machine performance and life. The dirty or blocked filter may lower the performance of the hydraulic component, and damage to components may be caused by continuous use. The replacement times of filter shall be increased under extreme working conditions.

5.7 Maintenance of Deutz engine

5.7.1 Check of engine oil level

⚠DANGER:

1. **Never work on running engine!**
2. **Never smoke and avoid open fire!**
3. **Be careful when contacting high temperature oil. Risk of scalding!**

⚠CAUTION:

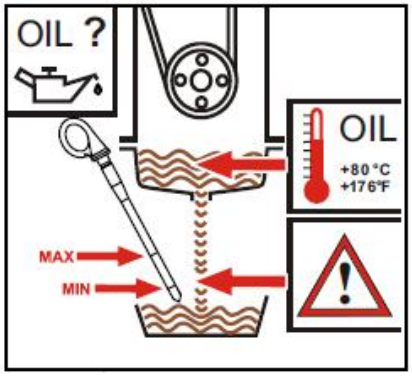
When working on the oil system, pay attention to the cleanliness of the outer surface. Carefully clean all areas involved. Dry wet areas with compressed air.

⚠CAUTION:

1. Please follow the oil safety provisions and relevant local regulations. Handle overflow oil and filter element as specified. Prevent the waste oil from penetrating into the ground.

2. Test run shall be carried out after each operation. Pay attention to the tightness and lubricating oil pressure at the same time, and then check the engine oil level. The engine oil level is to be checked every 8 hours or every day.

Insufficient or excessive oil can cause engine damage. The engine oil level can only be checked when the engine is placed horizontally and shut down. If the engine is hot, shut down the engine and check the engine oil level after 5 minutes. After the engine is cooled down, check immediately.



1) Insert oil dipstick and wipe it clean with a clean fiber-free wipe.
2) Insert the oil dipstick to the end.
3) Pull out the oil dipstick and read the engine oil level.
4) Engine oil level should always be between MIN mark and MAX mark!
5) Add to the maximum level if necessary.

5.7.2 Replacement of engine oil and filter

⚠DANGER:

1. **Never work on running engine!**
2. **Never smoke and avoid open fire!**
3. **Be careful when contacting high temperature oil. Risk of scalding!**

⚠CAUTION:

When working on the oil system, pay attention to the cleanliness of the outer surface. Carefully clean all areas involved. Dry wet areas with compressed air.

CAUTION:

Please follow the oil safety provisions and relevant local regulations. Handle overflow oil and filter element as specified. Prevent the waste oil from penetrating into the ground.

CAUTION

A trial run is required after each operation. Pay attention to the tightness and lubricating oil pressure at the same time, and then check the engine oil level.

Replace the engine oil and filter every 250 hours or 6 months. Replace the engine oil and filter after first 50 hours of use. If the ambient temperature is continuously lower than -10 ℃ or the oil temperature is lower than 60 ℃, or the sulfur content in the diesel fuel is 0.5%-1%, the change interval needs to be halved; If the oil does not reach the change interval within one year, replace the oil at least once a year.

Danger of scalding:

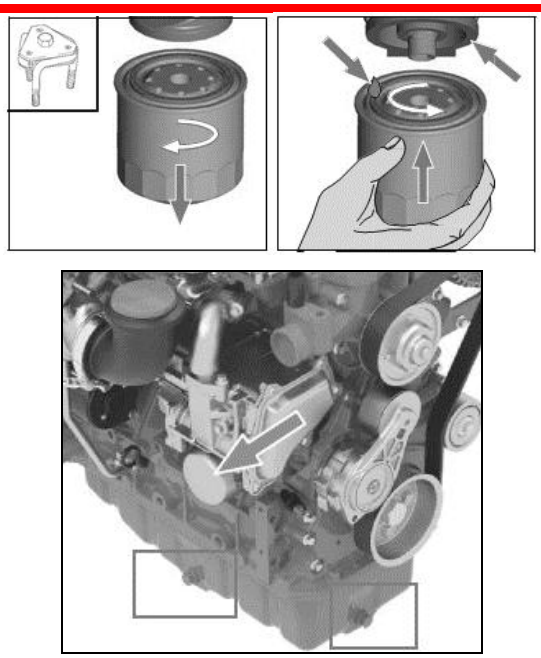
Beware of high temperature engine parts and oil. Contact with high temperature engine oil and/or engine parts can cause serious burns.

Note: carry out this function after engine warm-up to normal operating temperature.

Change of oil

1) Warm up and run the engine (oil temperature>80℃).
2) Place the engine horizontally.
3) Shut down the engine.
4) Place a container under the drain plug.
5) Unscrew the drain plug and drain the old oil.
6) Install a new seal ring for the drain plug, screw in and tighten the drain plug.
7) Add oil through the oil filler.
8) After the oil is added, warm up and run the engine (oil temperature> 80 ℃).
9) Wait for more than 5 minutes, check the oil level, and fill if necessary.

Replacement of oil filter



1. Oil filter 2. Oil plug

Note: each time the oil is replaced, the oil filter element should also be replaced.

Never prefill the filter. There is a risk of contamination.

1) If the torsion stop is Installed, remove the clamp (optional).
2) Use the wrench to loosen and unscrew the filter element.
3) for collecting the oil released.
4) Wipe the filter bracket sealing surface with a clean fiber-free wiping cloth.
5) Apply a layer of oil to the new filter seal ring.
6) Screw in the new filter by hand until the seal fits, and tighten well.
7) Fixed torque stopper clamp (optional).

5.7.3 Check for fuel leakage

CAUTION:

Please follow the fuel safety provisions and relevant local regulations. Dispose of spilled fuel and filter elements as specified. Fuel must not leak to the ground.

Visually inspect for fuel leakage every 8 hours or every day.

Danger of explosion and fire.

1. Engine fuel is combustible. Check the

location of the machine. When carrying out this step, the machine should be in an open and well-ventilated area away from heater, spark, flames, and burning tobacco. A qualified fire extinguisher shall be placed in an easily accessible place.

2. If the fuel leaks, prevent any additional personnel from entering this area, do not operate the equipment, and repair the leakage immediately.

5.7.4 Draining or replacement of fuel filter

⚠CAUTION:

1. Shut down the engine! Never smoke and avoid opening fire! Be careful when contacting high temperature fuel!

2. Never loosen the injector pipeline or high-pressure fuel pipeline when the engine is running.

3. Carefully clean all areas involved. Dry wet areas with compressed air.

4. Please follow the fuel safety provisions and relevant local regulations. Handle overflowed fuel and filter element according to national regulations. Fuel must not leak to the ground.

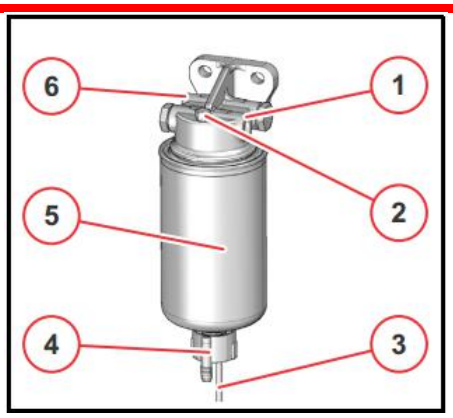
5. After completing the operation of the fuel system, the system should be subject to bleeding, trial run and tightness inspection.

Replace every 500 hours, and the replacement times should be increased under the extremely dirty working environment.

⚠Danger of explosion and fire.

Engine fuel is combustible. Check the location of the machine. When carrying out this step, the machine should be in an open and well-ventilated area away from heater, spark, flames, and burning tobacco. A qualified fire extinguisher shall be placed in an easily accessible place.

⚠Never pre-fill the filter due to the risk of contamination.



1. Fuel inlet of pump 2. Bleed bolt

3. Electric connector of water level sensor 4. Drain plug

5. Filter element 6. Fuel inlet of fuel tank

Draining of fuel primary filter

Shut down the engine:

1) Place a suitable container underneath.
2) Disconnect the harness.
3) Loosen the drain plug.
4) Drain the fuel until the pure diesel flows out.
5) Install the drain plug and electric connector
6) Tightening torque 1.6±0.3 N • m

Replace primary fuel filter element

1) Shut down the engine.
2) Cut off the fuel supply to the engine (when the tank level is high).
3) Place a suitable container underneath.
4) Disconnect the harness.
5) Remove the drain plug and drain the fuel completely.
6) Remove the filter element.
7) Clean the sealing surface of the new filter element and the back of the filter element with clean fuel to avoid possible dirt.
8) Slightly wet the sealing surface of filter element with fuel and re-screw the filter element onto the filter head (17-18 N•m) clockwise.
9) Install the drain plug, connect the wire, and check whether it is firmly installed.
10) Open the fuel cock and bleed for the system.

Bleeding of fuel system

1) The fuel system bleeding is completed by electric fuel pump.

2) To ensure that no error message is sent, do not try to start the engine during bleeding.

The bleeding are as follows:

1) Turn ignition switch "ON"

2) After the electronic fuel pump is started, run for 20 seconds until the fuel system completes the bleeding and establishes the necessary fuel pressure.

3) Wait until the electric fuel pump is shut down by the control unit.

4) Turn ignition switch to "OFF" position

5) Repeat this process at least 2 times until the fuel system bleeding is completed.

5.7.5 Check of engine air filter

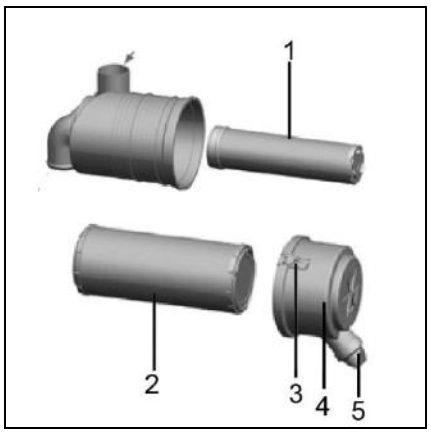
⚠Carry out this step when the engine is closed.

1) Check the air filter daily

2) Check the maintenance indicator of the air filter (if equipped). When the transparent part of the indicator appears red, it is necessary to maintain, clean or replace the filter element.

3) The air filter shall be cleaned every 250 hours or quarterly. Replace the air filter every 1000 hours or if it is broken. If the working environment is too dusty, please carry out this step more frequently.

5.7.6 Cleaning or replacement of air filter



1. Inner element 2. Outer element 3. Positioning plate 4. End cap 5. Dust discharge valve

1) Open the positioning plate (3).

2) Remove the filter cover (4) and unscrew the outer element (2).

3) Clean the outer element (2): in case of slight pollution, tap the end face gently or purge from the inside to the outside with dry compressed air for cleaning (generally the times of cleaning shall not exceed 5 times); Replace in case of serious contamination.

Replacement of inner element of air filter

⚠Never clean inner element. The outer element and inner element shall be replaced together.

1) Remove the inner element (1) and install the new inner element.

2) Screw in the new outer element (2) and gently press the outer edge surface, place the cover (4) and secure with the positioning plate (3).

5.7.7 Check of coolant level

Check the coolant level every 8 hours or every day.

⚠High temperature coolant poses risk of scalding.

1. The cooling system is under pressure! The cover can only be opened under the coolant is cooled down.

2. The coolant must have the specified concentration of cooling system protective agent!

3. Please follow coolant safety provisions and relevant local regulations.

4. Handle the overflow coolant according to the regulations and do not spray it on the ground.

5. Never run engine without coolant, even for a very short period of time.

1) Be careful to open the cover of the cooling system.

2) Coolant level should always be between MIN mark and MAX mark! Add to the maximum level if necessary.

5.7.8 Adding or replacement of engine coolant

Replace every 2,000 hours or every two years.

⚠High temperature coolant poses risk of scalding.

1. The cooling system is under pressure! The cover can only be opened under the coolant is cooled down.

2. The coolant must have the specified concentration of cooling system protective agent!

3. Please follow coolant safety provisions and relevant local regulations.

4. Handle the overflow coolant according to the regulations and do not spray it on the ground.

5. Never run engine without coolant, even for a very short period of time.

Draining of coolant

1) Be careful to open the cooler cover.
2) Place the container under the coolant port.
3) Release the coolant.
4) Reconnect and tighten the coolant port.
5) Close the cooler cover.

Adding of coolant

1) Be careful to open the cover of the cooling system.
2) Add coolant to maximum mark or the limit position.
3) Turn on the possible heating device and adjust it to the maximum gear, so as to fill the heating circuit and complete bleeding.
4) Close the cooler cover.
5) Hot start the engine to operating temperature.
6) Shut down the engine.
7) Check the coolant level when the engine is cooled, and add it to the MAX mark if necessary.

If the coolant level decreases rapidly

1) Check for dust and dirt between the radiator fin and the radiator pipe.
2) Check the tension of the fan belt.
3) Check for scale deposit in the radiator water pipe.

5.7.9 Check the engine belt.

Check the belt every 8 hours or every day.

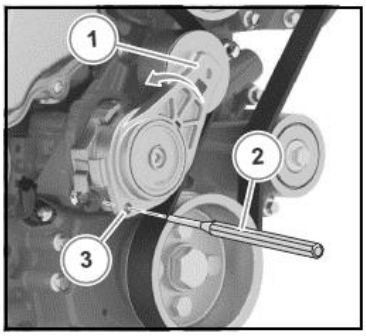
⚠CAUTION:

Work on the belt drive can only be carried out when the engine is stationary. If the double-layer belt is worn or the V belt is damaged, they shall be always replaced together.

⚠Risk of burns.

Be careful with high-temperature engine component, as contact with high-temperature engine component may cause severe burns.

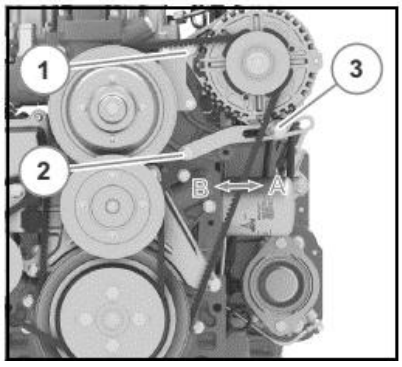
1) Visually inspect whether all the belt drives are damaged.
2) Replace the damaged component.
3) Reinstall the protection device if necessary.
4) Pay caution to the correct position when replacing the new belt. After 15 minutes of operation, check the tension force.



1. Tensioner 2. Dowel pin 3. Mounting hole

1) Use a socket wrench to press the tensioner in the direction of the arrow until the dowel pin can be fixed in the mounting hole. If the V-belt is loose.
2) First remove the V-belt from the smallest wheel or tensioner.
3) Install new V-belt.
4) Use a socket wrench to hold the tensioner to prevent following rotation, and remove the dowel pin.
5) Tension V-belt by tensioner and socket wrench. Check whether the V-belt is correctly installed on the guide device or not.

Replace belt



1. Bolt 2. Bolt 3. Bolt

1) Loosen bolt and lock nut.
2) Alternator moves towards (B) direction until the belt is loose.
3) Remove the old belt and install the new belt.
4) The alternator moves to the (A) direction until the correct belt tension is reached.
5) Check the belt tension force.
6) Re-tighten the bolt and lock nut.

Tightening torque bolt 1:42 N•m

Bolt 2: 30 N•m

Bolt 3: M830 N•m

Bolt 3: M1042 N•m

5.8 Scheduled maintenance

1) The quarterly, annual and biennial maintenance items must be completed by qualified personnel trained in the maintenance of the machine according to the procedures in the machine maintenance manual.
2) Machine that have been out of service for more than three months must be checked quarterly before they can be put back into service.

5.9 Engine fault diagnosis

Symptom	Cause	Solution
Engine failure to start or in the poor starting status	Disengagement failure (if possible)	Check coupling
	No fuel in fuel tank	Fill the tank
	Fuel suction pipe blocked	Check
	Below starting temperature limit	Check
	Cold starter damage	Inspect/replace
	Incorrect engine oil SAE viscosity grade	Replace lubricating oil
	The fuel quality does not conform to the requirements in the User Manual.	Replace the fuel
	Battery damaged or not charged	Check battery
	Looseness or oxidation of cable connector connecting starter device	Check cable connector
	Starter device damaged or pinion not engaged	Check the starter device
	Air filter dirty/exhaust turbocharger damage	Inspect/replace
	Air in the fuel system	Bleed the fuel system
	Low compression force	Check the compression force
	High exhaust back pressure	Check
	Nozzle pipe not sealed	Check nozzle pipe
	High pressure pump damaged	Inspect/replace
Engine failure to start, and diagnostic indicator light flashing	Starting stop of ECM	Check the error according to the DTC and eliminate the error cause
Engine started with operation unstable or interrupted	High exhaust back pressure	Check
	Low compression force	Check the compression force
	Cold starter	Inspect/replace
	Air in the fuel system	Bleed
	Fuel primary filter dirty	Clean
	The fuel quality does not conform to the requirements in the User Manual.	Replace the fuel
	Injector damage	Replace
	Nozzle pipe not sealed	Check nozzle pipe
	Engine cable bundle damaged	Inspect/replace
Speed change with diagnostic indicator light on	ECM identified a system error and activated the rotation speed compensation	Check the error according to the DTC and eliminate the error cause
Engine overheating with temperature warning device acting	Blockage in coolant filler reservoir vent pipe	Clean
	Oil cooler damage	Inspect/replace
	Oil filter air or lubricating oil side dirty	Replace
	High lubricating oil level	Check oil level of lubricating oil, and drain if necessary.
	Low lubricating oil level	Add lubricating oil
	Injector damage	Replace
	Coolant heat exchanger dirty	Clean
	Coolant pump damage (breakage or looseness of V-belt)	Check for breakage or looseness
	Lack of coolant	Fill
	High resistance in cooling system/small flow	Check cooling system
	Fan/viscous fan coupling damage, belt tearing or	Inspect/replace/tensioning

	looseness	
	Turbocharger air pipe not sealed	Check turbocharger air pipe
	Charge air cooler dirty	Inspection/cleaning
	Air filter dirty/exhaust turbocharger damage	Inspect/replace
	Air filter maintenance switch/maintenance indicator damaged	Inspect/replace
	Fan damaged/V belt broken or loosened	Check fan/V-belt, and replace them when necessary
	High exhaust back pressure	Check
	Throttle valve damaged	Inspect/replace
	Coolant temperature sensor damaged	Inspect/replace
	Coolant thermostat damage	Inspect/replace
	Coolant cover damage	Inspect/replace
Insufficient engine power	High lubricating oil level	Check oil level of lubricating oil, and drain if necessary.
	Temperature of the fuel suction device is too high	Check the system
	The fuel quality does not conform to the requirements in the User Manual.	Replace the fuel
	Air filter dirty/exhaust turbocharger damage	Inspect/replace
	Air filter maintenance switch/maintenance indicator damaged	Inspect/replace
	Fan damaged/V belt broken or loosened	Check fan/V-belt, and replace them when necessary
	Turbocharger air pipe not sealed	Check turbocharger air pipe
	Charge air cooler dirty	Clean
	Nozzle pipe not sealed	Check nozzle pipe
	Injector damage	Replace
	Throttle valve damaged	Inspect/replace
	Exhaust gas recirculation, control unit damage	Inspect/replace
	High exhaust back pressure	Inspection/cleaning
	Exhaust turbocharger damage	Replace
Insufficient engine power with diagnostic indicator light on.	ECM reduced power	Consult the DEUTZ service provider.
Engine cylinders not fully working.	Nozzle pipe not sealed	Check nozzle pipe
	Injector damage	Replace
	Low compression force	Check the compression force
	Engine cable bundle damaged	Inspect/replace
No oil pressure or low oil pressure	No refilling of lubricating oil	Add lubricating oil
	Excessive inclination of engine	Check engine mount/lower tilt position
	Incorrect engine oil SAE viscosity grade	Replace lubricating oil
	Oil pressure sensor damage	Inspect/replace
	Oil pressure control valve stuck	Inspection/cleaning
	Suction pipe blockage	Inspection/cleaning
Excessive engine oil consumption	High lubricating oil level	Check lubricating oil for oil level and drain it if necessary
	Excessive inclination of engine	Check engine mount/lower tilt position
	Crankcase vent system	Inspect/replace
Oil in the exhaust	The engine runs at low load for a long time	Check load factor

system	(<20-30%)	
	Damaged valve oil seal	Inspect/replace
	Exhaust turbocharger damage	Inspect/replace
Blue smoke from the engine	High lubricating oil level	Check lubricating oil for oil level and drain it if necessary
	Excessive inclination of engine	Check engine mount/lower tilt position
White smoke from the engine	The fuel quality does not conform to the requirements in the User Manual.	Replace the fuel
	Injector damage	Replace
	Condensed water	Preheat the engine to evaporate the remaining water.
Black smoke from the engine	Air filter dirty/exhaust turbocharger damage	Inspect/replace
	Air filter maintenance switch/maintenance indicator damaged	Inspect/replace
	Turbocharger air pipe not sealed	Check turbocharger air pipe
	Injector damage	Replace
Frequent shutdown	Regeneration air filter dirt/exhaust turbocharger damage	Inspect/replace
	Turbocharger air pipe not sealed	Check turbocharger air pipe
	Injector damage	Replace
	Differential pressure flowmeter damage	Replace
	NOx-sensor	Replace
	Incredible signals from diesel particulate filter differential pressure sensor	Replace
	Foreign matters in the pressure differential pipe	Clean

⚠CAUTION: the working hours shall be subject to the working hours of the engine, and the operation cycle shall be calculated from the factory date.

Maintenance interval

Maintenance level	Routine inspection	Level 1 maintenance	Level 2 maintenance	Level 3 maintenance	Level 4 maintenance	Level 5 maintenance
Maintenance interval	Daily	50h	300h	550h	800h	1050h

⚠CAUTION: The working hours of the engine apply.

List of maintenance items

System	Operation content	Maintenance level							Remarks
		Routine inspection	Level 1 maintenance	100 h maintenance	Level 2 maintenance	Level 3 maintenance	Level 4 maintenance	Level 5 maintenance	
Powertrain	Check the oil level of the oil	●							
	Check the oil level of the fuel tank	●							
	Check the fuel system line for leaks	●							
	Check the connection				●	●	●	●	

	between the engine and the tray								
	Replace engine oil	First maintenance at 50 h, and thereafter replace every 250 h or 6 months, whichever comes first.							At least once a year
	Replace the engine oil filter element	First maintenance at 50 h, and thereafter replace every 500 h or 6 months, whichever comes first							At least once a year
	Check and adjust fan belt tension		•	•	•	•	•	•	
	Use compressed air to clean radiator			•	•	•	•	•	
	Clean fuel tank filler filter			•	•	•	•	•	
	Discharge deposit from fuel tank			•	•	•	•	•	
	Replace secondary diesel filter	Replace every 500h or 6 months, whichever comes first.							
	Replace the primary fuel filter element	Replace every 500h or 6 months, whichever comes first.							
	Check the water level in the water separator and drain water regularly	Every day							
	Clean or replace the outer element and inner element of air filter	Clean the outer element every 250 h or when the indicator alarms, and never clean the inner element							Generally, the cleaning shall be no more than 5 times
Electrical system	Check the battery for low voltage.	Every day							
	Check whether each button of the PCU panel is operated normally.	Every day							
	Check whether the PCU harness is connected firmly	Every day							
	Check whether the PCU harness	Every day							

	connector is dirty or damaged								
	Check whether the PCU harness is squeezed or broken	Every day							
	Check if the tilt sensor harness is secured	Every day							
	Check whether the rotary table slewing limit switch is in the rocker arm position and whether the harness is loose.	Every day							
	Check whether the connection of the walking pump solenoid valve is loose and whether the wiring is normal	Every day							
	Check whether the buttons on the control panel operate normally	Every day							
	Check whether the warning lamp and horn function normally	Every day							
	Check whether the wiring of the solenoid valve coil of the main valve block is normal without looseness	Every day							
	Check whether the starter motor terminal is loose, broken, etc.	Every day							
	Load cell reset				●	●	●	●	
	Check whether the battery terminal is loose or rusty	Every day							
Hydraulic system	Check whether the system pressure is normal			●	●	●	●	●	
	Check whether the steering system pressure is normal			●	●	●	●	●	
	Check whether the traveling system pressure is normal			●	●	●	●	●	
	Check whether oil pipes and joints are loose	Every day							
	Check the cylinder for leakage/seepage	Every day							
	Check each valve	Every day							

	spool for oil leakage.		
	Check whether the two ball valves at the oil suction port at the bottom of the hydraulic oil tank are opened	Every day	
	Check whether the walking oil pipe fixing clamp is loose	Every day	
	Check hydraulic oil tank oil level	Every day	Add hydraulic oil L-HV 32 when fluid level is below position "M"
	Replace hydraulic oil and suction filter element	Every 2000 h or every two years, whichever comes first	Hydraulic oil L-HV 32,
	Replace the filter element of the high pressure filter.	Every 500 hours or 6 months, whichever comes first	
	Check the bleed cover of the hydraulic oil tank for leakage.	Every day	
	Replace air filter	Every 1000 hours or every year, whichever comes first	
	Check of the reducer for oil leakage	Every day	
	Check the walking motor for oil leakage	Every day	
	Replacement of the reducer gear oil	During first maintenance after 50 hours, and every 1000 hours or every year thereafter	
	Replacement of the return filter element	Every 500 hours or 6 months, whichever comes first	
Machine	Check whether the accompanying documents are complete and legible, and whether they are in the file box	Every day	
	Check whether the safety sign is correct	Every day	

	without dirt								
	Check whether the bolt, nut and other fasteners of the machine are loose or have abnormal sound	Every day							
	Check whether the structural parts of the machine have crack and open weld.	Every day							
	Check whether the vehicle paint falls off and whether there is serious rust, corrosion or oxidation.	Every day							
	Check whether the slider is loose, and whether there is zero clearance with the arm rod						•	•	
Lubrication	Lubricate the slewing bearing			•	•	•	•	•	Lithium base grease 3#
	Grease the slewing ring and the slewing reducer gear			•	•	•	•	•	Lithium base grease 3#
Cable carrier	Replace cable carrier	Every 7000 hours or every 10 years, whichever comes first							

Chapter VI Annex

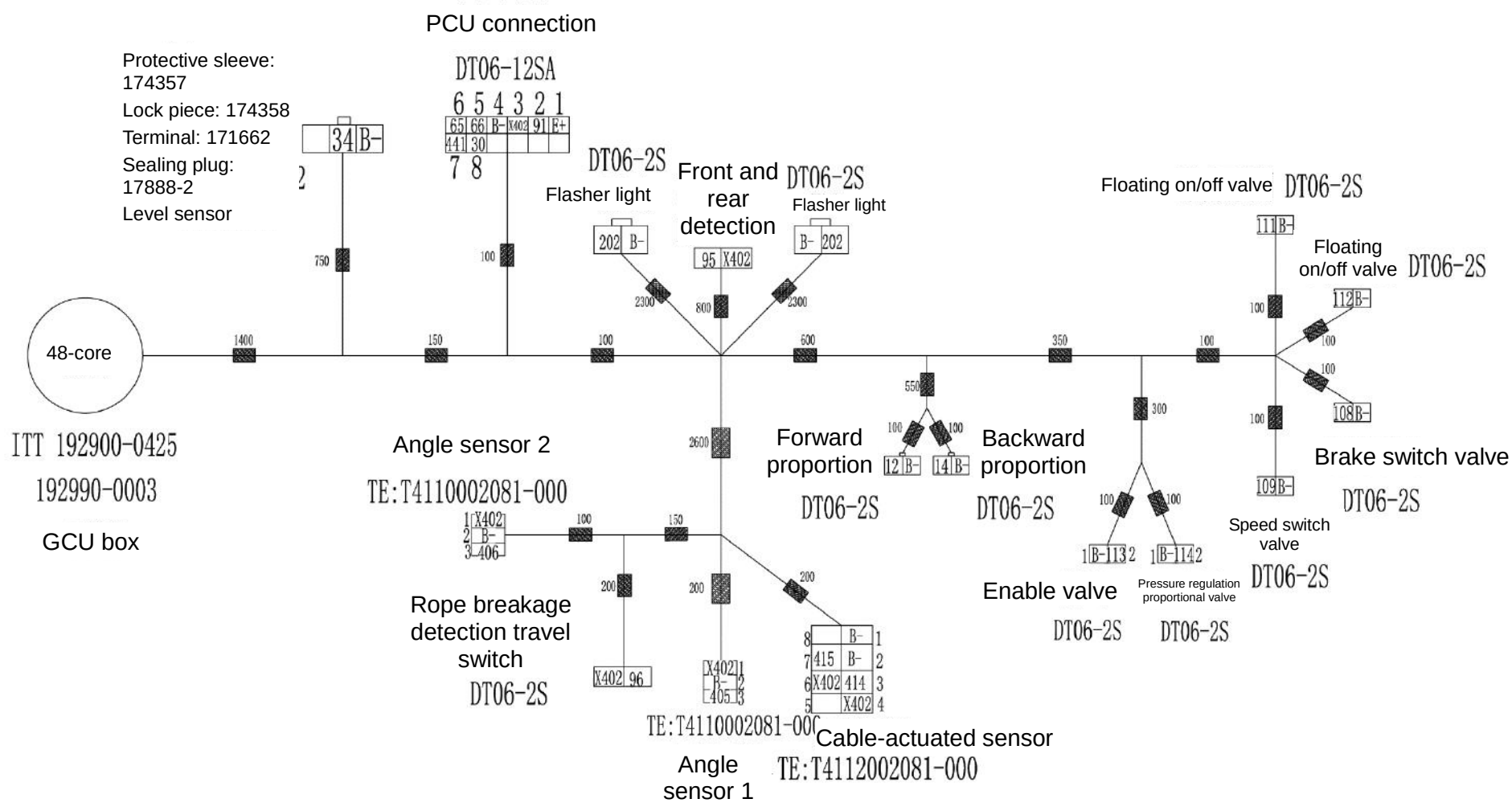
6.1 System DTC

DTC	Fault Description	Restricted action
1	Open circuit of control unit output power supply 1	Boom luff-up
2	Open circuit of control unit output power supply 2	Boom luff-up
3	Open circuit of control unit output power supply 3 and 4	Boom luff-up
4	Open circuit of platform electric box expansion module CAN bus	Equivalent to the restriction logic when all three control levers and load cell are faulty.
7	Rotary table tilt sensor fault	Boom luff-up, boom luff-down, boom extension, boom retraction, rotary table rotation, walking
8	Load cell 1 fault	Boom luff-up
9	Load cell 2 fault	Boom luff-up
10	Load cell 3 fault	Boom luff-up
11	Load cell 4 fault	Boom luff-up
12	Left control lever fault	Boom luff-up, boom luff-down (upper structure), rotary table rotation (lower structure)
13	Right control lever fault	Boom luff-up, walking, steering
14	Middle joystick	Boom luff-up, boom extending, boom retracting (boarding operation)
15	Rope broken	Boom luff-up, boom luff-down, boom extension, boom retraction, rotary table rotation, walking
16	Fault of boom angle sensor 1	Boom luff-up
17	Boom angle sensor 2 fault	Boom luff-up
18	Boom angle sensor check fault	Boom luff-up
19	Boom length sensor 1 fault	Boom luff-up and boom extending
20	Boom length sensor 2 fault	Boom luff-up and boom extending
21	Boom length sensor check fault	Boom luff-up and boom extending
22	Load cell check fault	Boom luff-up
23	Boom retraction proximity switch 1 fault	Boom luff-up
24	Boom retraction proximity switch 2 fault	Boom luff-up
25	Boom extension proximity switch 3 fault	Boom luff-up
26	Boom extension proximity switch 4 fault	Boom luff-up
101	Boom maximum angle luff-up limit	Boom luff-up
102	Boom minimum angle luff-down limit	Boom luff-down
103	Boom maximum extension length limit	Boom extension
104	Boom minimum retraction length limit	Boom contraction
105	Rotary table tilting	None
106	The rotary table tilts, the boom angle is greater than positive 5 degrees, the boom luffing is upward, and the boom extension is limited	Boom luff-up, boom extension, rotary table rotation, walking
107	The rotary table tilts, the boom extension length exceeds 60 cm, the boom luffing is upward, and the boom extension is limited	Boom luff-up, boom extension, rotary table rotation, walking
109	The drive is not enabled and the walking function is limited	Walking
110	Platform overload	Limit all actions
111	Length/angle sensor bus disconnected	Boom luff-up, boom extension

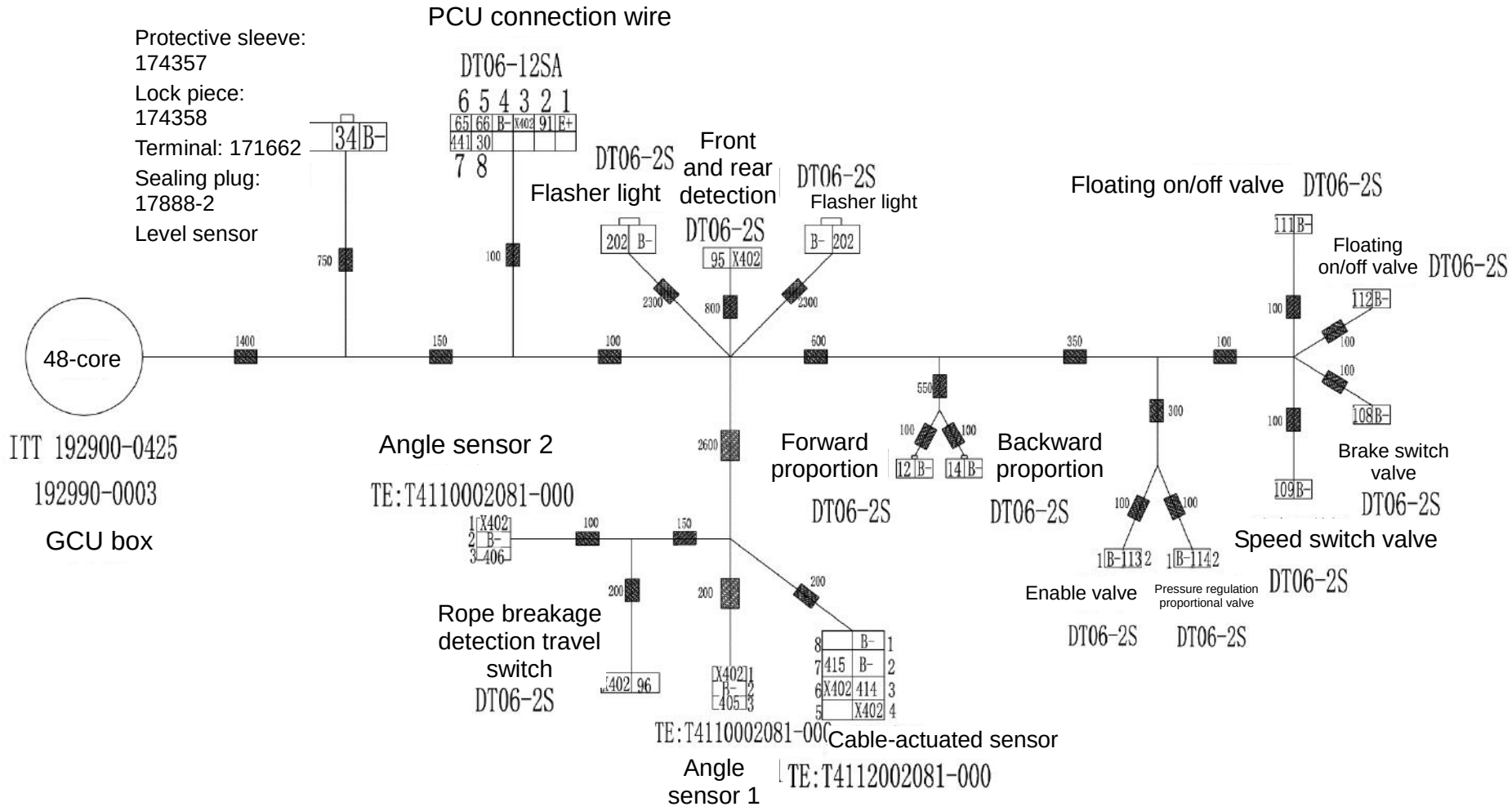
112	Length/angle sensor fault	Boom luff-up, boom extension
113	Low oil level alarm	None
114	Working radius out of the limit of safety area	Boom luff-down, boom extension
115	Manual locking reminder	Boom luff-up and boom extending
116	Manual locking	Boom luff-up, boom extension, walking
117	Mismatch of GPS with ECU	Not used temporarily
118	GPS is removed	Boom luff-up and boom extending

6.2 Description of harness wire size

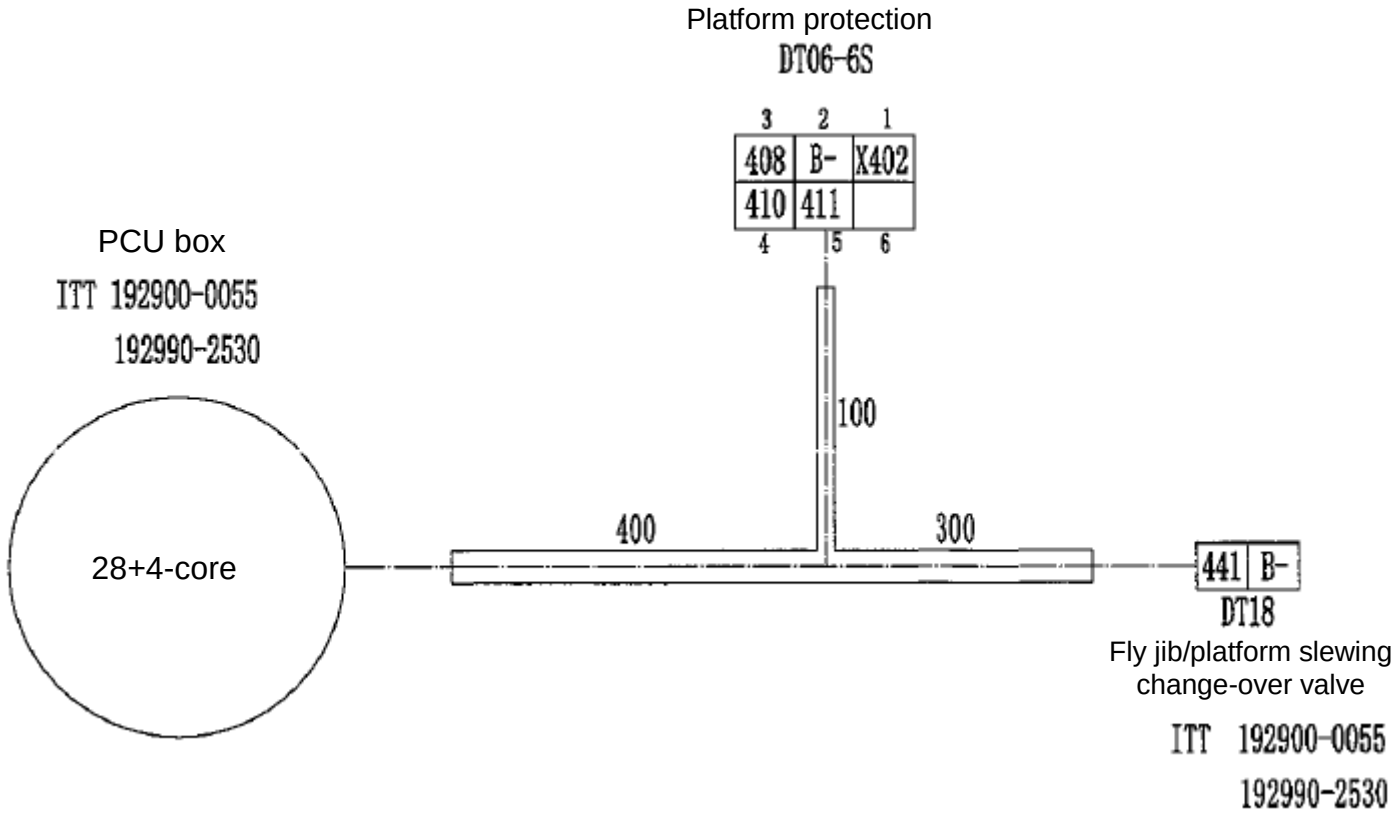
6.2.1 Main harness



6.2.2 Valve block harness



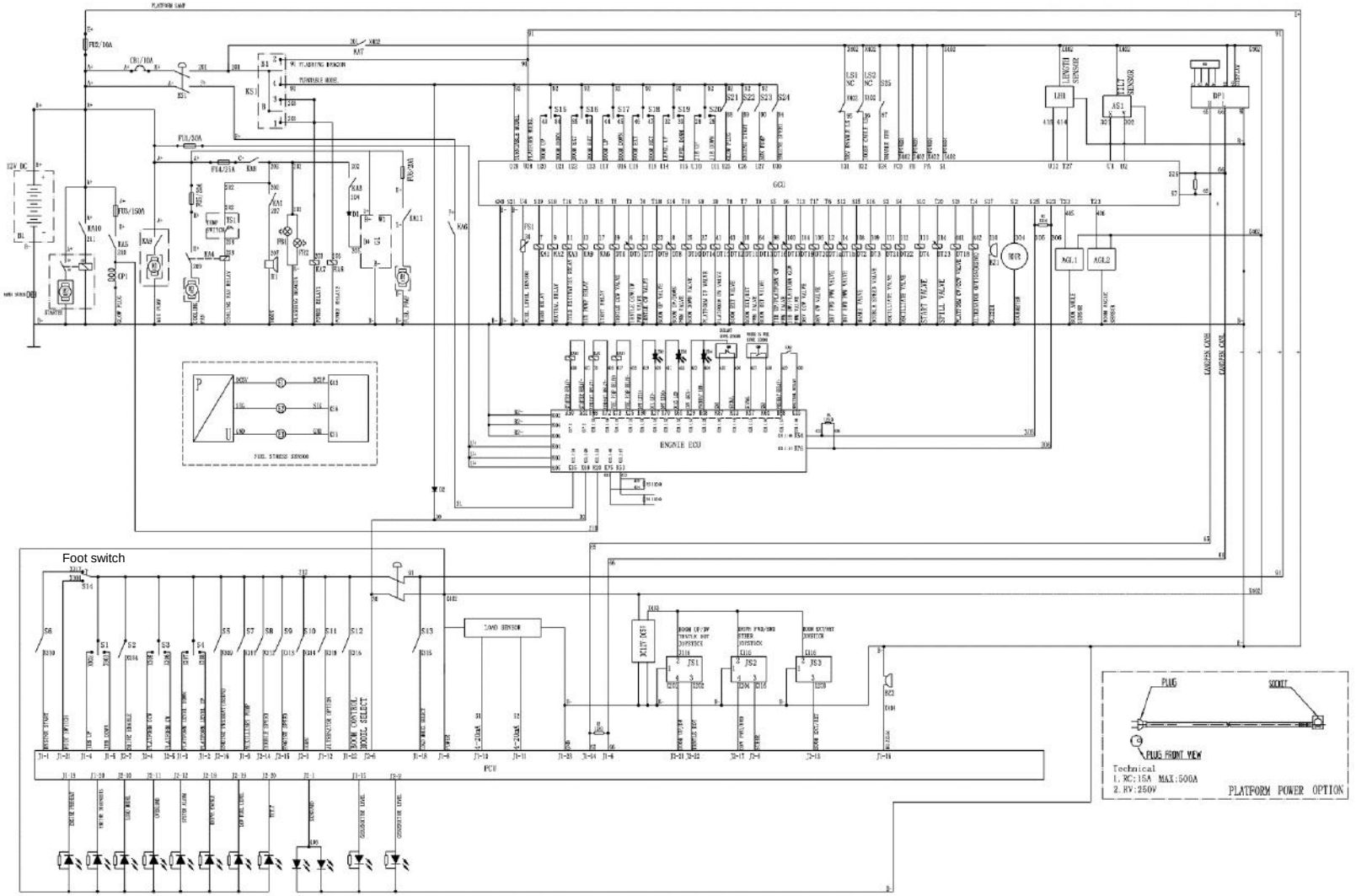
6.2.3 Platform harness



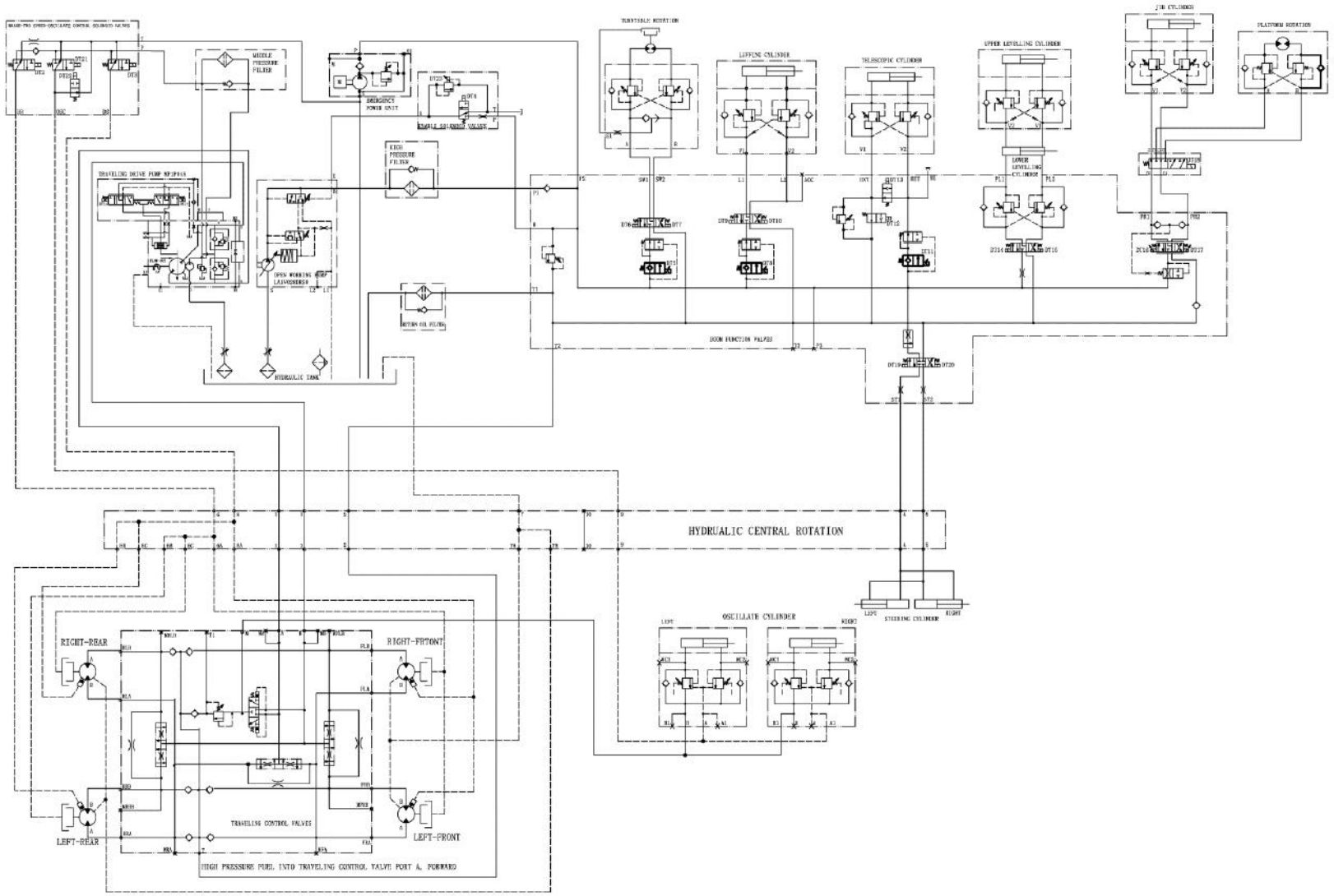
Wire size	Function	Color	Wire size	Function	Color	Wire size	Function	Color
X402	Power supply	Red	B-	Battery GND	Black	410	Proximity switch signal	White
441	Platform slewing on/off valve	White	408	Platform protection warning lamp	White	411	Reset signal	White

6.3 Schematic diagram

6.3.1 Electrical schematic diagram

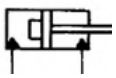
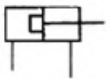
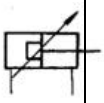
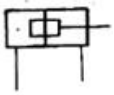
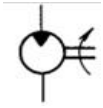
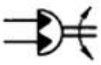


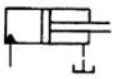
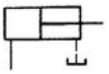
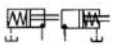
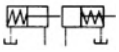
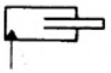
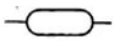
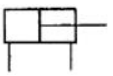
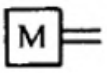
6.3.2 Hydraulic schematic diagram



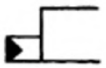
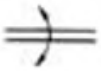
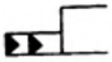
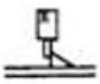
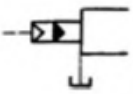
6.4 Symbols of common hydraulic parts

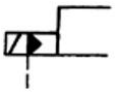
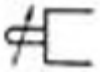
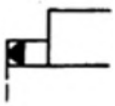
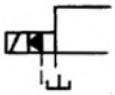
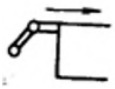
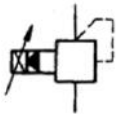
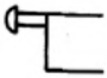
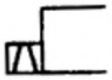
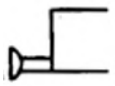
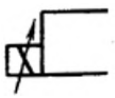
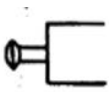
Common symbols of hydraulic components:

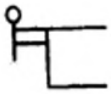
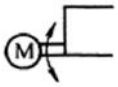
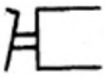
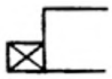
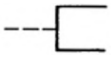
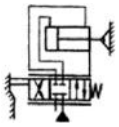
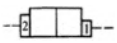
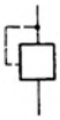
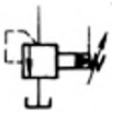
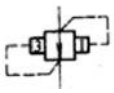
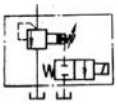
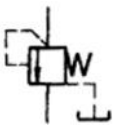
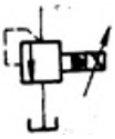
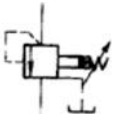
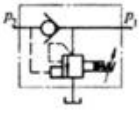
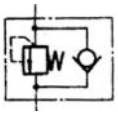
(1) Hydraulic pump, hydraulic motor and hydraulic cylinder							
Name		Symbols	Description	Name		Symbols	Description
Hydraulic pump	Hydraulic pump		General symbols	Double-acting cylinder	Non-adjustable one-way bounce cylinder		Detailed symbols
	Single-direction fixed displacement hydraulic pump		Single-direction rotation, one-way flow, fixed displacement				Simplified symbol
	Two-way fixed displacement hydraulic pump		Two-direction ration, two-way flow, fixed displacement		Adjustable one-way cushion cylinder		Simplified symbol
	Single-direction variable displacement hydraulic pump		Single-direction rotation, two-way flow, variable displacement				
	Two-way variable displacement hydraulic pump		Two-direction rotation, two-way flow, variable displacement		Non-adjustable two-way bounce cylinder		Detailed symbols
Hydraulic motor	Hydraulic motor		General symbols				Simplified symbol
	Single-direction fixed displacement hydraulic motor		One-way flow, single-direction rotation		Adjustable two-way bounce cylinder		Detailed symbols
	Two-way fixed displacement hydraulic motor		Two-way flow, two-direction ration, fixed displacement		Telescopic bar		
	One-way variable displacement hydraulic motor		Two-way flow, two-direction ration, variable displacement	Pressure transducer	Pneumatic-hydraulic converter		One-way action
	Swing motor		Two-way swing, fixed angle				Continuous action
Pump - motor	Fixed displacement hydraulic pump - motor		One-way flow, single-direction rotation, fixed displacement		Turbocharger		One-way action
	Variable displacement hydraulic pump - motor		Two-way flow, two-direction ration, variable displacement, external draining				Continuous action

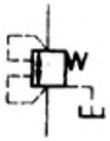
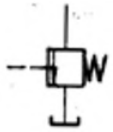
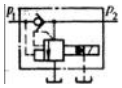
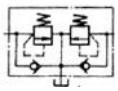
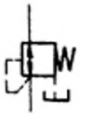
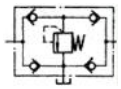
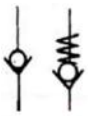
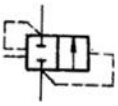
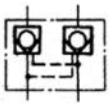
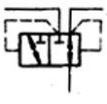
	Hydraulic integral transmission		Single-direction rotation, variable displacement, fixed displacement motor	Accumulator	Accumulator		General symbols
Single-action cylinder	Single piston rod cylinder		Detailed symbols		Gas isolation type		
			Simplified symbol		Heavy hammer type		
	Single piston rod cylinder (with return spring)		Detailed symbols		Spring type		
			Simplified symbol	Auxiliary gas reservoir			
	Plunger rod r			Gas reservoir			
	Telescopic cylinder			Energy source	Hydraulic pressure source		General symbols
Double-acting cylinder	Single piston rod cylinder		Detailed symbols		Air pressure source		General symbols
			Simplified symbol		Motor		
	Double piston rod cylinder		Detailed symbols		Prime motor		Except motor
			Simplified symbol				

(2) Mechanical control device and control methods

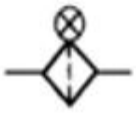
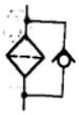
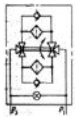
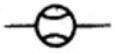
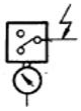
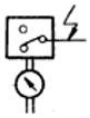
Mechanical control device	Straight moving rod		Arrows can be omitted	Pilot pressure control method	Hydraulic pilot pressurized control		Internal pressure control
	Rotation movement axis		Arrows can be omitted		Hydraulic pilot pressurized control		External pressure control
	Locating device				Hydraulic secondary pilot pressurized control		Internal pressure control, internal draining
	Locking device		* Control method for unlocking		Pneumatic-hydraulic pilot pressurization control		Air pressure external control, hydraulic pressure internal control,

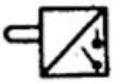
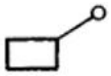
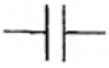
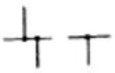
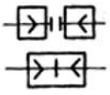
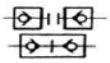
							external draining
	Jumper mechanism				Electro-hydraulic pilot pressure control		Hydraulic external control, internal draining
	Ejector rod type				Hydraulic pilot pressure relief control		Internal pressure control, internal draining
	Variable travel control type						External pressure control (with remote relief outlet)
	Spring controlled type				Electro-hydraulic pilot control		Electromagnet control, external pressure control, external draining
	Roller type		Operation at two directions		Pilot pressure control valve		With pressure adjusting spring, external draining, with remote relief outlet
	Single-direction roller type		Operate in a direction, with the arrow allowed to be omitted.		Pilot proportional solenoid pressure control valve		Pilot stage controlled by the proportional solenoid valve, and internal draining
Human control methods	Human control		General symbols	Electrical control method	Single-acting electromagnet		The electrical lead can be omitted, and the slash can also be directed to the lower right.
	Button type				Double-acting electromagnet		
	Button type				Single-acting adjustable electromagnetic operation (proportional solenoid valve,		
	Press-pull type				Double-acting adjustable electromagnetic		

					operation (torque motor, etc.)		
	Handle type				Rotation electronic control unit		
	One-way pedal type			Feedback control method	Feedback control		General symbols
	Two-way pedal type				Electrical feedback		The position is detected by potentiometer, differential transformer, etc.
	Pressurizing or pressure relief control				Internal mechanical feedback		Such as follower valve profiling control circuit
	Differentiating control						
	Internal pressure control		Control path inside the original				
	External pressure control		Control path outside the original				
(3) Pressure controller							
Relief valve	Relief valve		General symbol or direct-acting relief valve	Pressure reducing valve	Pilot proportional solenoid pressure reducing valve		
	Pilot relief valve				Proportional pressure reducing valve		Pressure reducing ratio 1/3
	Pilot electromagnetic relief valve		(Normally closed)		Fixed differential reducing valve		
	Direct-acting proportional relief valve			Priority valve	Priority valve		General symbol or harmonious-acting sequence valve
	Pilot proportional relief valve				Pilot sequence valve		
	Load-relief overflow valve		Unloading at p2>p1		One-way sequence valve (balance valve)		

	Two-way relief valve		Direct-acting, external draining	Unloading valve	Unloading valve		General symbol or direct-acting unloading valve
Pressure reducing valve	Pressure reducing valve		General symbol or direct-acting pressure reducing valve		Pilot electromagnetic unloading valve		p1>p2
	Pilot pressure reducing valve			Brake valve	Double overflow brake valve		
	Overflow pressure relief valve				Overflow oil axle brake valve		
(4) Direction control valve							
Check valve	Check valve		Detailed symbols	Reversing valve	Two-position five-way hydraulic valve		
			Simplified symbol (spring can be omitted)		Two-position four-way motorized valve		
Hydraulic check valve	Hydraulically controlled check valve		Detailed symbol (control pressure shutoff valve)		Three-position four-way solenoid valve		
			Simplified symbol		Three-position four-way electro-hydraulic valve		Simplified symbol (internal leakage and external control)
			Detailed symbol (valve opening by pressure control)		Three-position six-way hand valve		
			Simplified symbol (spring can be omitted)		Three-position five-way solenoid valve		
	Double hydraulically controlled check valve				Three-position four-way electro-hydraulic valve		External control and internal leakage (with manual emergency control device)
Shuttle valve	Or gate valve		Detailed symbols		Three-position four-way proportiona		Throttling type, overlapped

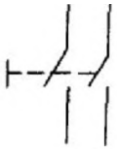
					l valve		center
			Simplified symbol		Three-position four-way proportional valve		Underlapped center
Reversing valve	Two-position two-way solenoid valve		Normally opened		Two-position four-way proportional valve		
			Normally open		Four-way servo valve		
	Two-position three-way solenoid valve				Four-way electro-hydraulic servo valve		Level 2
	Two-position three-way solenoid ball valve						Live feedback level 3
	Two-position four-way solenoid valve						
(5) Flow control valve							
Throttle valve	Adjustable throttle valve		Detailed symbols	Speed regulation valve	Speed regulation valve		Simplified symbol
			Simplified symbol		Bypass-type speed regulation valve		Simplified symbol
	Non-adjustable throttle valve		General symbols		Temperature compensated flow regulating valve		Simplified symbol
	One-way throttle valve				One-way speed regulation valve		Simplified symbol
	Double single-way throttle valve			Synchronous valve	Flow divider valve		
	Stop valve				Single flow divider valve		
	Roller control throttle valve (pressure reducing valve)				Flow combiner valve		
Speed regulation valve	Speed regulation valve		Detailed symbols		Flow diverter/combiner valve		

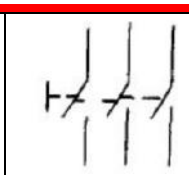
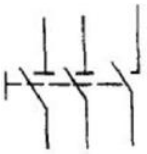
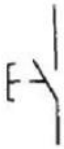
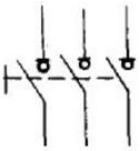
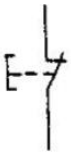
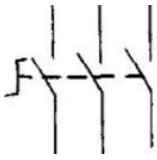
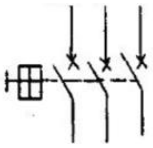
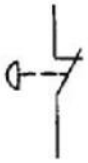
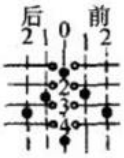
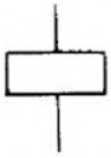
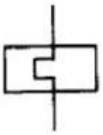
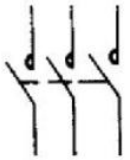
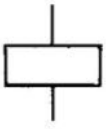
(6) Tank							
Ventilated type	Pipe end above the liquid level			Tank	Pipe end is at the bottom of the tank		
	Pipe end above the liquid level		With air filter		Local oil leakage or return		
				Pressurized tank or closed tank			Three oil lines
(7) Flow regulator							
Filter	Filter		General symbols	Air filter			
	Filter with contamination indicator			Temperature regulator			
	Magnetic filter			Cooler	Cooler		General symbols
	Filter with bypass valve				Cooler to coolant pipeline		
	Duplex filter		p1: inlet p2: return	Heater			General symbols
Pressure detector	Pressure indicator			Flow detector	Flow detector (flow indicator)		
	Pressure gauge				Flowmeter		
	Electric contact pressure gauge (pressure display controller)				Cumulative flow meter		
	Differential pressure control gauge			Temperature meter			
Level gauge				Tachometer			
				Torque meter			
(8) Other auxiliary components							

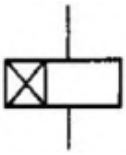
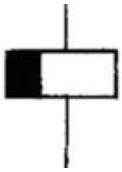
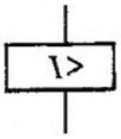
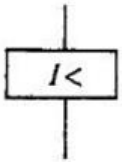
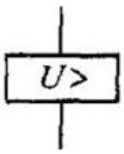
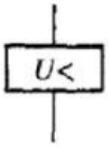
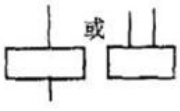
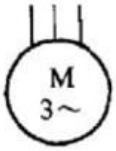
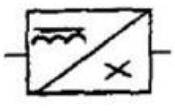
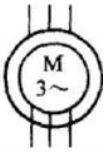
Pressure relay (pressure switch)			Detailed symbols	Differential pressure switch			
			General symbols	Sensor	Sensor		General symbols
Travel switch			Detailed symbols		Pressure sensor		
			General symbols		Temperature sensor		
Coupling	Coupling		General symbols	Amplifier			
	Flexible coupling						
(9) pipeline, pipe joint and joint							
Pipeline	Pipeline		Pressure pipeline return pipeline	Pipeline	Cross pipeline		Two pipelines which are crossed but not connected
	Control pipeline		Two pipelines intersect		Flexible pipeline		
	Control pipeline		Representing drain pipeline		Single-way vent		
Quick-change joint	Quick connector without check valve			Rotary joint	Single-way rotation joint		
	Quick connector with check valve				Three-way rotary connector		

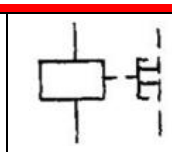
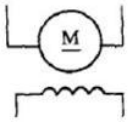
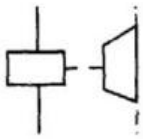
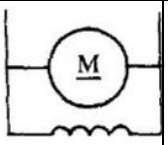
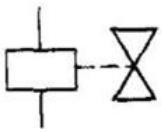
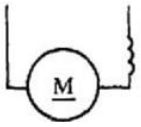
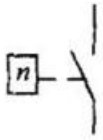
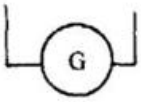
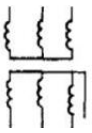
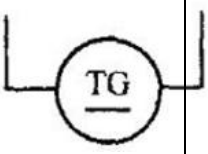
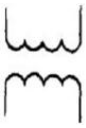
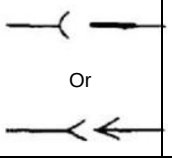
6.5 Schematic diagram of symbols of common electrical components

Common electrical component symbols:

Socket	Name	Graphic symbol	Text symbol	Category	Name	Graphic symbol	Text symbol
Switch	Single-pole control switch		SA	Position switch	Normally open contact		SQ
	General symbol of manual switch		SA		Normally closed contact		SQ

	Three-level control switch		QS		Composite contact		SQ
	Three-level isolating switch		QS	Button	Normally opened button		SB
	Three-level load switch		QS		Normally closed button		SB
	Combined rotary switch		QS		Combined button		SB
	Low-voltage circuit breaker		QF		Emergency stop button		SB
	Control unit or control switch		SA		Key-operated button		SB
Contactor	Coil operating device		KM	Heater relay	Heat element		FR
	Normally open main contact		KM		Normally closed contact		FR
	Normally open auxiliary contact		KM	Intermediate relay	Coil		KA
	Normally closed auxiliary contact		KM		Normally open contact		KA

Time relay	Power-up delay (slow closing) coil		KT		Normally closed contact		KA
	Power-off delay (slow opening) coil		KT	Current relay	Overcurrent coil		KA
					Undercurrent coil		KA
	Instantaneously closed NO contact		KT		Normally open contact		KA
	Instantaneously opened NC contact		KT		Normally closed contact		KA
	Delay closed NO contact		KT	Voltage relay	Overvoltage coil		KV
	Delay opened normally closed contact		KT		Undervoltage coil		KV
	Delay closed normally closed contact		KT		Normally open contact		KV
	Delay opened normally open contact		KT		Normally closed contact		KV
Electromagnetic operator	General symbol for electromagnet		YA	Motor	Three-phase cage asynchronous motor		M
	Electromagnetic chuck		YH		Three-phase wound rotor asynchronous motor		M

	Electromagnetic clutch		YC		Separately excited DC motor		M
	Electromagnetic brake		YB		Shunt-excited DC motor		M
	Solenoid valve		YV		Series DC motor		M
Relay of non-electricity control	Speed relay normally open contact		KS	Fuse	Fuse		FU
	Pressure relay normally open contact		KP	Transformer	Single-phase transformer		TC
Alternator	Alternator		G		Three-phase transformer		TM
	DC tachogenerator		TG	Transducer	Voltage transducer		TV
Lamp	Signal lamp (indicator light)		HL		Current transformer		TA
	Light		EL	Connector	Plug and socket		X Plug XP Socket XS