Service Manual

AR14J/AR16J
Articulated Boom Mobile Elevating Work Platform

⚠ WARNING
Before operation and maintenance, the drivers and maintenance personnel are required to read this manual thoroughly. Otherwise, fatal accident may occur. This manual shall be kept properly for future reference by the personnel concerned.

LINGONG HEAVY MACHINERY CO., LTD.

Articulated Boom Mobile Elevating Work Platform

Service Manual

880*1230 mm sixteen format 8 printed sheet

The second edition was first printed in Mar. 2022

L I N G O N G H E A V Y M A C H I N E R Y C O . , L T D .

Add: F12,Building 3 LushangGuoao Plaza, 9777 Jingshi Road,Lixia District, Jinan, Shandong, 250000,China

Tel: 86-0531-67605017

Technical service: 86-4009666569

Web: www.LGMG.com.cn

Sales of accessories:86-0531-67605016

Contents

Foreword

Thanks for purchasing the product produced by Lingong Heavy Machinery Co., Ltd. This manual introduces the technical parameters and maintenance & adjustment data of the Articulated Boom Mobile Elevating Work Platform, and also the troubleshooting and maintenance process for reference by qualified professional maintenance personnel.

The information contained in this manual are correct at the time of publication, but due to the continuous improvement of the structure and performance of our products, the design as well as operation and maintenance instructions of the product may be subject to change without notice. For the latest information of the machine or any question about this manual, please consult us. In additions, readers of this manual are encouraged to feedback the errors and put forward suggestions to Lingong Heavy Machinery Co., Ltd., which will be carefully considered in the future publication and printing of this manual.

⚠ WARNING

- **Only the personnel who have professionally trained and qualified are allowed to operate and maintain the machine.**
- **Incorrect operation, maintenance and repair are dangerous and may lead to personal injury or death.**
- **Before operation or maintenance, please read this manual thoroughly. Otherwise, do not operate, maintain or repair this machine.**
- **Please load the machine in strict accordance with the rating, otherwise all the consequences arising from overloading or unauthorized modification will be borne by the user.**
- **The operation instructions and precautions in this manual apply only to the intended use of the machine. If the machine is used for an operation that is out of the specification herein but not prohibited, always make sure that this operation will not cause personal injury to yourself or others.**

Safety Notices

The operator shall understand and abide by the current national and local safety regulations. If such regulations are not available, the safety instructions in this manual shall prevail.

Most accidents are caused by failure to obey operation and maintenance specifications of the machine. To avoid unnecessary accident, please read and follow all warnings and precautions in this manual and on the machine before operation or maintenance. Failure to comply with the instructions and safety rules in this manual and the corresponding manual on the machine will result in death or serious injury.

Considering the fact that not all possible hazards are foreseeable, it is impossible for safety notices in this manual and on the machine to cover all safety precautions. If it is necessary to take steps and operations not recommended herein, always protect the safety of yourself and others, and keep the machine from any damage. If the safety of some operations remains uncertain, please consult us or dealers.

Some operations to the machine require not only basic mechanical, hydraulic and electrical skills, but also professional skills, tools, lifting equipment and suitable workshop. Considering this, it is strongly recommended for you to get the machine maintained and repaired in the service center authorized by Lingong Heavy Machinery Co., Ltd.

The operation and maintenance precautions referred to herein apply only to the intended use of this machine. If the machine is to be used for other purposes than those listed herein, it is the user or operator instead of us that shall take the safety liabilities therefrom.

In no case shall any operations expressively prohibited herein be performed.

For the purpose of this manual, the following signal words are applied to identify safety instructions:

⚠DANGER - Indicating any existing dangers that, if not avoided, will cause serious injury or even death, and also serious machine damage.

⚠WARNING - Indicating any potential dangers that, if not avoided, may cause death or serious injury, and also serious machine damage.

⚠CAUTION - Indicating situations that, if not avoided, may cause minor or moderate injury, and also machine damage or shortened machine service life.

Chapter 1 Safety and Environment

1.1 Terms and definitions

Administrator: the entity or individual that directly controls the use and application of the lifting platform, which usually refers to the owner, the renter or the authorized personnel of owner who obtains the control right of the lifting platform;

Operator: personnel who has been professionally trained and mastered qualified knowledge and practical experience to operate the lifting platform.

Qualified personnel: personnel who has recognized academic qualifications, certificates, professional status or relevant professional knowledge, has been professionally trained and experienced,

and has evidences to prove that he/she has the ability to solve difficulties encountered in related matters, work or projects.

Safety Bulletin: relevant safety information issued by Lingong Heavy Machinery Co., Ltd.

1.2 Compliance

1. The maintenance is required to be carried out by personnel who have received and qualified in the maintenance training of this machine.
2. Immediately mark the machine if it is damaged or faulty, and withdraw it out of service.
3. Repair any damage or fault before operating the machine.

1.3 Before maintenance

1. Read and follow the safety rules and maintenance instructions in the corresponding operation manuals on the machine.
2. Ensure that all necessary tools and parts are in place.
3. Do not use parts not sold by Lingong Heavy Machinery Co., Ltd.
4. Please read each step thoroughly and follow the instructions, and do not try to perform repair by shortcut, as this is dangerous.
5. Please wear goggles and other PPEs when necessary.
6. When lifting or placing loads, pay attention to the potential pinch risk by parts which are moving, freely swinging or unstable. Always wear acceptable steel protective shoes.

1.4 Workplace requirements

Unless specially specified, the machine shall be able to operate safely under the following conditions:

1. Altitude ≤ 1000m;
2. Ambient humidity ≤ 90% (at +25℃).
3. The machine shall be able to operate normally under the following safe conditions:

- Ambient temperature of -20℃ ~ +40℃;
- Wind speed ≤ 12.5 m/s.

4. During normal operation or maintenance, please set up protective devices as the movement of mechanism and parts may cause danger to human body.
5. Take measures to prevent the danger caused by parts falling from the platform.
6. During maintenance, please place a satisfactory fire extinguisher in a readily available position.
7. Keep the workplace tidy and clean, so as to avoid dirt entering machine parts and causing damage thereafter.
8. Make sure that the forklift, crane or other lifting or supporting equipment has a sufficient lifting capacity to support and secure the weight to be lifted.
9. Do not reuse disposable fasteners (such as cotter pins and lock nuts) during maintenance, as they may not function normally when being reused.
10. Please dispose of the waste oil in an environment-friendly way.
11. Please ensure that the workplace is well ventilated and illuminated.

1.5 Safety considerations for maintenance and repair

1. Before adjusting and repairing the machine, please take the following preventive measures:

- Park the machine on a solid and level ground
- Block the wheels
- Cut off the power supply to disable the machine;
- Set all controls in “OFF” position to prevent the operating system from being started by accident;
- If possible, lower the platform as much as possible; otherwise, ensure that it will not fall;
- Before loosening or removing hydraulic components, release the hydraulic oil pressure in the hydraulic pipeline;
- Place safety supports as required.

2. Training of maintenance personnel:

Maintenance personnel are required to be trained by qualified personnel, and then check and maintain the machine according to the requirements of this machine.

3. Replacement of parts

The genuine parts of our company must be used for replacement; otherwise, we have the right to refuse to provide maintenance and repair service for the machine concerned.

4. Service Bulletin

Users should maintain and repair the machine in strict accordance with the Service Bulletin issued by Lingong Heavy Machinery Co., Ltd.

5. Weld repair of machine

1) Shut down the engine and switch off the low-voltage power supply before repair;

2) Ensure that the maintenance personnel has the special operation certificate;

3) Clean up the flammable materials around the welding position, and apply for a welding permit;

4) Protect the vehicle body against splashing and fire;

5) Operate in strict accordance with the welding process;

6. Precautions for battery maintenance

1) Do not store the battery which is fully discharged, and charge the battery in time after use.

2) In the process of use, correctly control the charging time according to the actual situation, and determine the charging frequency according to the actual use frequency.

3) Prevent exposure to the sun, as a high temperature will increase the internal pressure of the battery and cause electrolyte loss in the battery, leading to decrease of battery activity and faster aging of polar plate. Therefore, be sure to stop the vehicle in a cool place.

4) In the process of use, check the battery for faults on a regular basis. If any problem is found, drive the vehicle to the sales center or dealer for inspection and repair, so as to prolong the service life of the battery pack and save maintenance costs to the greatest extent.

7. Coolant

When the radiator is hot, do not open the radiator cover for fear of scalding by the boiling coolant. Therefore, be sure to open the radiator cover after the coolant temperature drops to an acceptable level.

1.6 Intended use

This machine is only intended for lifting people and their tools and materials to a high-altitude workplace.

1.7 Instructions

Most maintenance processes can only be performed by professionally trained maintenance personnel in a properly equipped workshop. After troubleshooting, select the appropriate maintenance procedure.

Perform removal to such an extent that the fault can be eliminated by repair. Then perform refitting in the order reverse to removal.

It is strongly recommended to get the machine maintained and repaired in the service center authorized by Lingong Heavy Machinery Co., Ltd.

Chapter 2 Product Introduction

2.1 Parameters of machine

S/N	1	2
Name	AR14J articulated lifting platform	AR16J articulated lifting platform
Order No.	A0014JNDCH20	A0016JNDCH20
Configurations	1. Deutz (Euro V) engine	1. Deutz (Euro V) engine
	2. Danfoss walking pump and motor	2. Danfoss walking pump and motor
	3. Turbo-worm slewing drive	3. Turbo-worm slewing drive
	4. 315/55 D20 filled off-road tire	4. 315/55 D20 filled off-road tire
	5. COBO electronic control system	5. COBO electronic control system

2.1.1 Parameters of AR14J (A0014JNDCH20) articulated lifting platform

1) Parameters of machine

Item	Parameter	Item	Parameter
Rated load (kg)	230	Rotary table rotation time per circle (stowed) (s)	82-92
		Rotary table rotation time per circle (extended) (s)	82-92
Total weight (kg)	7160	Boom lifting time (s)	35-45
Max. allowed workers	2	Boom lowering time (s)	30-40
Max. working height (m)	16.09	Articulating boom lifting time (s)	25-35
Max. platform height (m)	14.09	Articulating boom lowering time (s)	26-40
Max. horizontal reach (m)	7.67	Boom extension time (s)	20-30
Max. span height (m)	7.56	Boom retraction time (s)	20-30
Min. turning radius (inner wheel) (m)	1.94	Jib lifting time (s)	30-50
Min. turning radius (outer wheel) (m)	4.41	Jib lowering time (s)	20-35
Max. braking distance (no-load, stowed) (m)	1≤S≤1.5	Platform rotation time (s)	13-26
Max. travel speed (stowed) (km/h)	6.1±0.5	Theoretical maximum gradeability (no-load, stowed)	45%
Max. travel speed (extended) (km/h)	0.8±0.05	Max. operation effort (N)	400
Climbing speed (stowed) (km/h)	＞1.5	Max. allowed wind speed (m/s)	12.5
Climbing speed (extended) (km/h)	≤0.8	Drive mode	Four-wheel

Max. allowed inclination of chassis	Along the boom	4.5°		drive Front wheel steering
	Orthogonal to boom	4.5°		

2) Main dimensions

Item	Parameter	Item	Parameter
Overall length (mm)	6766	Track width (mm)	1981.5
Overall width (mm)	2310	Wheelbase (front/rear) (mm)	2059
Overall height (mm)	2170	Min. ground clearance (mm)	360
Dimension of working platform (length × width) (mm)	1830×760	Tire specification	315/55D20

3) Engine system

Item	Parameter	Item	Parameter
Model	Deutz D2.9L4	Number of cylinders	4
Type	In-line, water-cooled, four-stroke	Bore/stroke (mm)	92/110
Rated power (kW)	36.4	Rated fuel consumption (g/kW.h)	233
Rated speed (r/min)	2600	Max. torque (N.M)/speed (r/min)	150/1600
Displacement (ml)	2900	Emission standard	EU Stage Ⅴ

4) Hydraulic system

Item			Parameter
Walking system		Type	Closed
		Pump displacement (ml/r)	46
		Max. working pressure (MPa)	28
		Motor displacement (ml/r)	38
Functional system	Type		Open
	Pump displacement (ml/r)		18
	Lifting system	Max. working pressure (MPa)	22.5

	Slewing system	Max. working pressure (MPa)	15
		Motor displacement (ml/r)	160
	Steering system	Max. working pressure (MPa)	15
Boom luffing cylinder (mm)			Φ90×Φ45-595-1135
Boom telescopic cylinder (mm)			Φ50×Φ32-1828-2122
Up-and-down leveling cylinder (mm)			Φ75×Φ40-345-645
Folding jib luffing cylinder (mm)			Φ63×Φ45-670-924
Fly jib cylinder (mm)			Φ55×Φ35-436-789
Steering cylinder (mm)			Φ50×Φ30-260-500
Floating cylinder (mm)			Φ88.9-96-380

5) Transmission system

Item		Parameter
Walking reducer	Rated output torque (Nm)	3500
	Speed ratio	57.49:1
Slewing reducer	Rated output torque (Nm)	8729
	Speed ratio	86:1

6) Electronic control system

Item		Parameter
Battery	Output voltage (V)	12
	Capacity (Ah)	120 (20HR discharge rate)
Control system	Voltage (V)	12

7) Refilling capacity

Item	Parameter
Hydraulic oil (L)	130 (in case of oil change)
Engine oil (L)	8.5
Diesel (L)	65
Gearbox oil (L)	0.68L*4
Engine antifreeze (L)	8.5

Note: The type of hydraulic oil or diesel for refilling shall be selected according to the working environment and temperature:

1) -25℃＜ Min. temperature: L-HV 32 low-temperature hydraulic oil;

2) -40℃＜ Min. temperature ≤-25℃: L-HS 32 ultra-low temperature hydraulic oil;

3) Min. temperature ≤-40℃: 10# aviation hydraulic oil.

Ambient temperature ≥ 4℃: 0# diesel; ambient temperature ≥ -5℃: -10# diesel; ambient temperature ≥-14℃: -20 # diesel; ambient temperature ≥-29℃: -35# diesel.

2.1.2 Parameters of AR16J (A0016JNDCH20) articulated lifting platform

1) Parameters of machine

Item		Parameter	Item	Parameter
Rated load (kg)		230	Rotary table rotation time per circle (stowed) (s)	82-92
			Rotary table rotation time per circle (extended) (s)	82-92
Total weight (kg)		8180	Boom lifting time (s)	35-45
Max. allowed workers		2	Boom lowering time (s)	30-40
Max. working height (m)		17.70	Articulating boom lifting time (s)	25-35
Max. platform height (m)		15.70	Articulating boom lowering time (s)	26-40
Max. horizontal reach (m)		9.39	Boom extension time (s)	20-30
Max. span height (m)		7.56	Boom retraction time (s)	20-30
Min. turning radius (inner wheel) (m)		1.94	Jib lifting time (s)	30-50
Min. turning radius (outer wheel) (m)		4.41	Jib lowering time (s)	20-35
Max. braking distance (no-load, stowed) (m)		1≤S≤1.5	Platform rotation time (s)	13-26
Max. travel speed (stowed) (km/h)		6.1±0.5	Theoretical maximum gradeability (no-load, stowed)	45%
Max. travel speed (extended) (km/h)		0.8±0.05	Max. operation effort (N)	400
Climbing speed (stowed) (km/h)		＞1.5	Max. allowed wind speed (m/s)	12.5
Climbing speed (extended) (km/h)		≤0.8	Drive mode	Four-wheel drive Front wheel steering
Max. allowed inclination of chassis	Along the boom	4.5°		
	Orthogonal to boom	4.5°		

2) Main dimensions

Item	Parameter	Item	Parameter
Overall length (mm)	7560	Wheelbase (mm)	2059
Overall width (mm)	2310	Track width (mm)	1981.5

Overall height (mm)	2170	Min. ground clearance (mm)	360
Dimension of working platform (length × width) (mm)	1830×760	Tire specification	315/55D20

3) Engine system

Item	Parameter	Item	Parameter
Model	Deutz D2.9L4	Number of cylinders	4
Type	In-line, water-cooled, four-stroke	Bore/stroke (mm)	92/110
Rated power (kW)	36.4	Rated fuel consumption (g/kW.h)	233
Rated speed (r/min)	2600	Max. torque (N.M)/speed (r/min)	150/1600
Displacement (ml)	2900	Emission standard	EU Stage Ⅴ

4) Hydraulic system

Item			Parameter
Walking system		Type	Closed
		Pump displacement (ml/r)	46
		Max. working pressure (MPa)	28
		Motor displacement (ml/r)	38
Functional system	Type		Open
	Pump displacement (ml/r)		18
	Lifting system	Max. working pressure (MPa)	22.5
	Slewing system	Max. working pressure (MPa)	15
		Motor displacement (ml/r)	160
	Steering system	Max. working pressure (MPa)	15
Boom luffing cylinder (mm)			Φ100×Φ50-595-1135
Boom telescopic cylinder (mm)			Φ50×Φ35-2590-2884
Up-and-down leveling cylinder (mm)			Φ75×Φ40-345-645
Folding jib luffing cylinder (mm)			Φ63×Φ45-670-924
Fly jib cylinder (mm)			Φ55×Φ35-436-789

Steering cylinder (mm)	Φ50×Φ30-260-500
Floating cylinder (mm)	Φ88.9-96-380

5) Transmission system

Item		Parameter
Walking reducer	Rated output torque (Nm)	3500
	Speed ratio	57.49:1
Slewing reducer	Rated output torque (Nm)	8729
	Speed ratio	86:1

6) Electronic control system

Item		Parameter
Battery	Output voltage (V)	12
	Capacity (Ah)	120 (20HR discharge rate)
Control system	Voltage (V)	12

7) Refilling capacity

Item	Parameter
Hydraulic oil (L)	130 (in case of oil change)
Engine oil (L)	8.5
Diesel (L)	65
Gearbox oil (L)	0.68L*4
Engine antifreeze (L)	8.5

Note: The type of hydraulic oil or diesel for refilling shall be selected according to the working environment and temperature:

1） -25℃＜ Min. temperature: L-HV 32 low-temperature hydraulic oil;

2） -40℃＜ Min. temperature ≤-25℃: L-HS 32 ultra-low temperature hydraulic oil;

3） Min. temperature ≤-40℃: 10# aviation hydraulic oil.

Ambient temperature ≥ 4℃: 0# diesel; ambient temperature ≥ -5℃: -10# diesel; ambient temperature ≥-14℃: -20 # diesel; ambient temperature ≥-29℃: -35# diesel.

2.2 Pressure parameters of filters and valves

Table 1: Pressure parameters of valves

Code	Name	Pressure (bar)
4120705740	Luffing balance valve A-VBSO-SE30-FC2-PI-PL-38-28-1.4:1	350
4120705322	Telescopic balance valve ST4921-A00B	350

4120704727	Check valve SY-RV-L15-M22*1.5-0.5	350
4120705965	Multi-way valve AR16JEDC-5	270
4120704690	Relief valve block	250
4120704392	6/2 electromagnetic switching valve	250
4120706178	Solenoid valve ST0010-AB0F	250
4120703874	Ball valve Q11F-16P-1''	16
4120703386	Floating valve DCV20/1-0145	350
4120705600	Floating balance valve	280
4120707095	Platform swing control valve ST4277-AB00	207
4120704705	Jib luffing balance valve	350

Table 2: Pressure parameters of filters

Code	Name	Pressure
4110001498	Air cleaner G068663	2.5Kpa
4120001428	High-pressure filter KGLB-0080005L	32Mpa
4120001891	Suction filter WU-100*180-J	0.7Mpa

2.3 Tightening torque of joints and plugs

The tightening torque tolerance range is 10% for all hydraulic seals, important transmission connectors and key processes with defined torque tightening requirements, and 20% for non-essential reference torques, which is to be rounded to the nearest integer when necessary;

Table 1: Tightening torque of metric/inch-threaded joints and plugs (unit: N.m)

Tightening torque of metric-threaded oil ports					Tightening torque of inch-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 joints and plugs (unit: N.m)

Product series	Thread UN/UNF	Assembly torque with direction unadjustable (N.m)	Assembly torque with direction unadjustable (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 gives the torques for metric-threaded joints and inch-threaded joints, and Table 2 gives the torques for UN-threaded joints, and for those torques, an error of +10% is allowed;

2. The torque values given in Table 1 and Table 2 are based on the condition that the connected part is

made of steel, and for connected part made of aluminum, the tightening torque equal to 60% of the corresponding torque in Table 2 and Table 3 shall apply and shall be rounded to the nearest integer after calculation;

3. For Parker joints, the torque is to be selected according to the name and specification, and for ordinary joints, the torque is to be selected according to the thread specification.

For example:

1） GE 28 L M ED OMD A3C: GE for straight-through joint, 28 for pipe diameter, L for normal pressure, M for metric thread, ED for E-type elastic seal, OMD for no nut sleeve, A3C for galvanizing; then according to 28L MED, the torque selected from Table 1 is 325N.m

2） GE O 22L R 3/4 OMDA3C: O for F-type O-ring, R for inch thread, and 3/4 for thread specification G3/4; then according to O 22L R3/4, the torque selected from Table 2 is 160N.m;

3） GE O 20S R OMDCF: S for heavy pressure; then according to O 20S R, the torque selected is 160N.m;

2.4 Tightening torque of nuts and bolts

Table 3: Tightening torque of metric-threaded swivel nuts (unit: N.m)

Pipe diameter	Thread specification	Tightening torque	Pipe diameter	Thread specification	Tightening torque
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. For torques given in Table 2, an error of +10% is allowed;

2. The torque values given in Table 3 are based on the condition that the connected part is made of steel, and for connected part made of aluminum, the tightening torque equal to 60% of the corresponding torque in Table 1 shall apply and shall be rounded to the nearest integer after calculation;

3. For Parker rubber hoses, right-angle joints and tee joints, the torque is to be selected according to the name and specification, and for ordinary rubber hoses, right-angle joints and tee joints, the torque is to be selected according to the thread specification.

For example:

1) F481 CACF 2815 16: F481 for crimping form and hose type, CACF for joint type at both ends, CA for 24° conical swivel nut with O-ring, CF for 90° elbow of 24° conical swivel nut with O-ring, and 2815 for connection specification of joint at both ends of hose. According to this, the torque selected for end 28 is 135N.m, and the torque selected for end 15 is 58N.m;

2) F412 SN CACF 1210 06: SN for heavy pressure hose. According to this, the torque selected for end 12 is 63N.m, and the torque selected for end 10 is 53N.m;

3) EW15LOMDA3C: EW for right-angle combined joint. According to 15L, the torque selected from Table 1 is 32N.m.

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

Bolt strength grade	Yield strength, N/MM^2	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/MM^2	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/MM^2	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 3 Service

3.1 Platform assembly

3.1.1 Assembling the file box

1. Platform frame 2. File box 3. Bolt 4. Washer 5. Nut

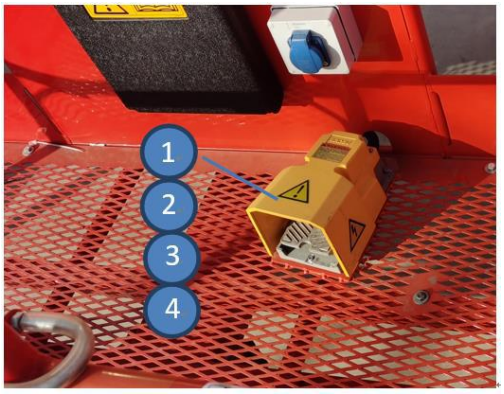
1) Assemble part 2 with part 3/4 (nut end)/5 to the mounting position in the middle of part 1, and tighten the bolts.

Reference tightening torque of part 3: 12±1N.m

Tools: open-end wrench 8-10

Note: Pay attention that the simple removal process will not be described. Please refer to the assembling process.

3.1.2 Assembling the foot switch



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

1) Assemble part 1 with parts 2/3/4 to the assembling position at the bottom of the platform frame, and tighten the screws.

Reference tightening torque of parts 2/3: 6N.m

Tools: Allen wrench M4

3.1.3 Assembling the lifting cross bar

1. Lifting cross bar 2. U-bolt 3. Rubber hose 4. Nut 5. Washer 6. Nut 7. Lifting side bar

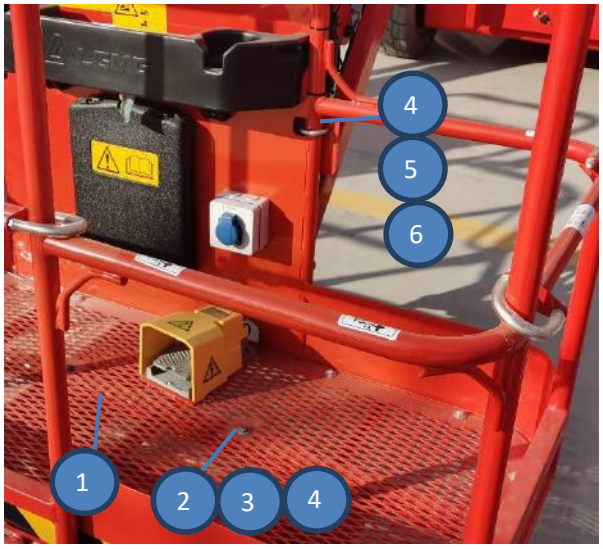
1) Pre-install part 3 on part 2, screw on part 4, then attach part 1 to the front door railing of the platform with U-bolts, fix it with parts 5/6, and install part 7 to the side door railing of the

platform in the same way as part 1.

Reference tightening torque of part 6: 12±1N.m

Tools: open-end wrench 13-16

3.1.4 Assembling the platform support



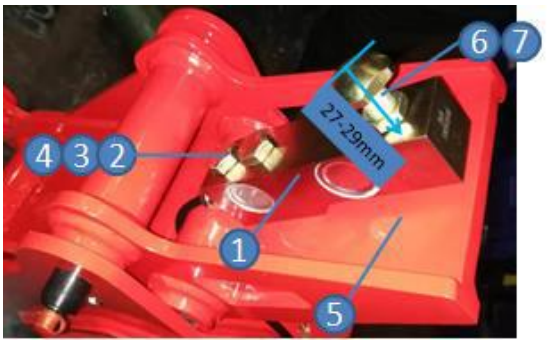
1. Platform support 2. Bolt 3. Washer 4. Nut 5. U-bolt 6. Washer

Place part 1 on the subassembling bench, then hoist the platform frame to the platform support, fix it with part 2 (inserting from top to bottom)/3 (for both bolt end and nut end)/4, and then fix the platform support and platform frame with parts 5/6/4.

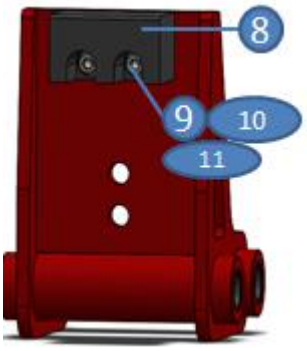
Tightening torque of part 2: 52±5N.m

Tools: open-end ratchet wrench 16, socket wrench 1/2-16mm

3.1.5 Assembling the load cell



1. Load cell 2. Bolt 3. Washer 4. Nut 5. Triangular bracket assembly 6. Adjusting bolt 7. Nut



8. Stop block 9. Screw 10. Washer 11. Nut

Install part 1 with parts 2/3 (nut end)/4 to part 5 (one of them), then screw part 7 on part 6, install part 6 to part 1 with the farthest end of part 6 about 27-29mm from the surface of the load cell, tighten part 7 on triangular bracket where the load cell is not installed, and assemble parts 8/9/10/11.

Tightening torque of part 2: 90±9N.m

Tightening torque of part 6: 52±5N.m

Reference tightening torque of part 9: 12±1N.m

Tools: open-end wrench 16-18, open-end

wrench 13-16

Socket wrench 1/2-18mm, QSP100N4, S6 Allen wrench

3.1.6 Assembling the swing motor mounting bracket

1) Connect the triangular bracket assembly to part 3 and platform support with parts 1. When knocking the part 1 for assembling, adjust the gap of triangular bracket assembly with platform support and swing motor mounting bracket using part 2 until the part 2 cannot be inserted any more. Pay attention that the knocking direction of parts 1 shall be consistent (that is, the grease nipples are on the same side after installation).

1. Transition support pin 2. Adjusting washer 3. Swing motor mounting bracket 4. Bolt 5. Bolt 6. Bolt 7. Bolt

2) Insert part 4, fix it with part 5 (to be pre-coated with adhesive), install part 6 on part 1, then add lithium grease 2# until the grease overflows from both sides of triangular bracket assembly, and then assemble part 7 to part 6.

Tightening torque of part 5: 52±5N.m

Tools: QSP100N4/socket wrench 1/2-16mm/ open-end wrench 13-16

3.1.7 Assembling the platform control unit (PCU)

1. PCU assembly 2. Bolt 3. Washer

1) Assemble part 1 to the mounting position in the middle of platform frame with parts 2 (to be pre-coated with adhesive)/3.

Reference tightening torque of part 2: 52±5N.m

Tools: open-end ratchet wrench 16

3.1.8 Assembling the anti-collision rubber pad

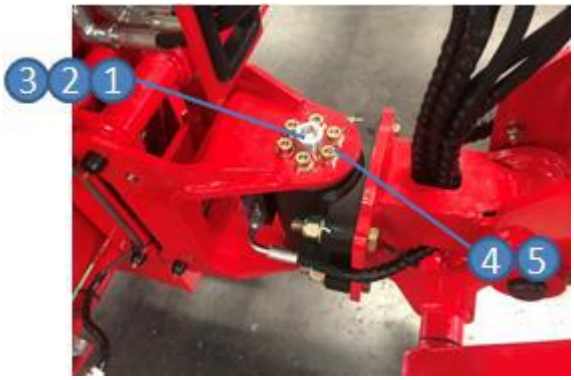
1. Anti-collision rubber pad 2. Screw 3. Washer 4. Nut

Reference tightening torque of part 2: 28±3N.m

Tools: 9-piece Allen wrench set/open-end wrench 13-16

3.1.9 Assembling the platform

1) Lift the platform to the assembling position of the swing cylinder, insert the part 1 through the platform support and the swing cylinder, manually screw on the parts 2/3 (note that do not tighten the part 1 at this time), adjust the perpendicularity between the platform and the fly jib, and after the adjustment, apply adhesive to parts 4 and pre-tighten them symmetrically (do not torque tighten them for the time being), then apply adhesive to parts 1 and torque tighten them, and finally torque tighten parts 4:



1. Screw 2. Washer 3. Nut 4. Screw 5. Washer

Tightening torque of part 1: 595±55N.m

Tightening torque of part 4: 71±7N.m

Tools: open-end wrench 30-32/QLE-750N/ QSP100N4

2) Connect the platform harness to PCU and connectors of load cell and platform valve block, and connect the corresponding oil pipes to the platform.

3.2 Axle assembly

3.2.1 Disassembling the front axle assembly

⚠ CAUTION: Before refitting, the O-ring of the removed fitting and/or hose assembly must be replaced and then tightened to the specified torque. Please refer to hydraulic hose and fitting torque specifications.

1) Fix the non-steered wheels and place the jack in the middle of the steering end (i.e., front axle) of the chassis.

2) Unscrew the wheel nuts, but do not remove them.

3) Raise the machine by 5 cm. Place the bracket under the chassis for the purpose of supporting.

4) Fix the sling connected to the crane to the front axle securely.

⚠ Caution: Risk of crushing. If not

supported, the chassis may fall.

5) Unscrew the wheel nuts and remove the tires.

6) Remove the pipe clamp.

7) Mark, disconnect and plug the hoses and fittings connected to the floating cylinder.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

8) Remove the pins and securing fasteners at two ends of the floating cylinder as shown below:

9) Remove the floating cylinder carefully.

10) Mark, disconnect and plug the hoses and fittings connected to the walking motor.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

11) Remove the securing fastener of center shaft for connecting the front axle to the chassis, and knock the pin out with the copper bar.

12) Move away the front axle slowly with the crane.

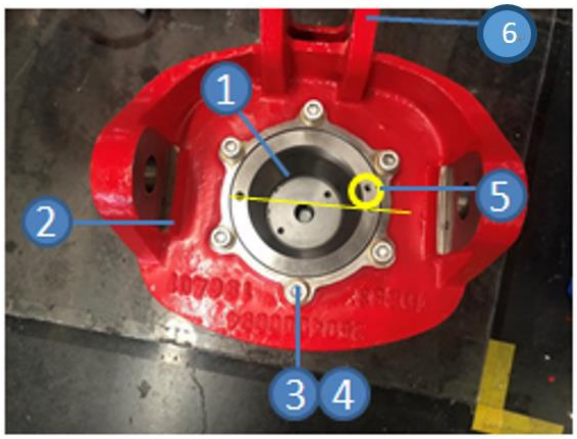
⚠ Caution: Risk of crushing. If not supported correctly by the sling, the front axle may fall.

3.2.2 Assembling the front axle assembly

1) Lift part 1 to the subassembly tooling, and lift part 2 onto part 1. Then rotate part 2 to adjust the assembly position so that the illustrated motor mounting bolt hole is parallel with the pin mounting hole. Next, remove the plug in the illustrated yellow circle, which is located at right-hand end of the operator. After the adjustment, use part 3 (coated with sealant)/ 4 to put fastener 5 for the connecting plate and the walking reducer at the plug hole, and press-fit part 6 into the pin hole of steering connecting plate steering cylinder and steering rod.

Note: The right steering connecting plate should

be connected to the reducer in the same way.



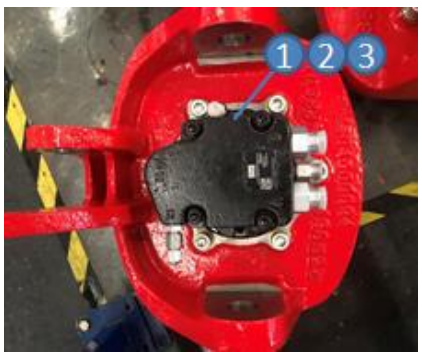
1. Walking reducer 2. Left steering connecting plate 3. Screw

4. Washer 5. O-ring 6. Shaft sleeve

Tightening torque of part 3: 260±26N.m

Tool: QSP420N4/ hexagon head socket wrench S14

2) Install the subassembled walking motor onto the walking reducer, making the brake oil ports coincident. Then install part 1, and fasten it with part 2 (coated with sealant) / 3. See the figure below:

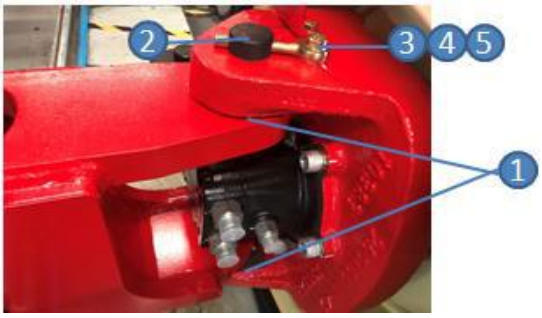


1. O-ring 2. Bolt 3. Washer

Tightening torque of part 2: 110±11N.m

Tool: QSP200N4/ hexagon head socket wrench S14

3) Lift the subassembled connecting plate to the assembly position of the front axle, and install part 1 to the upper and lower contact surfaces between the connecting plate and the front axle weldment. Install the pin (part 2) from top to bottom (from bottom to top for the lower part), adjust its position and fix it with parts 3, 4 and 5. See the figure below:



1. Wear washer 2. Front hub connecting pin 3. Latch

4. Bolt 5. Washer

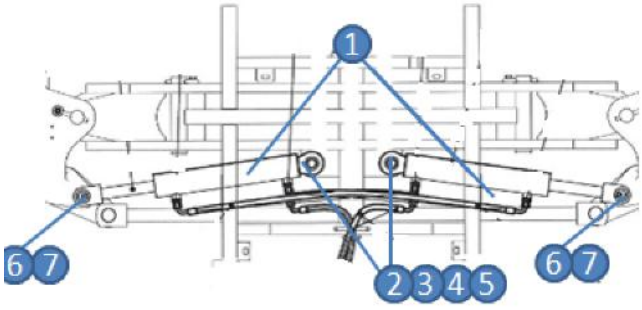
Note: Wear washers should be installed on both upper and lower surfaces of the steering connecting plate.

Tightening torque of part 4: 52±5N.m

Tool: QSP100N4/ socket wrench 16

4) Remove the plug of the steering cylinder (part 1). Note that residual oil in the cylinder will flow out during removal, and should be collected with an oil collector. Install the steering cylinder rod

with the non-rod piston chamber pulled out in the middle of front axle weldment. Then install washers (2504000277:4) on both upper and lower surfaces of the cylinder pin mounting hole, and install part 2 from top to bottom. Next, fix the pin with part 3/4/5 at the upper part, and install the rod end of steering cylinder to the steering connecting plate. Afterwards, install part 6 from top to bottom, install the washer, and fix with part 7.



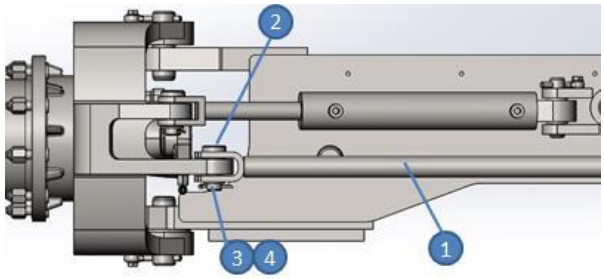
1. Steering cylinder 2. Steering cylinder pin 3. Latch 4. Bolt 5. Washer 6. Rod pin 7. Cotter pin

Tightening torque of part 4: 52±5N.m

Tool: QSP100N4/ socket wrench 16

5) Connect and install the hoses and fittings of two steering cylinders.

6) Install part 1 to the front axle, and connect the two ends to the left and right steering connecting plates. Then install part 2 from top to bottom, install part 3, and fix with part 4.

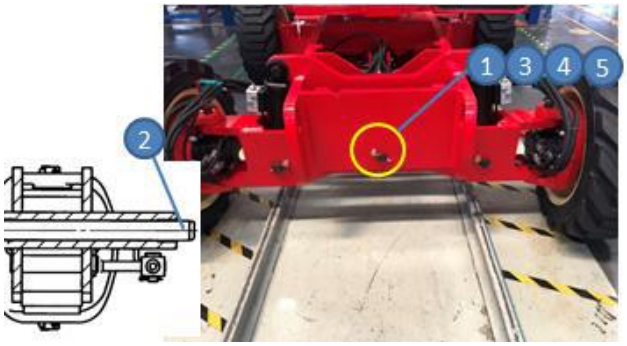


1. Steering rod 2. Rod pin 3. Washer 4. Cotter pin

7) Lift the subassembled front axle assembly with the lifting rope. Note: The lifting rope should be laid such that the front axle is horizontal during lifting. Adjust the position and height of front axle to make the axes of two connecting holes between the chassis and the front axle coincident.

8) Thread the front axle connecting pin (part 1) through the lower connecting hole of the floating cylinder from outside to inside, and add the adjusting washer (part 2) at the inside welded plate of front axle until it can be no longer added.

9) Adjust the position of pin, and fasten part 1 to the outside weld surface of front axle with parts 3, 4 and 5 tightened to specified torque. See the figure below:



1. Axle connecting pin 2. Adjusting washer 3. Bolt 4. Washer 5. Latch

Tightening torque of part 3: 52±5N.m

Tool: QSP100N4/ socket wrench 16

10) Pull out the floating cylinder, and make the upper opening of the cylinder parallel with the front axle.

11) As shown (at the part of front axle indicated in the yellow circle), thread the lower pin (part 1) of floating cylinder through the lower connecting hole of floating cylinder from outside to inside, and bring it out of the inside welded plate of front axle; adjust the position of pin, and fasten the floating cylinder to the outside weld surface of front axle with parts 2, 3 and 4 tightened to the specified torque.

See the figure below:

1. Lower pin of floating cylinder 2. Latch 3. Bolt 4. Washer

Tightening torque of part 3: 52±5N.m

Tool: QSP100N3/ socket wrench 16

3.2.3 Disassembling the rear axle assembly

⚠ CAUTION: Before refitting, the O-ring of the removed fitting and/or hose assembly must be replaced and then tightened to the specified torque

. Please refer to hydraulic hose and fitting torque specifications.

1) Fix the non-steered wheels and place the jack in the middle of the steering end (i.e., front axle) of the chassis.

2) Unscrew the wheel nuts, but do not remove them.

3) Raise the machine by 5 cm. Place the bracket under the chassis for the purpose of supporting.

4) Fix the sling connected to the crane to the rear

axle securely.

5) Mark, disconnect and plug the hoses and fittings connected to the rear axle walking motor, as shown below:

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

6) Remove the securing fastener of connecting shaft for connecting the rear axle to the chassis, and knock the pin out with the copper bar, as shown below:

7) Move away the front axle slowly with the crane.

⚠ Caution: Risk of crushing. If not supported correctly by the sling, the front axle may fall.

3.2.4 Assembling the rear axle assembly

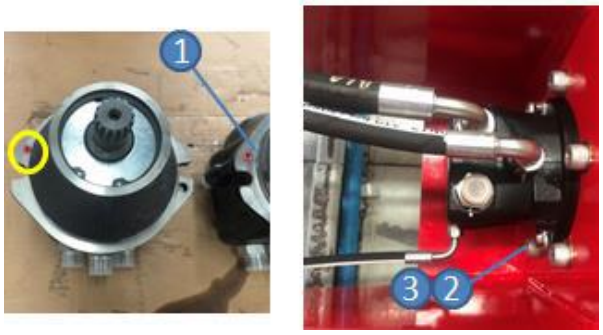
1) Lift the rear axle weldment onto the subassembly tooling, and lift the walking reducer to the mounting positions at two ends. Then rotate the walking reducer to adjust its mounting angle, ensuring that the motor mounting hole is at the horizontal mounting position and the reducer plug is on the right of the operator. Next, fasten the walking reducer with part 3 (coated with sealant)/ 4. Afterwards, remove the protection of parking brake oil port on the reducer, and install the O-ring. After that, press-fit the shaft sleeves at two ends of the pin mounting hole in the middle of rear axle.

1. Screw 2. Washer

Tightening torque of part 1: 260±26N.m

Tool: QSP400N4/ hexagon head socket wrench S14

2) Remove the plug (indicated by the illustrated yellow circle) of the subassembled rear axle motor, and lift the motor to the assembly position of the rear axle reducer. Remember to add part 1 before installing the motor, and ensure that the motor parking brake oil port is coincident with the reducer parking brake oil port during the installation. Then fix the motor with part 2 (coated with sealant)/ 3.

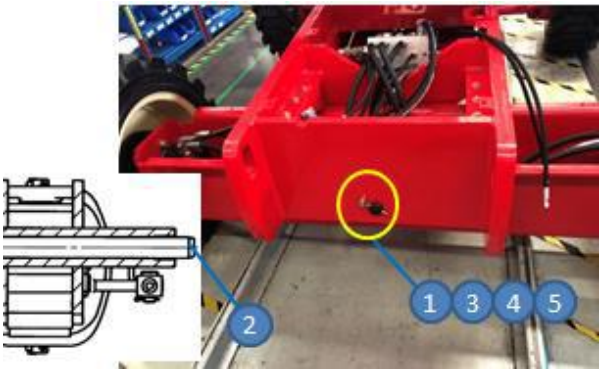


1. O-ring 2. Bolt 3. Washer

Tightening torque of part 2: 110±11N.m

Tool: QSP200N4/ socket wrench 19

3) Lift the grooved parts of reducers on two sides of rear axle to the chassis, and install the shaft (part 1), making the side with gap toward the rear side of machine. During installation of the shaft, adjust the gap between the rear axle and the chassis with part 2 until the part can no longer be added. Install the part from outside to inside, connect the inside and install it as a whole. Afterwards, fasten the part with parts 3, 4 and 5 tightened to specified torque. See the figure below:



1. Rear axle connecting pin 2. Adjusting washer 3. Bolt 4. Washer

5. Latch

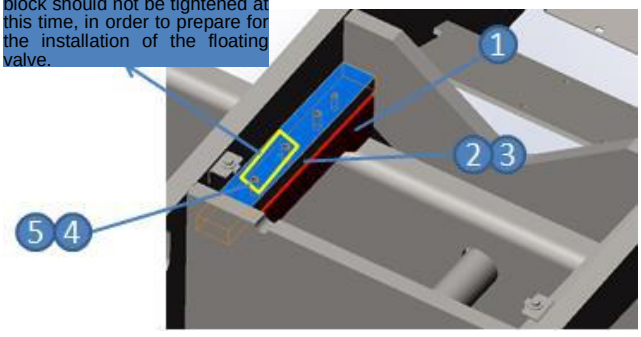
Tightening torque of part 3: 52±5N.m

Tool: QSP100N4/ socket wrench 16

4) Place the gap adjusting block between the chassis and the rear axle, and install part 1 to the rear axle with parts 4 and 5. Then adjust the gap of rear axle with parts 2 and 3. Gap control criterion: 4-5 mm.

Note: The number of part 2/3 may be determined according to the actual gap.

The illustrated bolt for the left block should not be tightened at this time, in order to prepare for the installation of the floating valve.



1. Stop block 2. Adjusting washer 3. Adjusting

washer 4. Bolt 5. Washer

Tightening torque of part 4: 52±5N.m

Tool: QSP100N4/ socket wrench 16

3.2.5 Disassembling the wheel

1) Unscrew the wheel nuts, but do not remove them .

2) Block the non-steered wheel, and place a jack with sufficient bearing capacity under the steering axle.

3) Raise the machine by 15 cm, and place a cushion block under the chassis for the purpose of supporting.

⚠ CAUTION: Risk of crushing.

If improperly supported, the machine may fall.

4) Unscrew the wheel nuts and remove the wheel.

5) Unscrew the hub fixing nuts.

6) Remove the hub.

3.2.6 Assembling the wheel

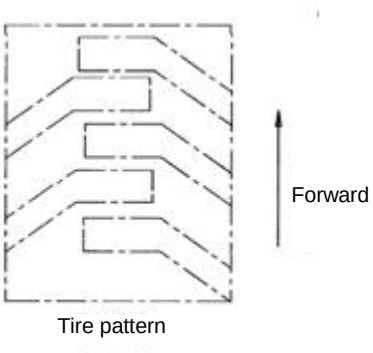
1) Lift the tire with the crane, and adjust the angle of tire to make the tire bolt holes coincident with the motor bolts.

2) Push in the tire horizontally and make it fit closely. Then pretighten the tire with part 2 (coated with threadlock before pretightening).

3) Tighten all nuts to specified torque diagonally.

1. Tire 2. Hexagon cone nut

Note: The left and right tires may not be mistaken during installation:



Tire pattern

Tightening torque of part 2: 305±25N.m

Tool: QSP400N4/ socket wrench 24

3.3 Jib assembly

3.3.1 Disassembling the swing cylinder, the fly jib cylinder and the jib

⚠ CAUTION: This procedure should be implemented when the boom is retracted.

⚠ CAUTION: The O-ring (if any) of the removed fitting and/or hose assembly

must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

1) Remove the platform.

2) Disconnect the electrical connection from the jib/platform changeover valve installed on the platform bracket.

3) Mark, disconnect and plug all hydraulic hoses on the jib/platform changeover valve. Plug the hose fittings, as shown below:

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

4) Remove the platform mounting weldment.

5) Attach the sling from the overhead crane to the swing cylinder for the purpose of supporting.

6) Remove the fastener of dowel pin from the cylinder mounting shaft at the fly jib cylinder barrel end. But do not remove the cylinder mounting shaft.

7) Remove the fasteners of dowel pins at two ends of the jib link. But do not remove the pin.

8) Use the copper hammer to knock out the cylinder mounting shaft connected to the upper link, to make the upper link sink.

9) Disconnect and plug the hoses and fittings on the swing cylinder, remove the securing fasteners on the swing cylinder, and remove the swing cylinder from the machine, as shown below:

10) Slide the two jib leveling arms away from the pivot pin at the boom cylinder rod end.

11) Remove the hose/ cable cover from the jib (upper link) side, and then take off the hose/ cable cover.

12) Attach the sling from the overhead crane to the fly jib.

13) Use a suitable lifting device to support the fly jib cylinder barrel end.

14) Mark, disconnect and plug the hydraulic hoses of the fly jib cylinder. And plug the fittings on the cylinder.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

15) Remove the fastener of dowel pin from the pivot at the fly jib cylinder block end.

16) Use a copper hammer to remove the pin and make the cylinder sink.

⚠ WARNING: Risk of crushing

If not properly supported by the crane, the jib may fall during removal of the pivot pin at the barrel end.

17) Remove the fastener of dowel pin from the jib mounting shaft. Remove the pin with the copper hammer, and then remove the jib from the boom head connecting plate.

⚠ WARNING: Risk of crushing

If not properly supported by the crane, the jib may fall due to loss of balance during removal from the machine.

18) Attach the sling from the overhead crane to the lifting lug at the fly jib cylinder rod end.

19) Knock out the mounting shaft at the fly jib cylinder barrel end with the copper hammer, and then remove the fly jib cylinder from the boom head connecting plate.

⚠ WARNING: Risk of crushing

If not properly supported by the crane, the jib may fall due to loss of balance during removal from the machine.

3.3.2 Assembling the swing cylinder, the fly jib cylinder and the jib

1) Place part 1/2/3/4 onto the jib subassembly tooling as shown below.

1. Lower connecting bracket assembly 2. Lower link 3. Upper link 4. Upper connector assembly

2) Connect the upper/lower connector assembly to the upper link with part 1, and then fix them with part 2/3/4/5, as shown below:

1. Shaft 2. Latch 3. Bolt 4. Washer 5. Nut

Tool: Open-end ratchet wrench 16

3) Install the cushion block, use part 1/2 to install part 3/4 to the assembly position at front end of upper link, and tighten the bolt, as shown below:

1. Cushion block 2. Bolt 3. Washer

Reference tightening torque of part 3: 12±1N.m

Tool: Open-end ratchet wrench 13

4) Install the balance valve (part 2) onto the fly jib cylinder (part 1), and fasten it with the bolt (part 4). Then remove the attached plugs at ports V1 and V2 of the balance valve, install the straight fitting (part 3) to the two ports and tighten them to specified torque. See the figure below:

1. Fly jib cylinder 2. Jib luffing balance valve 3. Straight fitting 4. Bolt

Tightening torque of part 3: 32±3N.m

Tightening torque of part 4: 19±2N.m

Tools: electric impact wrench (SATA 51082), socket wrench 1/2-10mm

5) Connect the cylinder piston rod to the jib lower connecting bracket assembly and the lower link with the shaft (part 1), and fix them with part 2/3/4/5. Similarly, connect the lower link to the upper connecting bracket assembly with part 1/2/3 (coated with sealant)/ 4/5, connect the cylinder base to the upper link with part 6, and fix them with part 2/4/5/7 (coated with sealant). See the figure below:

1. Shaft 2. Latch 3. Bolt 4. Washer 5. Nut 6. Shaft 7. Bolt

Tightening torque of part 3/7: 52±5N.m

Tools: socket wrench 1/2-16mm, open-end wrenches 16-18

6) Install part 1 onto the upper connector assembly with part 2 (coated with sealant)/ 3/4, as shown below:

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

Tightening torque of part 2: 305±25N.m

Tools: open-end wrenches 24-27, socket wrench 3/4-24

7) Lift the subassembled jib to the mounting position of telescopic boom, and connect the telescopic boom to the lower connector assembly with part 1, as shown below:

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

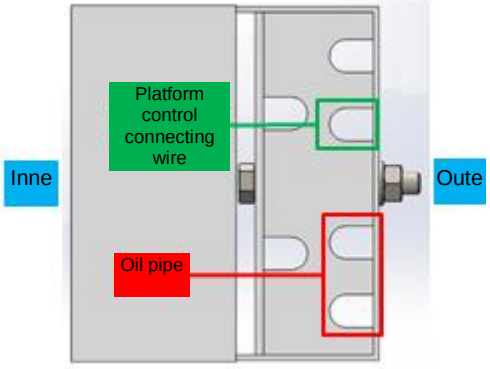
8) Install part 2/3 (coated with sealant)/ 4/5 for fixing; connect the upper leveling cylinder to the lower connector assembly with part 6.

Tightening torque of part 3: 52±5N.m

Tools: open-end wrench 16-1, open-end wrench 16-1

9) As shown above, fix the pipe and harness at the fly jib onto part 6 with part 2/3/4/5, and tighten the bolt.

The pipe harness should be arranged as shown below:



Reference tightening torque of part 3: 12±1N.m

Tools: Open-end wrench 13, ratchet wrench 13

10) Bundle up the platform control connecting wire and the fly jib valve block pipe at the illustrated position with the strap, and fix the pipe at the fly jib with part 1/2/3, as shown below:

1.Pipe clamp 2. Cushion collar 3. Spacer ring

11) Install the guard plate onto the fly jib upper link with part 1/2/3. Then thread the pipe and harness through the pipe clamp, wind 600PVC around them at the point 100 mm from the pipe clamp, and fix them with black insulating tape. Afterwards, fix the pipe at the fly jib with part 4/5/6.

See the figure below:

1. Bolt 2. Washer 3. Nut 4. Pipe clamp 5. Cushion collar 6. Spacer ring

Tightening torque of part 1: 12±1N.m

Tools: socket wrench 1/2-10mm, socket wrench 1/2-16mm, QSP100N4

, QSP25N4

3.4 Engine assembly

3.4.1 Subassembling the engine

1) Install part 1 to the engine with part 2 (coated with sealant)/ 3, apply the sealant and tighten the part to the specified torque.

Note: During fixing and connection of the coupling, apply AT272 threadlock to prevent looseness.

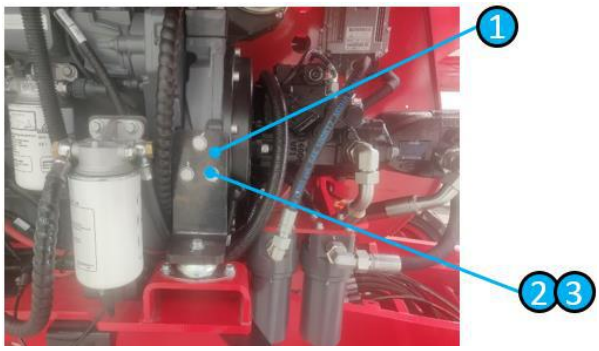
2) After fastening part 1, apply 596 plane sealant to the edge of engine, and install the pump cover (part 4) to the engine with part 5.

1. Flywheel coupling 2. Bolt 3. Washer 4. Pump cover 5. Screw

Tightening torque of part 2/5: 52±5N.m

Tools: QSP100N4, socket wrench 16

3) Lift the engine assembly, and install part 1 at the assembly position on the rear end of engine with part 2 (coated with sealant)/ 3. See the figure below:

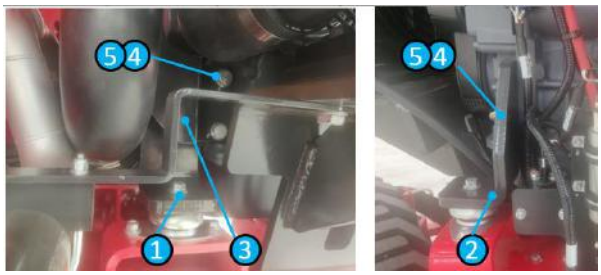


1. Rear outrigger 2. Bolt 3. Washer

Tightening torque of part 2: 90±9N.m

Tools: QSP100N4, socket wrench 21

4) Install part 1/3 on the right front side of engine with part 4/5, and install part 2 on the left front side of engine with part 4/5.



1. Right front outrigger 2. Left front outrigger 3. Intake steel pipe mounting bracket 4. Bolt 5. Washer

Tightening torque of part 4: 90±9N.m

Tools: QSP200N4, socket wrench 21

5) Install part 1 to the engine tray with part 2, and fix it with part 2 (coated with sealant) /3/4. Lower the subassembled engine to the damping pad of the engine tray and fix it with part 5.

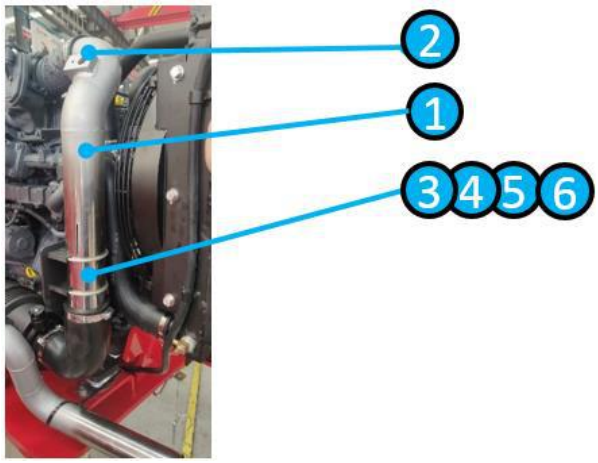
1. Shock absorber 2. Bolt 3. Washer 4. Nut 5. Bolt

Tightening torque of part 2: 52±5N.m

Tightening torque of part 5: 32±3N.m

Tools: QSP100N4, open-end wrench 16, QSP50N3, socket wrench 16/18

6) Fix part 1 onto the engine with part 2 and fasten part 1 with part 3/4/5/6;



1. Intake pipe weldment 2. Hose clamp 3. Stainless steel mount 4. U-bolt 5. Nut 6. Washer

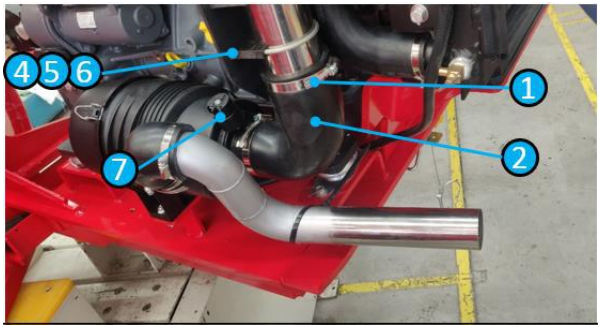
Tightening torque of part 2: 5-5.5N.m

Tightening torque of part 5: 6N.m

Tools: 8mm so

cket wrench, 7mm socket wrench

7) Use part 2 to connect part 1 to the engine intake steel pipe, and use part 4/5/6 to fix part 8 (4110001498: air cleaner G068663 1) onto the tray. Then install part 7 to the air cleaner inlet and tighten it. Afterwards, use part 2 to connect the engine intake hose to the air cleaner;



1. Engine intake hose 2. Hose clamp 3. Bolt 4. Washer 5. Nut 6. Hoop 7. Electronic differential pressure alarm

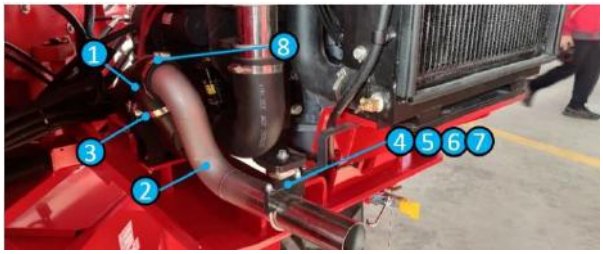
Tightening torque of part 2: 5-5.5N.m;

Tightening torque of part 3: 28±3N.m;

Reference tightening torque of part 6: 15-20N.m;

Tools: 13mm socket wrench, 7mm socket wrench

8) Use part 3 to connect part 1 to the air cleaner, use part 8 (4017000017 hose clamp JB8870-d70 1) to connect part 2 to part 1, and use part 4/5/6/7 to fix part 2 to the intake steel pipe mounting bracket;



1. Engine intake connecting pipe 2. Engine intake steel pipe 3. Hose clamp 4. U-bolt 5. Stainless steel mount 6. Nut 7. Washer 8. Hose clamp

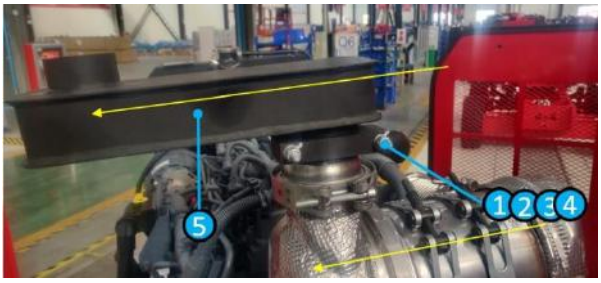
Tightening torque of part 3: 5-5.5N.m

Tightening torque of part 6: 6N.m

Tools: 13mm socket wrench, 7mm socket wrench

9) The tail pipe should be assembled in a

direction parallel to the axis of the engine muffler, as shown by the yellow arrows, with the U-bolt mount on the side away from the engine body, and should be fastened with part 2/3/4. Note that the U-bolt should be clamped in the middle of the exhaust connecting pipe weldment.



1. U-bolt 2. U-bolt mount 3. Washer 4. Nut 5. Exhaust connecting pipe weldment

Tools: electric impact wrench, socket wrench 13

3.4.2 Assembling the engine cooling system

1) Place one rubber plate (part 2) on the radiator bracket, then place the mounting plate (part 1) on the rubber plate, and place the radiator assembly (part 3) on part 1. Next, use part 4 (coated with sealant, and threaded from bottom to top) /5/6 for front side, and part 8 (4011000184 bolt GB5783-M10*40EpZn-8.8 2) /5 for rear side to connect the radiator assembly to the radiator bracket. Note that part 7 needs to be added for the fixing bolt on the right rear side of the radiator.

1. Mounting plate 2. Rubber plate 3. Radiator assembly 4. Bolt 5. Washer 6. Nut 7. Intake steel pipe mounting bracket 8. Bolt 9. Washer

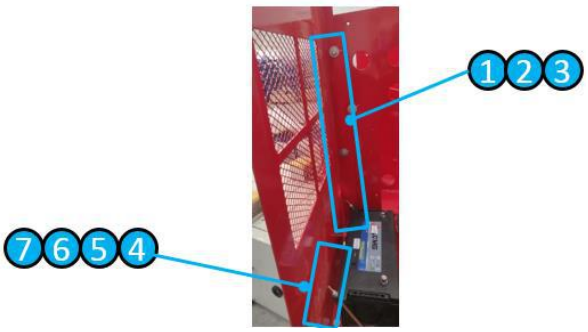
Tightening torque of part 4/8: 28±3N.m

Tools: QSP100N4/ socket wrench 16, open-end wrench 16

2) Adjust the clearance between the engine fan and the radiator, where the clearance between the engine/fan and the fan shroud should be within 15±5mm, the clearance from the outermost end of the fan to the outermost end of the guard net in the left and right directions should be within 20±6mm, and the clearance from the outermost end of the fan to the outermost end of the guard net in the front and rear directions should be within 18.5±3mm.

3) Install the radiator flitch weldment (part 1) onto the rotary table weldment with the bolt

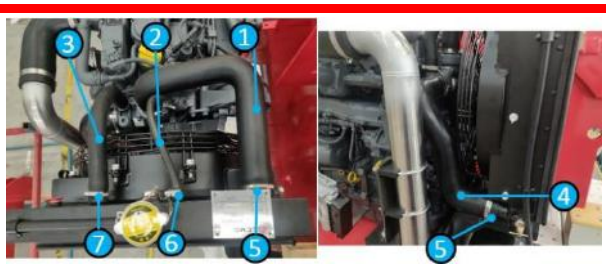
(part 2) and the washer (part 3). Install the flitch weldment onto the battery tray with the bolt (part 4), the washer for bolt (part 5), the washer for nut (part 6), and the nut (part 7).



1. Radiator flitch weldment 2. Bolt 3. Washer 4. Bolt 5. Washer 6. Washer 7. Nut

Tools: QSP100N4, socket wrench 18/13, open-end wrench 13

4) Connect one end of part 1 to the radiator inlet, and the other end to the engine water outlet, and fasten both ends with part 5; connect one end of part 2 to the radiator vent, and the other end to the engine vent, and fasten both ends with part 6; connect one end of part 3 to the top outlet of radiator, and the other end to the engine water filler, and fasten both ends with part 7; connect one end of part 4 to the bottom outlet of radiator, and the other end to the engine water inlet, and fasten both ends with part 5.



1. Engine water outlet pipe 2. Engine vent pipe 3. Engine makeup water pipe 4. Engine water inlet pipe 5. Hose clamp 6. Hose clamp 7. Hose clamp

Reference tightening torque of part 5/7: 5-5.5N.m;

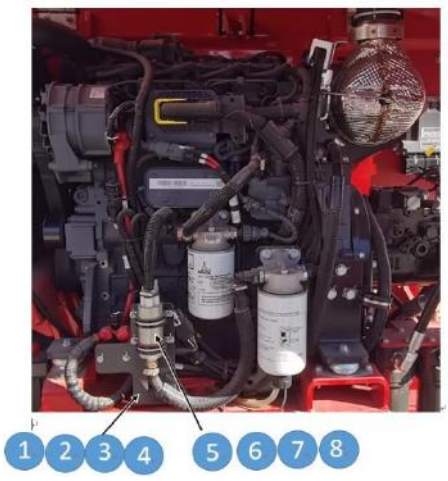
Reference tightening torque of part 6: 2-2.5N.m;

Tools: electric impact wrench 51082, socket wrench 7

3.4.3 Assembling the engine fuel pipeline

1) Install part 1 onto the engine tray with part 2/3/4.

2) Fix part 5 onto part 1 with part 6/7/8.



1. EFP mounting plate 2. Bolt 3. Nut 4. Washer

5. EFP 6. Bolt 7. Nut 8. Washer

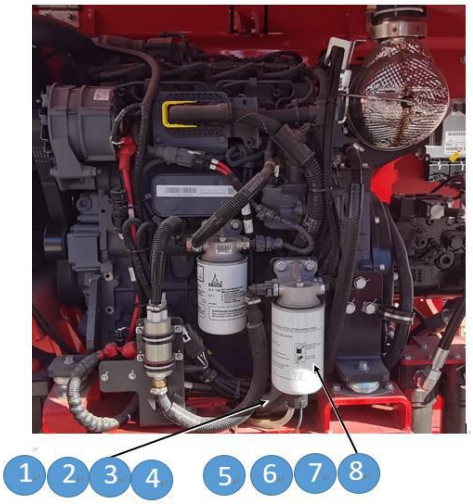
Tightening torque of part 6: 6±1N.m

Tightening torque of part 2: 28±3N.m

Tools: QSP100N4, QSP50N3, socket wrench 10/14

3) Install part 1 onto the engine tray with part 2/3/4.

4) Fix part 5 onto part 1 with part 6/7/8.



1. Water separator mounting plate 2. Bolt 3. Nut 4. Washer 5. Water separator 6. Bolt 7. Nut 8. Washer

Tightening torque of part 6: 52±5N.m

Tightening torque of part 2: 28±3N.m

Tools: QSP100N4, QSP50N3, socket wrench 16/14

5) Remove the fuel secondary filter supplied with the engine.

6) Add part 1 between the secondary filter and the engine housing, and fasten the secondary filter and the secondary filter cushion block with part 2.

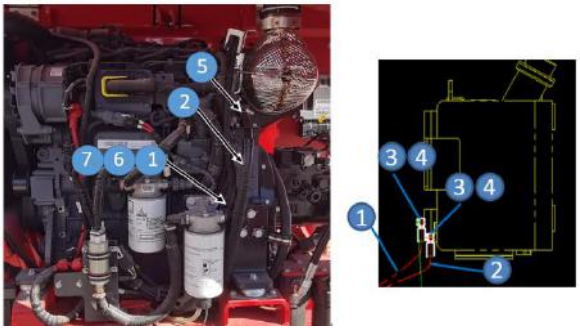
1. Secondary filter cushion block 2. Bolt

Tightening torque of part 2: 52±5N.m

Tools: QSP100N4, socket wrench 16

7) Connect one end of part 1 to the fuel tank, and fix it with part 3/4. Connect the other end to the water separator inlet, and fix it with part 6/7.

8) Connect one end of part 2 to the fuel tank, and fix it with part 3/4. Connect the other end to the engine, and fix it onto the quick connector with part 5.



1. Water separator inlet pipe 2. Engine fuel return pipe 3. Bolt 4. Washer 5. Hose clamp 6.

Bolt 7. Washer

Tightening torque of part 3/6: 32±3N.m

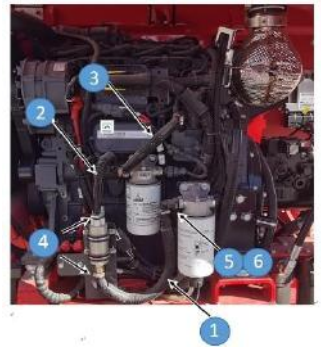
Reference tightening torque of part 5: 2.5-3N.m

Tools: QSP100N4, socket wrench 8/20/22, bent wrench with straight shank

9) Connect one end of part 1 to the water separator outlet, and fix it with part 5/6. Connect the other end to the EFP inlet, and fix it with part 4.

10) Connect one end of part 2 to the EFP outlet, and fix it with part 4. Connect the other end to the secondary filter inlet, and fix it with part 5/6.

11) Connect one end of part 3 to the secondary filter outlet, and fix it with part 5/6. Then connect the other end to the engine fuel inlet, and fix it onto the quick connector with part 4. Avoid interference with engine edges through adjustment of pipeline fitting.



1. EFP inlet pipe 2. Secondary filter inlet pipe 3. Engine inlet pipe 4. Hose clamp 5. Bolt 6. Washer

Tightening torque of part 5: 32±3N.m

Reference tightening torque of part 4: 2.5-3N.m

Tools: QSP100N4, socket wrench 8/22, bent wrench with straight shank

3.5 Cable carrier assembly

3.5.1 Disassembling the cable carrier

⚠ CAUTION: The O-ring (if any) of the removed fitting and/or hose assembly must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

1) Determine the position of cable from the cable carrier to the platform control unit. Number each cable and its entry to the platform control unit.

2) Disconnect the cable from the platform control unit.

3) Remove the hose and cable cover from the side of boom. Remove the hose and cable connector.

4) Remove the hose clamp on the boom head connecting plate.

5) Pull out all cable harnesses from the cable carrier. Do not pull out the hydraulic hose.

6) Mark, disconnect and plug the hydraulic hoses on ports V1 and V2 of the balance valve on the swing cylinder. And cover the hose fitting.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

7) Mark, disconnect and plug the hydraulic hoses on the fly jib/ swing cylinder. And cover the hose fitting.

8) Mark, disconnect and plug the hydraulic hoses on the leveling cylinder. And cover the fittings on the cylinder.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

9) Lift the boom to a horizontal position.

10) Place the cushion block between the upper and lower cable carriers, and fix the moving parts of upper and lower rails.

⚠ WARNING: Risk of crushing

If not properly fixed, the upper and lower cable carriers may become unbalanced and fall during removal from the machine.

11) Attach a sling from an overhead crane with the lifting capacity of 5 t/5,000 kg to the platform end of the boom for purpose of supporting. But do not lift it.

12) Remove all hoses and harness clamps from the underside of the boom.

13) Support the rod end of the boom luffing cylinder with a suitable lifting device.

14) Remove the latches and other securing fasteners from the cylinder mounting shaft at the rod end of the boom luffing cylinder. But do not remove the cylinder mounting shaft.

15) Raise the boom slightly with the overhead crane to release the pressure on the pivot at the boom luffing cylinder rod end.

16) Remove the pivot at the boom luffing

cylinder rod end with the copper hammer.

⚠ WARNING: Risk of crushing

If not properly supported by the lifting device, the boom luffing cylinder may become unbalanced and fall.

17) Lower the rod end of the boom luffing cylinder by approximately 30 cm.

18) Pull all hoses and cables out of the mount at the rod end of the boom luffing cylinder.

19) Raise the rod end of the boom luffing cylinder in place, and then install the pivot at rod end and the dowel pin fasteners.

20) Attach the sling from the overhead crane to the cable carrier.

21) Remove the mounting fastener from the upper cable carrier at the platform end of the telescopic boom.

22) Remove the mounting fastener of the lower cable carrier at the platform end of the telescopic boom.

23) Remove the cable carrier from the machine and place it on a structure that will support it.

⚠ WARNING: Risk of crushing

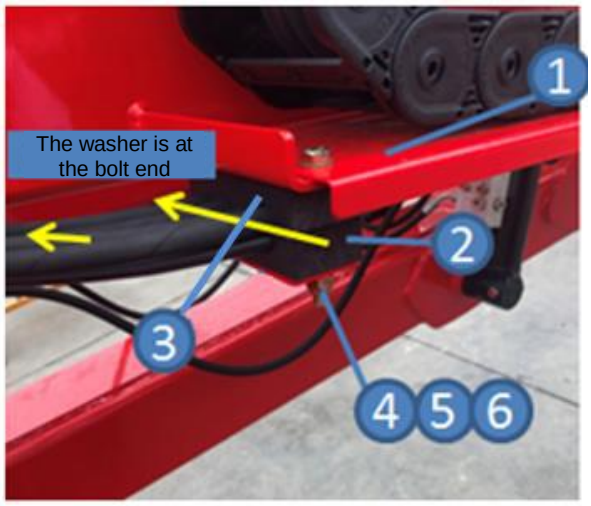
If not properly connected to the overhead crane, the cable carrier may become unbalanced and fall.

⚠ CAUTION: Risk of part damage

If being kinked or squeezed, the cable harness and hose may be damaged. If being twisted, the boom cable carrier may be damaged.

3.5.2 Assembling the cable carrier

1) Place part 1 on the side mounting plate of the boom, then place parts 2/3 on the lower end of the mounting plate of the support plate near the counterweight, then pre-tighten them with parts 4/5/6 (do not tighten them at this time), arrange the boom oil pipe harness, and then tighten the pipe clamp bolt (part 4).



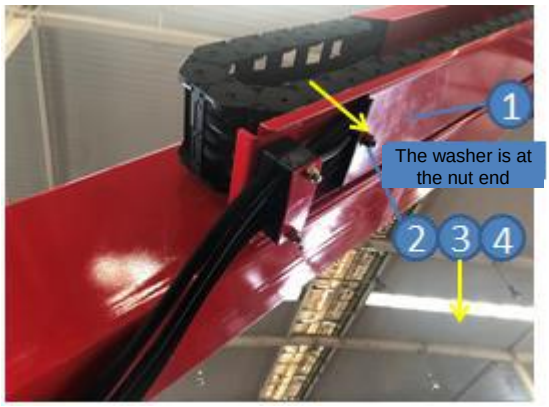
1. Cable carrier support plate 2. Pipe clamp 3. Pipe clamp pressure plate 4. Bolt 5. Washer 6. Nut

Reference tightening torque of part 4:

15±2N.m

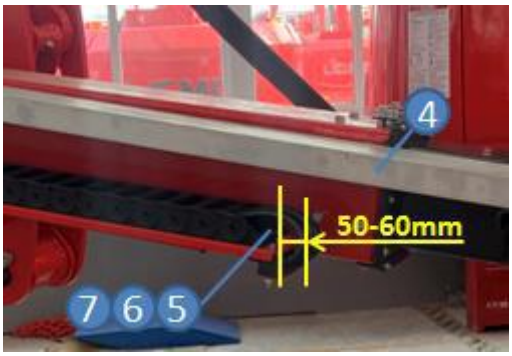
Tool: 13mm open-end ratchet wrench

2) Arrange the oil pipes and harnesses under the support plate, then install clip rubber strips (with applied adhesive) at both ends of part 1, then fix part 1 with parts 2/3/4 (the insertion direction of the bolt is shown in the figure), and tighten the nut, as shown in the figure below:



1. Cover plate weldment 2. Bolt 3. Nut 4. Washer

3) Install one end of the cable carrier on the support plate with parts 5/6/7 and the other end on the aluminum pipe with parts 5/6/7 (with the screw at the cable carrier end and the washer at the nut end, and tighten the screw), then insert the oil pipe and harness into the cable carrier when passing them upward from under the support plate, reserve the oil pipe and harness to be fixed at both ends of the cable carrier with straps according to the length as shown, and then wrap the reserved pipes and harnesses with 100mm long PVC (PVC ends are wrapped with black insulating tape) for protection, as shown in the figure below:

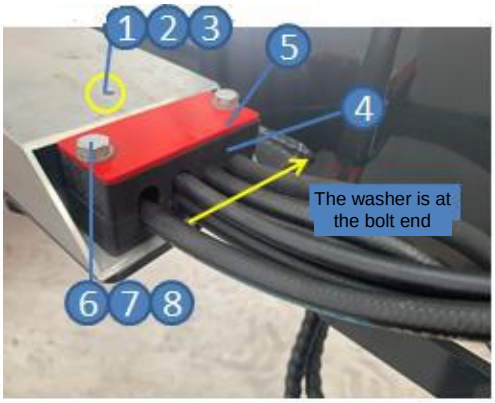


4. Aluminum pipe 5. Screw 6. Washer 7. Nut

Reference tightening torque of part 5: 12±1N m;

Tools: open-end ratchet wrench 10

4) Install the front end of the aluminum tube onto the telescopic boom mounting plate with parts 1/2/3 (indicated by the yellow circle in the figure), and then fasten parts 4/5 with parts 6/7/8, as shown in the figure below:



1. Screw 2. Washer 3. Nut 4. Pipe clamp 5. Pipe clamp pressure plate 6. Bolt 7. Washer 8. Nut

3.6 Boom/extension jib assembly

3.6.1 Disassembling the boom

⚠ WARNING: Risk of personal injury

This procedure requires specific maintenance skills, lifting equipment and a suitable workshop. Carrying out this procedure without these skills and tools may result in death or serious injury, as well as serious component damage. Therefore, it is strongly recommended that this service is performed by dealers.

⚠ **CAUTION: This procedure should be implemented when the boom is retracted.**

⚠ **CAUTION: The O-ring (if any) of the removed fitting and/or hose assembly must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.**

1) Remove the platform.

2) Remove the fly jib. Refer to "Disassembling the fly jib".

3) Remove the cable carrier. Refer to "Disassembling the cable carrier".

4) Lift the boom to a horizontal position.

5) Remove the hose and cable cover from upper pivot.

6) Remove the fastener of dowel pin from the mounting shaft at the barrel end of the boom luffing cylinder. Remove the cylinder mounting shaft with a copper hammer. Then put down the cylinder and make it sink.

⚠ CAUTION: Risk of part damage

When lowering the cylinder, make sure that the hose or fitting of the cylinder is not damaged.

7) Position the boom speed limit switch on the inner side of the upper pivot.

8) Remove the boom speed limit switch mounting fasteners. Do not disconnect the connecting wire.

9) Position the main telescopic boom drive speed limit switch inside the telescopic boom.

10) Remove the main telescopic boom drive speed limit switch mounting fasteners. Do not disconnect the connecting wire.

11) Pull the limit switch and wires out of the

extension pipe and move it away.

12) Mark, disconnect and plug the hydraulic hose of the boom extension cylinder. And cover the fittings on the cylinder.

⚠ WARNING: Danger of injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

13) Remove the hose clamp of the boom end spindle.

14) Connect a 5 ton/5000 kg overhead crane to the center point of the boom.

15) Connect similar lifting equipment to the boom luffing cylinder.

16) Place the support block under the boom luffing cylinder.

17) Remove the fastener of dowel pin from the boom luffing cylinder mounting shaft. Remove the pin with a copper hammer.

⚠ WARNING: Risk of crushing

If the support is improper, the boom lift cylinder and the boom will descend.

18) Lower the link end of the boom luffing cylinder to the support block. Protect the cylinder rod from damage.

19) Remove the fastener of dowel pin from the boom spindle.

20) Remove the boom pivot with a copper hammer, then carefully remove the boom from the machine and place it on a structure capable of supporting the boom.

⚠ WARNING: Risk of crushing

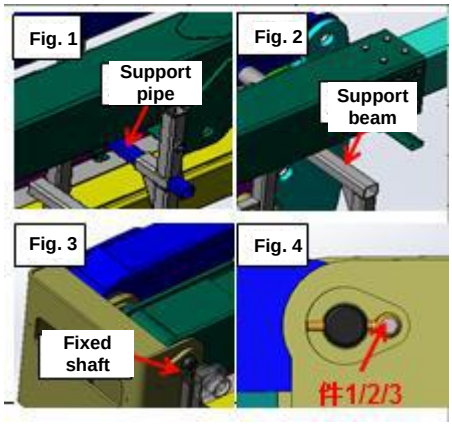
If it is not properly connected to the overhead crane, the boom may become unbalanced and fall when removed from the machine.

3.6.2 Assembling the boom assembly

1) Lift the telescopic boom assembly onto the right side of the boom subassembly tooling.

Note:

① Ensure the balance of the telescopic boom assembly during hoisting. The operator shall not stand at either end;



1. Latch 2. Bolt 3. Washer

Tightening torque of part 2: 90±9N.m;

Coat the latch fixing bolt (part 2) with AT262 threadlock.

Tool: QSP100N4/socket wrench 18#

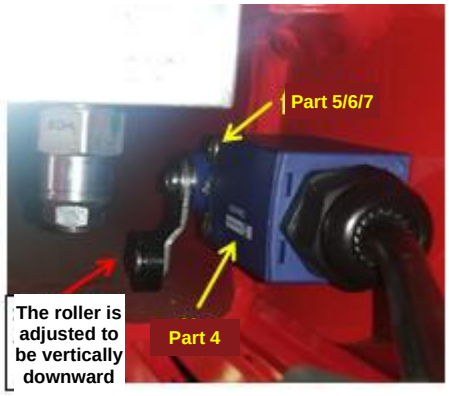
② Before lifting, place a support pipe in the middle of the tooling to prevent the telescopic boom from falling, as shown in Fig. 1;

③ Place the front end of the telescopic boom on the support beam at the front end of the tooling, as shown in Fig. 2;

④ Adjust the rear end hole of the telescopic boom to make it coaxial with the upper pivot hole, and hammer the pin that was not completely installed previously, as shown in Fig. 3;

⑤ Fix the shaft with parts 1/2/3, as shown in Fig. 4. Note: After fixation, there shall be no gap between the inner surface of the latch and the plate surface.

2) Install the travel switch (part 4) (1 piece) at the rear end of the boom, and fix it with parts 5/6/7, as shown in the figure:



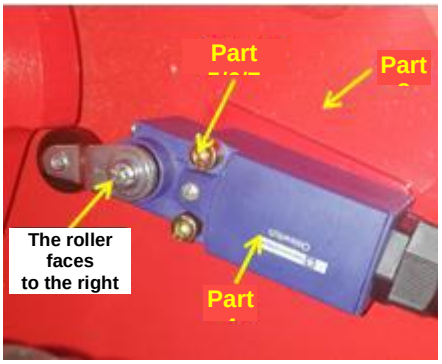
4. Travel switch 5. Screw 6. Nut 7. Washer

Note:

① In this step, it is required to adjust the travel switch roller to be vertically downward;

② The bolt passes outward from the travel switch side, with the washer at the bolt end and the nut on the outer side.

3) Install the travel switch (part 4) (1 piece) onto the right inner side of the upper pivot, and fix it with parts 5/6/7/8, as shown in the figure:



4. Travel switch 5. Screw 6. Nut 7. Washer 8. Boom luffing limit packing plate

Note:

① In this step, the travel switch roller faces the right side;

② The bolt passes outward from the travel switch side, with the washer at the bolt end and the nut on the outer side;

③ In this step, it is required to use the packing plate (part 8) on the right side of the travel switch.

Reference tightening torque of screw (part 5): 3±0.3 N.m;

Tools: open-end wrench 8-10

4) Connect the boom oil pipe.

3.6.3 Disassembling the extension jib assembly

Only when the outer jib or inner jib must be replaced, it is necessary to completely disassemble the boom. The telescopic cylinder can be removed with the boom not completely disassembled. Refer to "Disassembling the boom telescopic cylinder".

1) Remove the boom. Refer to "Disassembling the boom".

2) Place the cushion block under the barrel end of the boom telescopic cylinder for support.

3) Remove the fastener of dowel pin from the telescopic cylinder mounting shaft at the spindle end of the boom. Knock out the cylinder mounting shaft with a copper hammer.

4) Remove the wear-resistant cushion block from the platform end of the boom and mark its position.

Note: Pay attention to the position and quantity of washers used for each wear-resistant cushion block.

5) Make sure the support is secure and pull the telescopic boom and telescopic cylinder assembly out of the boom.

⚠ WARNING: Risk of crushing

If the support is improper, the boom may become unbalanced and fall off when the inner telescopic boom is removed from the boom.

Note: During disassembling, the overhead crane slings need to be carefully adjusted to achieve proper balance.

6) Remove the outer snap ring from the telescopic cylinder mounting shaft pin at the

platform end of the telescopic boom. Knock out the cylinder mounting shaft with a copper hammer.

7) Support and slide the telescopic cylinder out of the bottom of the telescopic boom. Place the telescopic cylinder on the cushion block for support.

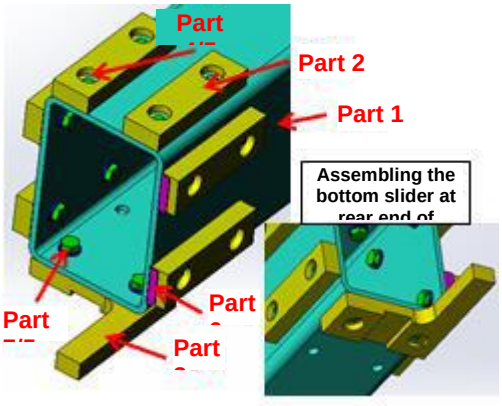
⚠ WARNING: Risk of crushing

If the support is improper, the telescopic cylinder may fall off due to imbalance when removed from the boom extension pipe.

Note: During disassembling, the overhead crane slings need to be carefully adjusted to achieve proper balance.

3.6.4 Assembling the extension jib assembly

1) Lift the extension jib (part 1) onto the assembly tooling;



1. Extension jib 2. Slider 3. Slider 4. Bolt 5. Washer

Tightening torque of part 4: 23±2N.m;

Tool: QSP50N3/socket wrench 16#

Note: Ensure the balance of the workpiece during lifting and placement. The operator shall not stand at either end of the workpiece.

2) Install the sliders (parts 2/3) at the rear end of the extension jib respectively, as shown in the figure;

Note:

① Install the slider (part 3) at the bottom of the extension jib;

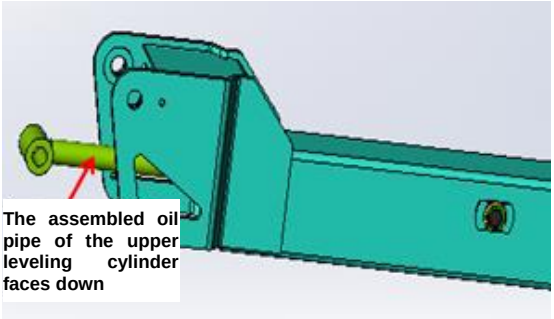
② After the slider is installed, measure the outer dimensions of the upper, lower, left and right sliders, then measure the front end dimensions of the boom at the corresponding positions, and determine the number of washers (part 6) used according to the dimension difference;

③ The gap between the sliders on both sides and the boom is required to be ≤ 1mm.

3) Remove the slider bolt, then apply 242 threadlock, and fix the slider again;

4) Install the upper leveling cylinder subassembly to the front end of the extension jib.

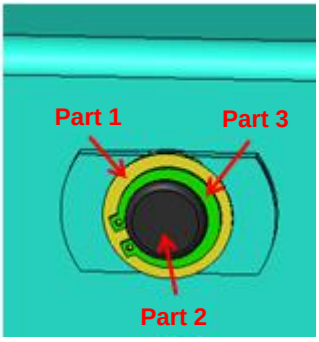
As shown in the figure below, install the fixed end of the upper leveling cylinder from the front end of the extension jib:



5) Adjust the shaft hole at the fixed end of the cylinder, make it coaxial with the first group of holes at the front end of the extension jib rectangular tube, and fix it with the shaft (part 1).

Note: Perform visual inspection for confirmation, rather than touch with hands.

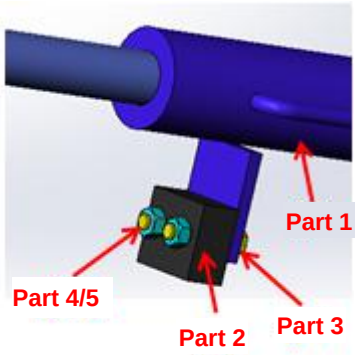
6) Install parts 2/3 at both ends of the shaft (part 1) respectively:



1. Shaft 2. Washer 3. Snap ring

7) Install the telescopic cylinder of the boom at the rear end of the extension jib;

Install the slider (part 2) onto the front end riser at the cylinder barrel end with parts 3/4/5, as shown in the figure below:



1. Boom telescopic cylinder 2. Support slider for telescopic cylinder 3. Bolt 4. Nut 5. Washer

Tightening torque of part 3: 23±2N.m

Tools: Open-end wrench 13#-16#/socket 16#

Note:

① Install the slider in front of the riser, with the riser protruding from the lower part of the slider, and the nut and washer on the slider side;

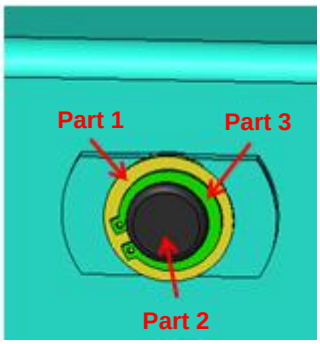
② Apply 242 threadlock to the bolt end.

8) Remove the accompanying blind at the fixed end of the cylinder, and clean impurities such as paint residue on the surface;

9) Pull the front end of the cylinder out about 1500mm;

10) Install the front end of the telescopic cylinder of the boom from the rear end of the extension jib; Note: The assembled slider of the cylinder faces down.

11) Adjust the shaft hole at the front end of the cylinder, make it coaxial with the second group of holes at the front end of the extension jib rectangular tube, and fix it with part 1;



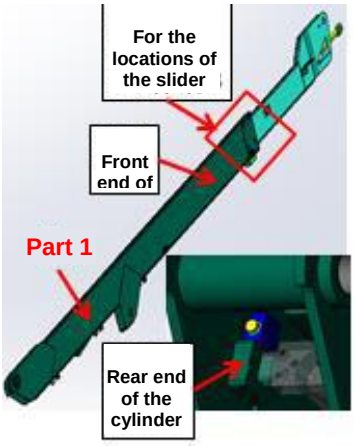
1. Shaft 2. Washer 3. Snap ring

Note: Perform visual inspection for confirmation, rather than touch with hands.

12) Install parts 2/3 at both ends of the shaft (part 1) respectively;

3.6.5 Assembling the telescopic boom assembly

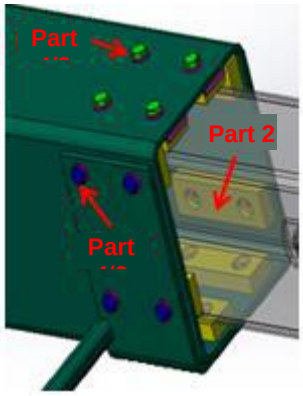
1) Install the rear end of the extension jib assembly from the front end of the boom, as shown in the figure:



1. Boom assembly

Note: After installation, the rear end of the telescopic cylinder should go beyond the stop block inside the rear end of the boom.

2) Install parts 2~7 at the front end of the boom as shown below:



2. Slider 3. Washer 4. Bolt

Note:

① After the slider is installed, check the gap between the slider and the telescopic boom with a feeler gauge. The gap between the sliders on both sides and the telescopic boom shall be ≤ 1mm, otherwise washers should be added for adjustment;

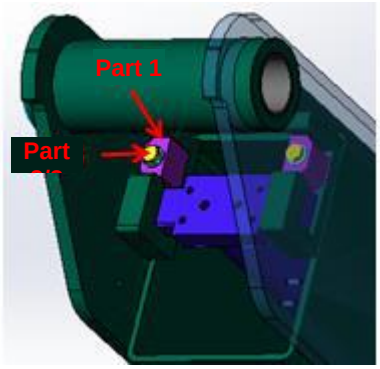
② After adjustment according to the gap requirements, apply 242 threadlock to parts 4/5/6;

③ The assembling direction of the cushion block (part 3) shall not be reversed, and the length of the fixing bolt here shall be correct.

Tightening torque of part 4: 23±3N.m;

Tool: QSP50N3/socket wrench 16#

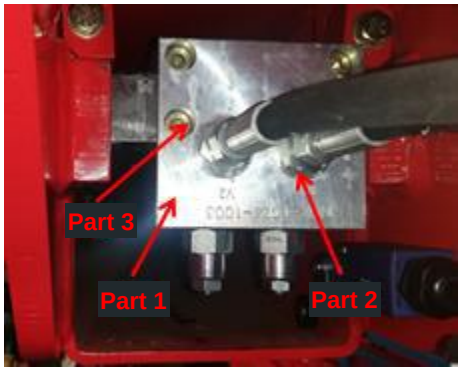
3) Clamp the rear end of the telescopic cylinder inside the stop block, and install the cylinder pressure plate (part 1) onto the limit plate at the rear end of the boom with parts 2/3, as shown in the figure below:



1. Cylinder pressure plate 2. Bolt 3. Washer

Note: Do not pry the rear end face of the telescopic cylinder directly with hard objects.

4) Assembling the telescopic balance valve assembly: install the straight fitting (part 2) onto the telescopic balance valve (part 1), as shown in the figure:



1. Telescopic balance valve 2. Straight fitting 3. Screw

5) Install the telescopic balance valve assembly onto the fixed end of the telescopic cylinder with part 3.

Tightening torque of part 9: 52±7N.m;

Tightening torque of part 12: 75±5N.M;

Tightening torque of part 13: 32±3N.m;

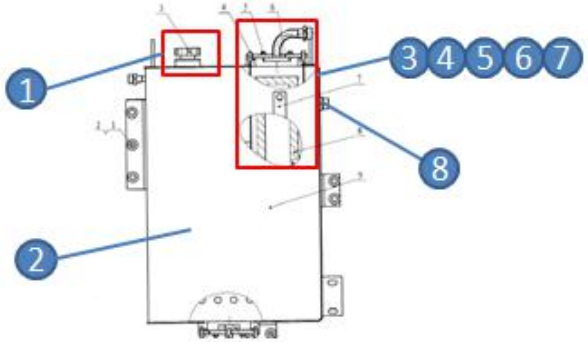
Tools: QSP100N4/QSP50N3, socket wrench 22#, and socket wrench 16#

3.7 Hydraulic tank/fuel tank

3.7.1 Assembling the hydraulic tank

1) Install the air cleaner (part 1) onto the hydraulic tank weldment (part 2).

2) Install the oil return filter element (part 3), the O-ring (part 4) and the oil return flange assembly (part 5) onto the top of the hydraulic tank weldment with the bolts (part 6), and install the oil level meter (part 7) onto the hydraulic tank weldment with its accompanying bolt; then install part 8 at the position shown in the figure:



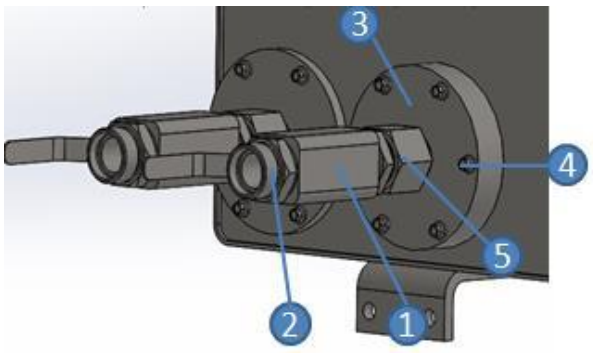
1. Air cleaner 2. Hydraulic tank weldment 3. Oil return filter element assembly 4. O-ring 5. Oil return flange assembly 6. Bolt 7. Oil level meter 8. Fitting

Tightening torque of part 6: 28±3N.m

Tightening torque of part 8: 135±14N.m

Tools: QSP50N3/socket wrench 10#, and SP220N*36

3) Install the oil suction filter together with the O-ring and the oil suction flange assembly (part 3) at the bottom of the hydraulic tank with the bolts (part 4), connect the straight fitting (part 5) onto the oil suction flange externally, connect the ball valve (part 6) externally onto the straight fitting, and connect the straight fitting (part 7) externally onto the ball valve, tighten the parts to the specified torque and make marks.



1. Ball valve 2. Straight fitting 3. Oil suction flange assembly

4. Bolt 5. Straight fitting

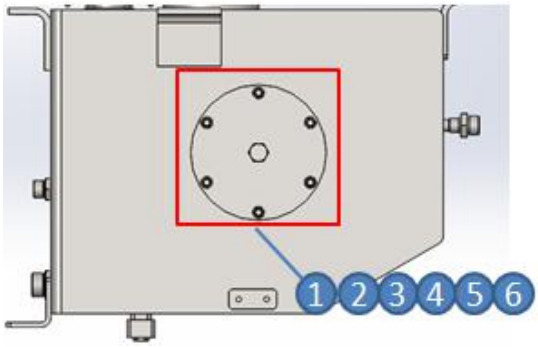
Tightening torque of part 4: 12±1N.m;

Tightening torque of part 5: 135±14N.m;

Tightening torque of part 2: 220±22N.m

Tools: QSP25N4/socket wrench 8#, and SP160N*41

4) Install the ring magnet (part 1), the O-ring (part 2) and the screw plug (part 3) onto the oil drain flange cover (part 4). Install the subassembled oil drain flange cover together with the O-ring (part 5) at the bottom of the hydraulic tank with the bolt (part 6), tighten the parts to the specified torque and make marks.



1. Ring magnet 2. O-ring 3. Screw plug

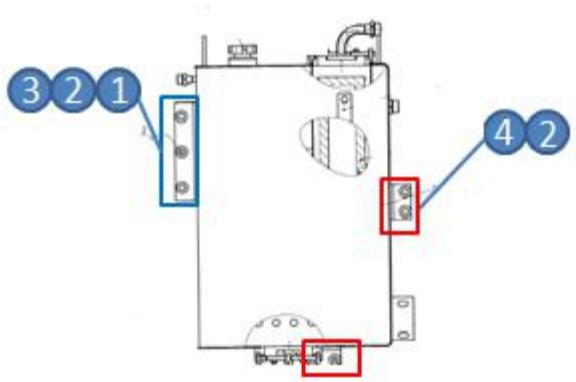
4. Oil drain flange cover 5. O-ring 6. Bolt

Tightening torque of part 6: 28±3N.m

Tool: QSP25N4/ socket wrench 10

5) Install the subassembled hydraulic tank at the assembling location at the right end of the rotary table near the platform with parts 1/2/3 (indicated by the blue box in the figure) and parts 2/4 (indicated by the red box in the

figure).



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

Tightening torque of part 2/4: 52±5N.m

Tools: QSP100N4/ socket wrench 16, open-end wrench 16

3.7.2 Disassembling the hydraulic tank

⚠ Risk of part damage. The working area and surface for performing this procedure must be clean. If debris enters the hydraulic system, serious damage may be caused to the components. Therefore, it is recommended that this service is performed by dealers.

The O-rings (if any) of the fittings and/or hoses must be replaced. During installation, all connections must be tightened to the specified torque. Please refer to torque specifications of hydraulic hoses and fittings.

(1) Close the two hydraulic ball valves on the hydraulic tank.

⚠ CAUTION: Risk of part damage. The engine shall not be started when the valve of the hydraulic tank is closed, otherwise parts may be damaged. If the valve is closed, remove the key from the key switch and put a label on the machine to inform related personnel.

(2) Remove the drain plug from the hydraulic tank, and completely drain hydraulic oil into a suitable container.

⚠ WARNING: Risk of personal injury. Sprayed hydraulic oil will penetrate and burn the skin. Therefore, please loosen hydraulic connectors very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

(3) Mark, disconnect and plug the suction pipes connected to the ball valves of hydraulic tank.

(4) Mark, disconnect and plug the fuel return pipe at the fuel tank.

(5) Support the hydraulic tank and fix it to appropriate lifting equipment. (6) Remove the securing fasteners of the hydraulic tank.

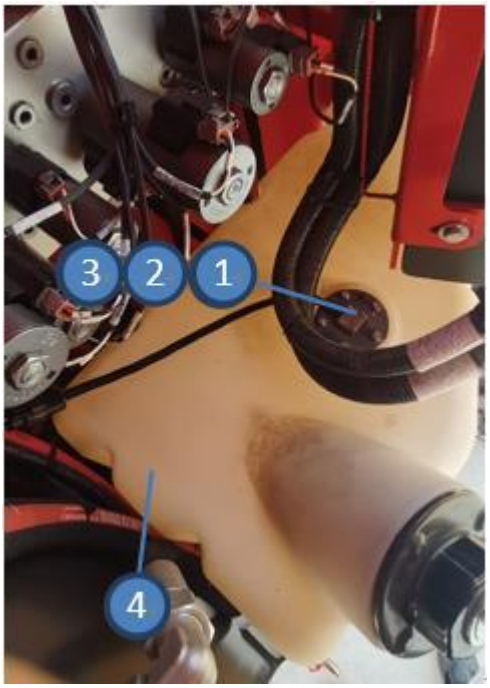
(7) Remove the hydraulic tank from the

machine.

⚠ WARNING: Risk of crushing. If not properly supported and fixed on the lifting equipment during removal from the machine, the hydraulic tank may become unbalanced and fall.

3.7.3 Assembling the fuel tank

1) Install the oil level sensor (part 1) on the top of part 4 with parts 2 and 3, and tighten part 2:



1. Oil level sensor 2. Screw 3. Washer 4. Fuel tank delivery assembly

Reference tightening torque of part 2: 6N.m

Tool: S4 Allen wrench

2) Install the subassembled fuel tank at the assembling location on the right end of the rotary table near the counterweight with parts 1/2.

1. Bolt 2. Washer

Tightening torque of part 1: 52±5N.m

Tools: QSP100N4/ socket wrench 16, open-end wrench 21

3) Assemble the two fuel pipes of the engine to the oil inlet and return ports at the rear end of the fuel tank, and tighten the bolts.

3.7.4 Disassembling the fuel tank

⚠ WARNING: Risk of explosion and fire Fuel is combustible. Please perform this procedure in an open, well-ventilated area away from heaters, sparks, flames, and fireworks. Acceptable fire extinguishers should be always provided in easily accessible places.

⚠ WARNING: Risk of explosion and fire Do not drain or store fuel in open containers for fear of possible fire.

(1) Mark, disconnect and plug the fuel supply

and return hoses.

(2) Remove the fuel filler cap from the fuel tank.

(3) Remove the drain plug at the bottom of the fuel tank, and drain the fuel into a suitable container.

⚠ WARNING: Risk of explosion and fire

When delivering fuel, connect a ground wire between the machine and the pump or container.

Note: Ensure that only manual pumps suitable for gasoline and/or diesel are used.

(4) Remove the securing fasteners of the fuel tank.

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

(6) Remove the fuel tank from the machine.

Note: Before installation, please clean the fuel tank and check for cracks and other damage.

3.8 Cylinder assembly

3.8.1 Disassembling the boom luffing cylinder

⚠ WARNING: Danger of injury

This procedure requires specific maintenance skills, lifting equipment and a suitable workshop. Carrying out this process without these skills and tools may result in death or serious injury, as well as serious component damage. Therefore, it is strongly recommended that this service is performed by dealers.

⚠ CAUTION: The O-ring (if any) of the removed fitting and/or hose assembly must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

1) Lift the boom to a horizontal position.

2) Lift the folding jib until the cylinder mounting shaft pin at the barrel end of the boom luffing cylinder is higher than the cover.

3) Connect a 5 ton/5000 kg overhead crane to the boom for support.

4) Raise the boom slightly with the overhead crane to release the pressure of the mounting shaft pin of the boom luffing cylinder.

5) Support the rod end and barrel end of the boom luffing cylinder with a second overhead crane or similar lifting equipment.

6) Mark, disconnect and plug the hydraulic hose of the boom luffing cylinder. And cover the fittings on the cylinder.

⚠ WARNING

Risk of personal injury. Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

7) Remove the fastener of dowel pin from the rod end cylinder mounting shaft of the boom luffing cylinder. Remove the cylinder mounting shaft with a copper hammer.

⚠ WARNING: Risk of crushing

During removal of the mounting shaft of the boom rod end cylinder, the boom will be lowered if it is not supported properly.

8) Place the support block under the luffing cylinder of the boom across the two covers for support.

9) Lower the rod end of the lift cylinder into the cylinder block. Protect the cylinder rod from damage.

⚠ WARNING: Risk of crushing

If not properly supported by the lifting device, the boom luffing cylinder may become unbalanced and fall.

10) Remove the fastener of dowel pin of cylinder mounting shaft at the barrel end of the boom luffing cylinder. But do not remove the cylinder mounting shaft.

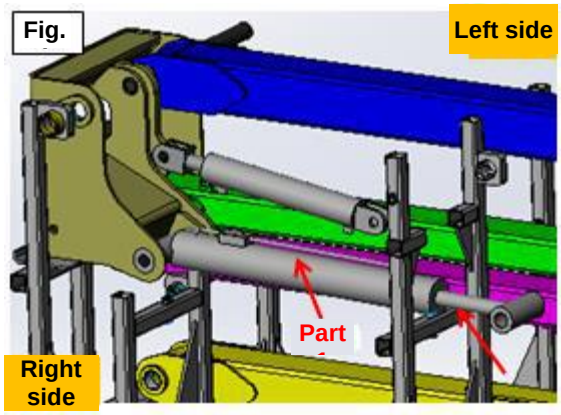
11) Remove the cylinder mounting shaft at the barrel end with a copper hammer. Carefully remove the boom luffing cylinder from the machine.

⚠ WARNING: Risk of crushing

If not properly supported and fixed on the lifting equipment, the lift cylinder may become unbalanced and fall.

3.8.2 Assembling the boom luffing cylinder

1) Assemble the boom luffing cylinder onto the upper pivot, as shown in Fig. 1:



1. Boom luffing cylinder

Hoist the middle position of the cylinder, and pay attention to the balance of the cylinder. The operator shall not stand at either end.

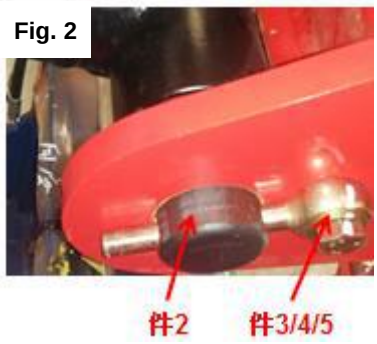
Note: ①. The telescopic end of the cylinder is placed on the tooling support beam (padded with a polyurethane plate).

② The hook can only be removed after the shaft at the rear end of the cylinder is knocked in.

2) Install the fixed end of the cylinder (part 1) onto the lower mounting hole of the upper pivot with the shaft (part 2);

Note: The end of the shaft with latch hole is on the left side.

3) Fix the shaft with parts 3/4/5, as shown in Fig. 2. Note: After fixation, there shall be no gap between the inner surface of the latch and the plate surface:



2. Shaft 3. Latch 4. Bolt 5. Washer

Tightening torque of part 20: 90±9N.m;

Tool: QSP100N4/ socket wrench 18

3.8.3 Disassembling the boom telescopic cylinder

The boom telescopic cylinder is used to extend and retract the boom. The boom telescopic cylinder is provided with a balance valve to prevent movement in case of hydraulic pipeline failure.

⚠ WARNING: Risk of personal injury

This procedure requires specific maintenance skills, lifting equipment and a suitable workshop. Carrying out this process without these skills and tools may result in death or serious injury, as well as serious component damage. Therefore, it is strongly recommended that this service is performed by dealers.

NOTE: The O-ring (if any) of the removed

fitting and/or hose assembly must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

1) Lift the boom to a horizontal position.

2) Extend the boom until the pivot at the link end of the boom telescopic cylinder can be reached in the boom telescopic pipe.

3) Remove the hose and cable guard from the upper pivot.

4) Mark, disconnect and plug the hydraulic hose of the boom telescopic cylinder. And cover the fittings on the cylinder.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen hydraulic connectors very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

5) At the platform end of the boom, remove the outer snap ring from the cylinder mounting shaft at the rod end of the telescopic cylinder. Remove the cylinder mounting shaft with a copper hammer.

6) Remove the fastener of dowel pin of the cylinder mounting shaft at the barrel end.

7) Pass a rod through the barrel end pivot, and remove the cylinder pin by turning it outward.

8) Support the telescopic cylinder and pull it out of the boom barrel.

⚠ WARNING: Risk of crushing

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

⚠ CAUTION: Risk of part damage

When removing the cylinder from the boom, be careful not to damage the balance valve on the boom extension cylinder.

⚠ CAUTION: Risk of part damage

If the boom extension cylinder is dragged, the hose and harness may be damaged.

Note: Pay attention to the length of cylinder after disassembling. The mounting spacing of cylinders must be the same.

Note: For the assembling method of the

boom telescopic cylinder, refer to Assembling the extension jib assembly.

3.8.4 Disassembling the lower leveling cylinder

The lower leveling cylinder are in the same hydraulic circuit as the upper leveling cylinder, and is intended for leveling the work gate. It is a part of the closed-loop hydraulic circuit, which keeps the platform level throughout the movement range of the boom. The lower leveling cylinder is located on the base of the boom.

⚠ WARNING: Danger of injury

This procedure requires specific maintenance skills, lifting equipment and a suitable workshop. Carrying out this process without these skills and tools may result in death or serious injury, as well as serious component damage. Therefore, it is strongly recommended that this service is performed by dealers.

⚠ **CAUTION: The O-ring (if any) of the removed fitting and/or hose assembly must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.**

1) Lift the folding jib until it can come into contact with the link end and barrel end pivots of the lower leveling cylinder.

(2) Mark, disconnect and plug the hydraulic hose of the main pump. Plug the fittings on the cylinder.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen hydraulic connectors very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

3) Connect the overhead crane or similar lifting equipment to the lower leveling cylinder.

4) Remove the fastener of dowel pin from the cylinder mounting shaft at the barrel end.

5) Pass a rod through the barrel end pivot, and remove the cylinder pin by turning it outward.

6) Remove the fastener of dowel pin from the rod end cylinder mounting shaft.

7) Pass a rod through the barrel end pivot, and remove the cylinder pin by turning it outward.

8) Remove the lower leveling cylinder from the

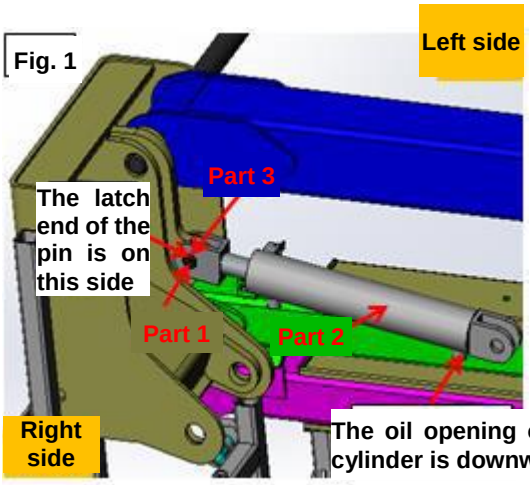
machine.

⚠ WARNING: Risk of crushing

If not properly connected to the overhead crane, the lower leveling cylinder may become unbalanced and fall.

3.8.5 Assembling the lower leveling cylinder

1) Install the lower leveling cylinder onto the upper pivot, as shown in the figure:



1. Shaft sleeve 2. Lower leveling cylinder 3. Leveling cylinder shaft

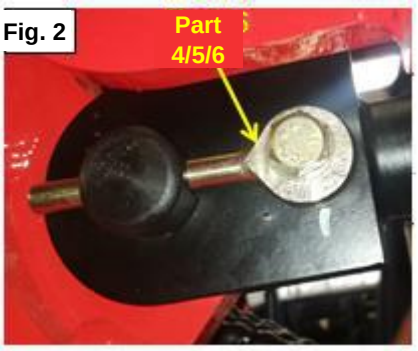
1) Install the shaft sleeve (part 1) in the mounting hole of the lower leveling cylinder on the middle plate of the upper pivot, as shown in Fig. 1;

2) Install the lower leveling cylinder (part 2) onto the upper pivot, and fix it with part 3;

Note: ①. Install the telescopic end of the lower leveling cylinder onto the upper pivot, with the oil port of the cylinder barrel facing down without reverse orientation;

② Knock in the shaft (part 3) leftward, the end with latch hole positioned on the right side.

3) Fix the shaft with parts 4/5/6, as shown in Fig. 2. Note: After fixation, there shall be no gap between the inner surface of the latch and the plate surface.



4. Latch 5. Bolt 6. Washer

Tightening torque of part 5: 52±5N.m;

Coat the latch fixing bolt (part 5) with AT262 threadlock.

Tool: QSP100N4/socket wrench 16#

3.8.6 Disassembling the upper leveling cylinder

Note:

1. Make sure there is no air in the closed circuit before removing the cylinder.

2. The O-ring (if any) of the removed fitting or hose assembly must be replaced. During installation, all connections must be tightened to specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

1) Extend the boom until it can come into contact with the cylinder mounting shaft at the barrel end of the upper leveling cylinder;

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 supporting the platform;

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

4) Mark, disconnect and plug the hydraulic hose of the swing cylinder at the fitting as shown below, and then connect them together with the fitting. Connect the hoses on the cylinder with the fitting;

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen the hydraulic fitting connection very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

5) Remove the fastener of dowel pin from the cylinder mounting shaft at the rod end of the upper leveling cylinder. Do not remove the cylinder mounting shaft;

6) Remove the fastener of dowel pin on the cylinder mounting shaft at the barrel end of the swing cylinder. Do not remove the cylinder mounting shaft;

7) Place a cushion block under the upper leveling cylinder for support. Protect the cylinder rod from damage.

8) Support the rotating mechanism of the platform with suitable lifting equipment;

9) Knock out the cylinder mounting shaft at the rod end with a copper hammer;

⚠ WARNING: Risk of crushing

If the support is improper, the platform may fall during removal of the cylinder mounting shaft at the link end of the slave cylinder.

⚠ CAUTION: Risk of part damage

If the lifting equipment does not provide proper support and causes the slave leveling cylinder to fall, the cylinder may be damaged.

10) Knock out the pin at the barrel end with a copper hammer;

11) Carefully pull the cylinder out of the boom.

Note: For the assembling method of the upper leveling cylinder, refer to 3.6.4 Assembling the extension jib assembly.

3.9 Bleeding cylinder

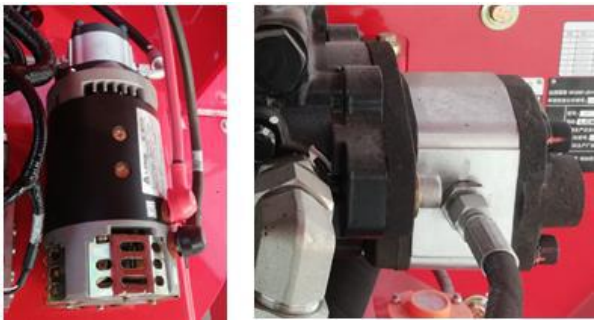
The ground control system is preferred for operation.

3.9.1 Bleeding function pump

1) After each cylinder is replaced, it is necessary to carry out bleeding. After checking the "key switch", activate the ground control mode;

2) Activate the “Turtle” position to keep the machine at a low speed;

3) Activate the platform swing button to keep the function pump running at a low speed for 1-2min;



Bleeding function pump

3.9.2 Bleeding slewing motor

1) Keep the “Turtle” position, and activate the rotary table slewing button to carry out left and right slewing for 1~2min. The machine should not swing greatly to ensure safety;

Bleeding slewing motor

3.9.3 Bleeding walking motor

1) Use the platform control mode and activate the “Turtle” position;

2) Operate the machine to walk back and forth for 1-2min under no load.

3.9.4 Bleeding steering cylinder

1) Use the platform control mode and activate the “Turtle” position;

2) Activate the steering button, and operate the machine to turn left and right. The steering

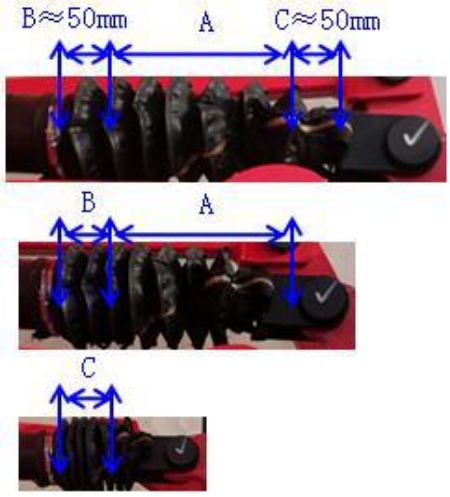
cylinder can be divided into three parts, as shown. The extension and retraction of piston rod should count as one cycle. The operation steps are as follows:

Step 1: Operate the machine so that the piston rod of the steering cylinder moves slowly 5 times in area A;

Step 2: Operate the machine so that the piston rod of the steering cylinder moves slowly twice in the minimum (C) and maximum (B) stroke areas;

Precautions:

1. Take care when bleeding the machine, and operate the machine gently;



Bleeding steering cylinder

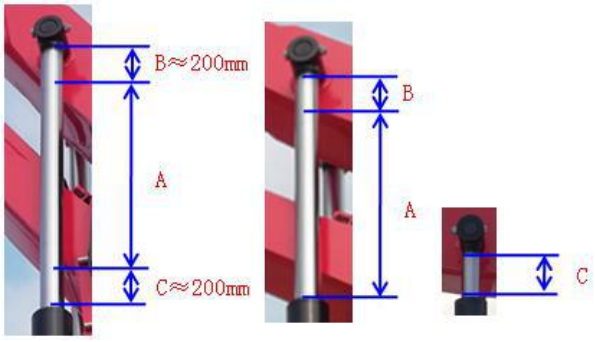
3.9.5 Bleeding folding jib luffing cylinder

1) Activate the “Rabbit” position to keep the machine at a high speed;

2) Activate the folding jib lifting button, and operate the machine to retract and extend the folding jib luffing cylinder. The folding jib luffing cylinder can be divided into three parts, as shown. The extension and retraction of piston rod should count as one cycle. The operation steps are as follows:

Step 1: Operate the machine so that the piston rod of the folding jib luffing cylinder moves slowly 5 times in area A;

Step 2: Operate the machine so that the piston rod of the folding jib luffing cylinder moves slowly twice in the minimum (C) and maximum (B) stroke areas;



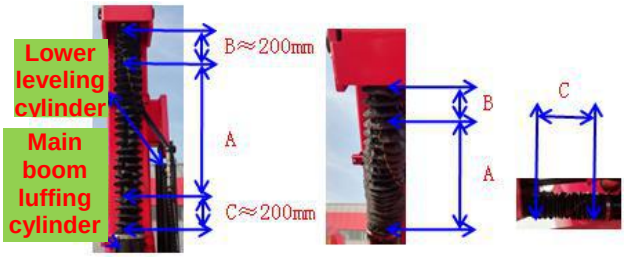
Bleeding folding jib luffing cylinder

3.9.6 Bleeding main boom luffing cylinder and lower leveling cylinder

1) Activate the main boom luffing lifting button to bleed the main boom luffing cylinder and lower leveling cylinder;

2) Taking the main boom luffing cylinder as the

reference, it can be divided into three parts, as shown. Refer to "Bleeding folding jib luffing cylinder" for the bleeding steps and requirements.

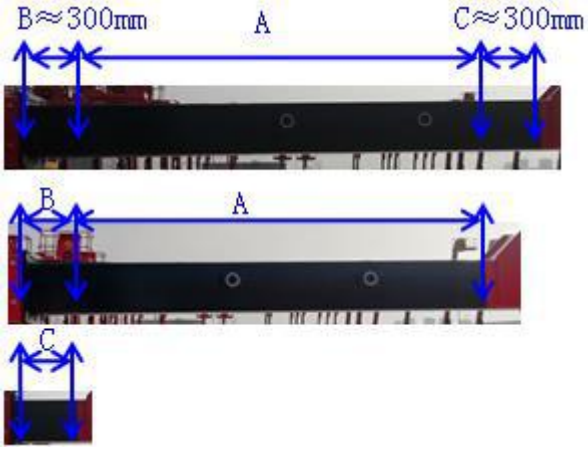


Bleeding main boom luffing cylinder

3.9.7 Bleeding main boom telescopic cylinder

1) Activate the main boom telescoping button to bleed the main boom telescopic cylinder;

2) The main boom luffing cylinder can be divided into three parts by taking the extension jib as the reference, as shown. Refer to "Bleeding folding jib luffing cylinder" for the bleeding steps and requirements.

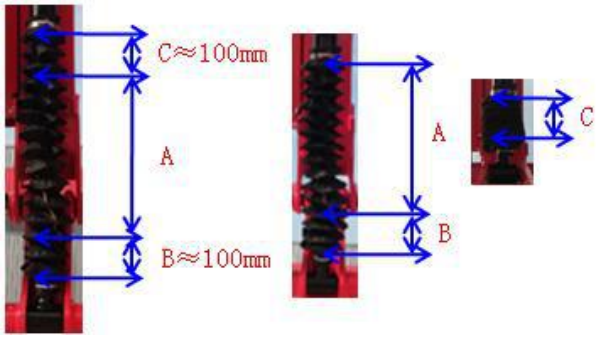


Bleeding main boom telescopic cylinder

3.9.8 Bleeding fly jib luffing cylinder and upper leveling cylinder

1) Activate the fly jib luffing lifting button to bleed the fly jib luffing cylinder and upper leveling cylinder;

2) Taking the fly jib luffing cylinder as the reference, it can be divided into three parts, as shown. Refer to "Bleeding folding jib luffing cylinder" for the bleeding steps and requirements.



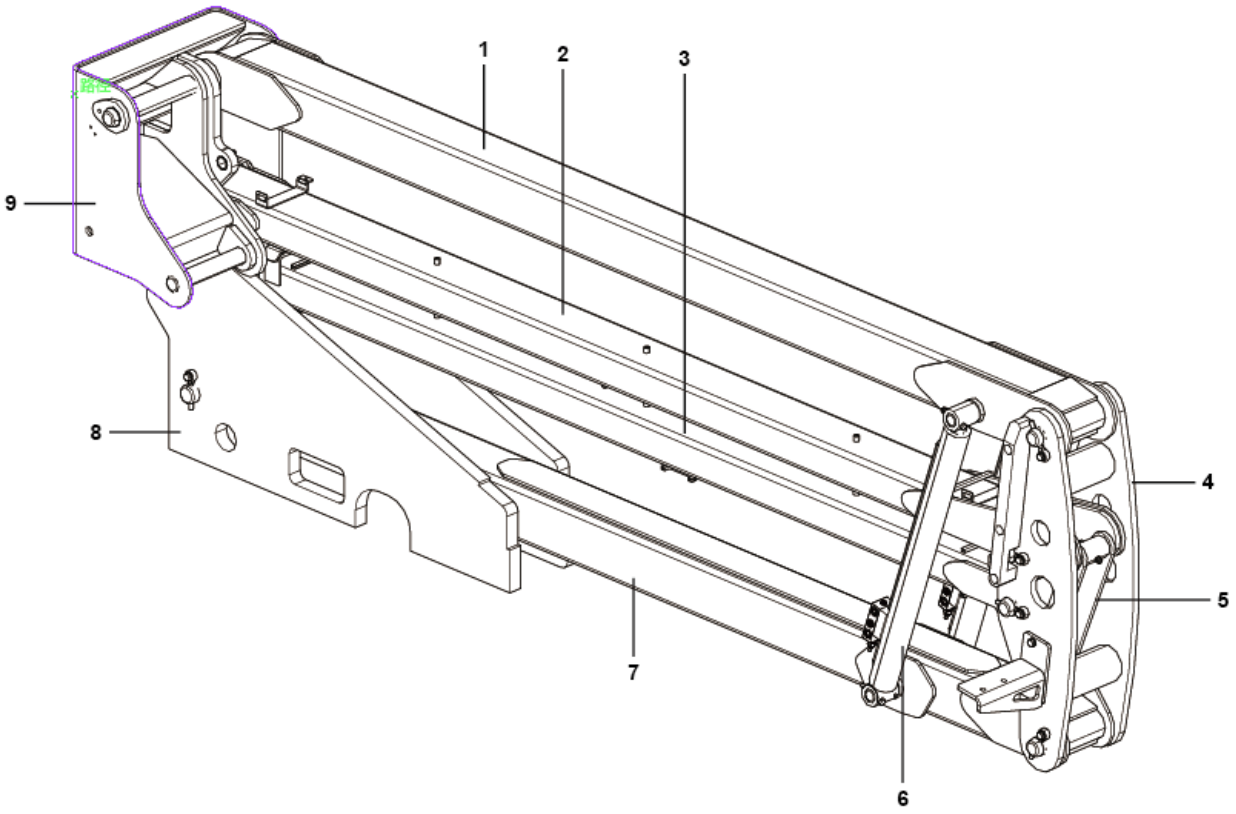
Bleeding fly jib luffing cylinder

3.9.9 Bleeding platform swing cylinder

1) Activate the platform rotation button, and carry out left and right slewing for 1~2 min. The machine should not swing greatly to ensure safety.

Bleeding platform swing cylinder

3.10 Folding jib assembly



(1) Upper 2nd jib assembly (#1 jib)

(2) Upper 1st jib assembly (#2 jib)

(3) Lower 1st jib assembly (#3 jib)

(4) Middle pivot

(5) Link

(6) Folding jib cylinder

(7) Lower 2nd jib assembly (#4 jib)

(8) Rotary table assembly

(9) Upper pivot

3.10.1 Removing folding jib

⚠ CAUTION: Risk of personal injury

This procedure requires specific service skills, lifting equipment and a suitable workshop. Otherwise, performing this procedure may lead to death or serious injury and damage to important parts. Therefore, it is strongly recommended that this service is performed by dealers.

⚠ CAUTION: Before refitting, the O-ring of the removed fitting and/or hose assembly must be replaced and then tightened to the specified torque. Please refer to hydraulic hose and fitting torque specifications.

1) Remove the platform.

2) Remove the jib. Refer to 3.3.1 for removing the jib.

3) Remove the main boom. Refer to 3.6.1 Removing main boom.

4) Remove the lower leveling cylinder. Refer to 3.8.4 for removing the lower leveling cylinder.

5) Fix the crane sling to the main boom luffing cylinder end, and then lift the main boom luffing cylinder vertically with the crane.

6) Mark the main boom luffing cylinder, disconnect and plug the hydraulic hose. Cover the fittings on the cylinder.

⚠ WARNING: Risk of personal injury

Spilled hydraulic oil can penetrate and burn skin. Release the hydraulic device slowly to reduce the oil pressure gradually. Avoid oil jet or splash.

7) Remove the fastener of the center pin from the main boom cylinder barrel end.

8) Remove the pin with a copper rod and remove the main boom luffing cylinder from the machine.

⚠ WARNING: Risk of squeezing

Without proper support from the lifting device, the main boom luffing cylinder may fall due to loss of balance.

9) Mark, disconnect and plug the hydraulic hoses on the two folding jib lift cylinders. And cover the fittings on the cylinder.

⚠ WARNING: Risk of personal injury

Spilled hydraulic oil can penetrate and burn skin. Therefore, please loosen hydraulic connectors very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

10) Remove the pin securing fasteners at both sides of the pin at the connecting rod end and

pivot at the barrel end of the folding jib lift cylinder. But do not remove the pin.

11) Tie the sling from the crane to the connecting rod end of the folding jib lift cylinder for support. Do not apply any lifting force.

12) Knock out half of the pivot pin at the cylinder barrel end with a copper hammer. Lower the barrel end of the folding jib lift cylinder so that it hangs down.

Knock out half of the pivot pin at the rod end with a copper hammer.

13) Remove the folding jib lift cylinder from the machine.

14) Repeat steps 11 to 14 for the other folding jib lift cylinder.

⚠ WARNING: Risk of crushing

Without proper connection to the crane, the folding jib lift cylinder may fall due to loss of balance during removal from the machine.

CAUTION: Risk of part damage. When removing the folding jib lift cylinder from the machine, be careful not to damage the balance valve at the cylinder barrel end.

15) Connect the sling from the crane to the upper pivot for support. Do not lift it.

16) Connect the sling of another overhead crane to the #1 jib midway between the upper and middle pivots.

17) Remove the pin securing fasteners from the middle and upper pivots of the #1 jib. But do not remove the pin.

18) Knock out both pins with a copper hammer.

19) Remove the #1 jib from the machine.

⚠ WARNING: Risk of crushing

Without proper connection to the overhead crane, the #1 jib may fall due to loss of balance during removal from the machine.

⚠ WARNING: Risk of crushing

Without proper support from the overhead crane, the upper pivot may fall during removal of the #1 jib from the machine.

20) Connect an overhead crane to the upper pivot to raise the folding jib assembly by about 76cm.

21) Insert a 10×10×28cm block between the #2 jib and the boom. Then lower the folding jib assembly to the cushion block.

⚠ WARNING: Risk of crushing

Without proper support from the 10×10×28cm cushion block, the folding jib may fall.

22) Pull out all cables and hoses through the upper pivot.

⚠ CAUTION: Risk of part damage

If being kinked or squeezed, the cables and hoses may be damaged.

23) Remove the hose and cable sheaths from the top of #2 jib.

24) Pull all hoses and cables out of the upper pivot through the middle pivot. Place the hoses and cables on the ground.

⚠ WARNING: Risk of part damage

If being kinked or squeezed, the parts may be damaged.

25) Remove the pin fastener securing the #2 jib on the upper pivot. Remove the pin with a copper hammer.

26) Remove the upper pivot.

⚠ WARNING: Risk of crushing

Without proper connection to the overhead crane, the upper pivot may fall due to loss of balance during removal from the machine.

27) Connect the sling from the overhead crane to the #2 jib at the upper pivot end.

28) Lift the #2 jib slightly and remove the 10×10×28cm cushion block.

29) Lower the #2 jib to the boom support pad.

30) Insert a 10×10×22cm cushion block at the middle pivot end of #3 and #4 jibs.

31) Connect the sling from the overhead crane to the middle pivot for support. Do not lift it.

32) Remove the pin securing fasteners from the pivots of #2, #3 and #4 jibs at the middle pivot. Do not remove the pin.

33) Knock out each pin with a copper hammer. Then remove the middle pivot from the folding jib assembly.

⚠ WARNING: Risk of crushing

Without proper support from the overhead crane, the middle pivot may fall due to loss of balance during removal from the folding jib assembly.

34) Connect the sling from the overhead crane to the center point of the #2 jib for support. Do not lift it.

35) Connect the sling from another overhead crane to the center point of the #4 jib for support. Do not lift it.

36) Remove the pin securing fasteners from both links. Do not remove the pin.

37) Remove the lower link shaft from the #3 jib

with a copper hammer.

38) Support the link with appropriate lifting equipment.

39) Remove the upper link shaft from the #2 jib with a copper hammer. Remove the link from the machine.

⚠ WARNING: Risk of crushing

Without proper support from the overhead crane, the #2 jib may fall during removal of the link from the #2 jib.

⚠ WARNING: Risk of crushing

Without proper support, the link may fall during removal from the boom assembly.

40) Remove the #2 jib from the machine.

⚠ WARNING: Risk of crushing

Without proper support from the overhead crane, the #2 jib may fall due to loss of balance during removal from the folding jib assembly.

41) Remove upper and lower hose and cable connectors from the #3 jib.

42) Pull off all cables and hoses from #3 jib and place them on the rotary table counterweight.

⚠ CAUTION: Risk of part damage

If being kinked or squeezed, the cables and hoses may be damaged.

43) Open the hood on the ground control unit side.

44) Remove the fuel tank filler cap.

45) Use an approved manual pump to drain the fuel in the fuel tank into a container with appropriate capacity.

⚠ DANGER: Risk of explosion and fire

Fuel is flammable. Operate in an open, well-ventilated area, and always keep away from heaters, sparks, flames and ignited smoke. Acceptable fire extinguishers should be provided in easily accessible places.

⚠ DANGER: Risk of explosion and fire

When delivering fuel, connect a ground wire between the machine and the pump or container.
CAUTION: Ensure that only a manual pump suitable for diesel is used.

46) Mark, disconnect and plug the fuel hose of the fuel tank. Clean up any spilled fuel.

47) Remove the fuel tank mounting fasteners. Carefully remove the fuel tank from the machine.

⚠ CAUTION: Risk of part damage

CAUTION: Risk of part damage. The fuel tank may be damaged if it falls. Before installation on the machine, clean the fuel

tank and check for cracks and other damage.

48) Remove the securing fasteners from the ground control unit and main boom function valve fixing plate.

49) Remove the ground control unit and main boom function valve fixing plate for easy access to the #3 jib pivot.

50) Connect the sling from the overhead crane to the center point of the #3 jib for support. Do not lift it.

51) Remove the mounting fasteners from the hood cover to get access to the pin fasteners for the pivots of #3 and #4 jibs at the rotary table riser.

52) Remove pin securing fasteners from the #3 jib of rotary table riser. Do not remove the pin.

53) Remove the #3 jib pivot from the rotary table with a copper rod through the access hole at the back of the ground control unit.

54) Remove the #3 jib from the machine.

⚠ WARNING: Risk of crushing

Without proper support from the crane, the #3 jib may fall due to loss of balance during removal from the machine.

55) Remove upper and lower hose and cable covers from the #3 jib.

56) Remove the mounting fasteners of folding jib drive speed limit switch from the #4 jib at the middle shaft end. Do not disconnect the wire.

57) Remove the pin securing fasteners of rotary table connecting shaft from the #4 jib. Do not remove the pin.

58) Connect the sling from the overhead crane to the center point of the #4 jib. Do not lift it.

59) Remove the #4 jib from the rotary table riser with a copper rod through the ground control unit side partition.

60) Remove the #4 jib from the machine.

⚠ WARNING: Risk of crushing

Without proper support from the crane, the #4 jib may fall due to loss of balance during removal from the machine.

3.10.2 Assembling folding jib assembly

1) Lift the boom assembly on line using slings as shown in Fig. 1 and Fig. 2:

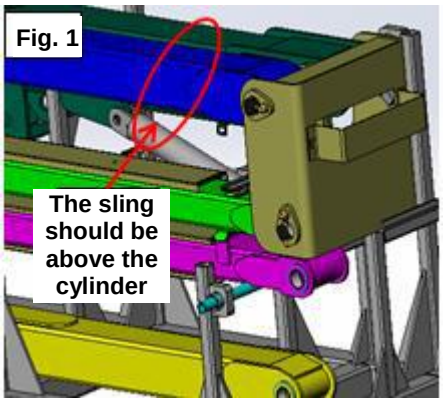
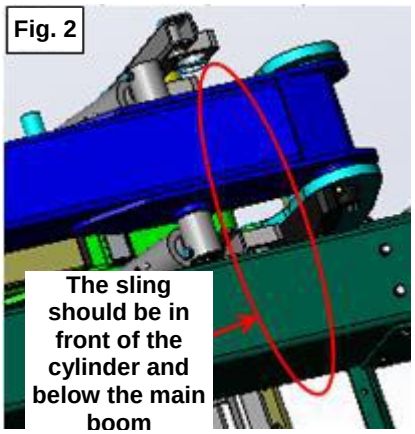
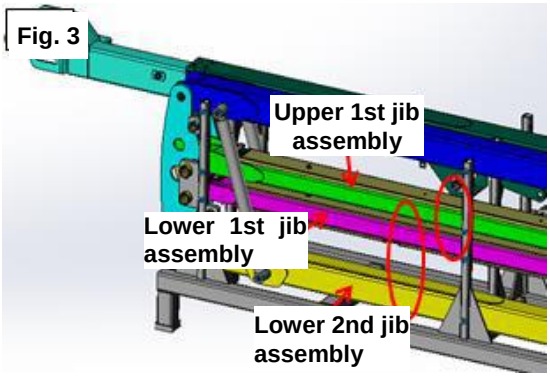


Fig. 2



2) Use slings to tie the upper 1st jib assembly together with the lower 1st jib assembly, and tie the lower 1st jib assembly together with the lower 2nd jib assembly, as shown by the red circles in Fig. 3;

Fig. 3



3) The rear lifting point of boom is the rear end of the leveling cylinder mounting plate. Pass the sling above the cylinder, as shown in Fig. 1;

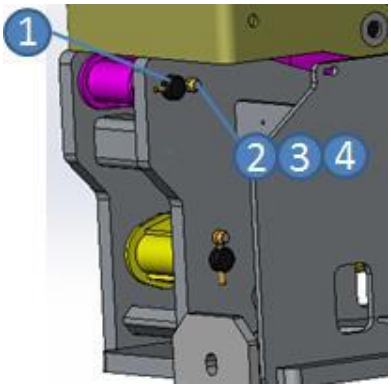
4) The front lifting point of boom is in front of the articulating boom luffing cylinder, and it should be lifted together with the main boom, as shown in Fig. 2;

CAUTION:

① After being lifted, the boom should be stable and basically vertical, with the front and rear ends basically horizontal;

② During lifting, no one shall stand in front of the boom, the boom shall not pass directly above any personnel, and the operator shall stand at the oblique rear;

5) Lift the boom assembly to the rotary table, so that the shaft holes at the rear ends of the lower 1st jib assembly and lower 2nd jib assembly are coaxial with the rotary table mounting holes, and fix them with the shafts (part 1); fix part 1 with parts 2/3 (glued)/4.



1. Shaft 2. Latch 3. Bolt 4. Washer

Tightening torque of part 3: 90±9N.m;

Tools: QSP100N4/open-end ratchet wrench 10 / socket wrench 1/2-18mm

Note:

① When adjusting the boom and rotary table mounting holes, make confirmation visually and not by hand; no one is allowed to stand in front of the boom in this process;

② Knock in the shaft leftward, the end with latch hole positioned on the right side.

③ Arrange the pipelines at the rear end of the boom in the rotary table in the order shown

in the following table.

6) Wrap the oil pipe arranged above the lower 1st jib assembly with the canvas (part 1), and wrap the oil pipe and harness arranged below the lower 1st jib with PVC.

1. Canvas

3.10.3 Removing folding jib lift cylinder

In the structure of folding jib assembly, there are two folding jib lift cylinders. The two cylinders work in parallel and extend and retract by hydraulic pressure. Each folding jib lift cylinder is equipped with a balance valve to prevent movement in the event of a hydraulic pipe failure.

⚠ WARNING: Risk of personal injury

Removal requires specific maintenance skills, lifting equipment and a suitable workshop. Carrying out removal without these skills and tools may result in personal injury or death, as well as serious component damage. Be sure to contact the dealer service.

CAUTION: The O-ring (if any) of the removed hose assembly or fitting must be replaced. During installation, all connections must be tightened to the specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

1) Lower the folding jib to the retracted position.

2) Lift the main boom so that it is higher than the shaft at the connecting rod end of the folding jib lift cylinder.

3) Mark, disconnect and plug the hydraulic hose of folding jib lift cylinder.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen hydraulic connectors very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

4) Remove the fasteners of the pins at the connecting rod end and barrel end of the folding jib cylinder. But do not remove the pin.

5) Connect the sling from the overhead crane to the connecting rod end of the folding jib lift cylinder for support. Do not apply any lifting force.

6) Knock out half of the pivot pin at the cylinder barrel end with a copper hammer. Lower the barrel end of the folding jib lift cylinder so that it hangs down.

7) Knock out half of the pivot pin at the rod end with a copper hammer.

8) Remove the folding jib lift cylinder from the machine.

⚠ WARNING: Risk of crushing

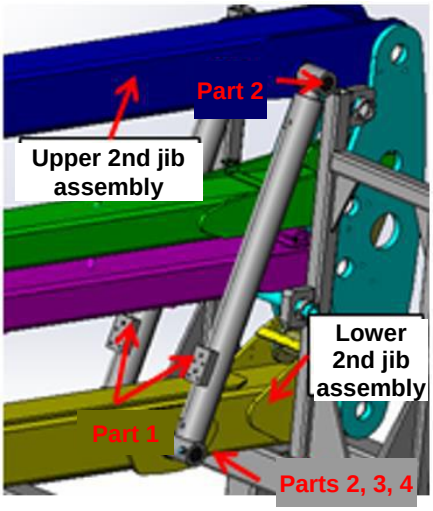
Without proper connection to the overhead crane, the folding jib lift cylinder may fall due to loss of balance during removal from the machine.

⚠ CAUTION: Risk of part damage

When removing the folding jib lift cylinder from the machine, be careful not to damage the balance valve at the cylinder barrel end.

3.10.4 Assembling folding jib lift cylinder

1) Assemble the folding jib lift cylinders to both sides of the front end of the boom, as shown:



1. Folding jib lift cylinder 2. Shaft 3. Bolt 4. Nut

2) Pass the shaft (part 2) through the lower mounting seat of left cylinder, and fix it with parts 3/4 (pass the bolt through it from back to front);

3) Pass the lower shaft of left cylinder into the front shaft hole of lower 2nd jib assembly, adjust the position of the upper hole of left cylinder, fix the upper 2nd jib assembly with the shaft (part 2), and make sure that the shaft does not protrude from the right side of upper 2nd jib assembly at this time;

4) Install the lower end of right cylinder to the right side of lower fixed shaft; be sure to block the left cylinder to prevent the shaft coming out.

5) Adjust the position of the upper mounting seat of right cylinder and knock the upper fixed shaft in;

CAUTION: The shaft fixing bolts of both cylinders are at the outside, and should be passed from back to front.

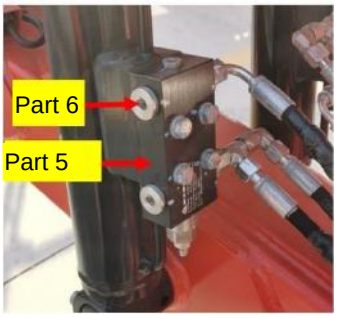
6) Fix both ends of the upper and lower fixed shafts with parts 3/4, as shown:

3. Bolt 4. Nut

Tightening torque of part 3: 52±5N.m;

Tools: QSP100N4/ socket wrench 16 #, open-end wrench 13-16

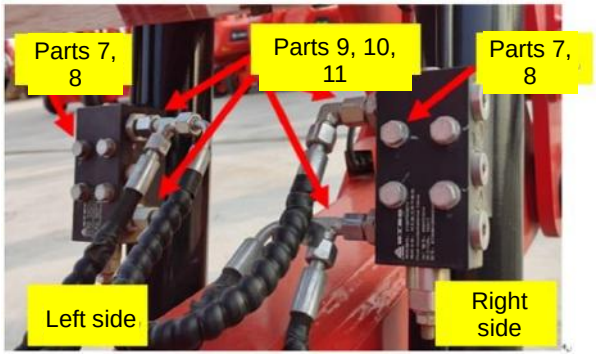
7) Install the balance valves (part 5) to the lower part of both cylinders as shown below:



5. Folding jib luffing balance valve 6. Plug

CAUTION: Before installation, make sure that the supplied O-ring on the mounting surface of the balance valve does not fall off or be damaged.

8) Assemble parts 9/10 to the balance valves of the left and right cylinders as shown below:



7. Bolt 8. M8 hard gasket 9. Straight fitting 10. Right-angle fitting 11. Tee fitting

CAUTION: The upper end of the folding jib luffing balance valve is V2 and the lower end is V1;

①. The straight fitting (part 9) is installed at different positions on the left and right balance valves, and should be tightened using torque wrench and marked by a marker pen.

②. The right-angle fitting (part 10) is installed at different positions on the left and right balance valves, and should not be tightened at this time (should be tightened after the oil pipes are connected).

③. The tee fitting (part 11) is installed at different positions on the left and right balance valves, and should not be tightened at this time (should be tightened after the oil pipes are connected).

Tightening torque of part 6: 32±3N.m; tightening torque of parts 7, 8 and 9: 75±8N.m;

Tools: QSP50N3 / socket wrench 13/ socket wrench 22

QSP100N4/SP120N*22

3.11 Rotary table swing assembly

3.11.1 Removing slewing drive assembly

⚠ CAUTION: The O-ring (if any) of the removed hose assembly and/or fitting must be replaced. During installation, all connections must be tightened to the specified torque. Please refer to the specification for selection of tightening torque of the lifting platform.

⚠ WARNING: Risk of personal injury

This procedure requires specific maintenance skills, lifting equipment and a suitable workshop. Carrying out this procedure without these skills and tools may result in death or serious injury, as well as serious component damage. Therefore, it is strongly recommended that this service is performed by dealers.

1) Remove the rotary table.

2) Mark, disconnect and plug the hydraulic hose of the rotary table slewing drive assembly. Plug the fitting.

⚠ WARNING: Risk of personal injury

Sprayed hydraulic oil can penetrate and burn the skin. Therefore, please loosen hydraulic connectors very slowly to reduce the oil pressure gradually. Do not spray or eject the oil.

7) Connect the sling and overhead crane or other suitable lifting device to the slewing drive assembly.

8) Remove the slewing drive assembly mounting fasteners.

9) Carefully remove the slewing drive assembly from the machine.

⚠ WARNING: Risk of crushing

Without proper connection to the overhead crane, the rotary table rotation assembly may fall due to loss of balance during removal from the machine.

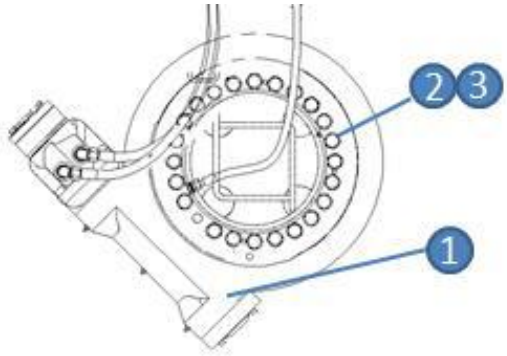
3.11.2 Assembling slewing drive assembly

1) Install the hose fittings to the two ports in part 1, as shown.

2) Lift the slewing drive assembly to the slewing assembly tooling, and assemble the slewing drive assembly to the rotary table with parts 2 (glued) and 3.

Tightening torque of part 2: 305±25N.m

Tools: QSP420N, QSP100N4, socket wrench 24, socket wrench 18

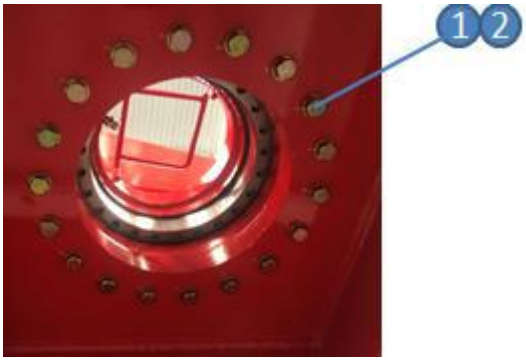


1. Slewing drive assembly 2. Bolt 3. Washer

3.11.3 Lifting rotary table

1) Lift the rotary table assembly to the chassis.

2) Adjust the mounting position of the slewing ring and fix it with parts 1 (glued)/2.



1. Bolt 2. Washer

Tightening torque of part 1: 305±25N.m

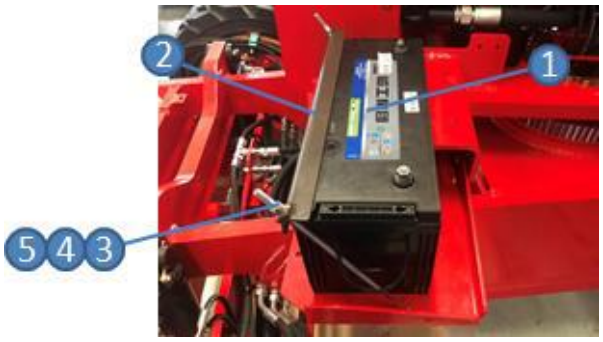
Tool: QSP420N/ socket wrench 24

3.12 Other components

3.12.1 Assembling battery

1) Place the battery (part 1) on the battery tray, fix it with the locking angle steel (part 2),

threaded rod (part 3), washer (part 4) and nut (part 5), and then tighten the nut.



1. Battery 2. Locking angle steel 3. Washer 4. Nut

Reference tightening torque of part 5: 12±1N.m

Tools: Ratchet wrench 13

Note: The removal is carried out in reverse order of assembly, and just corresponding fasteners need to be removed, which is not described in detail here.

3.12.2 Assembling tilt sensor

1) Install the tilt switch (part 1) to the mounting position on the engine tray with the screw (part 2) and washer (part 3), and tighten the screw;

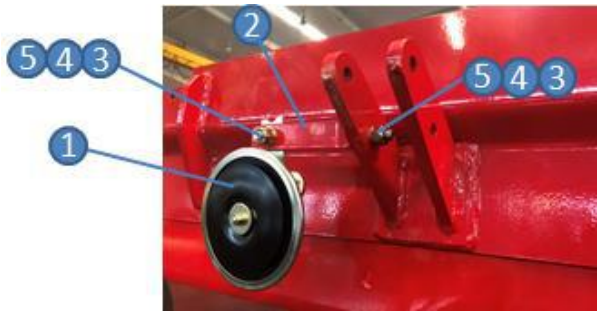
1. Tilt switch 2. Screw 3. Washer

Note: When installing the tilt switch, ensure the correct installation direction, where X is in the direction of the boom, and adjust the bubble to the center by tightening the screw on the tilt switch. The tilt switch X is in the direction of the boom.

Note: The removal is carried out in reverse order of assembly, and just corresponding fasteners need to be removed, which is not described in detail here.

3.12.3 Assembling horn

1) Assemble the horn (part 1) to the part 2 with the parts 3/4/5, and assemble the subassembled horn to the assembly position on the right hood mounting plate with the parts 3/4/5.



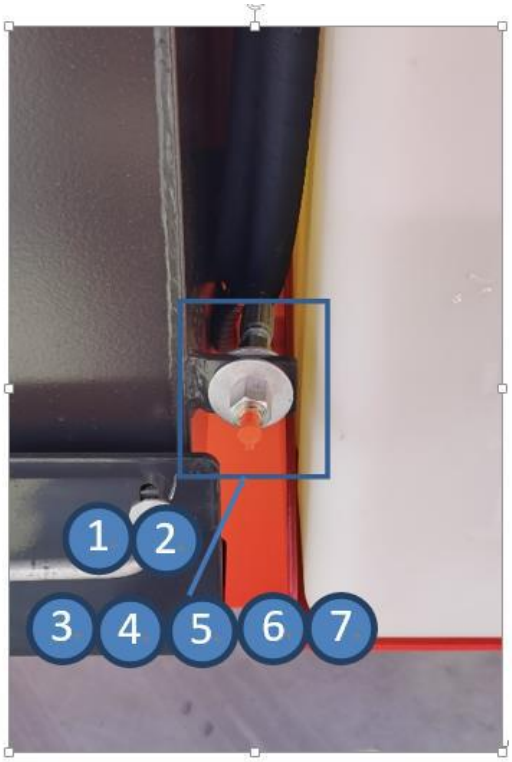
1. Horn 2. Horn fixing plate 3. Bolt 4. Washer 5. Nut

Tightening torque of part 3: 28±3N.m

Tools: QSP50N3/ socket wrench 13, open-end wrench 13

Note: The removal is carried out in reverse order of assembly, and just corresponding fasteners need to be removed, which is not described in detail here.

3.12.4 Assembling slewing ring grease filler hose



1. Straight fitting 2. Hose 3. Bulkhead fitting 4. Nut

5. Washer 6. Oil bowl 7. Oil bowl dust cap

1) Remove the grease filler from the slewing ring and screw-on part 1 (just tighten it), connect part 2 to part 1 and then wind it around to the right side of the rotary table, install parts 3/4/5/6/7 to the mounting position on the hydraulic tank (upper installation hole), and then connect the hose to the bulkhead fitting.

Tightening torque of part 2: 22±2N.m

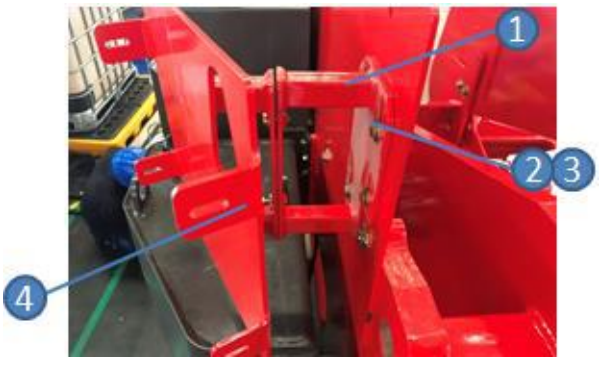
Tool: SP67N*19

2) Fill the grease into the grease filler hose with the grease filling machine until the grease overflows from the oil bowl slightly.

Note: The removal is carried out in reverse order of assembly, and just corresponding fasteners need to be removed, which is not described in detail here.

3.12.5 Assembling ground control system

1) Assemble the electric control box bracket weldment 1 (part 1) to the upper right part of the rotary table weldment with the bolt (part 2) and washer (part 3), assemble the electric control box bracket weldment 2 (part 4) to the electric control box bracket weldment 1 with the bolt (part 2) and washer (part 3), and tighten them to the specified torque:



1. Electric control box bracket weldment 2. Bolt 3. Washer 4. Electric control box bracket weldment

Tightening torque of part 2: 28±3N.m

Tool: QSP50N3/ socket wrench 13

2) Assemble part 1 to the ground control unit bracket weldment on the right side of the rotary table, and fix it with parts 2/3:

1. Ground control unit assembly 2. Bolt 3. Washer

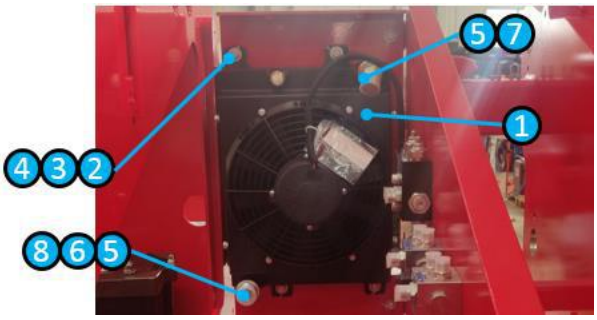
Tightening torque of part 2: 28±3N.m

Tool: QSP50N3/ socket wrench 13

Note: The removal is carried out in reverse order of assembly, and just corresponding fasteners need to be removed, which is not described in detail here.

3.12.6 Assembling hydraulic oil radiator

1) Assemble part 1 to the radiator mounting plate weldment with parts 2/3/4.
2) Install the parts 5/7 at the upper port and do not tighten the part 7.
3) Install the parts 5/6/8 (4120002548 fitting 2C-22-30 1) at the lower port and do not tighten the parts 6/8.



1. Hydraulic oil radiator 2. Bolt 3. Washer 4. Nut 5. Straight fitting 6. Tee fitting 7. Combination fitting

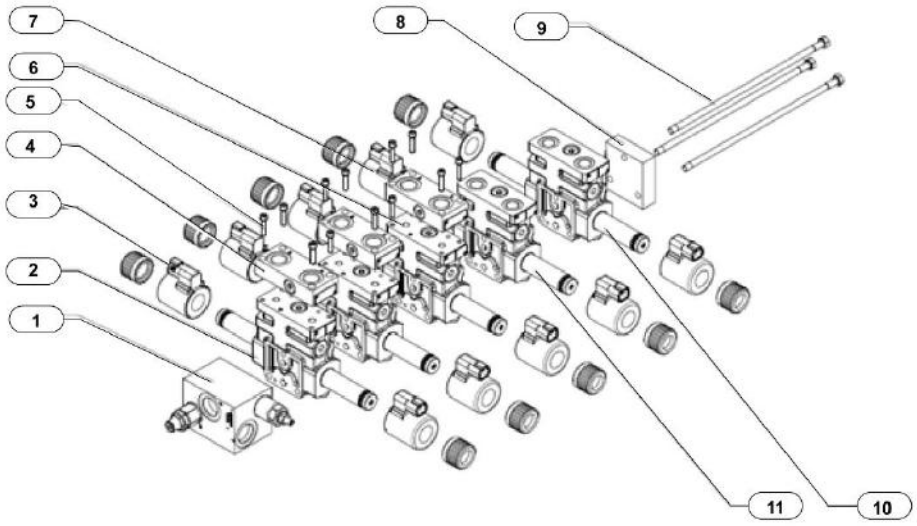
Tightening torque of part 2: 28±3N.m

Tightening torque of part 5: 160±16N.m

Tools: Electric impact wrench 51082, socket wrench 13

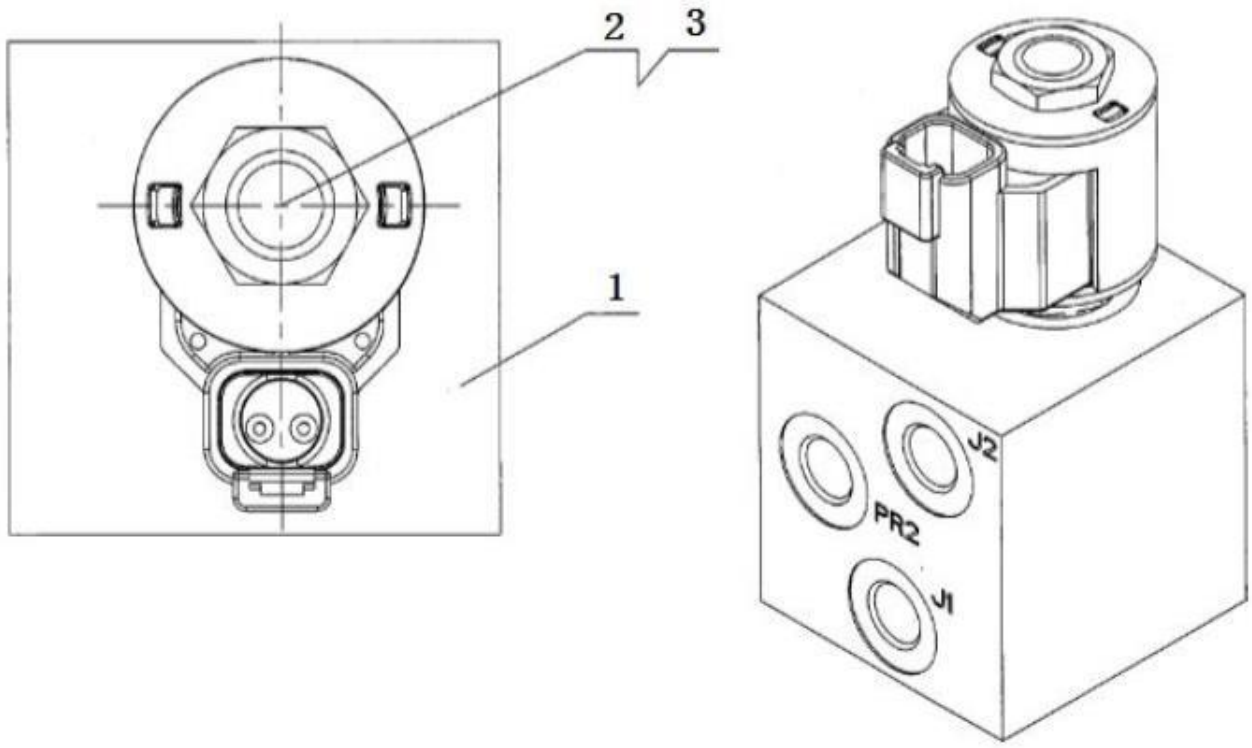
3.13 Valve group

3.13.1 Multi-way valve assembly AR16JEDC-5



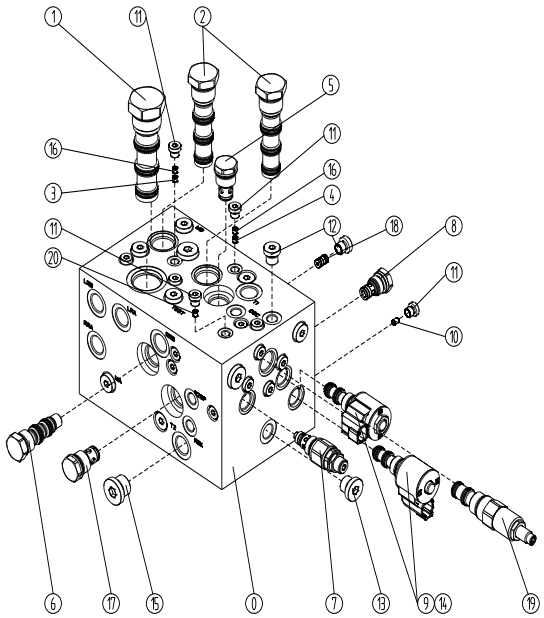
S/N	Name	Function
1	Oil inlet valve	Oil inlet and return; connecting the valve block, pump and tank
2	Luffing valve	For luffing
3	Coil	/
4	Sandwich plate relief valve	Secondary relief valve to protect oil cylinder
5	Hexagon socket screw	/
6	Slewing valve	For slewing
7	Sandwich plate relief valve	Secondary relief valve to protect oil cylinder
8	End plate	For fixing the valve block
9	Assembling bolts	/
10	Platform working valve	For leveling, jib flying and swinging
11	Telescoping valve	For telescoping

3.13.2 Platform swing control valve ST4277-AB00



S/N	Name	Code	Mounting torque (N.M)
1	Valve block ST4277-A000M	4120001998001	/
2	Solenoid valve SV08-31-0-N-0	4120001998002	/
3	Coil 4303612	4120001571010	/

3.13.3 ST5093-AB0C walking control valve group



S/N	Name	Code	Spool function
0	Valve block ST5093-A000M	4120704576003	Carrier of spool and oil passage
1	Flow divider/combiner FD56-45-0-P-66	4120001571002	Flow diversion and combination, increasing or decreasing fluid trend
2	Flow divider/combiner FD52-45-0-P-66	4120001571003	Flow diversion and combination, increasing or decreasing fluid trend
3	Damper STTY002-2.3	4120001571004	Restricting flow rate and stabilizing the flow
4	Damper STTY002-1.2	4120001571005	Restricting flow rate and stabilizing the flow

5	Check valve CVC0.S10.0Y.000	4120704190002	Unidirectional oil flow
6	Flush valve HS50-43-0-P	4120001571007	Closed system flush valve
7	Relief valve RVC0.S08.0Y.000	4120001571008	Restricting flushing pressure
8	Check valve STCV08-0-000A	4120001490007	Unidirectional oil flow
9	Solenoid valve SV08-31-0-N-0	4120001998002	2-speed, braking
10	Damper STTY002-0.6	4120001159010	Restricting flow rate
11	Plug 4BN-02WD	4129900116002	Plug
12	Plug 4BN-04WD	4190001419	Plug
13	Plug 4BN-06WD	4120001493	Plug
14	Coil 4303612	4120001571010	Coil
15	Plug 4BN-08WD	4120001371	Plug
16	Damper STTY002-2.5	4120704576001	Restricting flow rate
17	Plug CP10-20-N	4120704576002	Plug
18	Shuttle valve 7120012	4120704189010	Shuttle valve
19	Pressure reducing valve PR10-32A-0-N-8/M35	4120704543006	Restricting float pressure
20	Damper STTY002-2.0	4120704053013	Restricting flow rate

Chapter 4 Maintenance

4.1 Observing the regulations

1) The operator can only check the regular maintenance items specified in this manual.

2) As required by the manufacturer, the regular maintenance and inspection shall be performed by the trained maintenance technicians.

Maintenance symbols

The following symbols are used in this manual to express the relevant meanings in the instructions. The meanings of one or more symbols prefixed to the maintenance procedure are as follows.

 Indicating that tools are required to implement this procedure.

 Indicating that new parts are required to implement this procedure.

 Indicating that dealers are required to implement this procedure.

4.2 Checking the battery

⚠ Danger: Risk of explosion! Risk of electric shock! Risk of burns!

Stay away from the fireworks, and remove all rings, watches and other ornaments. Wear goggles, protective gloves and protective clothes if necessary. Avoid touching the spilled electrolyte with hands or other parts of the body. Use soda and water to neutralize the spilled electrolyte.

This machine uses the maintenance-free lead-acid battery. It is essential to keep the battery in good condition to achieve superior machine performance and safe operation. If the voltage is improper or the cable or wire is damaged, the parts may be damaged and hazards may be caused. This inspection shall be performed once every 8h or every day for the battery.

- Check if the battery lock lever is stable.
- Check if the battery cable is connected firmly, without corrosion.
- Check if the electrolyte leaks, and if the battery is dry and clean.

- Check the color of the battery hydrometer:

Battery hydrometer

Hydrometer color	Meaning and measures
White	Lack of electrolyte; please shut down the machine to stop using it
Black	Undervoltage or damage
Green	Measure the voltage of each battery, and if the voltage is lower than 11V, it means the battery is damaged; if the voltage is between 12.4V-12.7, it means the battery is in good condition

Battery hydrometer color and description

- If the color of the battery hydrometer is green and the voltage is above 12V, but the starter cannot be driven, the trained and qualified maintenance personnel shall conduct further inspection of the battery.

⚠ CAUTION: If an external power supply is required to charge the battery, only the charger approved by LGMG can be used.

It is necessary to add the terminal protector and corrosion-resistant sealant to protect the battery terminals and cables against corrosion.

4.3 Checking the hydraulic filter

The hydraulic filter shall be checked or replaced once every 500h or every six months.

⚠ In a dusty working environment, it is required to increase the number of times for implementation of this step.

It is essential to replace the hydraulic filter to achieve superior performance and long service life of the machine. If the filter is dirty or clogged, the performance of the machine may be deteriorated, and the parts may be damaged after continuous use. In an extremely dirty working environment, it is required to increase the number of times for replacement of the filter.

⚠ Risk of personal injury. Be careful of hot oil. The contact with hot oil will cause

severe burns.

⚠ This step shall be implemented when the engine is shut down.

Replacement of the return filter element of the hydraulic tank

1) Implement this step once every 500h or every six months whichever comes first.

2) It is essential to replace the return filter element to achieve superior performance and long service life of the machine. If the filter is dirty or clogged, the performance of the machine may be affected, and the parts may be damaged after continuous use. The filter element shall be replaced frequently in a harsh working environment.

CAUTION: Risk of burns.

Be careful of hot oil. The contact with hot oil may cause severe burns.

① Open the upper cover of the hydraulic tank.

② Remove the upper filter element flange of the hydraulic tank.

③ Pull out the filter element and replace it with a new one.

④ Install the flange and cover.

⑤ Use a marker to write down the replacement time and date on the filter element replacement record.

⑥ Turn the key switch to the GCU mode, and pull up the red emergency stop buttons of GCU and PCU.

⑦ Press the lift switch.

⑧ Check the filter components for oil leakage.

Replacement of the high pressure filter element

1) Place a suitable container under the filter.

2) Remove the nut at the bottom of the filter cover with a wrench, and remove the filter cover.

3) Take out the filter element from the filter cover.

4) Check the seal of the filter cover, and replace it when necessary.

5) Install a new high pressure filter element, and tighten it.

6) Wipe off any oil droplets splashed during installation.

7) Check that the filter cover and relevant components are free of leakage.

4.4 Replacing the air filter of the hydraulic tank

The air filter of the hydraulic tank shall be replaced once very 500h or every day. In a dusty working environment, it is required to increase the number of times for implementation of this step.

⚠ This step shall be implemented when the engine is shut down.

1） Remove the filter element.

2） Wipe the internal part and rear cover of the cartridge with a piece of wet cloth.

Install a new air filter element.

4.5 Checking the hydraulic oil level

The proper hydraulic oil level is essential for operating the machine. If the hydraulic oil is at an improper level, the hydraulic components will be damaged. Through a daily inspection, the inspector can determine the hydraulic oil level change which indicates that the hydraulic system is faulty.

⚠ If the hydraulic oil isn't changed during inspection in two years, it shall be checked on a quarterly basis. The hydraulic oil shall be changed if any nonconformity is found during inspection.

1) Make sure that the arm rod is retracted, and then perform a visual inspection of the hydraulic tank.

Result: The hydraulic oil level shall be 20mm above and below the middle position of the oil level meter.

2) Add the oil as needed, and do not add too much. See the table below for hydraulic oil grades.

Temperature	Model
Minimum temperature > -25°C	L-HV32 low temperature hydraulic oil
-40°C < Minimum temperature ≤ -25°C	L-HS32 ultra-low temperature hydraulic oil
Minimum temperature ≤ -40°C	10# aviation hydraulic oil

4.6 Checking the oil level of the reducer

This procedure shall be implemented every 250h.

If the oil level of the reducer is incorrect, the performance of the machine will be deteriorated, and the parts will be damaged after continuous use.

1) Drive the equipment to rotate until one oil filler is at the highest point.

2) Remove the other plug, and check the oil level.

Result: The oil level shall be flush with the bottom of the side plug hole.

3) When necessary, remove the upper plug, and add oil until the oil level is flush with the bottom of the side plug hole.

4) Apply the pipe thread sealant to the plug, and install the plug into the reducer.

5) Repeat this step for each reducer.

4.7 Changing the reducer gear oil

The first maintenance shall be performed upon operation for 50h, thereafter reducer gear oil shall be changed every 1000h or every year.

It is essential to change the reducer gear oil to achieve superior performance and long service life of the equipment. If the reducer gear oil isn't changed every year, the performance of the equipment may be deteriorated, and the parts may be damaged after continuous use.

1) Select the reducer to be maintained and drive the equipment until one of the two plugs is at the lowest point.

2) Remove the two plugs, drain the gear oil (completely), and collect it in a suitable container.

3) Drive the equipment to rotate until one plug is at the highest point.

4) Add oil from the hole of the reducer at the high point until the oil level is flush with the side hole at the bottom. Install the plug.

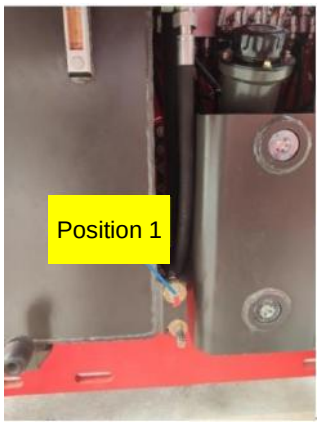
5) Repeat this step to add oil to each reducer.

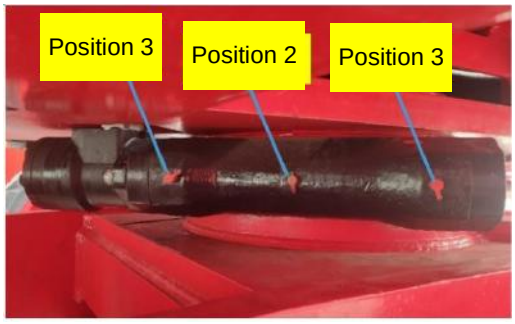
Item	Conditions	Grade
Gear oil	30°C < Minimum temperature	85W/140
	-10°C < Minimum temperature < 30°C	85W/90
	-30°C < Minimum temperature < -10°C	80W/90
	Minimum temperature < -	75W

	30°C	

4.8 Maintenance of worm-type slewing drive

The worm-type slewing drive assembly has three lubrication positions, that is, race (position 1), mesh between worm and slewing bearing (position 2), and tapered roller bearing (position 3, two places). The specific lubrication positions are as shown below:





1. Maintenance before delivery

(Remarks: This refers to the lubrication of LGMG mobile elevating work platform before delivery)

1) Position 1. Lubrication of race:

Completed, no need of further lubrication.

2) Position 2. Lubrication at the mesh between worm and slewing bearing.

Lubrication amount: 650g grease.

Lubrication method: While rotating the slewing reducer, continuously add grease into the grease filler.

Grease grade: 3# grease

3) Position 3. Lubrication of tapered roller bearing: Completed, no need of further lubrication.

2. Maintenance after delivery

1) Position 1. Lubrication of race:

Lubrication amount: Appropriate (recommended value: 18g)

Lubrication frequency: Every year or every 1000h whichever comes first.

Lubrication method: While rotating the slewing reducer, continuously add grease into the grease filler.

Grease grade: 3# grease

2) Position 2. Lubrication at the mesh between worm and slewing bearing.

Lubrication amount: Appropriate (recommended total value: 400g)

Lubrication frequency: Every 3

months or every 150h whichever comes first.

Lubrication method: While rotating the slewing reducer, continuously add grease into the grease filler.

Grease grade: 3# grease

3) Position 3. Lubrication of tapered roller bearing:

Lubrication amount: Appropriate (recommended: 5g/place, a total of 10g)

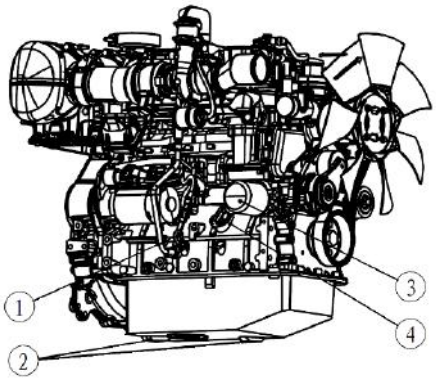
Lubrication frequency: Every year or every 1000h whichever comes first.

Lubrication method: Direct lubrication

Grease grade: 3# grease

4.9 Maintenance of Deutz engine

4.9.1 Checking the engine oil level



TD2.9 L4 engine

1. Oil dipstick 2. Oil drain plug 3. Oil filter 4. Oil filler

⚠ No working on a running engine! No smoking or open flames! Be careful when handling high temperature engine oil. Risk of burns!

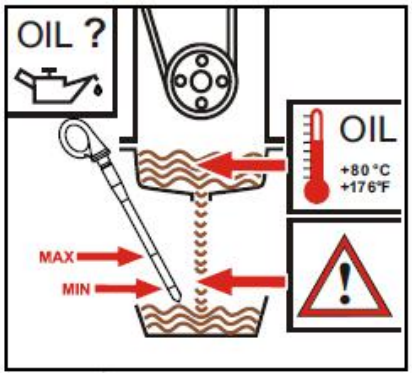
⚠ When working on the oil system, pay attention to the cleanliness of the outer surface. Carefully clean all areas involved. Dry the wet parts with compressed air.

⚠ Please abide by the oil safety provisions and local regulations. Dispose of spilled oil and filter elements as specified. Ensure that waste oil doesn't drip to the ground.

⚠ Perform a trial run after each operation. Meanwhile, pay attention to the tightness and lubricating oil pressure, and check the engine oil level once every 8h or every day.

Insufficient or excessive oil will cause engine damage. The oil level can be checked only when the engine is placed horizontally and shut down. If the engine is hot, shut it down, and after 5 minutes, check the oil level. If the engine

is cold, check the oil level immediately.



1） Insert the oil dipstick, and wipe it with a piece of clean fiber-free cloth.

2） Insert the oil dipstick to the end.

3） Pull out the oil dipstick, and read the oil level.

4） Ensure that the oil level is always between MIN and MAX!

Add the engine oil until it reaches the MAX mark if necessary.

4.9.2 Changing engine oil and replacing oil filter

⚠ No working on a running engine! No smoking or open flames! Be careful when handling high temperature engine oil. Risk of burns!

⚠ When working on the oil system, pay attention to the cleanliness of the outer surface. Carefully clean all areas involved. Dry the wet parts with compressed air.

⚠ Please abide by the oil safety provisions and local regulations. Dispose of spilled oil and filter elements as specified. Ensure that waste oil doesn't drip to the ground.

⚠ Perform a trial run after each operation. Meanwhile, pay attention to the tightness and lubricating oil pressure, and check the engine oil level once

The engine oil shall be changed and the filter shall be replaced every 500h or every six months. After 50h of first use, the engine oil shall be changed and the filter shall be replaced. If the ambient temperature is consistently below -10°C, the oil temperature is below 60°C, or the sulfur content in diesel is within 0.5%-1%, the oil change cycle shall be halved; if the oil does not reach the change cycle in one year, the oil shall be changed at least once a year.

⚠ Risk of burns: Be careful of high temperature engine parts and oil. Getting

into contact with high temperature engine oil and/or engine parts can cause serious burns.

⚠ Perform this function after the engine warms up to normal operating temperature.

Changing engine oil

1) Warm up the engine (oil temperature > 80°C).

2) Place the engine horizontally.

3) Shut down the engine.

4) Place a container under the oil drain plug.

5) Unscrew the oil drain plug to drain the old oil.

6) Install a new seal ring on the oil drain plug, screw the oil drain plug in and tighten it.

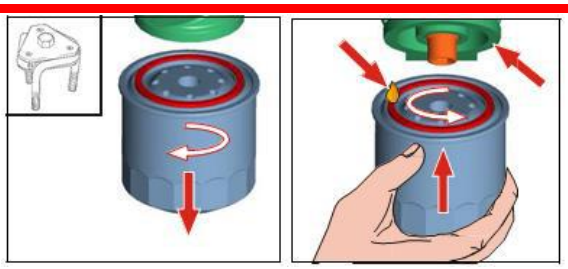
7) Add oil at the oil filler.

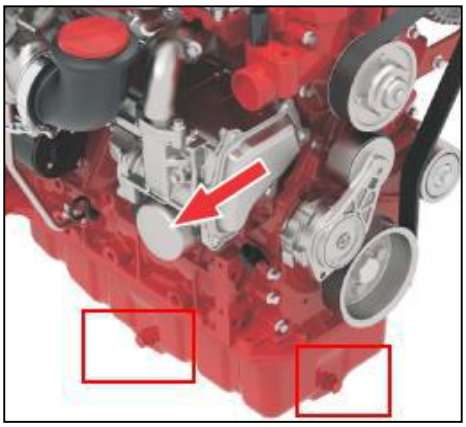
8) Warm up the engine (oil temperature > 80°C).

9) Place the engine horizontally.

10) After the oil is added, wait for more than 5 minutes, check the oil level, and add oil if necessary.

Replacing the oil filter





1. Oil filter 2. Oil drain plug

Every time the oil is changed, the oil filter element shall be replaced.

⚠ Never pre-install the oil filter. There is a risk of contamination.

1） If a torsion stop is installed, remove the clamp (optional).

2） Loosen and unscrew the filter element using a wrench.

3） Collect the discharged engine oil.

4） Clean the sealing surface of the filter bracket with a clean fiber-free cloth.

5） Apply a thin layer of oil to the seal ring of the new filter.

6） Screw in the new filter by hand until the seal ring fits, and then tighten it fully.

7） Secure the clamp of torsion stop (optional).

4.9.3 Checking fuel leaks

⚠ Engine must be shut down! No smoking or open flames, and be careful when handling hot fuel!

Please observe safety regulations on fuel and relevant local laws and regulations. Dispose of spilled fuel and filter elements according to regulations. Fuel must not leak to the ground.

Visually check whether there is fuel leakage every 8 hours or everyday.

⚠ Explosion and fire hazard. Fuel is combustible. Check the location of the machine. This step shall be performed in open and well-ventilated areas away from heaters, sparks, flames, and burning tobacco. A conforming fire extinguisher should be placed in an easily accessible place.

⚠ Explosion and fire hazard. If a fuel leak is found, irrelevant personnel shall be prevented from entering the area and operation on the equipment is prohibited. The leak shall be repaired immediately.

4.9.4 Bleeding or replacing the fuel filter

⚠ Engine must be shut down! No smoking or open flames! Be careful when handling hot fuel!

⚠ Do not loosen the fuel injection pipeline or high pressure fuel pipeline while the engine is running.

⚠ Carefully clean all areas involved. Dry the wet parts with compressed air.

⚠ Please observe safety regulations on fuel and relevant local laws and regulations. Dispose of spilled fuel and filter elements according to national regulations. Fuel must not leak to the ground.

⚠ After the operation on the fuel system is completed, bleed the system, conduct a trial run and check the tightness.

Replace the filter every 500h, or more frequent in case of extremely dirty working environment.

⚠ Risk of explosion and fire. Fuel is combustible. Check the location of the machine. This step shall be performed in open and well-ventilated areas away from heaters, sparks, flames, and burning tobacco. A conforming fire extinguisher should be placed in an easily accessible place.

⚠ Never pre-install the oil filter. There is a risk of contamination.

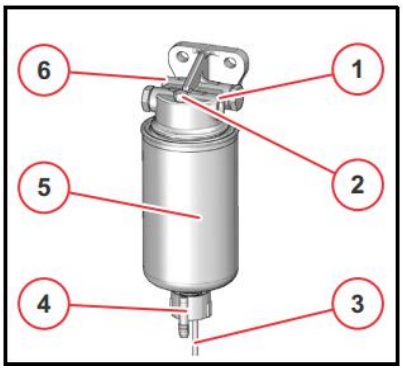


Fig. 1-14 (D/TD2.9L4)

1. Fuel inlet of pump 2. Bleed bolt 3. Electrical interface of water level sensor 4. Drain plug 5. Filter element 6. Fuel inlet of fuel tank

Bleeding the primary fuel filter

Shut down the engine.

1. Place a suitable container underneath.

2. Disconnect the cable.

3. Unscrew the drain plug.

4. Drain the liquid until pure diesel flows out.

5. Install the drain plug and the electrical interface.

6. Tightening torque: 1.6±0.3Nm

Replacing the primary fuel filter element

1. Shut down the engine.

2. Cut off the fuel supply to the engine (when the level of the fuel tank is high).

3. Place a suitable container underneath.

4. Disconnect the cable.

5. Loosen the drain plug and drain the liquid.

6. Remove the filter element.

7. Clean the sealing surface of the new filter element and the back of the filter head to avoid dirt.

8. Wet the sealing surface of the filter element slightly with fuel and install the filter element clockwise (by 17-18 Nm) to the filter head.

9. Install the drain plug.

10. Connect the cable.

11. Remove the fuel cock and bleed the system.

Bleeding the fuel system

1. The fuel system is bled by the electric fuel pump.

2. To ensure that no error message is sent, do not attempt to start the engine during bleeding. Perform the bleeding operation as follows:

1. Turn on the ignition switch.

2. After the electronic fuel pump is turned on, run it for 20 seconds so that the fuel system is bled completely and necessary fuel pressure is built.

3. Wait until the electric fuel pump is turned off by the control unit.

4. Turn off the ignition switch.

5. Repeat this process at least 2 times until the fuel system is bled completely.

4.9.5 Checking the air cleaner of the engine

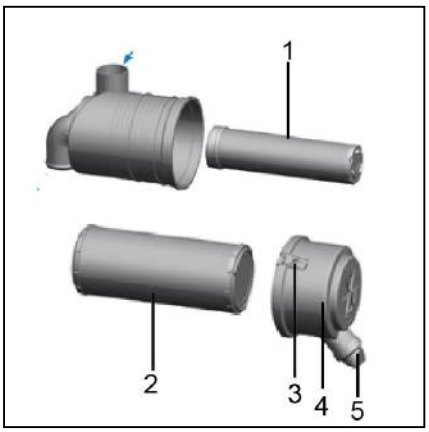
⚠ This step shall be implemented when the engine is shut down.

1) Check the air cleaner daily.

2) Check the maintenance indicator (if any) of the air cleaner. When the transparent part of the indicator turns red, clean or replace the air cleaner element.

3) Clean the air cleaner every 250h or quarterly, and replace the air cleaner every 1000h or when it is damaged. In a dusty working environment, it is required to increase the number of times for implementation of this step.

4.9.6 Cleaning or replacing the air cleaner



1. Inner element 2. Outer element 3. Positioning plate

4. End cover 5. Dust valve

1） Open the positioning plate (3).

2） Take off the filter cover (4) and unscrew the outer element (2).

3） Clean the outer element (2): In case of slight contamination, tap the end surface or purge the air cleaner from inside towards outside with dry compressed air for cleaning (generally not more than 5 times of

cleaning); replace the cleaner element when it is seriously contaminated.

Replacing the air cleaner inner element

⚠ Never clean the inner element (1). The outer element and the inner element shall be replaced together.

1) Unscrew the inner filter (1). Install a new inner element.

2) Screw in the new outer element (2), gently press the outer edge surface, install the cover (4) and fix it with the positioning plate (3).

4.9.7 Checking the coolant level

Check the coolant level every 8 hours or everyday.

⚠ High temperature coolant can cause burns.

The cooling system is under pressure! The cover can only be opened when it is cooled.

Coolant must have the protectant concentration specified for the cooling system!

Please observe safety regulations on coolant and relevant local laws and regulations.

Dispose of spilled coolant according to regulations and do not spill it on the ground.

Never run the engine without coolant, even for a very short time.

1) Carefully open the cover of the cooling system.

2) The coolant level should always be between the Min. and Max. marks! Add the engine oil until it reaches the MAX mark if necessary.

4.9.8 Adding or changing engine coolant

Change the engine coolant every 2000 hours or every two years.

⚠ High temperature coolant can cause burns.

The cooling system is under pressure! The cover can only be opened when it is cooled.

Coolant must have the protectant concentration specified for the cooling system!

Please observe safety regulations on coolant and relevant local laws and regulations.

Dispose of spilled coolant according to regulations and do not spill it on the ground.

Never run the engine without coolant, even for a very short time.

Draining the cooling system

1） Carefully open the cooler cover.

2） Position the container under the coolant port.

3） Drain the coolant.

4） Reconnect and tighten the coolant port.

5） Close the cooler cover.

Adding coolant

1) Carefully open the cover of the cooling system.

2) Add the coolant to the Max. mark or to the limit position.

3) Turn on the possible heater and adjust it to the maximum, so as to fill the heater circuit and bleed it.

4) Close the cooler cover.

5) When the engine is still hot, start it to the operating temperature.

6) Shut down the engine.

7) Check the coolant level when the engine cools down, and add coolant to the Max. mark if necessary.

If the coolant reduces rapidly,

1) Check whether there is dust and dirt between the radiator fins and the radiator tubes.

2) Check the fan belt tension.

3) Check the radiator water pipe for scale.

4.9.9 Checking the engine belt

Check the belt every 8h or everyday.

⚠ Work on the pulley only when the engine is at rest. If the double belt is worn or the V-belt is damaged, it shall always be replaced together.

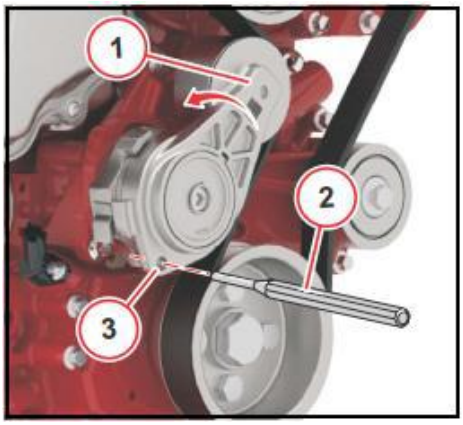
⚠ Be careful of high temperature engine parts. Getting into contact with high temperature engine parts may cause serious burns.

1) Visually check all pulleys for damage.

2) Replace the damaged components.

3) Reinstall the protective device if necessary.

4) When it is a new belt, pay attention to whether its position is correct. After running for 15 minutes, check the tension.



Replace the V-belt

1 Tensioner 2 Locating pin 3 Mounting hole

1) Use a socket wrench to press the tensioner as arrowed until the locating pin can be fixed in the mounting hole. Then handle the slack V-belt.

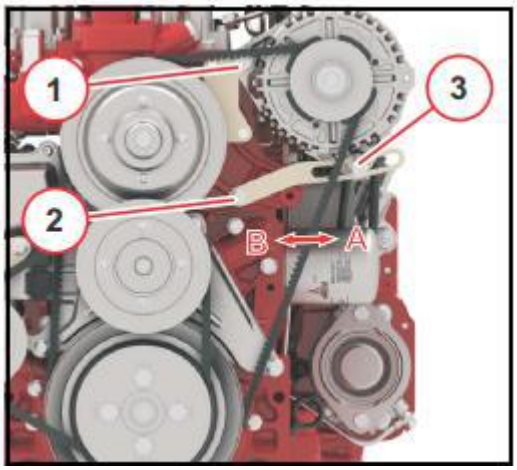
2) First remove the V-belt from the smallest pulley or tensioner.

3) Install a new V-belt.

4) Use the socket wrench to hold the tensioner to prevent it from turning, and remove the locating pin.

5) Tension the V-belt by the tensioner and the socket wrench. Check if the V-belt is properly installed on the guide.

Replacing the belt



1 Bolt 2 Bolt 3 Bolt

1) Loosen the bolts and lock nuts.

2) Move the engine in the direction of (B) until the belt is loose.

3) Remove the old belt and install a new one.

4) Move the engine in the direction of (A) until the correct belt tension is reached.

5) Check the belt tension.

6) Tighten the bolts and lock nuts.

Tightening torque: Bolt 1: 42 Nm

Bolt 2: 30 Nm

Bolt 3 M8: 30 Nm

Bolt 3 M10: 42 Nm

4.10 Scheduled maintenance

1) Quarterly, yearly and biennial maintenance items must be performed by qualified personnel trained on the maintenance of the machine in accordance with the procedures in the Maintenance Manual of the machine.

2) Machines that are not used for more than three months must be subject to quarterly inspection before put into use again.

4.11 Fault diagnosis of engine

Symptom	Cause	Action
Engine fails to be started or starting condition is poor	Coupling failure (if possible)	Check the coupling
	No fuel in fuel tank	Fuel tank
	The fuel inlet pipe is blocked	Check
	Below the limit starting temperature	Check
	Cold starter	Check/replace
	Wrong engine oil SAE viscosity grade	Change the oil
	The fuel quality is not as specified in the operation manual	Change the fuel
	The battery is damaged or not charged	Check the battery
	The starter cable connector is loose or oxidized	Check the cable connector
	The starter is damaged or the pinion is not engaged	Check the starter
	The air cleaner is dirty / the exhaust turbocharger is damaged	Check/replace
	Air in the fuel system	Bleeding the fuel system
	Low compression force	Check the compression force
	High exhaust back pressure	Check
	The nozzle tube is not sealed	Check the nozzle tube
	The high-pressure pump is damaged	Check/replace
Engine fails to be started and diagnostic indicator flashes	The EMS prevents starting	Check the error according to the DTC and troubleshoot it
Engine is started, but it	High exhaust back pressure	Check

runs unstably or is interrupted	Low compression force	Check the compression force
	Cold starter	Check/replace
	Air in the fuel system	Bleed
	The primary fuel filter is dirty	Clean
	The fuel quality is not as specified in the operation manual	Change the fuel
	The injector is damaged	Replace
	The nozzle tube is not sealed	Check the nozzle tube
	The engine cable harness is damaged	Check/replace
Engine speed changes and diagnostic indicator lights up	The EMS detects a system error and activates the compensation speed	Check the error according to the DTC and troubleshoot it
Engine is overheated and temperature warning device responds	The bleed pipe of the coolant reservoir is blocked	Clean
	The oil cooler is damaged	Check/replace
	The air or oil side of the oil filter is dirty	Replace
	The oil level is too high	Check the oil level and drain the oil if necessary.
	The oil level is too low	Add oil
	The injector is damaged	Replace
	The coolant heat exchanger is dirty	Clean
	The coolant pump is damaged (V-belt is broken or loosened)	Check whether it is broken or loose
	Coolant is in short supply	Add coolant
	Resistance in the cooling system is too high/flow is too small	Check the cooling system

	The fan/viscous coupler is damaged, or the belt is torn or loosened	Check/replace/tension
	The turbocharger air pipe is not tightly sealed	Check the turbocharger air pipe
	The turbocharger air cooler is dirty	Check/clean
	The air cleaner is dirty / the exhaust turbocharger is damaged	Check/replace
	The air cleaner maintenance switch/maintenance indicator is damaged	Check/replace
	The fan is damaged/V-belt is broken or loosened	Check the fan/V belt, replace it if necessary
	High exhaust back pressure	Check
	The throttle valve damaged	Check/replace
	Coolant temperature sensor	Check/replace
	The coolant thermostat is damaged	Check/replace
	The coolant reservoir cap is damaged	Check/replace
Insufficient engine power	The oil level is too high	Check the oil level and drain the oil if necessary.
	The fuel inhaler temperature is too high	Check the system
	The fuel quality is not as specified in the operation manual	Change the fuel
	The air cleaner is dirty / the exhaust turbocharger is damaged	Check/replace
	The air cleaner maintenance switch/maintenance indicator is damaged	Check/replace
	The fan is damaged/V-belt is broken or loosened	Check the fan/V belt, replace it if

		necessary
	The turbocharger air pipe is not tightly sealed	Check the turbocharger air pipe
	The turbocharger air cooler is dirty	Clean
	The nozzle tube is not sealed	Check the nozzle tube
	The injector is damaged	Replace
	The throttle valve damaged	Check/replace
	The exhaust gas is recirculated, and the control unit is damaged	Check/replace
	High exhaust back pressure	Check/clean
	The exhaust turbocharger is damaged	Replace
Insufficient engine power and diagnosis indicator on	The EMS reduces power	Please consult DEUTZ service provider
Not all engine cylinders are working	The nozzle tube is not sealed	Check the nozzle tube
	The injector is damaged	Replace
	Low compression force	Check the compression force
	The engine cable harness is damaged	Check/replace
The engine has no oil pressure or the oil pressure is too low	The oil level is too low	Add oil
The engine has no oil pressure or the oil pressure is too low	The engine is tilted too a great extent	Check engine mount / lower the tilt position
	Wrong engine oil SAE viscosity grade	Change the oil
	The oil pressure sensor is damaged	Check/replace
	The oil pressure control valve is stuck	Check/clean

	The oil suction pipe is blocked	Check/clean
Excessive engine oil consumption	The oil level is too high	Check the oil level and drain the oil if necessary
	The engine is tilted too a great extent	Check engine mount / lower the tilt position
	Crankcase exhaust system	Check/replace
There is oil in the exhaust system	The engine has been running under too small load (< 20-30%) for a long time	Check the load factor
	The valve oil seal is damaged	Check/replace
	The exhaust turbocharger is damaged	Check/replace
The engine emits heavy blue smoke	The oil level is too high	Check the oil level and drain the oil if necessary
	The engine is tilted too a great extent	Check engine mount / lower the tilt position
The engine emits heavy white smoke	The fuel quality is not as specified in the operation manual	Change the fuel
	The injector is damaged	Replace
	Condensed water	The engine warms up to evaporate the remaining water
The engine emits heavy black smoke	The air cleaner is dirty / the exhaust turbocharger is damaged	Check/replace
	The air cleaner maintenance switch/maintenance indicator is damaged	Check/replace
	The turbocharger air pipe is not tightly sealed	Check the turbocharger air pipe
	The injector is damaged	Replace

Frequent stop	The regeneration air cleaner is dirty / the exhaust turbocharger is damaged	Check/replace
	The turbocharger air pipe is not tightly sealed	Check the turbocharger air pipe
	The injector is damaged	Replace
	The differential pressure flowmeter is damaged	Replace
	NOx-sensor	Replace
	Diesel particulate filter differential pressure sensor provides incredible signal	Replace
	There are impurities in the differential pressure pipe	Clean

4.12 Maintenance schedule

AR14JD/AR16JD (A0014JNDCH20, A0016JNDCH20)						
Maintenance period	Material code	Material name	Spec.	Unit	Quantity	Remarks
50h	5301000045	Diesel oil	CH-4 15W/40	Liter	8.5	Deutz-D2.9L4
	4110001407001	Oil filter	01174416	Piece	1	
	5301000007	Gear oil	SAE 85W/90 GL-5	Liter	2.72	Walking reducer: 0.68L×4
500h	5301000045	Diesel oil	CH-4 15W/40	Liter	8.5	Deutz-D2.9L4
	4110001407001	Oil filter	01174416	Piece	1	
	4110702802001	Secondary diesel filter	04137456	Piece	1	
	4120001428001	High pressure filter element	GFX-80×5	Piece	2	One working pump and one walking pump
	4120000304	Return filter element	SJXHL-250*10	Piece	1	Hydraulic tank
1000h	5301000045	Diesel oil	CH-4 15W/40	Liter	8.5	Deutz-D2.9L4
	4110001407001	Oil filter	01174416	Piece	1	
	4110702802001	Secondary diesel filter	04137456	Piece	1	
	4110702802002	Primary diesel filter	04130241	Piece	1	
	4120001428001	High pressure	GFX-80×5	Piece	2	One working pump and one

		filter element				walking pump
	4120001427	Air cleaner	EF2-32	Piece	1	Hydraulic tank
	4120000304	Return filter element	SJXHL-250*10	Piece	1	
	5301000007	Gear oil	SAE 85W/90 GL-5	Liter	2.72	Walking reducer: 0.68L×4
	4110001498004	Cleaner outer element	P822768	Piece	1	Engine intake system (clean the cleaner outer element for 5-6 times as indicated, or replace it after it is damaged)
	4110001498003	Cleaner inner element	P822769	Piece	1	
1500h	5301000045	Diesel oil	CH-4 15W/40	Liter	8.5	Deutz-D2.9L4
	4110001407001	Oil filter	01174416	Piece	1	
	4110702802001	Secondary diesel filter	04137456	Piece	1	
	4120001428001	High pressure filter element	GFX-80×5	Piece	2	One working pump and one walking pump
	4120000304	Return filter element	SJXHL-250*10	Piece	1	Hydraulic tank
2000h	5301000045	Diesel oil	CH-4 15W/40	Liter	8.5	Deutz-D2.9L4
	4110001407001	Oil filter	01174416	Piece	1	
	4110702802001	Secondary diesel filter	04137456	Piece	1	
	4110702802002	Primary diesel filter	04130241	Piece	1	
	4120001428001	High pressure filter element	GFX-80×5	Piece	2	One working pump and one walking pump
	4120001427	Air cleaner	EF2-32	Piece	1	Hydraulic tank
	4120000304	Return filter element	SJXHL-250*10	Piece	1	
	4120001891	Suction filter	WU-100*180-J	Piece	2	Hydraulic tank (replace it when changing hydraulic oil)
	5301000007	Gear oil	SAE 85W/90 GL-5	Liter	2.72	Walking reducer: 0.68L×4
	4110001498004	Cleaner outer element	P822768	Piece	1	Engine intake system (clean the cleaner outer element for 5-6 times as indicated, or replace it after it is damaged)
	4110001498003	Cleaner inner element	P822769	Piece	1	

⚠ Note: The working hours are based on the engine working time, and the operation cycle is calculated from the date of production.

Maintenance period

Maintenance level	Routine inspection	Level 1	100h	Level 2 maintenance	Level 3 maintenance	Level 4 maintenance	Level 5 maintenance
Maintenance period	Daily	50h	100h	300h	500h	800h	1000h

List of maintenance items

System	Operation	Maintenance level							Remarks
		Routine inspection	Level 1 maintenance	100h maintenance	Level 2 maintenance	Level 3 maintenance	Level 4 maintenance	Level 5 maintenance	
Powertrain	Check the engine oil level	•							
	Check the fuel level in the fuel tank	•							
	Check if the fuel system pipeline leaks	•							
	Check the radiator coolant level	•							
	Check if the cooling system pipeline leaks	•							
	Check the connection between the engine and the tray				•	•	•	•	
	Change the engine oil	First 50h, thereafter every 400h (Kubota-V2403-E3)/500h (DeutzD2.9L4/Kubota-V2403-E5) or every six months, whichever comes first.							At least once a year
	Replace the engine oil filter element	First 50h, thereafter every 400h (Kubota-V2403-E3)/500h (DeutzD2.9L4/Kubota-V2403-E5) or every six months, whichever comes first.							At least once a year
	Check and adjust the tightness of the fan belt		•	•	•	•	•	•	
	Clean the radiator with compressed air			•	•	•	•	•	
	Clean the fuel filter of fuel tank			•	•	•	•	•	
	Drain deposits from the fuel tank			•		•		•	
	Replace the fine diesel filter	Every 400h (Kubota-V2403-E3)/500h (DeutzD2.9L4/Kubota-V2403-E5) or every six months, whichever comes first.							
	Replace the primary	Every 400h (Kubota-V2403-E3)/500h (Kubota-V2403-E5)/1000h							

	fuel filter element	(DeutzD2.9L4) or every six months, whichever comes first.							
	Check the water level in the water separator, and drain the water regularly	•							
	Clean or replace the air cleaner outer element and inner element	Clean the air cleaner outer element every 250h or when the indicator alarms, and it is forbidden to clean the air cleaner inner element							It can be cleaned for at most 5 times generally.
	Change coolant	Every 2000h or every two years, whichever comes first.							
Electrical system	Check the battery for undervoltage	•							
	Check if the battery terminals are loose or rusted	•							
	Check the color of the battery sight hole				•	•	•	•	
	Check if buttons on the PCU panel operate normally	•							
	Check if the PCU harness connector is connected firmly	•							
	Check if the PCU harness connector is stained	•							
	Check if the PCU harness is extruded or broken	•							
	Check if the inclinometer is wired firmly	•							
	Check the position of the rotary table swing limit switch rocker arm and if it is wired loosely	•							
	Check if the solenoid valve connector of the walking pump is loose and is wired normally	•							
	Check if buttons on the ground control panel operate normally	•							
	Check if the warning lamp and horn function normally	•							
	Check if the solenoid valve coils of main valve block are wired normally or loose	•							
	Check the starter motor terminals for looseness, breakage, etc.	•							
	Check the color of the battery sight hole				•	•	•	•	
	Load cell zero				•	•	•	•	

	calibration								
Hydraulic system	Check if the system pressure is normal			•	•	•	•	•	
	Check if the steering system pressure is normal			•	•	•	•	•	
	Check if the traveling system pressure is normal			•	•	•	•	•	
	Check if the oil pipes and joints are loose	•							
	Check if the oil cylinder leaks oil	•							
	Check if the valve spools leak oil	•							
	Check if the two ball valves at the suction port at the bottom of the hydraulic tank are open	•							
	Check if the walking oil pipe fixing clip is loose	•							
	Check the oil level in the hydraulic tank	•							Add hydraulic oil L-HV32 when the oil level is lower
	Check the permeability of the hydraulic oil tank exhaust cap			•	•	•	•	•	
	Replace hydraulic oil and suction filter	Every 2,000h or every two years, whichever comes first							Hydraulic oil L-HV32
	Replacement of the high pressure filter element	Every 500h or every six months, whichever comes first.							
	Check the hydraulic tank vent cap for leakage	Daily							
	Replace the air cleaner	Every 1,000 hours or every year, whichever comes first							
	Check the reducer for oil leakage	Daily							
	Check the walking motor for oil leakage	Daily							
	Change the reducer gear oil	First 50h, thereafter every 1,000h or every year, whichever comes first.							
	Replace the return oil filter element	Every 500h or every six months, whichever comes first.							
Machine	Check if the attached documents are complete, easy to read, and if they are in the file box	Daily							
	Check if the safety identification is correct or stained	Daily							

	Check the machine bolts, nuts and other fasteners for looseness or abnormal noise	Daily							
	Check the structural parts of the machine for cracks and if there is any open weld	Daily							
	Check if the machine paint for falling off, serious rust, corrosion or oxidation	Daily							
	Check if the slider is loose and if there is zero clearance between the slider and the boom						•	•	
Lubrication	Lubricate the slewing bearing			•	•	•	•	•	Lithium-based grease 3#
	Grease the slewing bearing and the gears of the slewing reducer			•	•	•	•	•	Lithium-based grease 3#

Chapter 5 Commissioning

5.1 Safety instructions

Before commissioning, please make sure to refer to the *Operation and Maintenance Manual*, familiarize yourself with the relevant safety precautions and basic operating requirements, and be particularly familiar with the following safety matters:

1) It is strictly forbidden for alcoholics, drug users, and those taking inhibition reaction drugs to approach and operate the machine;

2) Before operating the machine, please ensure that you have equipped with protection equipment, such as helmet, safety belts (five-point), safety shoes, and your body is in good condition;

3) The machine cannot be operated with the hood open. Before starting the engine, confirm the surrounding environment of the machine to ensure that the engine is unmanned to avoid the danger of starting the engine. and these instructions will not be repeated below;

4) Before operating the machine, sound the horn to ensure that there are no people or obstacles around, so as to avoid safety damage to others, yourself, the machine or obstacles, and other people are not allowed to operate the machine during commissioning;

5) This machine is not insulated, and does not provide protection against electric shock when it is in contact with or near wires, power supplies or electrical equipment.

Please follow the applicable laws and regulations and the instructions in the table below to maintain a sufficient safety distance from wires, power supplies, and electrical equipment.

Voltage	**Required safety distance**
0V～50KV	3.05m
50V～200KV	4.60 m
200V～350KV	6.10 m
350V～500KV	7.62 m
500V～750KV	10.67 m

750V～1000KV	13.72 m

If the machine comes into contact with a live wire, stay away from the machine immediately. Before the power of the wire is cut off, personnel are forbidden to touch or operate the machine. Do not operate or use the machine during lightning or storms.

6) Do not raise the arm rod when the wind speed may exceed 12.5m/s. If the wind speed exceeds 12.5m/s after the arm rod is raised, lower the arm rod and do not continue to operate the machine;

7) Do not operate the machine in strong winds or gusts. Do not increase the surface area of the platform or load. Enlarging the area exposed to the wind will reduce the stability of the machine;

8) Do not operate the machine via the PCU box when the platform is tripped, stuck, or other objects nearby hinder its normal movement. If it is expected to operate the machine via the ground control unit, this operation can be done only after all personnel have left the platform;

9) In the retracted state, be very careful and reduce the speed when the machine is driven on gravel, unstable or smooth surfaces, near openings or steep slopes, etc.;

10. Do not sit, stand or climb on the protective guard of the platform. Stand steadily on the platform base plate at all times.

5.2 Commissioning process

S/N	Commissioning steps
1	Pick-up inspection
2	Start test
3	Basic operation test of ground control unit
4	Basic operation test of platform control unit
5	Oil level inspection
6	System overflow pressure
7	Folding jib lowering overflow pressure
8	Boom lowering overflow pressure
9	Parameter setting
10	Load cell calibration
11	1.1 times load test
12	Travel speed test (high speed)
13	Braking distance test
14	Speed limit test
15	Operation time test

16	Drive enable function
17	Tilt sensor test
18	Gradeability test
19	Curb test
20	Pothole test
21	Emergency function test
22	Max. lifting height
23	1.25 times load test
24	Horizontal stability
25	Clearance inspection
26	Visual inspection
27	Charging test
28	Machine inspection

5.3 Machine inspection

Pick-up inspection

1) After picking up the machine, follow the machine checklist to check the machine to be tested: basic information, appearance of the machine, configuration of the machine, oil and water volume, electrical components, etc., as shown in the above figure (left); any problem found should be recorded in time.

2) The following electrical components should be carefully checked: key switch, emergency stop button, ground control system switch, platform control switch, foot switch;

Inspection criteria: effective in use.

Visual inspection

Check the appearance of the vehicle as follows:

1) The top coat has no bumps, scratches, or color difference;

3） Anti-rust treatment on exposed metal should be done

3) There should be no porosity, undercut, crack, burn through, etc. after welding

4） The hydraulic pipelines should be arranged neatly and reasonably, the connection should be tight and firm, mark or mark glue should be provided

5） No oil and water leakage is found

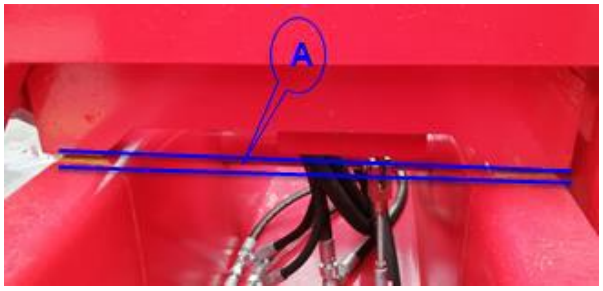
6） Signs and marks are installed firmly, and they should be upright, eye-catching, correct and clear

Clearance inspection

1) Check the gap of the rear axle

Insert a feeler into the gap between the rear axle and the chassis, and measure the gap between the left and right sides of the rear axle; control

criteria: 4≤A≤5mm

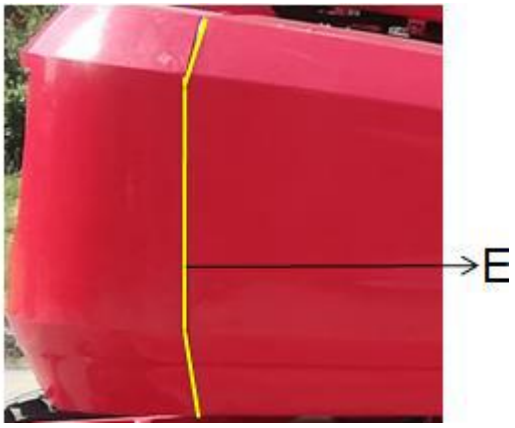


Rear axle gap

2) Check the gap between the left and right covers and the counterweight

Use a feeler to measure the gap between the left and right covers and the counterweight, and the upper and lower gap should be even.

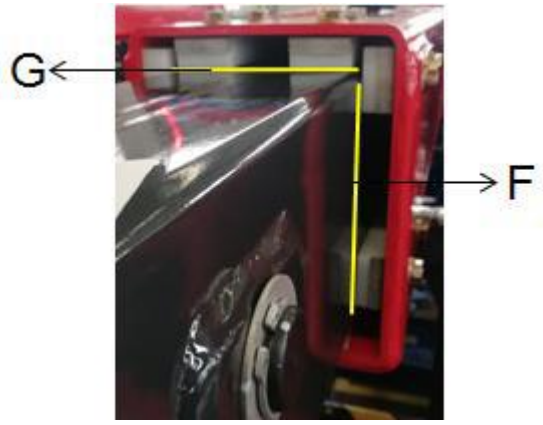
Control criteria: E clearance requirement: 6-9mm, the upper and lower gap difference should not be more than 2mm;



3) Check the gap between the slider and the arm rod

Insert a feeler into the gap between the telescopic boom and the slider, and measure the sum of the left and right gaps and the sum of the upper and lower gaps of the boom

Control criteria: **F/G**＜1mm.

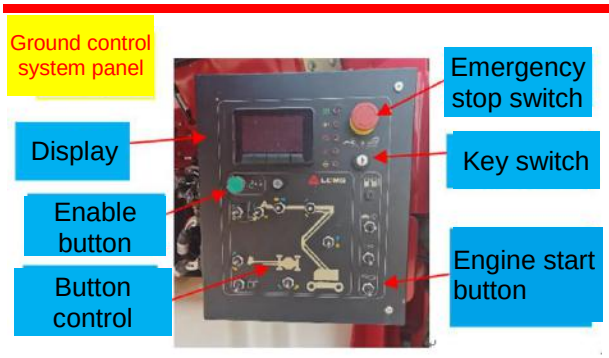


Gap between the slider and the boom

5.4 Basic test

5.4.1 Start test

1) After the key is inserted into the key switch socket and turned to "Platform Control" mode, then the beacon will flash, the screen will light up, and the platform control unit will run; after the key switch is turned to the neutral position, the machine will be turned off, and the beacon will be turned off, the screen will be off; after the key switch is turned to "Ground Control" mode, the beacon will flash, the screen will light up, and the ground control unit will run;

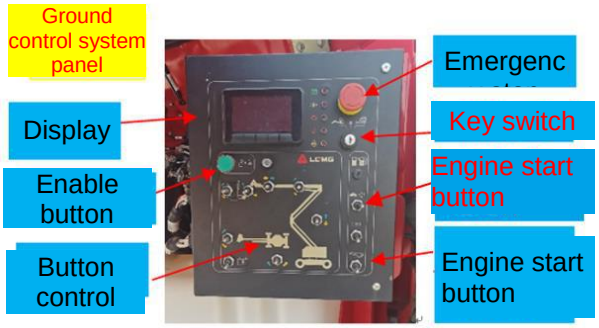


Control criteria: effective in use

2) Engine start switch

The engine can be started smoothly without abnormal noise if the engine start switch is turned;

Control criteria: effective in use, conforming to requirements



3) Engine high/low speed test (DEUTZ-D2.9L4):

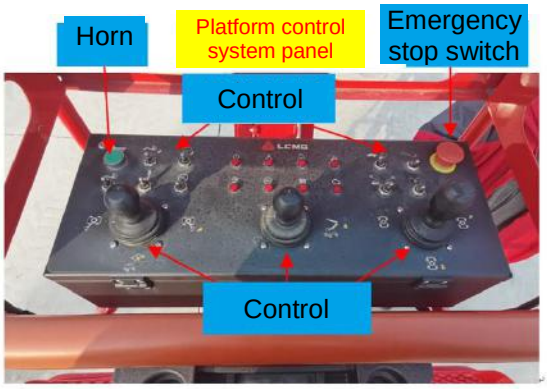
Low speed : 1,500r/min, engine running smoothly without abnormal noise (idling)

High speed: 2,500r/min, engine running smoothly without abnormal noise (high idle speed)

Control criteria: conforming to requirements

4) Emergency stop switch

The engine cannot be started smoothly without abnormal noise after the emergency stop switch of the ground control system is pressed and the engine start switch is turned;



The engine can be started smoothly after the emergency stop switches of the platform control switch and the ground control switch are pulled outward and the engine start switch is turned;

The engine can be started smoothly after the emergency stop switch of the platform control system is pressed, the emergency stop switch of the ground control system is pulled outward, and the engine start switch (ground control) is turned;

The working engine stops working if the emergency stop switch is pressed;

5) Horn switch

The horn will sound if the horn switch is pressed;

6) Enable button

With the enable button not held, all arm rods

and platform functions should not operate after each boom and platform function toggle switch is turned on.

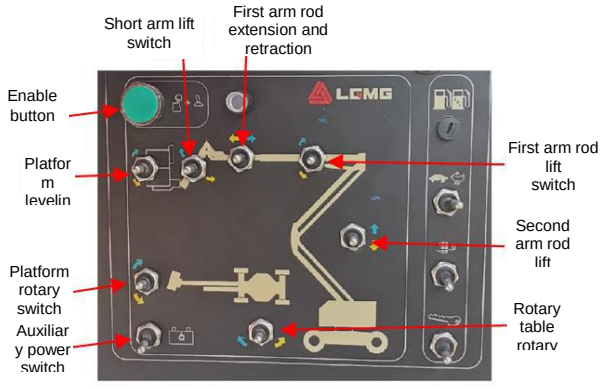
With the enable button held, all arm rods and platform functions should operate for a complete cycle after each boom and platform function toggle switch is turned on.

Control criteria: effective in use

5.4.2 Basic operation test of ground control unit

1. The machine can be started when the key is turned to the GCU mode, and the emergency stop switch is turned on.

2) Press and hold the enable button (this operation is required for the following basic operation test)



Ground control system panel

3) Platform leveling switch

The platform level will rise if the platform leveling switch is moved upwards; the platform level will drop if the platform leveling switch is moved downwards.

4) Platform rotary switch

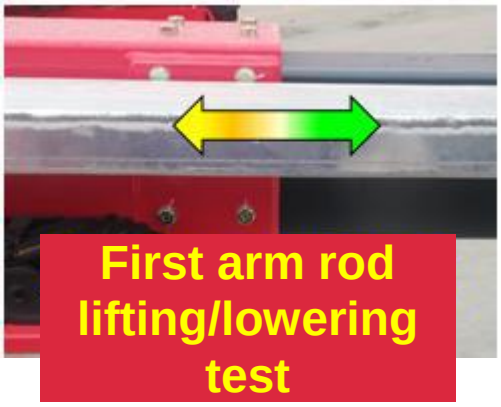
The platform will rotate to the left if the platform rotary switch is moved upwards; the platform will rotate to the right if the platform rotary switch is moved downwards.

5) Short arm lift switch

The short arm will rise if the short arm lift switch is moved upwards; the short arm will drop if the short arm lift switch is moved downwards.

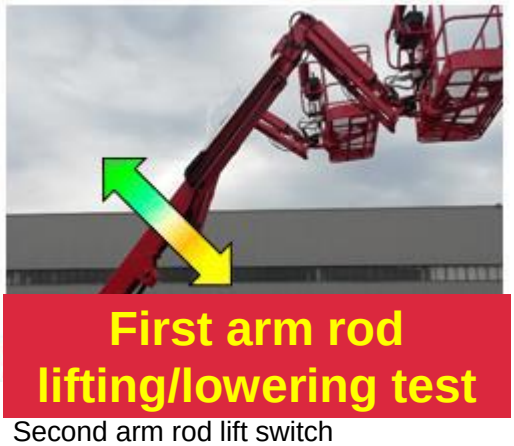
6) First arm rod extension and retraction switch

The arm rod will extend if the first arm rod extension and retraction switch is moved leftward; the arm rod will retract if the first arm rod extension and retraction switch is moved rightward.



7) First arm rod lift switch

The first arm rod will rise if the first arm rod lift switch is moved upwards; the first arm rod will drop if the first arm rod lift switch is moved downwards.



8) Second arm rod lift switch

The second arm rod will rise if the second arm rod lift switch is moved upwards; the second arm rod will drop if the second arm rod lift switch is moved downwards.

9) Rotary table rotary switch

The rotary table will rotate to the right if the rotary table rotary switch is moved rightward; the rotary table will rotate to the left if the rotary table rotary switch is moved leftward.

⚠ CAUTION:

1. Commissioning shall be done by a dedicated person, and during the commissioning period, no one else is allowed to operate the machine.

2. Each commissioning should be done separately, two or more operations cannot be carried out at the same time.

3. The commissioning time of each operation should be 3-5S, the commissioning is visible to the naked eye, and it should be stopped when it is effective.

4. After the all commissioning operations are completed, the buttons and switches shall be returned to their positions.

10) Auxiliary power switch

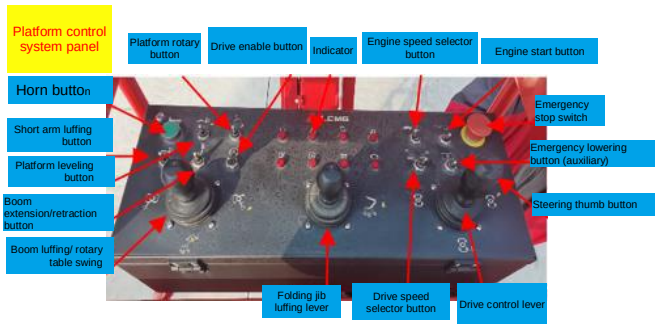
Turn the key switch to the GCU; pull the red "emergency stop switch" button outward to the ON position; move the auxiliary power switch to either side, repeat all the above operations until all operations can be achieved.

Note: (1) When testing the auxiliary power switch, in order to save battery power, please test each function in a part of the cycle.

(2) The drive function shall not work with the auxiliary power supply.

5.4.3 Basic operation test of platform control system

1) Start the machine and turn the key to the platform control mode



Platform control system panel

2) Push the red emergency stop button inward to the “OFF” position. Control criteria: all functions cannot be operated after each function control lever or button of the machine is turned on.

3) Push the red emergency stop button outward to the “ON” position. Control criteria: the function control lever or button can be operated normally to operate the machine.

4) Do not press down the foot switch, and test the control lever or button of each function of the machine. **Control criteria: the machine functions shall not run;**

Foot switch

5) Press down the foot switch, and test the control lever or button of each function of the machine. **Control criteria:** all arm rods and platform functions should operate for a complete cycle.

6) When the emergency stop switch is in the "ON" position, press the horn button. **Control criteria:** The horn sounds.

7) Release the horn button. **Control criteria:** The horn stops sounding.

⚠ CAUTION:

1) Commissioning shall be done by a dedicated person, and during the commissioning period, no one else is allowed to operate the machine;

2) Each commissioning should be done separately, two or more operations cannot be carried out at the same time;

3) The commissioning time of each operation should be 3-5S, the commissioning is visible to the naked eye, and it should be stopped when it is effective;

4) After the all commissioning operations are completed, the buttons and switches shall be returned to their positions.

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

9) Platform leveling switch

Control criteria: The platform level will rise if the platform leveling switch is moved upwards; the platform level will drop if move the platform leveling switch if the platform leveling switch is moved downwards.

10) Platform rotary button

Control criteria: The rotary table will rotate to the right if the rotary table rotary switch is moved rightward; the rotary table will rotate to the left if the rotary table rotary switch is moved leftward.

11) Short arm lift switch

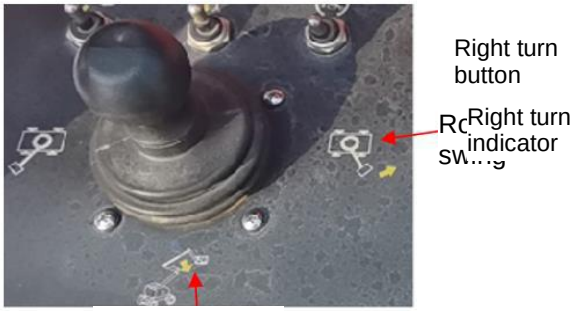
Control criteria: The short arm will rise if the short arm lift switch is moved upwards; the short arm will drop if the short arm lift switch is moved downwards.

12) Control the lifting/lowering of the second arm rod via the middle lever.

Control criteria: The folding jib will rise if the lever is moved upwards, the folding jib will drop and the alarm will sound if the lever is moved downwards.

13) Control the rotation of the rotary table via the left control lever.

Control criteria: The rotary table will rotate to the right if the left control lever is moved rightward. The rotary table will rotate to the left if the left control lever is moved leftward.



Left control lever

14) Control the lifting/lowering of the first arm rod via the left control lever.

Control criteria: The boom will rise if the lever is moved upwards, the boom will drop and the alarm will sound if the lever is moved downwards.

15) First arm rod extension and retraction switch

Control criteria: The first arm rod will extend if the first arm rod extension and retraction switch is moved downwards; the first arm rod will retract if

the first arm rod extension and retraction switch is moved upwards.

16) Control the drive travel of the machine via the right control lever.

Control criteria: The machine will be driven forward if the right control lever is moved upwards. The machine will be driven backward if the right control lever is moved downwards.

Right control lever

17) Control the turning of the machine via the right control lever.

Control criteria: When the thumb presses the left button (red circle) of the right control lever, the machine will turn to the left. When the thumb presses the right button (blue circle) of the right control lever, the machine will turn to the right.

18) Move the speed adjustment switch to select different speed modes, and perform the function tests respectively.

Control criteria: The speed of the machine function increases or decreases with different modes, and the speed of the fly jib and platform does not change.

19) Drive speed selector switch

The machine is on a slope. Symbol: Climbing position, driving at low speed.

The machine is on a horizontal plane. Symbol: driving at high speed

20) Engine idle speed selection

If the foot switch is not depressed, the engine will idle at the lowest speed. Turtle symbol: foot switch activates low idle speed; rabbit symbol: foot switch activates high idle speed.

CAUTION:

1. In the case of a large slope, engage climbing gear for operation, and for other road conditions, please select the horizontal gear.

5.4.4 Hydraulic oil level test

1) Retract the boom in place, lower the short arm to the lowest position, push the emergency stop switch to the “OFF” position, pull open the rubber hook under the right cover by hands, open the right cover, and snap the support rod into the rubber groove.

2) After parking for 5 min, observe the oil level of the hydraulic tank.

Control criteria: The amount of oil in the hydraulic tank is higher than 1/3 of the scale of the level gauge, but not higher than 1/2 of the level of the level gauge.

5.4.5 Load test (1.1 times rated load)

1) When the machine is stopped, suspend the counterweight trolley with a load 1.1 times rated load (253Kg) on the working platform.

Control criteria: If the engine is overloaded during running, the overload indicator will be always on and the buzzer will sound; if the engine is overloaded in the non-running state, the engine cannot be started. After removing the heavy object to the standard weight, it will return to normal.

5.4.6 Travel speed (high speed) test

1) Press down the foot switch in the platform control mode;

2) Drive the machine to the test road at a low speed, adjust the direction of the machine to ensure that the machine is straight and travels in a straight line;

3) Slowly move the drive control lever 5m in front of start line of test road to the high speed position; start timing when the center of front wheels of the machine crosses the test start line, and stop timing when the center of front wheels of the machine crosses the finish line, i.e. record the time for the trolley to travel through the test road for a total of 20m. Stop the machine safely and

record the time.

Control criteria: 6.1±0.5km/h, i.e. time: 10.9＜t＜ 12.8 S

5.4.7 Braking distance test

1) Follow the travel speed test closely;

2) When the center of the front wheel of the machine passes the 20m test line, turn off the power switch and let the machine stop automatically.

Use a tape measure to measure the distance from the 20m line to the center line of the front wheel (stopped), and the measured distance is the braking distance.

Control criteria:1.0m-1.5m.

⚠ CAUTION:

1. The machine under test shall be kept in the no-load state, with the boom retracted;

2. Pay attention to driving safety.

5.4.8 Drive speed limit test

1) In the platform control mode, depress the foot switch, after which the boom is lifted by about 90cm (or the articulating boom、 is lifted by about 90cm, or the boom is extended by 30cm);

2) Adjust the traveling direction of the machine to ensure that the machine is straightened and driven on a straight line;

3) Slowly move the drive control lever about 5m in front of start line of test road to the full drive position; start timing when the center of front wheels of the machine crosses the test start line, and stop timing when the center of front wheels of the machine crosses the finish line, i.e. record the time for the trolley to travel through the test road for a total of 20m. Stop the machine safely and record the time.

Control criteria: 0.8±0.05km/h， i.e. time: 85s＜ t＜96s

⚠ CAUTION:

1. Conduct timing in one of the three states. For other two states, determine that the speed limit function can be achieved under specific conditions;

2. Expect the test arm rod, the other arm

rods are retracted;

3. Pay attention to driving safety.

5.4.9 Braking distance test (at slow speed)

1) Follow the travel speed (low speed) test closely;

2) When the center of the front wheel of the machine passes the 20m test line, turn off the power switch and let the machine stop automatically.

Use a tape measure to measure the distance from the 10m line to the center line of the front wheel (stopped), and the measured distance is the braking distance.

3. Control criteria: ≤0.5m

CAUTION:

1. The machine under test shall be kept in the no-load state, with the boom retracted;

2. Pay attention to driving safety.

5.4.10 Drive enable system test

1) Start the machine, and operate it using the platform control system;

2) Adjust the arm rod to the retraction position, keep the vehicle retracted, and depress the foot switch; rotate the rotary table until the arm rod moves over one non-steered wheel (in both directions);

Control criteria: the drive indicator light is on at any position within the rotation range. Move the drive control lever away from the center, after which the drive function cannot be achieved.

3) Turn and hold the drive enable toggle switch to one side, and move the drive control lever away from the center slowly, after which the drive function can be achieved normally.

CAUTION:

1. The machine travels in the opposite direction of the travel and direction control

lever movement;

2. Pay attention to safety during the rotation test.

5.4.11 Tilt sensor test

1) In the platform control mode, depress the foot switch, after which the boom is lifted by about 90cm (or the articulating boom、 is lifted by about 90cm, or the boom is extended by 30cm);

2) Keep the arm rod in a direction consistent with the travel direction, and drive the machine up the slope (below the highest point) in the direction of the slope.

Control criteria: the tilt indicator light does not come on, the buzzer does not sound, and all functions are normal.

3) Continue driving to the upper plane of the slope, with an angle between the chassis and the ground of 4.5°.

Control criteria: the tilt indicator light stays on, the buzzer sounds, and the functions of lifting, arm rod extension, slewing, leveling and traveling are restricted.

4) Continue driving to the downhill plane of the slope. Control criteria: the tilt indicator light does not come on, the buzzer does not sound, and all functions are normal.

5) In the platform control mode, depress the foot switch, retract the boom, and repeat the above 4.5° test.

6) Similarly, use the same method to test the slope with a 4.5° angle between the chassis and the ground for both the front and rear axles.

⚠ CAUTION:

1. Conduct the test in one of the three states. For other two states, test the tilt indicator light and buzzer under specific conditions;

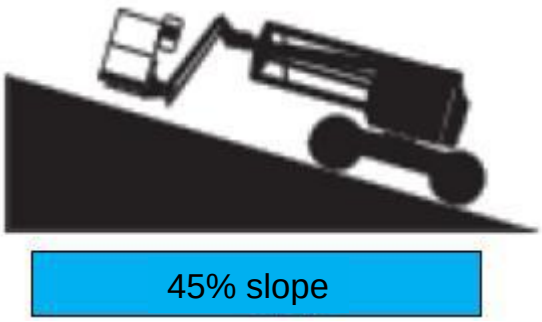
2. Expect the test arm rod, the other arm rods are retracted;

3. Pay attention to driving safety.

5.4.12 Gradeability test (45%)

1) Drive the machine to the front of a 45% slope, and adjust the machine state, with the platform at the upper part of slope and the counterweight at the lower part of slope;

2) Turn the drive speed selector switch on the platform control panel to the “Climbing” position;



3) Adjust the platform height, and drive the machine to the 45% slope.

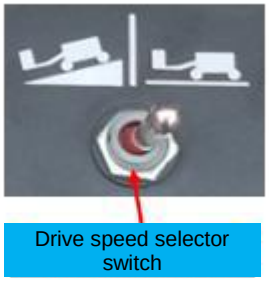
Control criteria: the machine climbs to the top normally, the tires do not slip and the machine does not tip over.

4) During downhill driving, apply the brake to test the braking distance.

Control criteria: ≤0.8m

5.4.13 Gradeability test (25%)

1) Drive the machine to the front of a 25% slope, and adjust the machine state, with the platform at the lower part of slope and the counterweight at the upper part of slope;



2) Turn the drive speed selector switch on the platform control panel to the “Climbing” position;

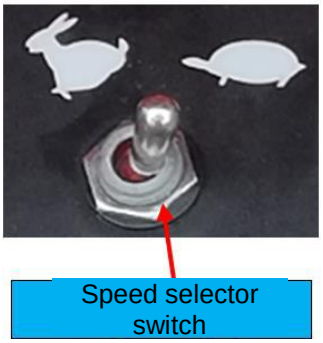
3) Adjust the platform height, and drive the machine to the 25% slope.

Control criteria: the machine climbs to the top normally, the tires do not slip and the machine does not tip over.

5.4.14 Floating test

1) Start the machine, drive it to the front of 10cm test pit, and adjust the machine state;

2) Turn the speed selector switch on the platform control panel to the “Turtle” position, and retract the boom;

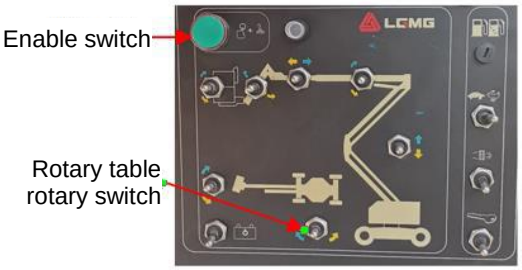


3) Adjust the travel direction of the machine, and drive it, so that the left front wheel and the left rear wheel cross the test pit in turn.

Control criteria: the machine tires are not off the ground.

5.4.15 Operation time test

1) Start the machine, keep it restarted in situ, and adopt the ground control mode for the test;



Ground control system panel

2) Press the enable button and rotary table rotary switch (to the left) at the same time, move the rotary table to the leftmost side; then start the rotary table rotary switch in the opposite direction, rotate the rotary table, start timing at the same time, rotate the rotary table to the rightmost side, stop the rotary table, and stop timing.

Control criteria: 82s-92s.

Note: (1) The control criterion of operation time test is based on an oil temperature of 40°C. The time will be affected when the oil temperature changes.

(2) Carry out the test for each operation separately. After the test, retract and return each part, and then perform the next test.

3) Press the enable button and the first arm rod lift switch (up) at the same time to lift the boom and start timing simultaneously; when the boom is lifted to the highest position, stop lifting and timing.

Control criteria: 35s-45s.

4) Press the enable button and the first arm rod lift switch (down) at the same time to lower the boom and start timing simultaneously; when the boom is retracted, stop lowering and timing.

Control criteria: 30S-40S.

5) Press the enable button and the second arm rod lift switch (up) at the same time to lift the folding jib and start timing simultaneously; when the folding jib is lifted to the highest position, stop lifting and timing.

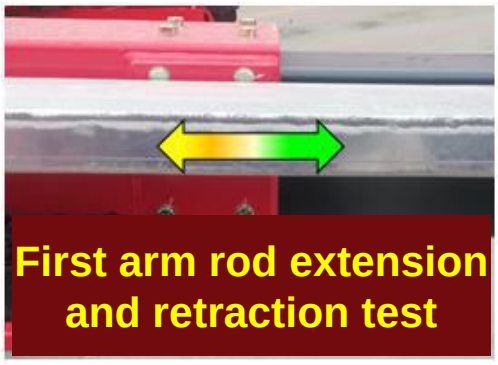
Control criteria: 25S-35S.

6) Press the enable button and the second arm rod lift switch (down) at the same time to lower the folding jib and start timing simultaneously; when the folding jib is retracted, stop lowering and timing.

Control criteria: 26S-40S.

7) Press the enable button and the first arm rod extension switch (leftward) at the same time to extend the boom and start timing simultaneously; when the boom is extended to the limit, stop extending and timing.

Control criteria: 20S-30S.

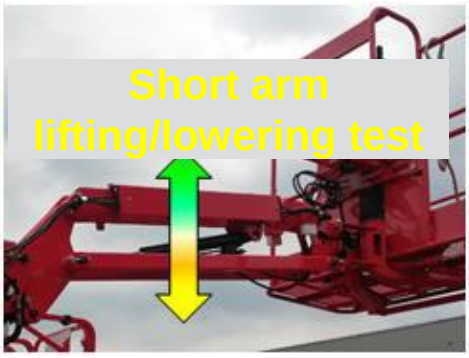


8) Press the enable button and the first arm rod extension switch (rightward) at the same time to retract the boom and start timing simultaneously; when the boom is retracted, stop retracting and timing.

Control criteria: 20S-30S.

9) Press the enable button and the short arm lift switch (up) at the same time to lift the short arm and start timing simultaneously; when the short arm is lifted to the highest position, stop lifting and timing.

Control criteria: 30S-50S.

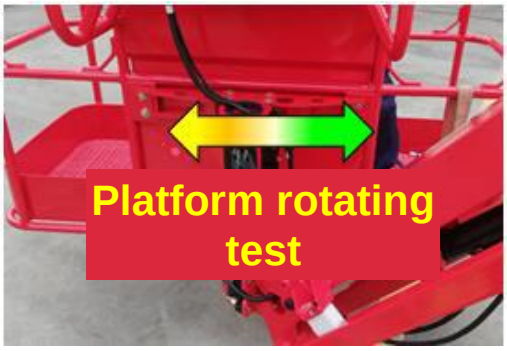


10) Press the enable button and the short arm lift switch (down) at the same time to lower the short arm and start timing simultaneously; when the short arm is retracted, stop lowering and timing.

Control criteria: 20S-35S.

11) Press the enable button and the platform rotary switch (up) at the same time, and rotate the platform to the leftmost side; then start the platform rotary switch in the opposite direction, rotate the platform and start timing simultaneously; when the platform is rotated to the rightmost side, stop rotating and timing.

Control criteria: 13S-26S.



⚠ CAUTION:

1. The control criterion of operation time test is based on an oil temperature of 40±5°C. The time will be affected when the oil temperature changes;

2. Carry out the test for each operation separately. After the test, retract and return each part, and then perform the next test;

5.4.16 Lifting height test

1) Move the machine under test at rated load to a level ground in the test area;

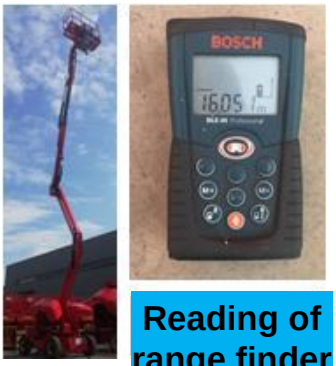
2) In the ground control mode, lift the platform to the highest point, make it horizontal, and measure the distance from the ground to the bottom of the platform with a laser range finder;

Test target value of AR16J: 15.70 ±0.16 (m);

Test target value of AR14J: 14.09 ±0.14 (m);

3**) Instructions for use of the laser range finder:**

Press the upper middle red (MEAS) button of the laser range finder, align the laser dot with the bottom surface of the extended platform, press the upper left blue (Timer) button of the laser range finder, and press the red (MEAS) button again for 5s (adjustable). In this case, the height data is shown on the display screen;



Reading of range finder

5.4.17 Load test (1.25 times)

1) Place 1.25 times the rated load (287.5Kg) on the lifting platform, and connect the seat belt to the platform guardrail. In this case, the overload alarm should be disabled;

2) Turn the emergency stop switch of the ground and platform controllers to “ON” position, turn the key switch to “Ground control” position, and operate the machine on the ground;

3) Lift the folding jib, telescopic boom, boom and short arm respectively to raise the platform to the highest position, and when each boom part reaches the highest position, stay for 5-10s, check whether the machine has oil leakage or structural interference and whether the oil pipe

harness incurs squeezing, wear, etc.

Control criteria: the machine has no oil leakage or structural interference, and the oil pipe harness is free of squeezing, wear, etc.;

4) Lift the platform to the highest point, measure the platform height with a laser range finder, and wait for 60s to confirm whether there is any change in the platform height. Wait for 15min, and test the retraction of hydraulic cylinder piston rods and the sinkage of the platform.

Control criteria: the retraction of hydraulic cylinder piston rods is not more than 2mm, and the sinkage of the platform is not more than 1% of the height of the platform under the working condition.

5.4.18 Rated load calibration

1) After the tests are completed, park the machine on a solid ground;

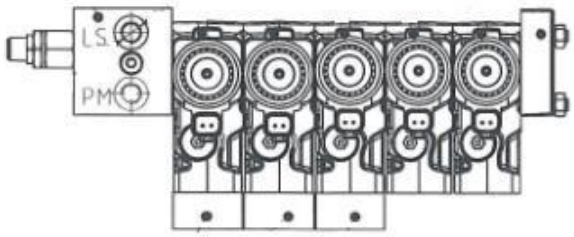
2) Use the ground control mode, enter the system design interface, and calibrate the no load;

3) Hang the rated load of 230kg at the platform end, and calibrate the rated load.

5.5 Pressure test

5.5.1 Function valve relief pressure test

1) Install the pressure tap to the control valve (indicated by a blue circle);



2) Connect the pressure gauge to the pressure tap;

3) Extend the telescopic boom to the limit length, and retract the other booms; observe the pressure until the pressure gauge indicates the maximum value. At this time, the indication of the gauge is the system relief pressure. Record the pressure;

Control criteria (target pressure): 225 bar ± 10 bar.

4) In case of inconsistency with the target value, do correction as follows:

Unscrew the fastening nut of the relief valve, and rotate the valve spool clockwise or

counterclockwise with the Allen wrench to increase or decrease the pressure as appropriate until the pressure is consistent with the target value;

5) Keep the position of the Allen wrench unchanged, and tighten the fastening nut of the relief valve; restore the rocker arm to the normal position.

Note: (1) The ground in the test area shall be solid and flat, with a gradient not more than 1%; during operation, the ground shall not subside, and there shall be no obstacles that affect the lifting, lowering and slewing of articulated lifting platform around it.

(2) The laser range finder shall be placed on a flat ground; the platform test position shall be the steel plate on the bottom of the extended platform rather than the reinforcing rib.

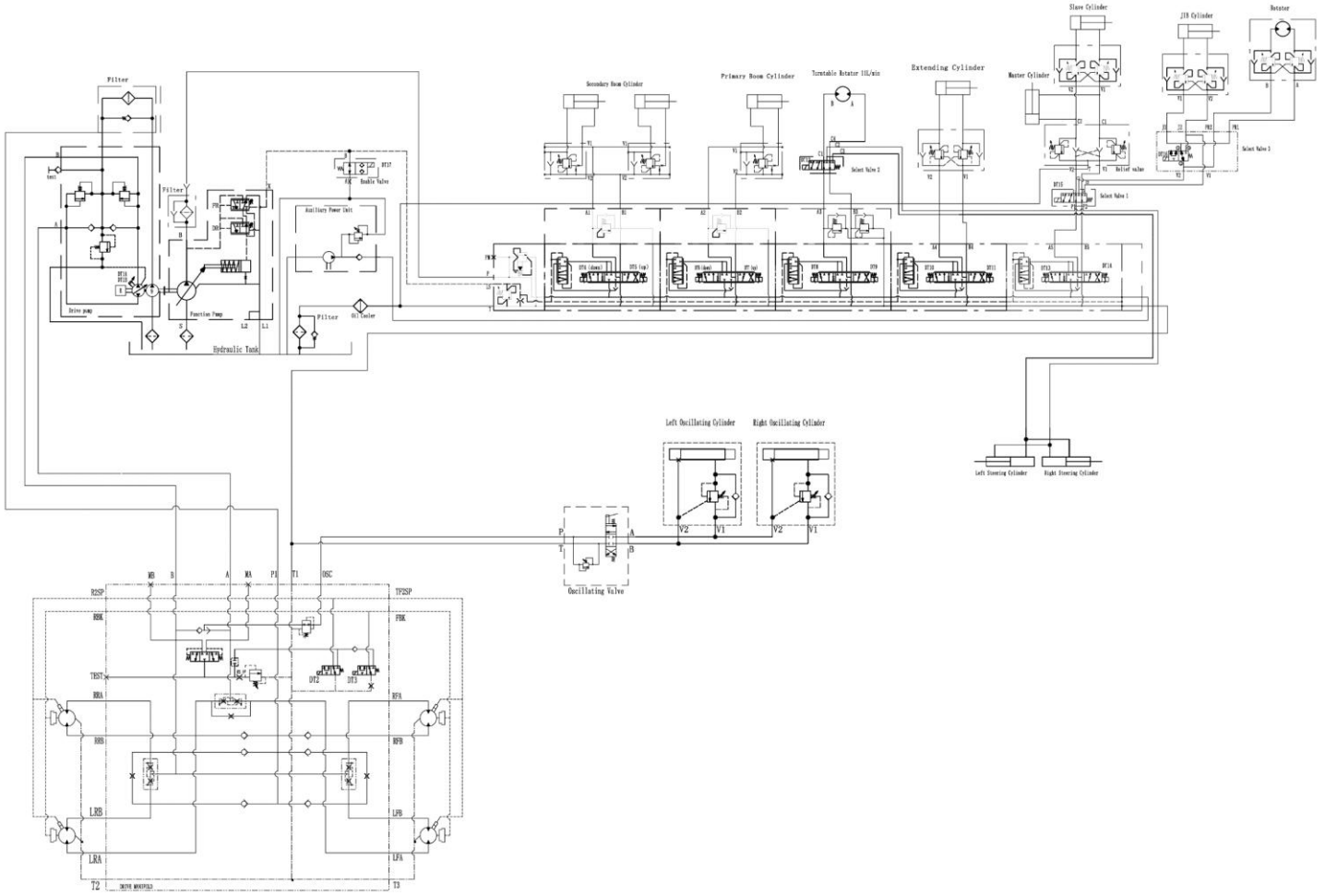
Chapter 6 Appendix

6.1 DTCs of COBO system

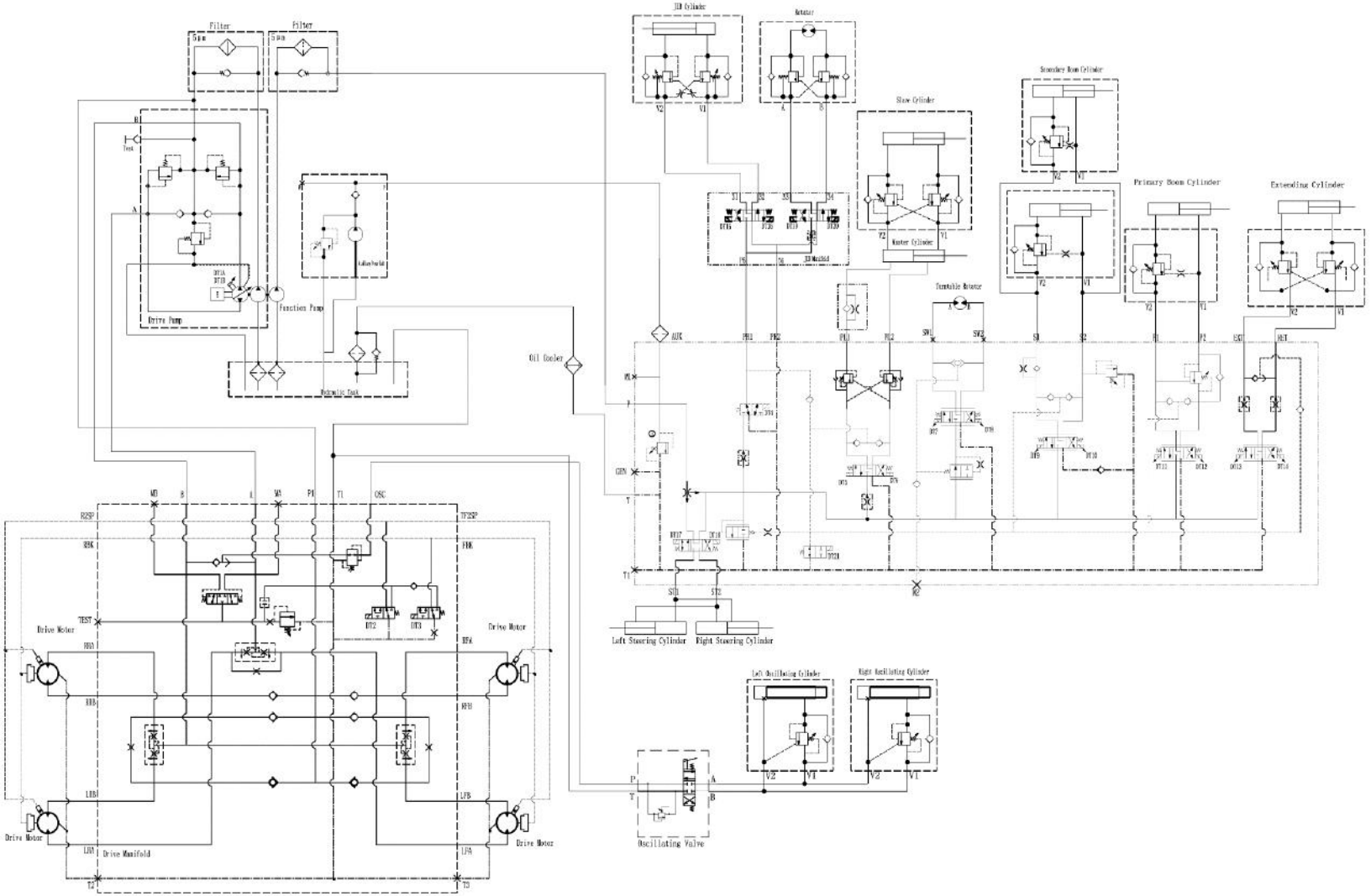
DTC	Description
1	Open circuit in control unit output power supply 1
2	Open circuit in control unit output power supply 2
3	Open circuit in control unit output power supply 34
4	Platform electric box extension module bus off
5	Carrier electric box display bus off
6	Weighing failure
7	Load cell 1 fault
8	Load cell 2 fault
9	Load cell check failure
10	Load cell 4 fault
11	Left joystick fault
12	Right joystick fault
13	Middle joystick fault
14	Boom luffing travel switch fault
15	Folding jib luffing travel switch fault
16	Boom telescopic travel switch fault
17	Rear detection travel switch fault
101	Chassis tilt
102	Traveling limit function not enabled in drive
103	Basket overload
104	Low oil level alarm
105	Oil pressure alarm
106	Oil temperature alarm

6.2 Schematic diagram

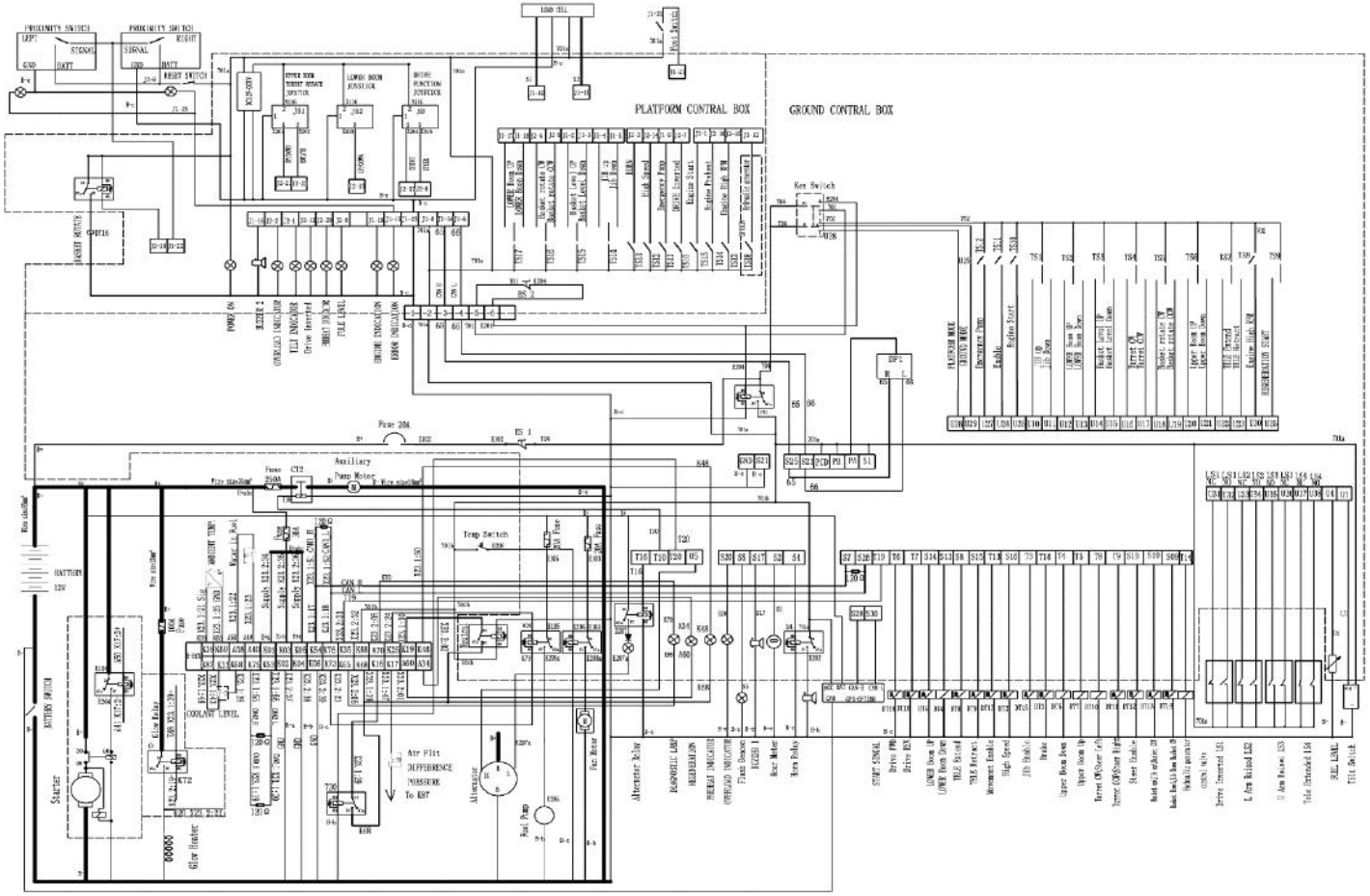
6.2.1 AR14J/AR16J hydraulic schematic diagram (Rexroth)



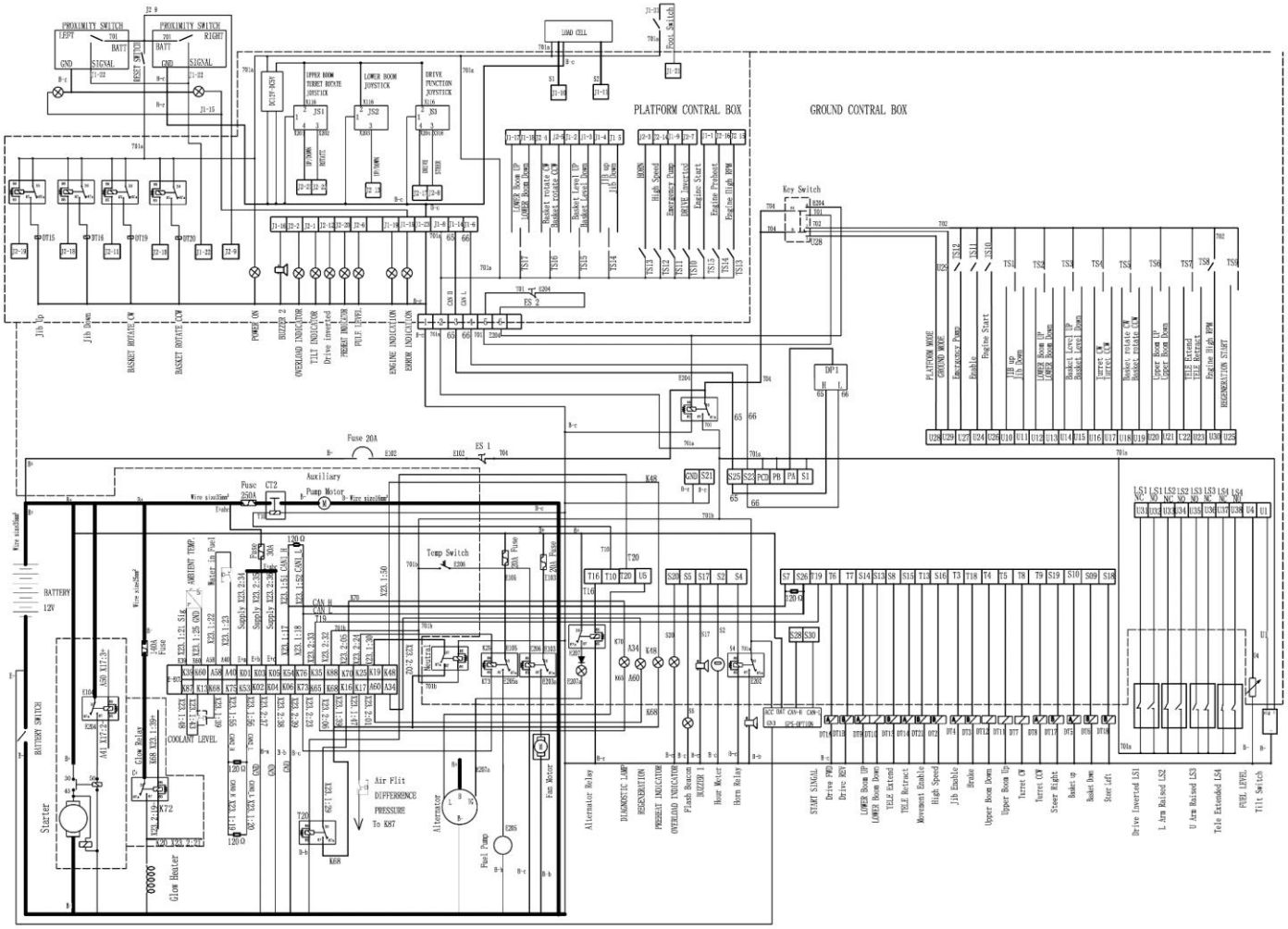
6.2.2 AR14J/AR16J hydraulic schematic diagram (Sant main valve)



6.2.3 AR14J/AR16J electrical schematic diagram (Rexroth)

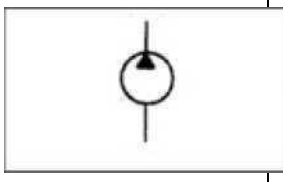
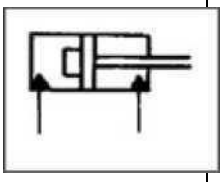
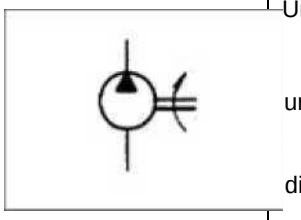
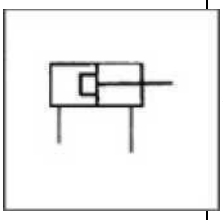
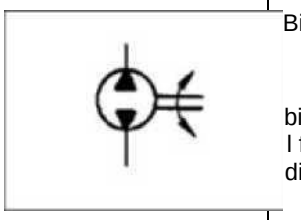
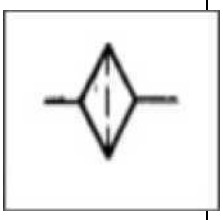
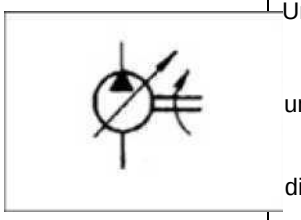
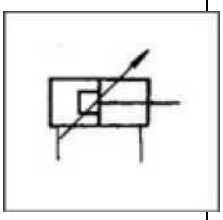
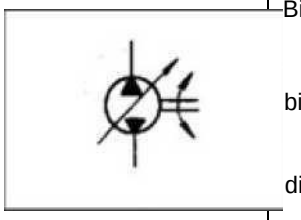
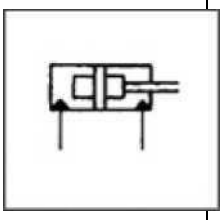
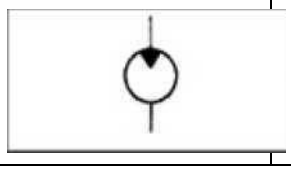
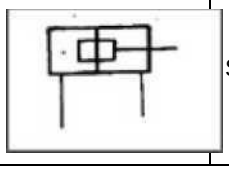


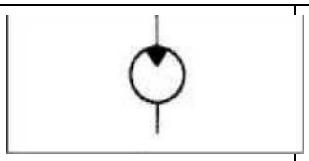
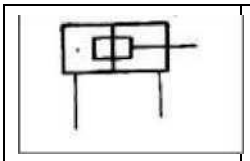
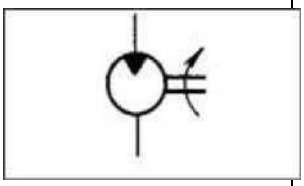
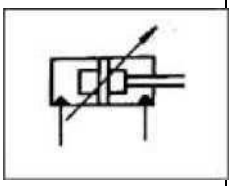
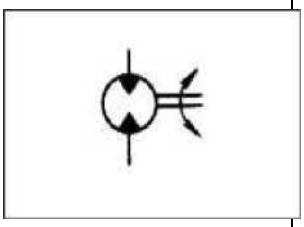
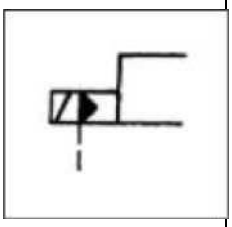
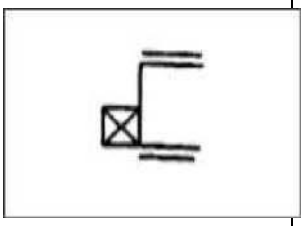
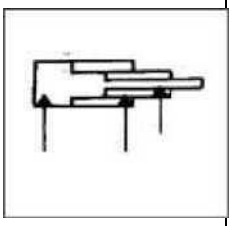
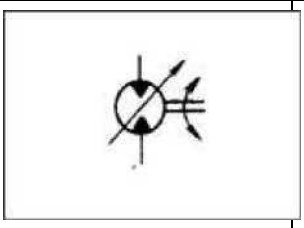
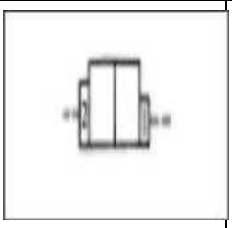
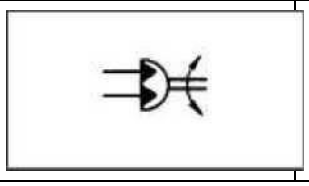
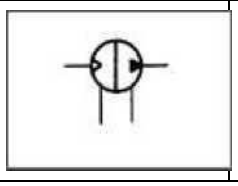
6.2.4 AR14J/AR16J electrical schematic diagram (Sant main valve)

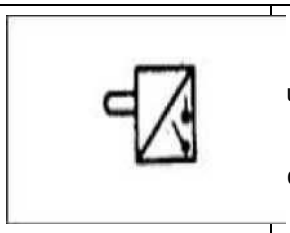
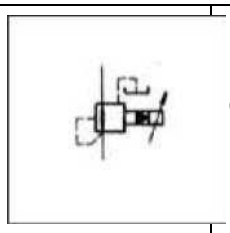
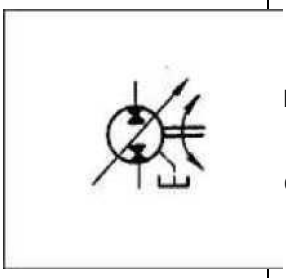
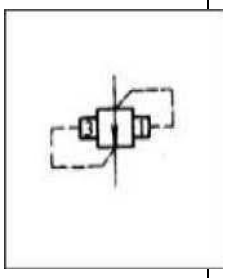
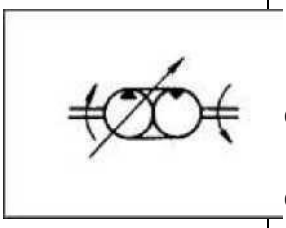
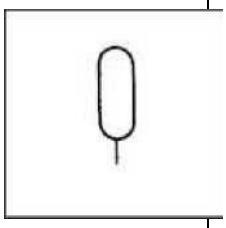


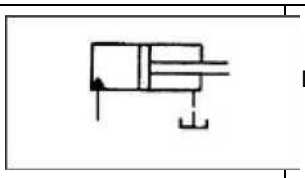
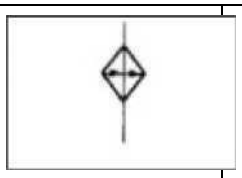
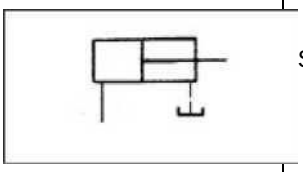
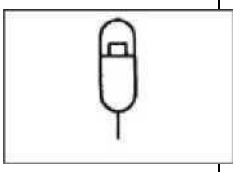
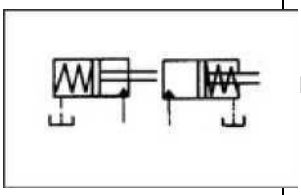
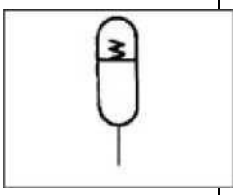
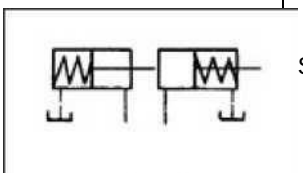
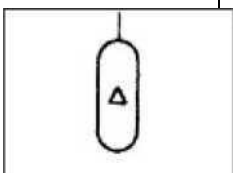
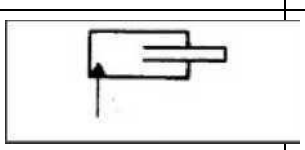
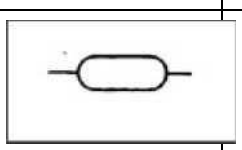
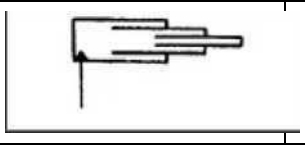
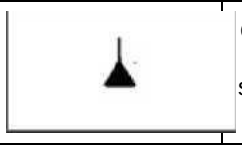
6.3 Diagram of common hydraulic part symbols

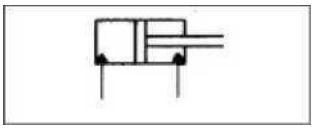
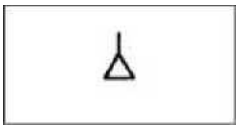
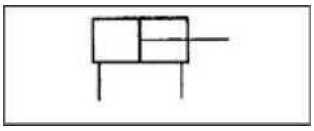
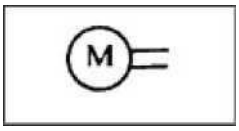
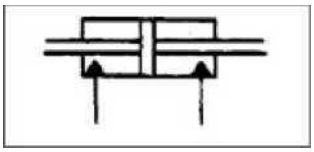
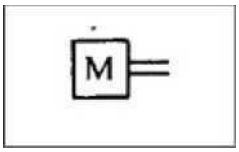
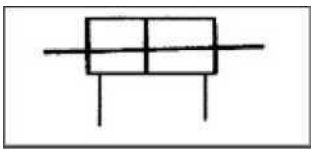
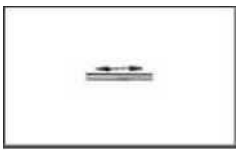
Graphic symbols of common hydraulic parts (taken from GB/T786.1-1993)

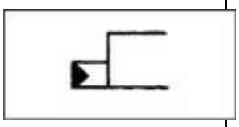
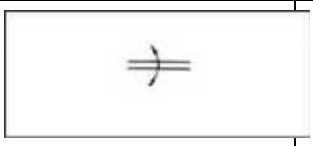
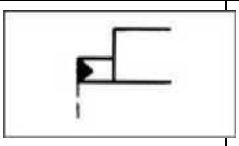
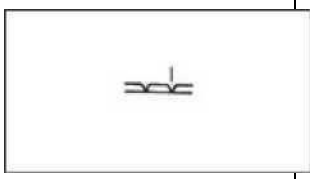
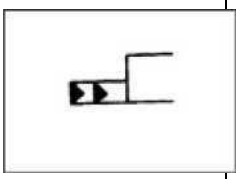
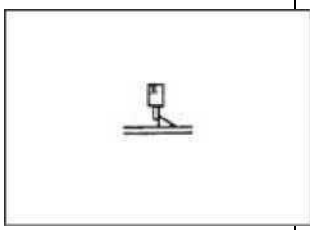
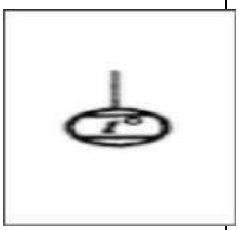
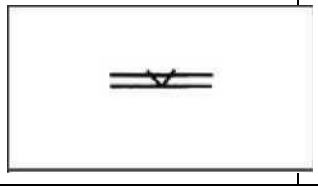
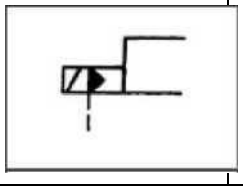
(1) Hydraulic pump, hydraulic motor and hydraulic cylinder							
		Symbol	Description	Name		Symbol	Description
Hydraulic pump	Hydraulic pump		General symbol	Double-acting cylinder	Non-adjustable one-way bounce cylinder		Detailed symbol
	One-way fixed displacement hydraulic pump		Unidirectional rotation, unidirectional flow, fixed displacement				Simplified symbol
	Two-way fixed displacement hydraulic pump		Bidirectional rotation, bidirectional flow, fixed displacement		Adjustable one-way bounce cylinder		Detailed symbol
	One-way variable displacement hydraulic pump		Unidirectional rotation, unidirectional flow, variable displacement				Simplified symbol
	Two-way variable displacement hydraulic pump		Bidirectional rotation, bidirectional flow, variable displacement		Non-adjustable two-way bounce cylinder		Detailed symbol
	Hydraulic motor		General symbol				Simplified symbol

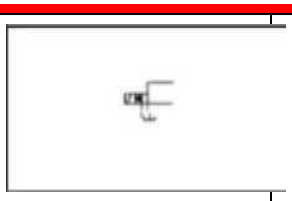
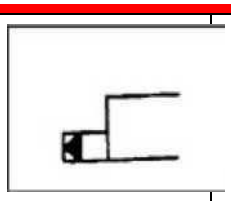
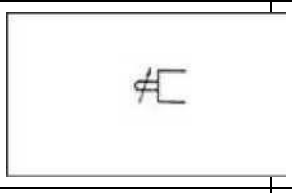
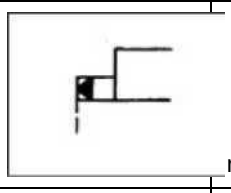
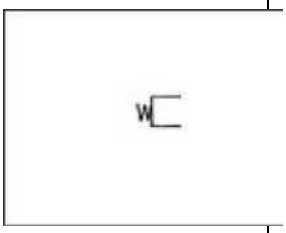
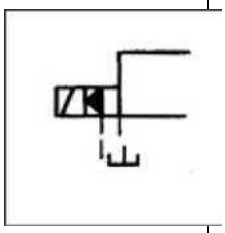
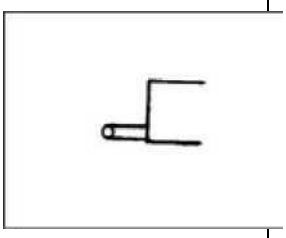
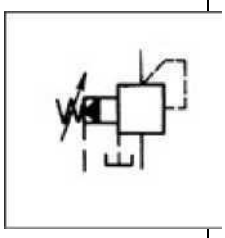
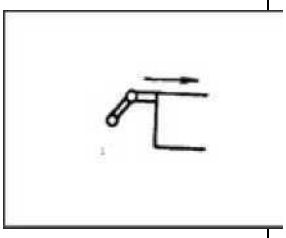
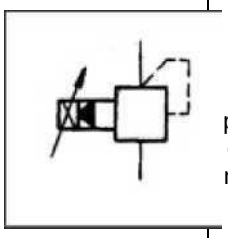
Hydraulic motor	Hydraulic motor		General symbol			Simplified symbol
	One-way fixed displacement hydraulic motor		Unidirectional flow, unidirectional rotation	Adjustable two-way bounce cylinder		Detailed symbol
	Two-way fixed displacement hydraulic motor		Bidirectional flow, bidirectional rotation, fixed displacement			Simplified symbol
	One-way variable displacement hydraulic motor		Unidirectional flow, unidirectional rotation, variable displacement	Telescopic cylinder		
	Two-way variable displacement hydraulic motor		Bidirectional flow, bidirectional rotation, variable displacement	Air-liquid converter		One-way action
	Swing motor		Bidirectional swing, fixed angle			Continuous action

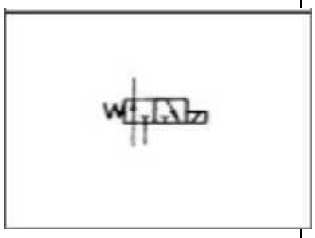
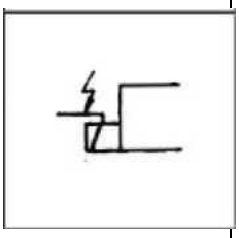
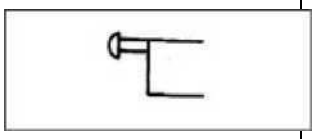
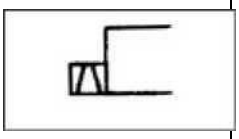
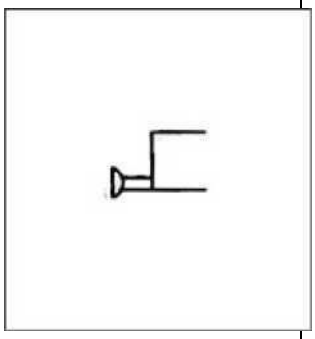
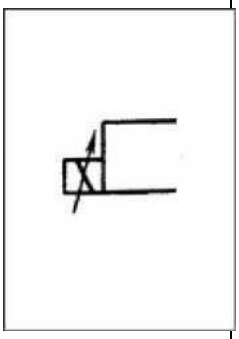
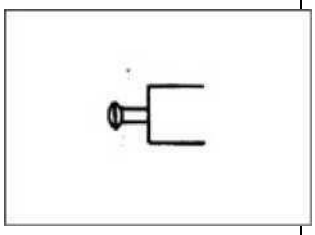
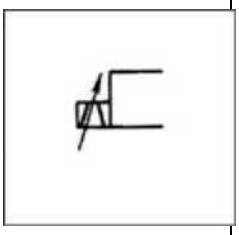
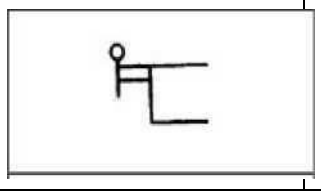
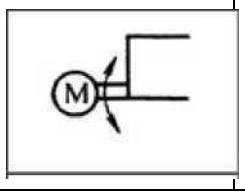
Pump - motor	Fixed displacement hydraulic pump - motor		Unidirectional flow, unidirectional rotation, fixed displacement	Pressure transducer	Turbocharger		One-way action
	Variable displacement hydraulic pump - motor		Bidirectional flow, bidirectional rotation, variable displacement, external oil drain				Continuous action
	Hydraulic integrated transmission		Unidirectional rotation, variable displacement pump, fixed displacement motor		Accumulator		General symbol

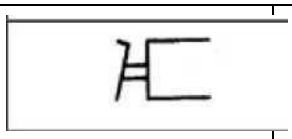
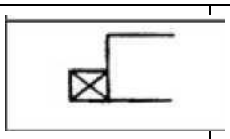
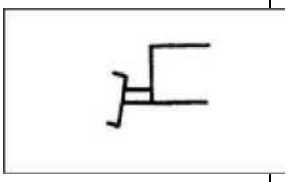
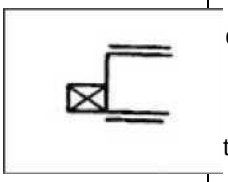
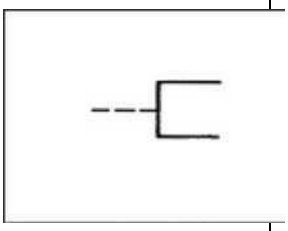
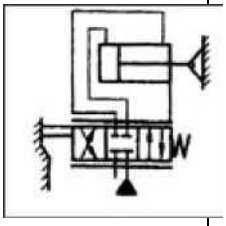
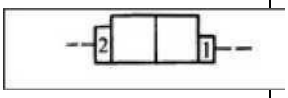
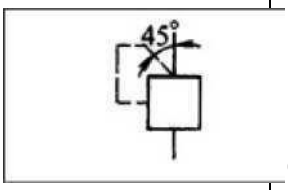
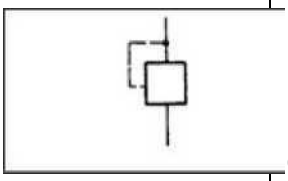
Single -acting cylinder	Single piston rod cylinder		Detailed symbol	Accumulator	Gas isolation type		
			Simplified symbol		Counterweight type		
	Single piston rod cylinder (with spring return)		Detailed symbol		Spring type		
			Simplified symbol	Auxiliary gas bottle			
	Plunger cylinder			Gas tank			
	Telescopic cylinder				Hydraulic pressure source		General symbol

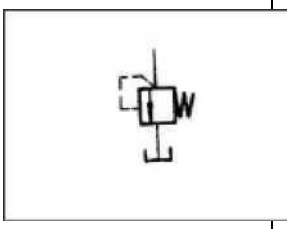
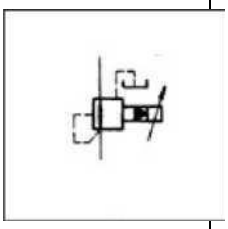
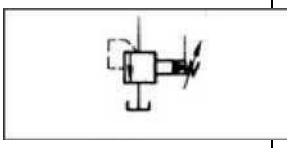
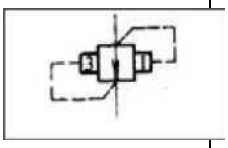
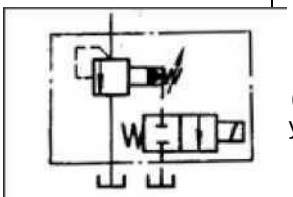
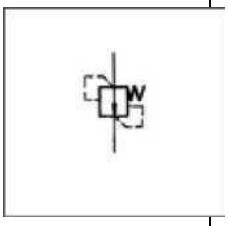
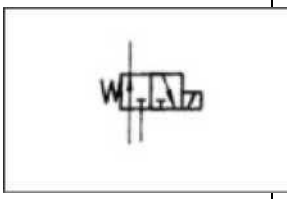
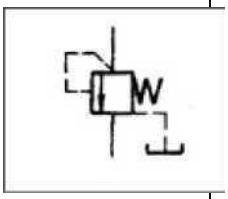
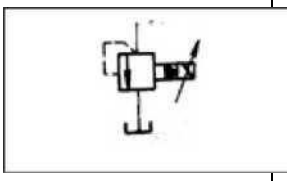
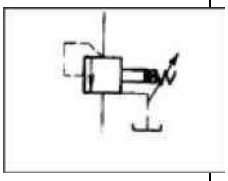
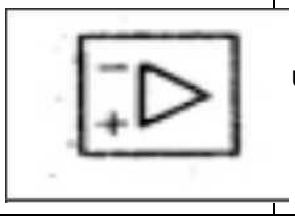
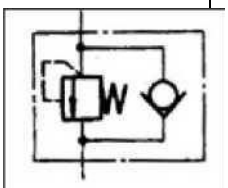
Double-acting cylinder	Single piston rod cylinder		Detailed symbol	Energy source	Air source		General symbol
			Simplified symbol		Motor		
	Double piston rod cylinder		Detailed symbol		Prime motor		Except motor
			Simplified symbol				

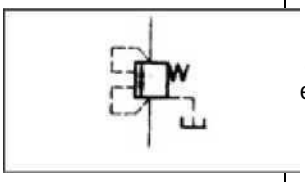
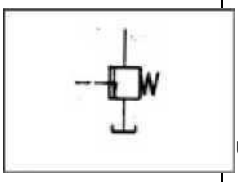
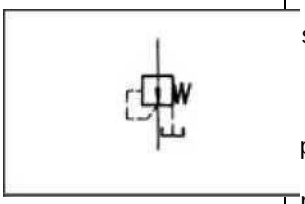
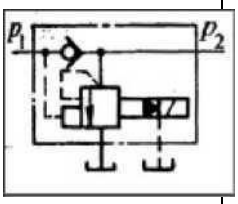
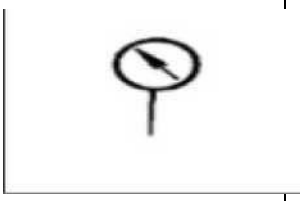
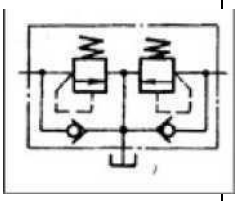
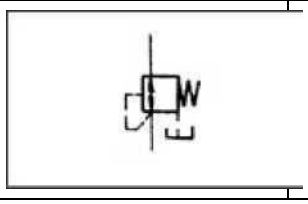
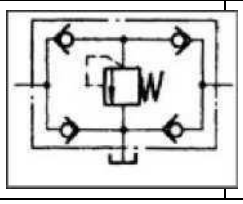
(2) Mechanical control devices and control methods						
Name		Symbol	Description		Symbol	Description
Mechanical control parts	Rod for linear motion		Arrows can be omitted	Hydraulic pilot pressurization control		Internal pressure control
	Shaft for rotational motion		Arrows can be omitted	Hydraulic pilot pressurization control		External pressure control
	Positioning device			Hydraulic double pilot pressurization control		Internal pressure control, internal oil drain
	Locking device		*Control method for unlocking	Air-liquid pilot pressurization control		External air pressure control, internal hydraulic pressure control, external oil drain
	Bouncing mechanism			Electro-hydraulic pilot pressure control		External hydraulic pressure control, internal oil drain

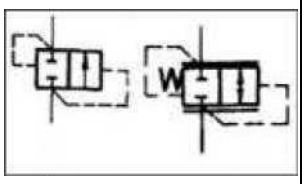
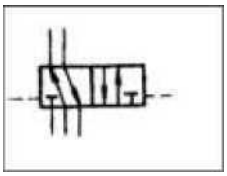
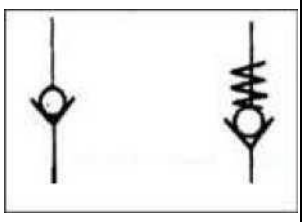
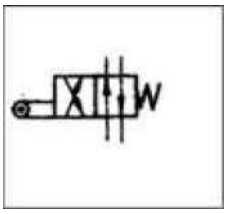
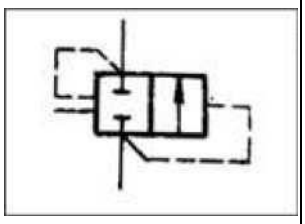
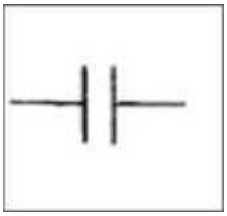
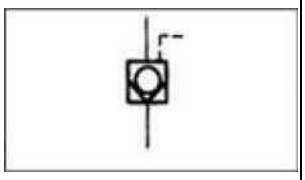
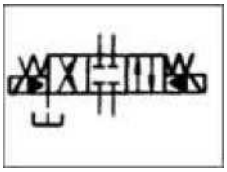
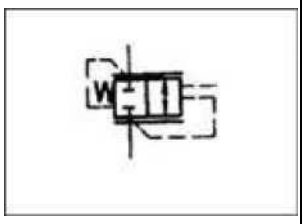
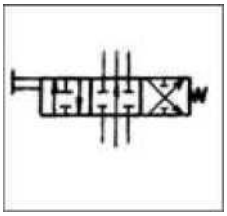
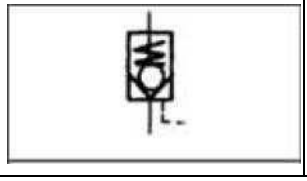
Mechanical control methods	Ejector rod type		Pilot pressure control methods	Hydraulic pilot depressurization control		Internal pressure control, internal oil drain
	Variable travel control type					External pressure control (with remote relief outlet)
	Spring-controlled type			Electro-hydraulic pilot control		Electromagnet control, external pressure control, external oil drain
	Roller type			Pilot pressure control valve		With pressure regulating spring, external oil drain, with remote relief outlet
	One-way roller type			Pilot proportional solenoid pressure control valve		Pilot level controlled by proportional electromagnet, internal oil drain
		Operation in two directions				
		Operation in only one direction; arrows can be omitted				

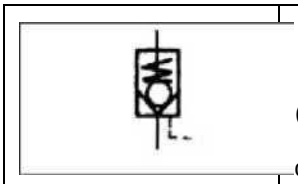
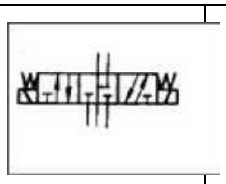
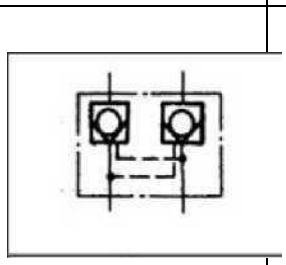
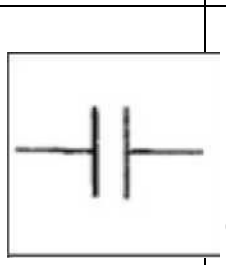
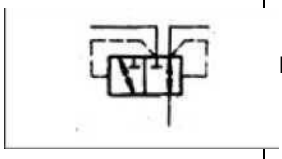
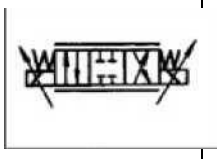
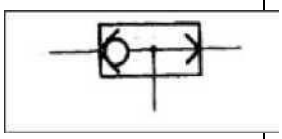
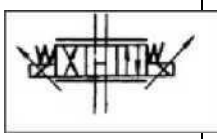
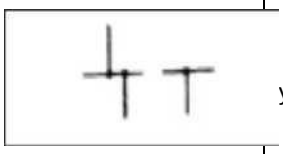
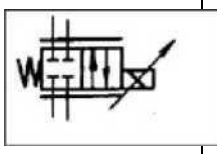
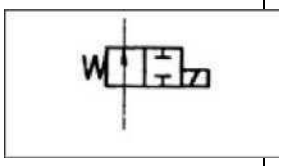
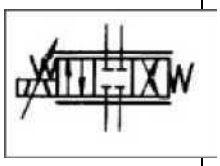
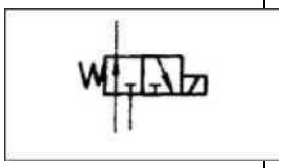
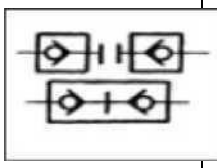
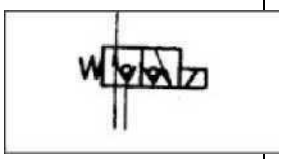
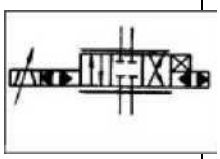
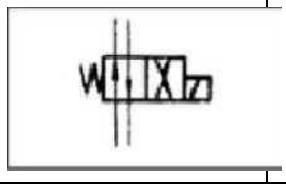
Manual control methods	Manual control		General symbol	Electrical control methods	Single-acting electromagnet		Electrical leads can be omitted, and the oblique line can also face the lower right
	Button type				Double-acting electromagnet		
	Draw knob type				Single-acting adjustable electromagnet (proportional electromagnet, torque motor, etc.)		
	Press-pull type				Double-acting adjustable electromagnet (torque motor, etc.)		
	Handle type				Electrical control device of rotational motion		

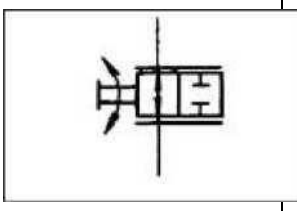
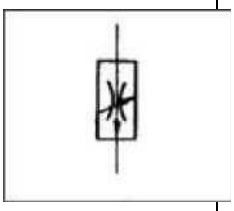
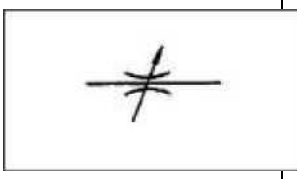
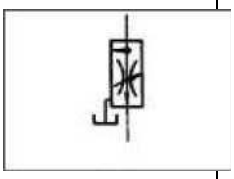
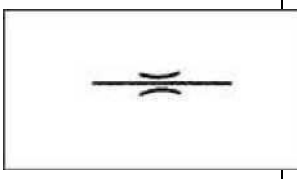
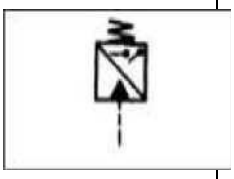
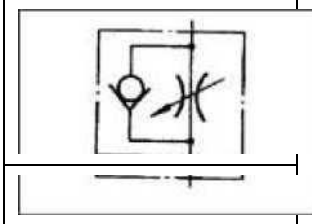
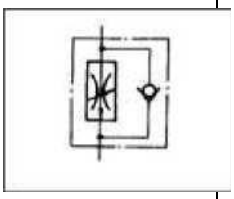
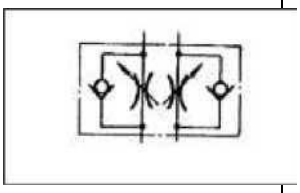
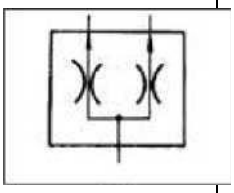
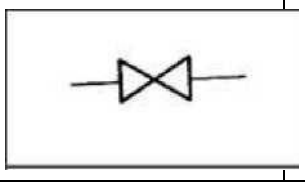
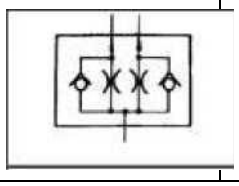
	One-way pedal type		Feedback control methods	Feedback control		General symbol
	Two-way pedal type			Electrical feedback		Position detection by potentiometers, differential transformers, etc.
Direct pressure control methods	Pressurization or depressurization control			Internal mechanical feedback		Follower valve profiling control circuit, etc.
	Differential control					
	Internal pressure control		Control access inside the element			
	External pressure control		Control access outside the element			

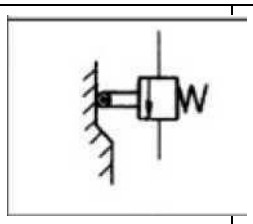
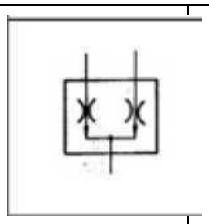
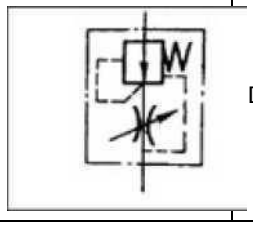
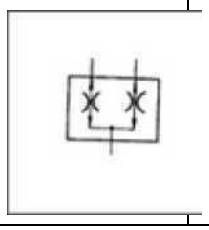
(3) Pressure control valve							
Name		Symbol	Description	Name		Symbol	Description
Relief valve	Relief valve		General symbol or spring loaded type relief valve	Pressure reducing valve	Pilot proportional solenoid pressure reducing valve		
	Pilot relief valve				Proportional pressure reducing valve		Pressure reducing ratio: 1/3
	Pilot electromagnetic relief valve		(Normally closed)		Constant difference pressure reducing valve		
	Direct-acting proportional relief valve			Sequence valve	Sequence valve		General symbol or harmonious-acting sequence valve
	Pilot proportional relief valve			Sequence valve	Pilot sequence valve		
	Unloading relief valve		Unloading when p2>p1		One-way sequence valve (balance valve)		

	Two-way relief valve		Direct-acting, external oil drain	Unloading valve		General symbol or direct-acting unloading valve
Pressure reducing valve	Pressure reducing valve		General symbol or direct-acting pressure reducing valve	Unloading valve	Pilot electromagnetic unloading valve	 p1>p2
	Pilot pressure reducing valve		Brake valve	Double overflow brake valve		
	Overflow pressure reducing valve			Overflow oil bridge brake valve		

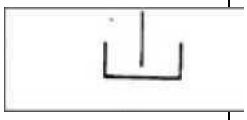
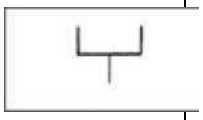
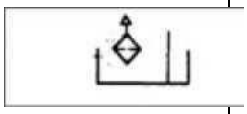
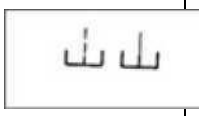
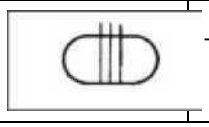
(4) Directional control valves						
Name		Symbol	Description	Name	Symbol	Description
Check valve	Check valve		Detailed symbol	Two-position five-way hydraulic valve		
			Simplified symbol (springs can be omitted)	Two-position four-way motorized valve		
Hydraulic check valve	Hydraulically controlled check valve		Detailed symbol (valve closed by control pressure)	Three-position four-way solenoid valve		
			Simplified symbol	Three-position four-way electro-hydraulic valve		Simplified symbol (internal control and external leakage)
			Detailed symbol (valve opened by control pressure)	Three-position six-way hand valve		
			Simplified symbol (springs can be omitted)	Three-position five-way solenoid valve		

			Simplified symbol (springs can be omitted)	Direction al control valve	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	Gate type		Detailed symbol		Three-position four-way proportional valve	 Throttle type, overlapped center
			Simplified symbol		Three-position four-way proportional valve	 Underlapped center
Direction al control valve	Two-position two-way solenoid valve		Normally closed		Two-position four-way proportional valve	
			Normally open		Four-way servo valve	
	Two-position three-way solenoid valve				Four-way electro-hydraulic servo valve	 Two stage
	Two-position three-way solenoid ball valve					 Three stage with electrical feedback
	Two-position four-way solenoid valve					

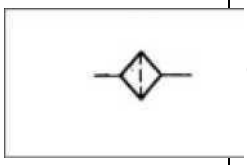
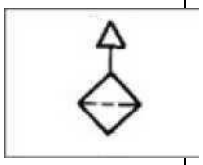
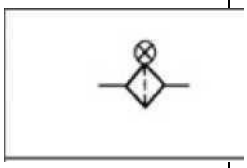
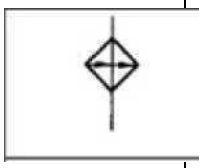
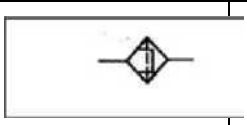
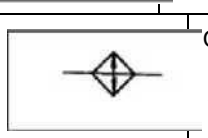
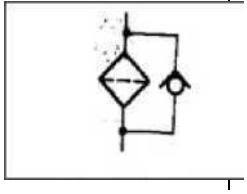
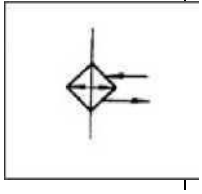
(5) Flow control valves							
Name		Symbol	Description	Name		Symbol	Description
Throttle valve	Adjustable throttle valve		Detailed symbol	Flow regulating valve	Flow regulating valve		Simplified symbol
			Simplified symbol		Bypass flow regulating valve		Simplified symbol
	Non-adjustable throttle valve		General symbol		Temperature compensated flow regulating valve		Simplified symbol
	Throttle check valve				One-way flow regulating valve		Simplified symbol
	Double throttle check valve				Flow divider valve		
	Globe valve				One-way flow divider valve		

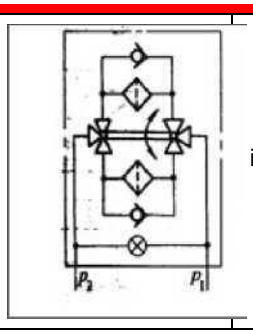
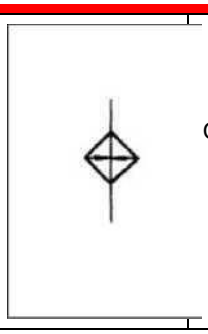
	Roller-controlled throttle valve (deceleration valves)			Synchronization valve	Flow combiner valve		
Flow regulating valve	Flow regulating valve		Detailed symbol		Flow diverter/combiner valve		

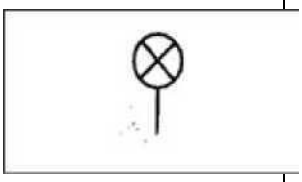
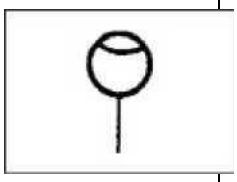
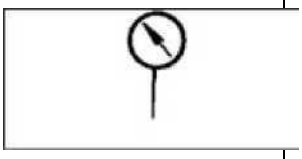
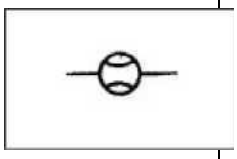
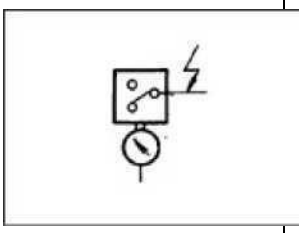
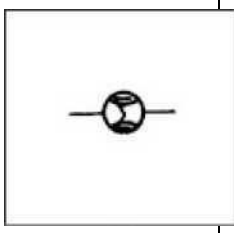
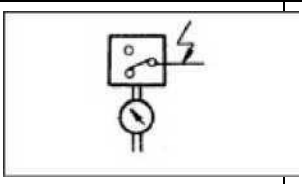
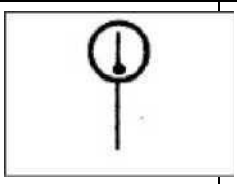
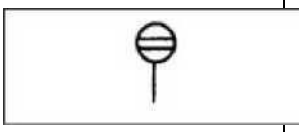
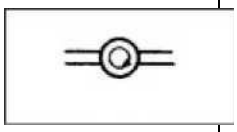
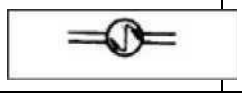
(6) Oil tanks

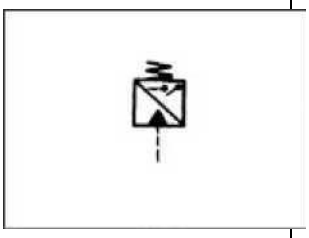
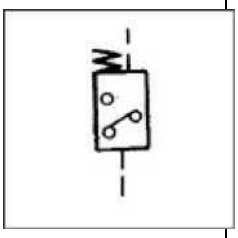
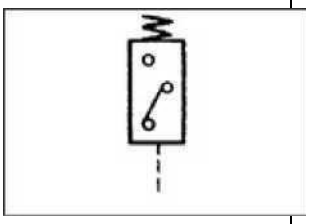
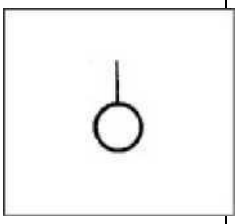
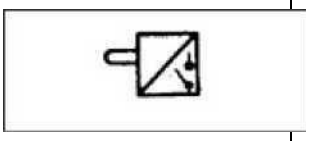
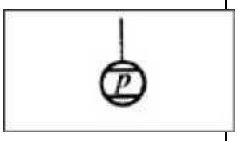
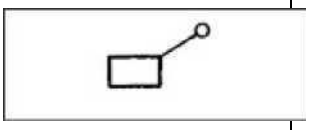
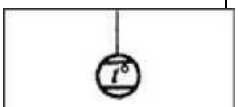
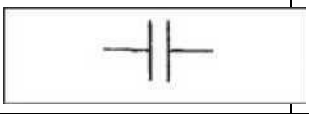
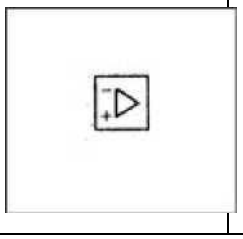
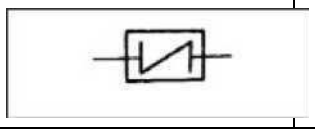
Name		Symbol	Description	Name		Symbol	Description
Atmospheric Type	Pipe end above liquid level			Fuel tank	Pipe end at the bottom of oil tank		
	Pipe end below liquid level		With air cleaner		Partial oil drain or oil return		
				Pressurized oil tank or sealed oil tank			Three oil lines

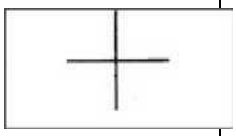
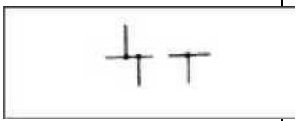
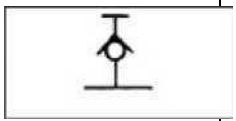
(7) Fluid regulators

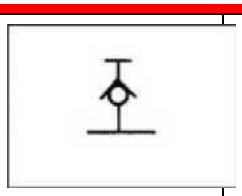
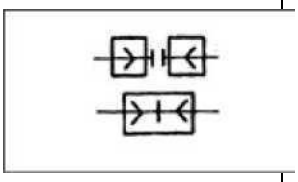
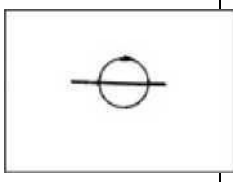
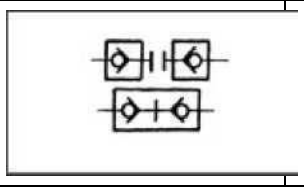
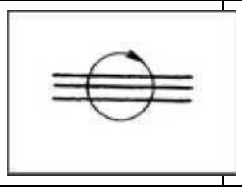
Name		Symbol	Description	Name		Symbol	Description
Filter	Filter		General symbol	Air cleaner			
	Filter with contamination indicator			Thermostat			
	Magnetic filter			Cooler	Cooler		General symbol
	Filter with bypass valve				Cooler with coolant pipeline		

	Duplex filter		p1: Oil inlet p2: Oil return	Heater	 General symbol

Name		Symbol	Description	Name		Symbol	Description
Pressure detector	Pressure indicator			Flow detector	Flow detector (liquid flow indicator)		
	Pressure gauge (meter)				Flowmeter		
	Electric contact pressure gauge (pressure display controller)				Accumulated flowmeter		
	Differential pressure control gauge			Thermometer			
Oil level meter				Tachometer			
				Torque meter			
(9) Other auxiliary components							

(9) Other auxiliary components							
Name		Symbol	Description	Name		Symbol	Description
Pressure relay (pressure switch)			Detailed symbol	Differential pressure switch			
			General symbol	Sensor			General symbol
Travel switch			Detailed symbol	Sensor	Pressure sensor		
			General symbol		Temperature sensor		
Coupling	Coupling		General symbol	Amplifier			
	Flexible coupling						

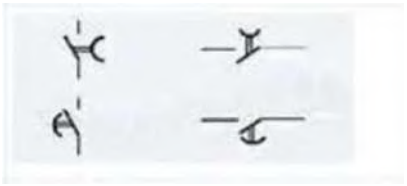
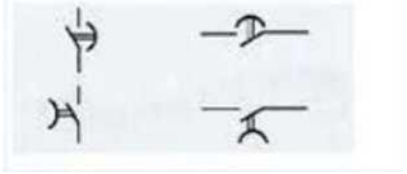
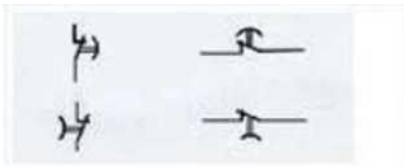
(10) Pipelines, pipeline ports and fittings							
Name		Symbol	Description	Name		Symbol	Description
Pipeline	Pipeline		Pressure line and return line	Pipeline	Crossing pipeline		Two pipelines crossing and not connected
	Connecting line		Two pipelines intersecting and connected		Flexible line		

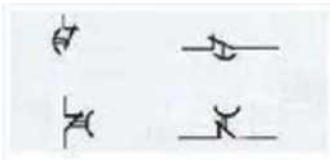
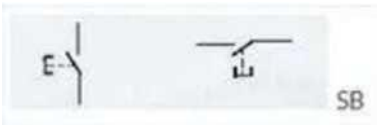
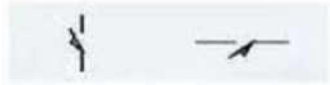
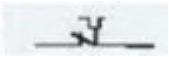
	Control line	 It can indicate a drain line		One-way bleeder (pressure tap)	
Quick connector	Quick connector without check valve		Rotary connector	Single-way rotary connector	
	Quick connector with check valve			Three-way rotary connector	

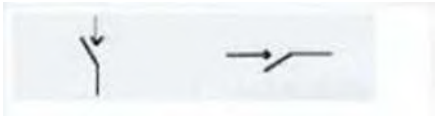
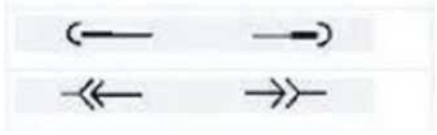
6.4 Diagram of common electrical part symbols

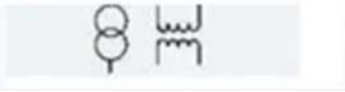
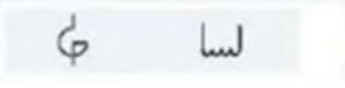
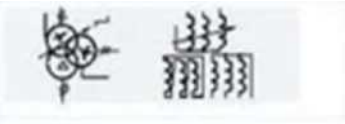
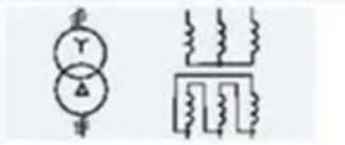
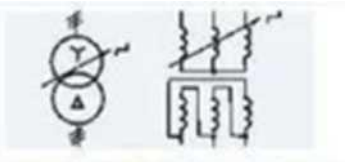
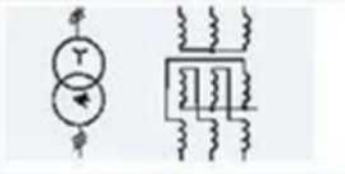
Full list of graphic symbols:

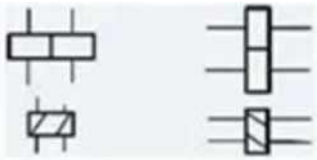
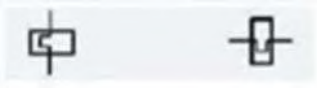
S/N	Graphic symbols	Description
1		Electrical graphic symbol of switch (mechanical)
2		General symbol of multiple-pole switch in single-line representation
3		General symbol of multiple-pole switch in multi-line representation
4		Contactor (contact open at non-operating position)
5		Contactor (contact closed at non-operating position)
6		Graphic symbol for electrical diagram of load switch (load-disconnector switch)
7		Load switch with automatic release function
8		Fuse type circuit breaker
9		Circuit breaker
10		Isolating switch
11		General symbol of fuse

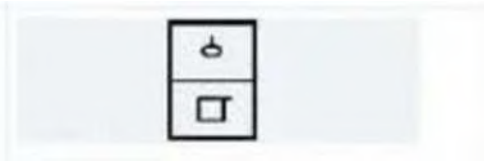
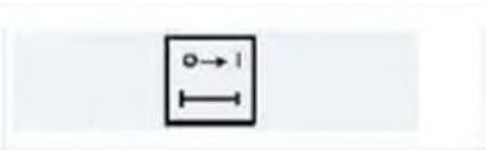
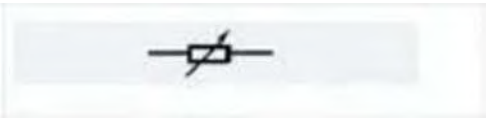
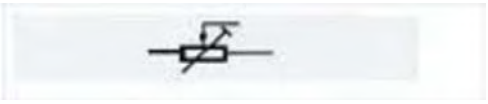
12		Drop-out fuse
13		Fuse-switch
14		Fuse-switch-disconnector
15		Fuse type load switch
16		Make contact, delayed closing when the operating device is actuated
17		Make contact, delayed closing when the operating device is released
18		Graphic symbol for electrical diagram of break contact, delayed closing when the operating device is released

19		Break contact, delayed closing when the operating device is actuated
20		Make contact, delayed closing when the operating device is actuated and delayed opening when the operating device is released
21		Push button switch (unlocked)
22		Knob switch, rotary switch (locked)
23		Position switch, make contact Limit switch, make contact
24		Position switch, break contact Limit switch, break contact
25		Thermoswitch, make contact Note: θ can be replaced by operating temperature
26		Automatic thermoswitch, break contact Note: Distinguish this contact from the thermal relay contact shown below 
27		Gas discharge tube fluorescent lamp starter with thermoelement

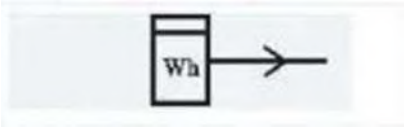
28		Make (normally open) contact Note: This symbol can also be used as a general symbol of switches
29		Break (normally closed) contact
30		Change-over break before make contact
31		Passing make contact temporarily closed when the operating device is actuated or released
32		Socket (female) or one pole of socket
33		Plug (raised head) or one pole of plug
34		Plug and socket (raised head and female)
35		Connected brace
36		Umschaltlasche

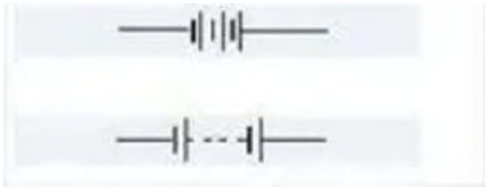
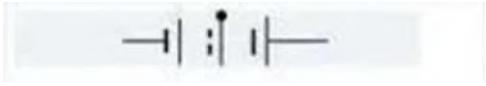
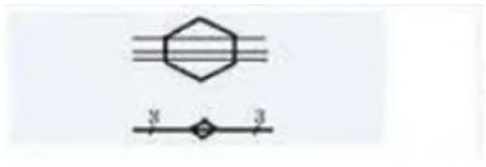
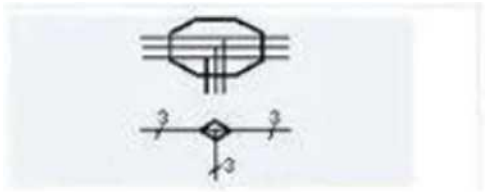
37		Double winding transformer
38		Three-winding transformer
39		Autotransformer
40		Reactor choke diagram
41		Current transformer Pulse transformer
42		Current transformer with two cores and two secondary windings
43		Current transformer with two secondary windings on one core
44		Three-phase, three-winding transformer with on-load tap-changer and star-delta connection of neutral lead
45		Three-phase, three-winding transformer, in which two windings have star connection of neutral lead, the neutral point is grounded and the third winding has open-delta connection
46		Three-phase transformer Star-delta connection
47		Three-phase transformer with on-load tap-changer and star-delta connection
48		Three-phase transformer Star-zigzag connection
49		General symbol of operating device

50		Combined representation of operating device with two windings
St		Operating device of thermal relay

52		Gas relay
53		Device for auto-reclosing
54		General symbol of resistor
55		Variable resistor Adjustable resistor
56		Potentiometer with movable contact
57		Preset potentiometer
58		General symbol of capacitor
59		Variable capacitor Adjustable capacitor
60		Duplex homological variable capacitor
61		Indicating instrument (the asterisk must have the specified meaning)
62		Voltmeter
63		Ammeter

64		Electrical graphic symbol of reactive-current meter
65		Maximum demand indicator (operated by one integrating meter)
66		Varmeter
67		Power factor meter
68		Frequency meter
69		Thermometer, pyrometer (θ can be replaced by t)
70		Tachometer
71		Integrating meter, energy meter (the asterisk must be replaced as specified)
72		Ampere-hour meter
73		Energy meter (watt-hour meter)

74	 PJR	Var-hour-meter
75		Energy meter with transmitter
76		Telemeter operated by energy meter (transponder)
77		Telemeter with printing apparatus and operated by energy meter
78		General symbols of screen, disk and rack Note: The equipment name can be indicated by equipment or models
79		General symbol of column rack
80		General symbols of manual switchboard, relay station, measurement console, business station, etc.
81		Control and signal lines (for electric power and lighting)
82		Primary cell or battery

83		Primary cell pack or battery pack
84		Tapped primary cell pack or battery pack
85		General symbol of grounding
86		Connected to housing or base plate
87		Noiseless grounding
88		Protective grounding
89		Equipotential
90		Cable terminal
91		Straight junction box of power cable
92		Connection box and distribution box of power cable

93		Control and indicating equipment
94		Alarm activation device (point type - manual or automatic)
95		Line detector
%		Fire alarm device
97		Heat
98		Smoke
99		Explosive gas
100		Manual start

Chapter 7 Kubota EU5 Engine Content

Notice：
Chapter 7 is the differentiation content of Kubota EUⅤ engine and Deutz EUⅤ engine in AR14J\AR16J service manual.For other content of Kubota EUⅤ engine,please refer to the content of Deutz EUⅤ engine in the front of this manual.

7.1 Parameters of machine

S/N	1	2
Name	AR14J articulated lifting platform	AR16J articulated lifting platform
Order No.	A0014JNKCH21	A0016JNKCH21
Configurations	Kubota (Euro V) engine	Kubota（(Euro V) engine
	2. Danfoss walking pump and motor	2. Danfoss walking pump and motor
	3. Turbo-worm slewing drive	3. Turbo-worm slewing drive
	4. 315/55 D20 filled off-road tire	4. 315/55 D20 filled off-road tire
	5. COBO electronic control system	5. COBO electronic control system
	6.Sant hydraulic system	6.Sant hydraulic system

7.1.1Parameters of AR14J（A0014JNKCH21）articulated lifting platform

1) **Parameters of machine**

Item	Parameter	Item	Parameter
Rated load (kg)	230	Rotary table rotation time per circle (stowed) (s)	82-92
		Rotary table rotation time per circle (extended) (s)	82-92
Total weight (kg)	7160	Boom lifting time (s)	35-45
Max. allowed workers	2	Boom lowering time (s)	30-40
Max. working height (m)	16.09	Articulating boom lifting time (s)	25-35
Max. platform height (m)	14.09	Articulating boom lowering time (s)	26-40
Max. horizontal reach (m)	7.67	Boom extension time (s)	20-30
Max. span height (m)	7.56	Boom retraction time (s)	20-30
Min. turning radius (inner wheel) (m)	1.94	Jib lifting time (s)	30-50
Min. turning radius (outer wheel) (m)	4.41	Jib lowering time (s)	20-35
Max. braking distance (no-load, stowed) (m)	1≤S≤1.5	Platform rotation time (s)	13-26
Max. travel speed (stowed) (km/h)	6.1±0.5	Theoretical maximum gradeability (no-load, stowed)	45%
Max. travel speed (extended) (km/h)	0.8±0.05	Max. operation effort (N)	400

Climbing speed (stowed) (km/h)		＞1.5	Max. allowed wind speed (m/s)	12.5
Climbing speed (extended) (km/h)		≤0.8	Drive mode	Four-wheel drive Front wheel steering
Maximum allowable inclination of chassis	Along the boom	4.5°		
	Boom orthogonal	4.5°		

2) **Main dimensions**

Item	Parameter	Item	Parameter
Overall length (mm)	6766	Track width (mm)	1981.5
Overall width (mm)	2310	Wheelbase (front/rear) (mm)	2059
Overall height (mm)	2170	Min. ground clearance (mm)	360
Dimension of working platform (length × width) (mm)	1830×760	Tire specification	315/55D20

3) **Engine system**

Item	Parameter	Item	Parameter
Model	V2403-CR-E5B-LGL-1	Rated speed（r/min）	2600
Displacement（ml）	2434	Maximum torque（Nm）	159.8/1600rpm
Rated power（KW）	36	Emission standard	EU StageⅤ EPA Tier 4f

4) **Transmission system**

Item		Parameter
Walking reducer	Rated output torque (Nm)	3500
	Speed ratio	57.49：1
Slewing reducer	Rated output torque (Nm)	8729
	Speed ratio	86：1

5) **Hydraulic system**

Item			Parameter
Walking system	Type		Closed
	Pump displacement (ml/r)		46
	Max. working pressure (MPa)		28
	Motor displacement (ml/r)		38
Functional system	Type		Open
	Pump displacement (ml/r)		11
	Lifting system	Max. working pressure (MPa)	23.5
	Slewing system	Max. working pressure (MPa)	23.5
		Motor displacement (ml/r)	160

	Steering system	Max. working pressure (MPa)	23.5

6) **Electronic control system**

Item		Parameter
Battery	Output voltage (V)	12
	Capacity (Ah)	120(20HR discharge rate)
Control system	Voltage (V)	12

7) **Refilling capacity**

Item	Parameter	Item	Parameter
Hydraulic oil (L)	130	Engine oil (L)	8
Gearbox oil (L)	0.68*4	Engine antifreeze (L)	7.5
Diesel (L)	65		

7.1.2 Parameters of AR16J(A0016JNKCH21) articulated lifting platform

1) **Parameters of machine**

Item		Parameter	Item	Parameter
Rated load (kg)		230	Rotary table rotation time per circle (stowed) (s)	82-92
			Rotary table rotation time per circle (extended) (s)	82-92
Total weight (kg)		8180	Boom lifting time (s)	35-45
Max. allowed workers		2	Boom lowering time (s)	30-40
Max. working height (m)		17.7	Articulating boom lifting time (s)	25-35
Max. platform height (m)		15.7	Articulating boom lowering time (s)	26-40
Max. horizontal reach (m)		9.39	Boom extension time (s)	20-30
Max. span height (m)		7.56	Boom retraction time (s)	20-30
Min. turning radius (inner wheel) (m)		1.94	Jib lifting time (s)	30-50
Min. turning radius (outer wheel) (m)		4.41	Jib lowering time (s)	20-35
Max. braking distance (no-load, stowed) (m)		1≤S≤1.5	Platform rotation time (s)	13-26
Max. travel speed (stowed) (km/h)		6.1±0.5	Theoretical maximum gradeability (no-load, stowed)	45%
Max. travel speed (extended) (km/h)		0.8±0.05	Max. operation effort (N)	400
Climbing speed (stowed) (km/h)		>1.5	Max. allowed wind speed (m/s)	12.5
Climbing speed (extended) (km/h)		≤0.8	Drive mode	Four-wheel drive Front wheel steering
Max. allowed inclination of chassis	Along the boom	4.5°		
	Orthogonal to boom	4.5°		

2) **Main dimensions**

Item	Parameter	Item	Parameter
Overall length (mm)	7560	Wheelbase (mm)	1981.5
Overall width (mm)	2310	Track width (mm)	2059
Overall height (mm)	2170	Min. ground clearance (mm)	360
Dimension of working platform (length × width) (mm)	1830×760	Tire specification	315/55D20

3) **Engine system**

Item	Parameter	Item	Parameter
Model	V2403-CR-E5B-LGL-1	Rated speed（r/min）	2600
Displacement（ml）	2434	Maximum torque（Nm）	159.8/1600rpm
Rated power（KW）	36	Emission standard	EU Stage Ⅴ EPA Tier 4f

4) **Transmission system**

Item		Parameter
Walking reducer	Rated output torque (Nm)	3500
	Speed ratio	57.49：1
Slewing reducer	Rated output torque (Nm)	8729
	Speed ratio	86：1

5) **Hydraulic system**

Item			Parameter
Walking system		Type	Closed
		Pump displacement (ml/r)	46
		Max. working pressure (MPa)	28
		Motor displacement (ml/r)	38
Functional system	Type		Open
	Pump displacement (ml/r)		11
	Lifting system	Max. working pressure (MPa)	23.5
	Slewing system	Max. working pressure (MPa)	23.5
		Motor displacement (ml/r)	160
	Steering system	Max. working pressure (MPa)	23.5

6) **Electronic control system**

Item	Parameter

Walking reducer	Rated output torque (Nm)	12
	Speed ratio	120(20 小时放电率)
Slewing reducer	Rated output torque (Nm)	12
	Speed ratio	

7) **Refilling capacity**

Item	Parameter	Item	Parameter
Hydraulic oil (L)	130	Engine oil (L)	8
Gearbox oil (L)	0.68*4	Engine antifreeze (L)	7.5
Diesel (L)	65		

Note: The type of hydraulic oil or diesel for refilling shall be selected according to the working environment and temperature:

(1) -25℃＜ Min. temperature: L-HV 32 low-temperature hydraulic oil;

(2) -40℃＜ Min. temperature ≤-25℃: L-HS 32 ultra-low temperature hydraulic oil;

(3) Min. temperature ≤-40℃: 10# aviation hydraulic oil.

Ambient temperature ≥ 4℃: 0# diesel; ambient temperature ≥ -5℃: -10# diesel; ambient temperature ≥-14℃: -20 # diesel; ambient temperature ≥-29℃: -35# diesel.

7.2 Kubota EUV Engine assembly

7.2.1 Subassembling the engine

1) Install part 1 to the engine with part 2 (coated with sealant)/ 3, apply the sealant and tighten the part to the specified torque.

Note: During fixing and connection of the coupling, apply AT272 threadlock to prevent looseness.

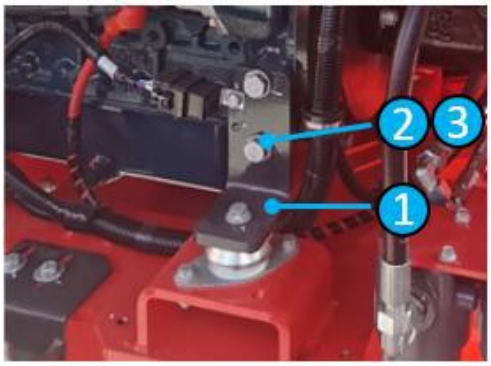
2) After fastening part 1, apply 596 plane sealant to the edge of engine, and install the pump cover (part 4) to the engine with part 5.

1. Flywheel coupling 2. Bolt 3. Washer 4. Pump cover 5. Screw

Tightening torque of part 2/5: 52±5N.m

Tools: QSP100N4, socket wrench 16

3）Lift the engine assembly, and install part 1 at the assembly position on the rear end of engine with part 2 (coated with sealant)/ 3. See the figure below:

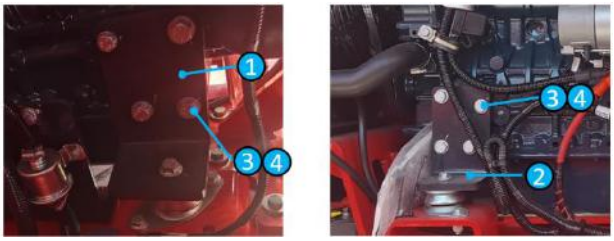


1. Rear outrigger 2. Bolt 3. Washer

Tightening torque of part 2: 90±9N.m

Tools: QSP100N4, socket wrench 21

4）Assemble piece 1 to engine front right side with piece 3/4, Assemble piece 1 to engine front left side with piece 3/4.



1. Right front leg 2. The left leg 3. Bolt 4. Washer

Tightening torque of part 4: 90±9N.m

Tools: QSP200N4, socket wrench 21

5）Assemble part 1 with part 2 on the engine tray,fix it with part 2(glue coating)/3/4,the engine installed in the lifting part is mounted on the shock cushion of the engine tray,and fix the engine with part 5.

1.Shock absorber 2.Bolts 3.Washers 4.Nuts 5.Bolts

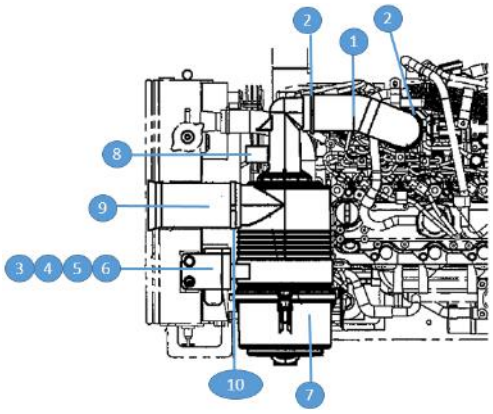
Tightening torque of part 2: 52±5N.m

Tightening torque of part 5: 32±3N.m

Tools: QSP100N4, open-end wrench 16, QSP50N3, socket wrench 16/18

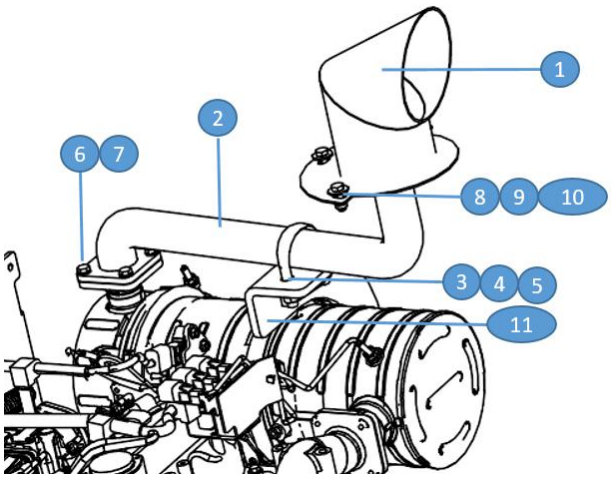
6）Part 1 is fixed to the engine with part2,part 8 is fixed with part 4/5/6/7,part 8 is assembled to the air filter inlet,and tighten,part 2 is connected

with the engine air inlet hose and air filter;



1.Engine intake hose 2.Hose clamp 3.Air filter bracket 4.Bolts 5.Nuts 6.Washers 7.Air filter 8.Mechanical differential pressure alarm 9.Engine suction hose 10. Hose clamp

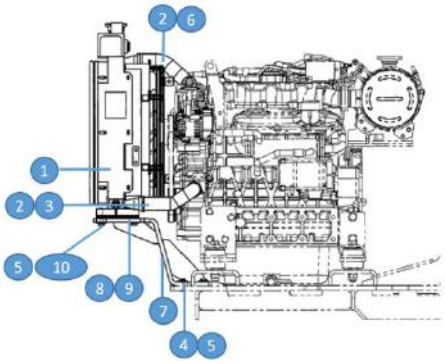
7）The Assembly direction of exhaust tail pipe point is parallel to the axis of the muffler provided by the engine,as shown in the figure below.Assemble part 1 to part 2 with part 8/9/10,fix part 2 to the engine with part 11 to part 3/4/5,and connect part 2 to the muffler with part 6/7.



1.Upper exhaust liner 2.Exhaust liner weldiing 3.U-Bolt 4.Washer 5.Nut 6.Bolt 7.Washer 8.Nut 9.Washer 10.Bolt 11.Exhaust pipe support

7.2.2 Assembling the engine cooling system

Place a piece 8 rubber plate on the radiator bracket,place the piece 9 mounting plate on the rubber plate,place the piece 1 radiator assembly on the piece 9,connect the radiator assembly to the radiator bracket with the piece 5/10.One end of piece 6 is connected with the radiator inlet,the other is connected with the engine outlet,both ends are fastened with piece 2;One end of part 3 is connected with the radiator bottom water outlet,the other end is connected with the engine water inlet,both ends are fastened with Part 2.

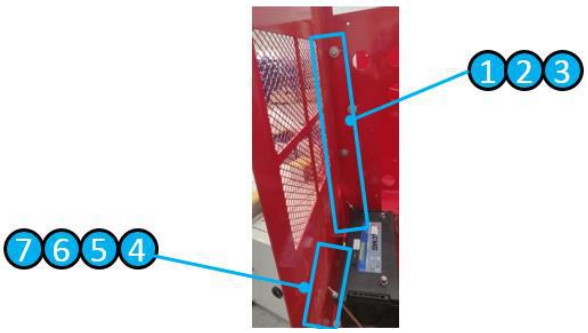


1.Radiator assy 2.Hose clamp 3.Engine inlet pipe 4.Bolt 5.Washer 6.Engine outlet pipe 7.Radiator support 8.Rubber sheet 9.Dead plate 10.Bolt

1） 调Adjust the clearance between the engine fan and the radiator, where the clearance between the engine/fan and the fan shroud should be within 15±5mm, the clearance from the outermost end of the fan to the outermost end of the guard net in the left and right directions should be within 20±6mm, and the clearance from the outermost end of the fan to the outermost

end of the guard net in the front and rear directions should be within 18.5±3mm.

2) Install the radiator flitch weldment (part 1) onto the rotary table weldment with the bolt (part 2) and the washer (part 3). Install the flitch weldment onto the battery tray with the bolt (part 4), the washer for bolt (part 5), the washer for nut (part 6), and the nut (part 7).



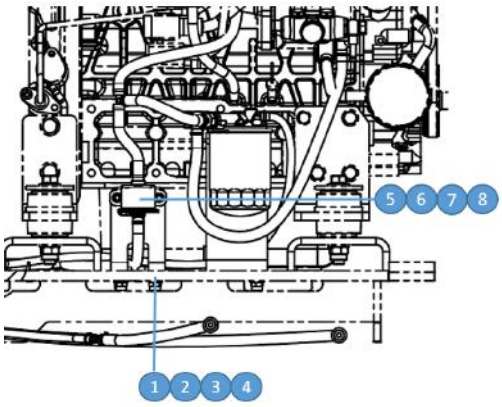
1. Radiator flitch weldment 2. Bolt 3. Washer 4. Bolt 5. Washer 6. Washer 7. Nut

Tools: QSP100N4, socket wrench 18/13, open-end wrench 13

7.2.3 Assembling the engine fuel pipeline

1) Install part 1 onto the engine tray with part 2/3/4.

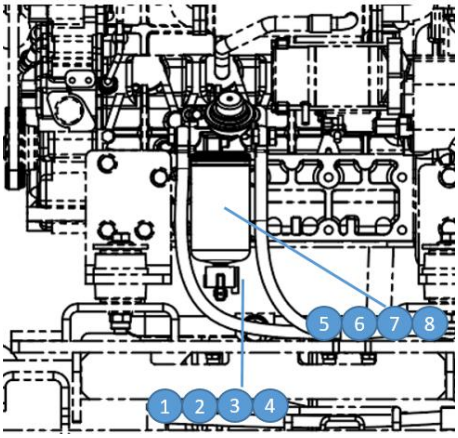
2) Fix part 5 onto part 1 with part 6/7/8.



1. EFP mounting plate 2. Bolt 3. Nut 4. Washer 5. EFP 6. Bolt 7. Nut 8. Washer

3) Install part 1 onto the engine tray with part 2/3/4.

4) Fix part 5 onto part 1 with part 6/7/8.



1. Water separator mounting plate 2. Bolt 3. Nut 4. Washer 5. Water separator 6. Bolt 7. Nut 8. Washer

5) Remove the fuel secondary filter supplied with the engine.

6) Add a fine filter pad between the fine filter and the engine housing,and tighten the fine filter and fine filter pad with bolts.

7) One end of the oil-water separator inlet pipe is connected to the fuel tank and fixed.The other section is connected to the oil inlet of the oil-water separator ang fixed.

8) One end of the engine return ppipe is connected to the fuel tank and fixed.The other end is connected to the engine and fastened to the quick plug using a collar.

9) One end of the electronic pump inlet pipe is connected to the water outlet of the oil-water separator and fixed.The other end is connected to the oil inlet of the fuel pump and fixed with a throat hoop.

10) One end of the fine filter inlet pipe is connected to the oil outlet of the fuel pump, and fixed with a collar.The other end is connected to the oil inlet of the fine filter and fixed.

11) One end of the engine inlet pipe is connecte d to the fine filter oil outlet and fixed. The oth er end is connected to the engine oil inlet an d fixed to the quick plug using a collar. Avoid interference with engine edges by adjusting t he direction of pipe interface.

7.3 Kubota EU V engine maintenance

7.3.1 Compliance and Obedience

1) The operator is only allowed to perform routine maintenance items as specified in this manual.
2) Carry out periodic maintenance and check by trained maintenance technicians as required by the manufacturer.

Maintenance Symbols

The following symbols are used in this manual to help convey relevant meanings in the instructions. When one or more symbols are shown at the first part of the maintenance program, the meanings expressed are as follows.

It indicates a tool required to carry out this procedure.

It indicates a new part required to carry out this procedure.

It indicates that the engine must be in a cooling state before carrying out this procedure.

7.3.2 Check for Batteries

A sound battery condition is critical to good engine performance and safe operation. Improper electrolyte levels or damaged cables or wires may cause damage to engine components and bring hazardous conditions.

⚠ Note: This check item is not required for machines with sealed or maintenance-free batteries.

⚠ Warning: danger of electric shock.

Contact with an electrical circuit may result in death or serious personal injury. Take off all rings, watches and other accessories.

⚠ Warning: danger of bodily injury.

The battery contains acidic substances. Avoid overflow of acidic substance or contact with it in the battery. Use soda and water to neutralize the overflowing acidic substances in the battery.

1) Wear protective clothing and protective glasses.
2) Make sure that the battery cables are firmly wired and not corroded.
3) Make sure the battery locking bracket is stable.

⚠ Note: Adding a terminal protector and an anti-corrosion sealant will help remove corrosion caused to battery terminals and cables.

7.3.3 Maintenance of worm-Type Slewing Drive

There are three positions to be lubricated on the worm-type slewing drive assembly, i.e., lubrication of the roller path (Position I), lubrication of the engaging position (Position II) between the worm and the slewing bearing, and lubrication of the tapered roller bearing (Position III). The specific lubrication positions are shown as below:

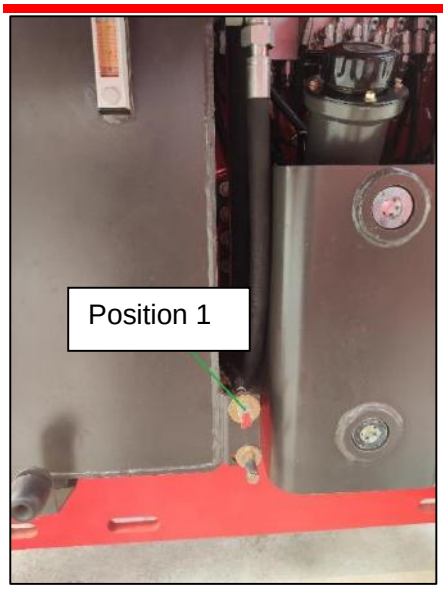


Figure 1-1

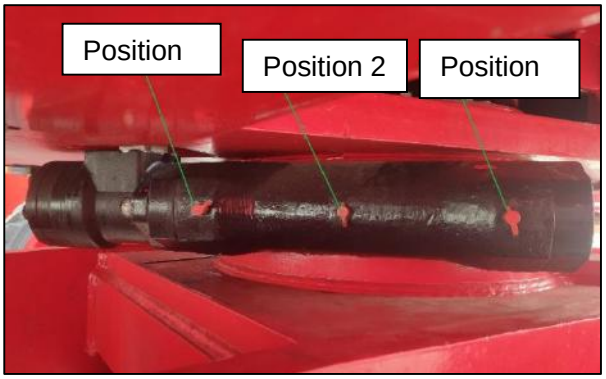


Figure 1-2

7.3.3.1Maintenance before Delivery

⚠ Notice: It refers to the lubrication of the LGMG platform for working at heights before delivery.

1) Position 1: Lubrication of the roller path: The roller path is full and does not need to be lubricated again.
2) Position 2: Lubrication of the engaging position between the worm and the slewing bearing
3) Quantity: It is required to inject 650g of lubricating grease.
4) Lubrication method: Continuously inject lubricating grease into the injection port of lubricating grease while rotating the slewing reducer
5) Model of the lubricating grease: 3# lubricating grease
6) Position 3: Lubrication of the tapered roller bearing: the tapered roller bearing is full and does not need to be lubricated again.

7.3.3.2 Market Maintenance

1) Position I: Lubrication of the roller path:
2) Quantity: Proper amount (18g is recommended)
3) Lubricating frequency: Lubricate every year or every 1,000 h, whichever occurs first.
4) Lubrication method: Continuously inject lubricating grease into the injection port of lubricating grease while rotating the slewing reducer
5) Model of the lubricating grease: 3# lubricating grease

1) Position II: Lubrication of the engaging position between the worm and the slewing bearing
2) Quantity: Proper amount (It is suggested to inject a total of 400g of lubricating grease)
3) Lubricating frequency: Lubricate every three months or every 150 h, whichever occurs first.
4) Lubricating method: Continuously inject lubricating grease into the injection port of lubricating grease while rotating the slewing reducer
5) Model of the lubricating grease: 3# lubricating grease

1) Position III: Lubrication of the tapered roller bearing:
2) Quantity: Proper amount (5g is recommended at each position, and a total of 10g for the two positions)
3) Lubricating frequency: Lubricate every year or every 1,000 h, whichever occurs first.
4) Lubricating method: Direct lubrication
5) Model of the lubricating grease: 3# lubricating grease

7.3.4 Check Hydraulic Oil Level

Check it every 8 hours or every day.

Maintaining the hydraulic fluid at the proper oil level is essential for the vehicle operation. If the hydraulic oil is at an appropriate oil level, the

hydraulic components may be damaged. Through daily inspections, the inspector can determine changes in the hydraulic oil level which can indicate problems with the hydraulic system.

1) Make sure the boom is in the telescoped position and then visually check the hydraulic tank.

Result: The hydraulic oil is above the middle scale of the level gauge and below the maximum scale of the level gauge.

2) The hydraulic oil should be filled as needed. No over-filling will be allowed. Hydraulic oil

Specification

Use temperature	Oil type	Remark
Minimum air temperature ＞ -33℃	L-HV 46 low temperature hudraulic oil	Chevron
-39 ℃ ＜ minimum air temperature ≤-33℃	L-HS 46ultralow temperature hudraulic oil	
Minimum air temperature ≤-39℃	10# aviation hydraulic oil	

7.3.5 Check for the Oil Level in the Reducer

Check this step every 250 hours or a quarter.

The incorrect oil level in the reducer shall lead to the reduction of equipment performance and continuous use will result in damage to components.

Figure 1-3

1. Oil filler 2. Viewing port

1) Drive equipment to rotate until one plug is located at the horizontal position, and the other is at the top.

2) Disassemble the plug of viewing port 2 at the horizontal position, and inspect oil level.

Result: Oil level shall be flush with bottom of viewing port 2.

3) If necessary, please add gear oil from the oil filler 1 until the oil level is flush with the bottom of the viewing port 2, please select of gear oil by referring to Complete Machine Parameters section.

4） Coat pipe thread sealant to plugs, and assemble plugs to the reduction gear.

Repeat this step for every traveling reduction gear.

7.3.6 Replacement of the Gear Oil of Reducer

It is available in the first 50 hours, and it will be replaced every 1,000 hours or a year.

It is necessary to replace the gear oil of reducer to maintain good equipment performance and service life. Failure to replace the reducer engine oil every year may result in reduced equipment performance, and continuous use may result in damage to components.

1) Select the reducer to be maintained, and drive the equipment until one plug is at the lowest point.

2) Remove the two plugs and drain the oil (note to be drained) into the proper container.

3) Drive equipment to rotate until one plug is located at the horizontal position, and the

other is at the top.

4) Refill oil from the hole of reducer at the high point until the liquid level is the same as the side hole at the bottom. Install a plug.

5) Repeat this procedure for each reducer to refuel.

7.3.7 Replacement of Engine Oil and Filter

⚠ warning:

To avoid personal injury or death:

⚠ Be sure to stop the engine before draining engine oil.

⚠ When draining engine oil, place some container underneath the engine and dispose it according to local regulations.

⚠ Do not drain oil after running the engine. Allow engine to cool down sufficiently.

It is available in the first 50 hours, and the engine oil and filter shall be replaced every 500 hours or half a year. (If the ambient temperature continues to be below -10℃. (14 ˚F) or the temperature of engine oil is below 60℃ (84 ˚F), the oil change period is reduced by a half; if the engine oil does not reach the replacement interval period within a year, the oil shall be replaced at least once a year.)

⚠ Danger of burn, be careful of high-temperature engine parts and oil, contacting with high temperature engine oil and/or engine parts will cause severe burns.

⚠ Perform the function after engine warm up to normal operation temperature.

Replacement of engine oil

⚠ After the filter element is replaced, be sure to keep the engine idling at a low speed for at least 3-5 minutes, so that the engine has been lubricated before being put into operation.

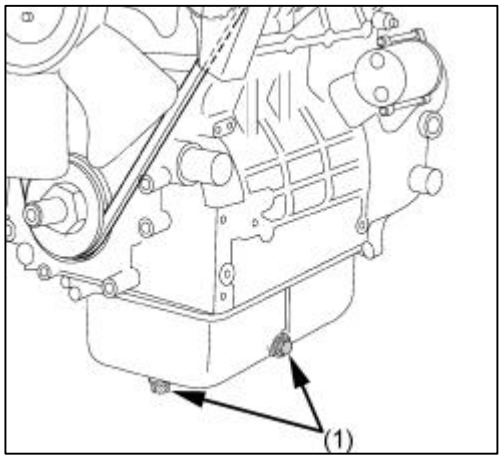


Figure 1-4

1. Oil drain plug

1) Warm up and run the engine (engine oil temperature> 80℃).

2) Place the engine horizontally.

3) Shut down the engine.

4) Place the container under the engine oil drain plug.

5) Screw off the engine oil drain plug to drain the old engine oil.

6) Install the new seal ring for the engine oil drain plug and screw in and tighten it.

7) Add engine oil at the engine oil filler.

8) Warm up and run the engine (engine oil temperature> 80℃).

9) Place the engine horizontally.

10) Check the engine oil level and fill it if

necessary.

Replacement of the Engine Oil Filter

The engine oil filter element must also be replaced every time the engine oil is replaced.

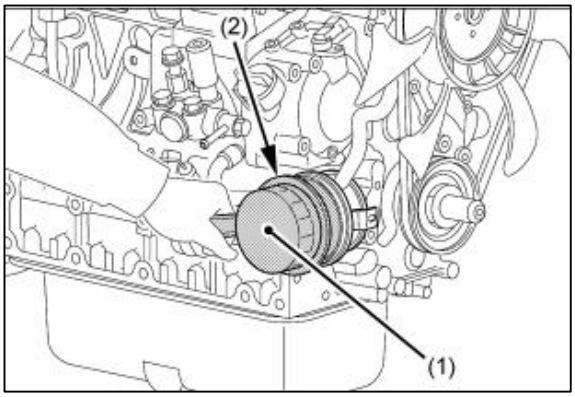


Figure 1-5

1. Oil filter cartridge

2. Remove with a filter wrench (Tighten with your hand)

1) Release and unscrew the filter element with a wrench.

2) Contain the oil that was drained.

3) Clean the sealing surface of the filter holder with a clean fiber-free wiper.

4) Apply a thin layer of engine oil to the seal ring of the new filter.

5) Screw in the cartridge by hand. When the seal ring contacts the seal surface, tighten the cartridge enough by hand. Because, if you tighten the cartridge with a wrench, it will be tightened too much.

7.3.8 Check for Fuel Leakage

⚠ The engine must be shut down!

No smoking and open fires!

Be careful when contacting high temperature fuel!

Please observe the safety regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

DO NOT USE Fuels that have sulfur content greater than 0.0015 % (15 ppm).

Visually check for fuel leakage every 8 hours or every day.

⚠ There is danger of explosion and fire. The fuel of the engine is combustible. Check the position of the machine. When this step is performed, the machine shall be away from the heater, spark, flame, and open and well-ventilated areas with burning tobacco. A qualified fire extinguisher shall be placed in an easily accessible place.

⚠ There is danger of explosion and fire. If fuel leaks, prevent any additional person from entering the area or operating the equipment. Repair the leakage immediately.

7.3.9 Draining of water separator

⚠ Risk of explosion and fire. Engine fuel is combustible. The position where the equipment is located shall be inspected. When the step is executed, equipment shall be located in an open and well-ventilated area that keeps away from the heater, spark, flame and burning tobacco. A qualified fire extinguisher shall be placed at the location that is easily accessible.

⚠ Perform the step when the engine flames out.

Check and drain the water separator every 50 hours.

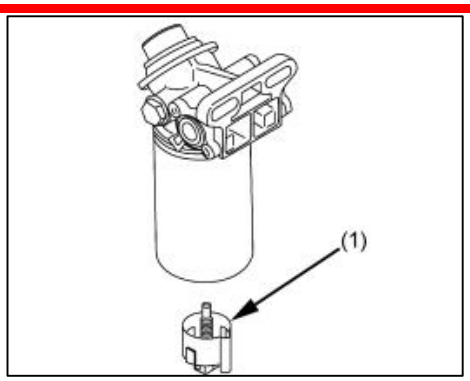


Figure 1-6

1.Drain plug

1) Shut down the engine, and find the water separator.
2) Disconnect cable connection.
3) Loosen the drainage plug located at the bottom of the filter cartridge, allowing the water drained to an appropriate container.
4) Finally be sure to air-bleed the fuel system before getting the engine restarted.
5) Wipe up any fuel that may be splashed.
6) Start the engine from the ground control and inspect whether or not there is leakage in the fuel filter.

Replacement of water separator filter

Replace the water separator filter with a new one every 500 hours.

1) Remove the old water separator filter with a filter wrench.
2) Apply a film of oil to the gasket for the new water separator filter.
3) Screw in the water separator filter by hand. Because, if you tighten the water separator filter with a wrench, it will be tightened too much.

Replace the water separator filter periodically to prevent wear of the supply pump or the injector, due to dirt in the fuel.

⚠ Risk of explosion and fire. Where there is fuel leakage, prevent any irrelevant personnel from entering the area and strictly prohibit operating the equipment. Repair the leak immediately.

7.3.10 Replacement of the Fuel filter

⚠ The engine must be shut down!

No smoking and open fires!

Be careful when contacting high temperature fuel!

⚠ Do not release the injection pipeline or the high-pressure oil pipeline when the engine is running.

⚠ Carefully clean all areas involved in cleaning. Blow wet parts with compressed air.

⚠ Please observe the safety regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

⚠ After completing the operation on the fuel system, exhaust the system, perform the trial operation and check the seal performance.

Replace the fuel filter cartridge with a new one every 500 operating hours, or half a year, but an increase in the number of replacement filters is required for the extremely dirty work environment.

⚠ There is danger of explosion and fire. The fuel of the engine is combustible. Check the position of the machine.When this step is performed, the machine shall be away from the heater, spark, flame, and open and well-ventilated areas with burning tobacco.

A qualified fire extinguisher shall be placed in an

easily accessible place.

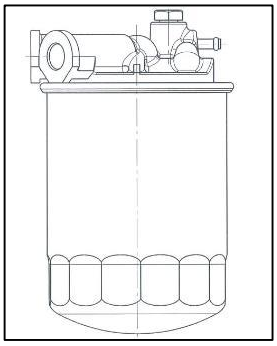


Figure 1-7

1) Release and unscrew the filter element with a wrench.
2) Contain the diesel fuel drained.
3) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
4) Apply a thin layer of diesel to the seal ring of the new filter.
5) Screw in a new filter manually until seal fit and tighten it.
6) Exhaust the fuel system.

7.3.11 Changing of oil separator element

To avoid personal injury or death:

Be sure to stop the engine before changing the oil separator element.

This procedure shall be performed every 1500 hours.

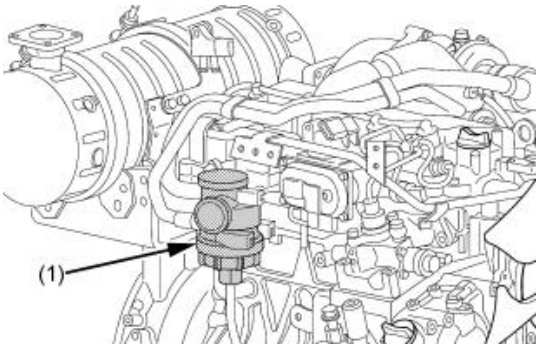


Figure 1-8

1.Oil separator

1) Remove the cover and take out the oil separator element and gasket. Then wipe oil and grease off the zone in question.
2) Fit a new oil separator element and gasket into position

7.3.12 Cleaning or Replacement of Air Filter

Clean it every 250 hours or quarterly and replaced for every 1000 hours.

⚠ Do not operate on running engines!

⚠ Be sure to pay attention to the cleanliness of the external surface when operating on the engine suction system, and close the suction inlet when necessary. The old filter elements are handled in an environmentally friendly manner.

Cleaning of air filter

⚠ Do not clean the filter element (4) with gasoline or high temperature liquid.

Note:

Open the evacuator valve once a week under ordinary conditions - or daily when used in a dusty place. This will get rid of large particles of dust and dirt.

Wipe the inside air cleaner clean with cloth if it is dirty or wet.

Avoid touching the element except when cleaning.

When dry dust adheres to the element, blow compressed air from the inside turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm ,30 psi).

If the primary element is stained heavily, replace it soon. At this time, replace the secondary element too.

The secondary element should be removed

only if it is to be replaced.

To protect the engine, do not remove the secondary element in servicing the primary element.

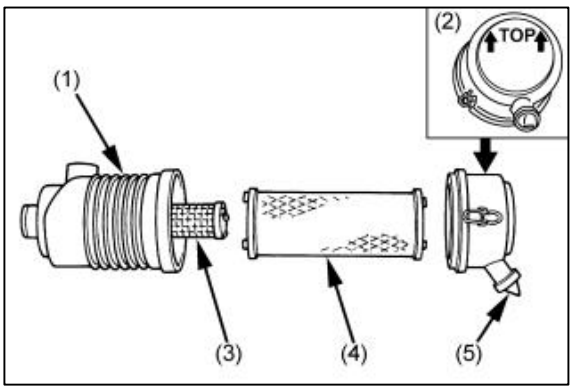


Figure 1-9

1. Air cleaner body
2. Dust cup
3. Secondary element
4. Primary element
5. Evacuator valve

Make sure the hooking clip for the element is tight enough. If it is loose, dust and dirt may be sucked in,wearing down the cylinder liner and piston ring earlier and thereby resulting in poor power output.

Do not overservice the air cleaner element. Overservicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.

1) Open the hooking clip.
2) Remove the filter cover (2) and screw off the filter element (4).
3) Filter element (4): For slight contamination, purge with dry compressed air (maximum 205 Kpa) from inside to outside for cleaning (general cleaning times are no more than 5 times);

Replace it in case of serious contamination.

Replacement of the Safety Filter Tube of the Air Filter

⚠ Never clean the safety filter tube (3).

1) Screw off the Primary element (4) and the Secondary element (3).
2) Install the new Secondary element.
3) Install the filter element (4), place the outer cover (2) and fix it with the hooking clip.

7.3.13 Check for Coolant Liquid Level

Check the coolant liquid level every 8 hours or every day.

⚠ The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Do not remove the radiator cap while coolant is hot.

Never run the engine without coolant, even if it's a very short time.

1) Carefully open the cover for the cooling system.
2) The coolant liquid level shall always be between min and max!
3) Use clean, fresh water and 50% anti-freeze to fill it, if necessary.

7.3.14 Filling or Replacement of Engine Coolant

Replace it every 2,000 hours or two years.

⚠ The coolant at high temperature has the risk of scald.

Do not stop the engine suddenly, stop it after about 5 minutes of unloaded idling.

Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped)

Do not remove the radiator cap while coolant is

hot. When cool to the touch, rotate cap to the first stop to allow excess pressure to escape.

Then remove cap completely.

If overheats should occur, steam may gush out from the radiator or recovery tank; Severe burns could result.

Draining of the Cooling System

1) Carefully open the cooler cover.
2) Place the receiving container under the coolant interface.
3) Drain the coolant.
4) Reconnect and tighten the coolant interface.
5) Close the cooler cover.

Filling of the Coolant

1) Carefully open the cover for the cooling system.
2) Fill the coolant to max or the filling limit position.
3) Close the cooler cover.
4) Run the engine to the running temperature.
5) Shut down the engine.
6) Check the coolant liquid level when the engine is cooled, and fill it to max if necessary.

7.3.15 Check for Engine Belt

Check it every 8 hours or every day.

⚠ Only when the engine is stationary can the belt drive operation be carried out.

⚠ There is danger of burn. Be cautious of high-temperature engine components. Contact with them may cause serious burn.

Belt Check

1) Visually inspect whether all belt drives for damage.
2) Replace damaged components.
3) Reinstall the protector if necessary.
4) When it is a new belt, check whether the position is correct. After running for 15 minutes, check the tension.

Adjustment of belt tension

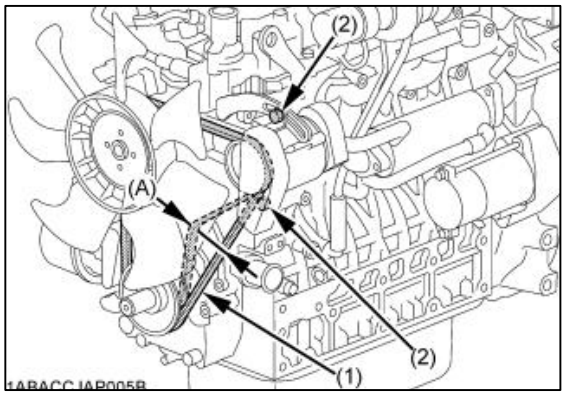


Figure 1-10

1. Fan belt
2. Bolt and nut

1) Apply moderate thumb pressure to belt between the pulleys.
2) If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
3) Replace fan belt if it is damaged.

Proper fan belt tension	A deflection when the belt is pressed in the middle of span.
7 to 9 mm	under load of 10 kg

7.3.16 Regular Maintenance

Maintenance items with period of a quarter, a year, and two years must be completed by qualified staff upon training in maintenance of the machine in accordance with procedures in the machine maintenance manual.

For machines that are idle for more than three months, quarterly check must be performed before they can be re-used.

7.3.17 Kubota EUⅤ Engine fault table

Fault	Cause	Measures
When it is difficult to start the engine	Fuel is thick and doesn't flow.	Check the fuel tank, and remove water, dirt and other impurities. Check the fuel filter cartridge and replace it if necessary.
	Engine oil becomes thick in cold weather and engine cranks slow	Use oils of different viscosities, depending on ambient temperatures. (Use 10W-30 in winter season.)
	Battery is discharged and the engine will not crank	Charge the battery
When output is insufficient	Fuel is insufficient	Refuel. Check the fuel system. (Bleed the fuel system if necessary.)
	Overheating of moving parts	Consult your KUBOTA Dealer
	Air cleaner is dirty.	Clean the element
	The output is limited because of a trouble	Check the engine warning lamp. (If a trouble occurs, it means that the ECU might be in the output limiting mode.)
When engine suddenly stops	Lack of fuel	Refuel. Check the fuel system. (Bleed the fuel system if necessary.)
	Overheating of moving parts	Consult your KUBOTA Dealer
	Air cleaner is dirty	Clean the element
	Forced stop due to a trouble	Check the engine warning lamp. (If a serious trouble occurs, it means that the ECU might have forced the engine to a stop.)
When engine must be stopped immediately	Engine revolution suddenly decreases or increases.	Check the adjustments and the fuel system
	Unusual sound is heard	Check all moving parts carefully
	Color of exhaust suddenly turns dark	Check the DPF itself
	Oil lamp lights up during operation	Check the lubricating system. Check to see if the engine bearing

		clearances are within factory specs. Check the function of the relieve valve in the lubricating system. Check pressure switch. Check filter base gasket
	Engine warning lamp lights up.	Consult your KUBOTA Dealer
	DPF service lamps light up	Consult your KUBOTA Dealer
When engine overheats	Engine oil insufficient	Check oil level. Replenish oil as required
	Fan belt broken or elongated	Change belt or adjust belt tension
	Coolant insufficient	Replenish coolant
	Excessive concentration of antifreeze	Add water only or change to coolant with the specified mixing ratio
	Radiator net or radiator fin clogged with dust	Clean net or fin carefully
	Inside of radiator or coolant flow route corroded	Clean or replace radiator and parts
	Fan or radiator or radiator cap defective	Replace defective parts
	Thermostat defective	Check thermostat and replace if necessary
	Temperature gauge or sensor defective	Check temperature with thermometer and replace if necessary
	Overload running	Reduce load
	Head gasket defective or water leakage	Replace parts

7.3.18 Engine fault codes

DTC Description	SPN	FMI	Inspection Item	DTC Set Parameter
NE-G Phase Shift	636	7	Large phase shift between NE (crankshaft position sensor) pulse and G (camshaft position sensor) pulse	Phase difference between NE pulse and G pulse within +30 ~-20°
IAT Sensor Integrated MAF Sensor: Low	171	4	Sensor / harness shorted to ground	IAT sensor integrated MAF sensor voltage: below 0.2 V
IAT Sensor Integrated MAF Sensor: High	171	3	Sensor/harness open or shorted to +B	IAT sensor integrated MAF sensor voltage: above 4.85 V
PLV Emergency Open	633	7	PLV emergency open	PLV is opened in emergency; Engine speed is greater than 700 min-1 (rpm)
High Rail Pressure	157	0	Actual pressure above the command pressure	Rail pressure sensor is normal; Sensor supply voltage VCC # is normal
SCV (MPROP) Stuck	1347	7	SCV stuck in the open position (the actual rail pressure stays higher than the command pressure)	The drain request of the fuel supply pump drops below -730 mm^3/st, and the actual rail pressure is 20 MPa (100 kgf/cm^2, 1400 psi) higher than the command pressure
Fuel Leak (in High Pressure Fuel System)	1239	1	Fuel leak in high pressure fuel system (This fault will be detected when the fuel consumption is too high, which is calculated from the fuel pressure difference before and after the fuel injection)	The pump fully supplies fuel; The deviation between the actual rail pressure and the target pressure is greater than 20 MPa
Intake Air Flow: Low	132	1	Low engine intake air mass flow (with turbo-blower intake hose disconnected)	Engine intake air mass flow: below 50% of the target value
MAF Sensor: Low	132	4	Sensor/harness open or shorted to ground	MAF sensor voltage: below 0.1 V
MAF Sensor: High	132	3	Sensor/harness shorted to +B	MAF sensor voltage: above 4.9 V under normal operating conditions
Intake Air Temperature Error: Low	172	4	Sensor/harness shorted to ground	IAT sensor voltage: below 0.2 V
Intake Air Temperature Error: High	172	3	Sensor/harness open or shorted to +B	IAT sensor voltage: above 4.95 V
Coolant Temperature	110	4	Sensor/harness shorted to	Coolant temperature

Sensor: Low			ground	sensor voltage: below 0.176 V
Coolant Temperature Sensor: High	110	3	Sensor/harness open or shorted to +B	Coolant temperature sensor voltage: above 4.870 V
Rail Pressure Sensor: Low	157	4	Sensor/harness shorted to ground; Sensor failure	Rail pressure sensor voltage: below 0.065 V
Rail Pressure Sensor: High	157	3	Sensor/harness open or shorted to +B; Sensor failure	Rail pressure sensor voltage: above 3.235 V
Injector Charge Voltage: High	523535	0	Injector Charge Voltage: High	Injector Charge Voltage: High
No.1 Cylinder Injector Harness/Coil Open Circuit	651	3	Harness open circuit; Injector coil open circuit	Harness or injector coil open circuit
No.3 Cylinder Injector Harness/Coil Open Circuit	653	3	Harness open circuit; Injector coil open circuit	Harness or injector coil open circuit
No.4 Cylinder Injector Harness/Coil Open Circuit	654	3	Harness open circuit; Injector coil open circuit	Harness open circuit; Injector coil open circuit
No.2 Cylinder Injector Harness/Coil Open Circuit	652	3	Harness or injector coil open circuit	Harness or injector coil open circuit
Engine Overheat	110	0	Engine coolant overtemperature	Engine coolant temperature ≥ 120 ℃ (248℉)
Engine Overrun	190	0	Engine speed above threshold	Engine speed ≥ 3500 min^{-1} (rpm)
Boost Pressure Sensor: Low	102	4	Sensor/harness shorted to ground; Sensor failure	Boost pressure sensor voltage below 0.2 V
Boost Pressure Sensor: High	102	3	Sensor/harness open or shorted to +B; Sensor failure	Boost pressure sensor voltage above 4.9 V
No Pulse Input from NE Sensor (Crankshaft Position Sensor)	636	8	Sensor/harness open circuit or short circuit; Sensor failure	Failure to recognize NE sensor pulse
NE Sensor (Crankshaft Position Sensor) Pulse Number Error	636	2	Sensor/harness open circuit or short circuit; Sensor failure	Pulse count per revolution is not 58 teeth
No Pulse Input from G Sensor (Camshaft Position Sensor)	723	8	Sensor/harness open circuit or short circuit; Sensor failure	Sensor/harness open circuit or short circuit; Sensor failure
G Sensor (Camshaft Position Sensor) Pulse Number Error	723	2	Failure to recognize G sensor pulse	Pulse count per revolution is not 3 teeth
Glow Plug Relay Drive Circuit Open	676	5	Intake air glow plug relay open circuit	Harness open circuit, or relay coil open circuit
Drive Circuit Shorted to +B	523544	3	Drive circuit shorted to +B	Harness shorted to +B
Glow Plug Relay Drive Circuit Shorted to Ground	523544	4	Intake air glow plug relay drive circuit shorted to ground	Harness shorted to ground

Glow Heater Relay Drive Circuit Overheat	676	0	Glow plug drive circuit overheat	Glow plug relay coil resistance or load above the specified value in ECU
EGR Actuator Open Circuit	523574	3	EGR actuator open circuit	EGR actuator open-circuit error signal received via CAN
EGR Actuator Coil Short Circuit	523574	4	EGR actuator coil short circuit	EGR actuator coil short-circuit error received via CAN
EGR Position Sensor Failure	523572	4	EGR position sensor failure	EGR position sensor error signal received via CAN
Oil Pressure Error	100	1	Oil pressure switch	Oil pressure switch ON: ＞ 1 s
Exhaust Gas Temperature Sensor 1: Low	3242	4	Sensor/harness shorted to ground	Diesel particulate filter (hereinafter referred to as the "DPF") inlet temperature sensor (T1) voltage: below 0.08 V
Exhaust Gas Temperature Sensor 1: High	3242	3	Sensor/harness open or shorted to +B	DPF inlet temperature sensor (T1) voltage: above 4.92 V
Exhaust Gas Temperature Sensor 0: Low	4765	4	Sensor/harness shorted to ground	DOC inlet temperature sensor (T0) voltage: below 0.08 V
Exhaust Gas Temperature Sensor 0: High	4765	3	Sensor/harness open or shorted to +B	DOC inlet temperature sensor (T0) voltage: above 4.92 V
Battery Voltage: Low	168	4	Harness open circuit, short circuit or damage; Battery failure	The battery voltage identified by the ECU in the 12 V system is below 8 V, and is not monitored during startup.
Battery Voltage: High	168	3	Harness open circuit, short circuit or damage; Battery failure	The battery voltage identified by ECU in the 12 V system is above 16 V.
QR (IQA) Data Error	523538	2	QR Data Read Error	Read error of QR data from EEPROM
No QR (IQA) Data	523538	7	QR data not written	Area of QR data on EEPROM is vacant
ECU Flash-ROM Error	628	2	Flash ROM error	● Checksum error ● Delete error ● Write error ● Read error
ECU CPU (Master IC) Error	1077	2	CPF and/or IC failure	Critical CPU and/or IC errors
ECU CPU (Monitoring IC)	52352	2	CPU Monitor IC Failure	CPU monitor IC failure

Error	7			
Injector Charge Voltage: Low	523525	1	Injector charge voltage: low ECU charge circuit failure	Injector charge voltage: low ECU charge circuit failure
SCV (MPROP) Open Circuit	1347	5	SCV open circuit	SCV open circuit
SCV (MPROP) Drive System Failure	1347	4	SCV open or shorted to ground	SCV open or shorted to ground
SCV (MPROP) Shorted to +B	1347	3	SCV shorted to +B	SCV shorted to +B
Injector Driver IC Error or Open Circuit	1077	12	Injector driver IC error, or No. 1 & No. 4 cylinder injector open circuit, or No. 2 & No.3 cylinder injector open circuit	Injector driver IC error, or No. 1 & No. 4 cylinder injector open circuit, or No. 2 & No.3 cylinder injector open circuit
Injector Driver IC Short Circuit	523605	6	Intake air glow plug relay open circuit	Injector IC error reported
Sensor Supply Voltage 1: Low	3509	4	Sensor supply voltage 1 error or recognition error	Sensor supply voltage below 4.75 V
Sensor Supply Voltage 1: High	3509	3	Sensor supply voltage 1 error or recognition error	Sensor supply voltage above 5.25 V
Sensor Supply Voltage 2: Low	3510	4	Sensor supply voltage 2 error or recognition error	Sensor supply voltage below 4.75 V
Sensor Supply Voltage 2: High	3510	3	Sensor supply voltage 2 error or recognition error	Sensor supply voltage above 5.25 V
Sensor Supply Voltage 3: Low	3511	4	Sensor supply voltage 3 error or recognition error	Sensor supply voltage below 4.75 V
Sensor Supply Voltage 3: High	3511	3	Sensor supply voltage 3 error or recognition error	Sensor supply voltage above 5.25 V
Main Relay Locked in Closed Position	1485	2	Main relay failure	The main relay stays on for more than 1 s with no command given
Starter Motor Relay Drive Circuit Shorted to Ground	677	4	Starter motor relay drive circuit shorted to ground	Harness shorted to ground
EEPROM Checksum Error	523700	13	KBT-EEPROM checksum error	EEPROM checksum error
Intake Throttle Feedback Error	523580	2	Intake throttle feedback error	Throttle position deviation is not corrected after 20 load error recovery operations
Accelerator Position Sensor 1: Low	91	4	Sensor/harness shorted to ground or open	Accelerator position sensor 1 voltage below 0.3 V
Accelerator Position Sensor 1: High	91	3	Short circuit to ground outside sensor/harness	Accelerator position sensor 1 voltage below 4.8 V
Accelerator Position Sensor 2: Low	29	4	Sensor/harness shorted to ground or open	Accelerator position sensor 2 voltage below 0.3V
Accelerator Position Sensor	29	3	Short circuit to ground	Accelerator position

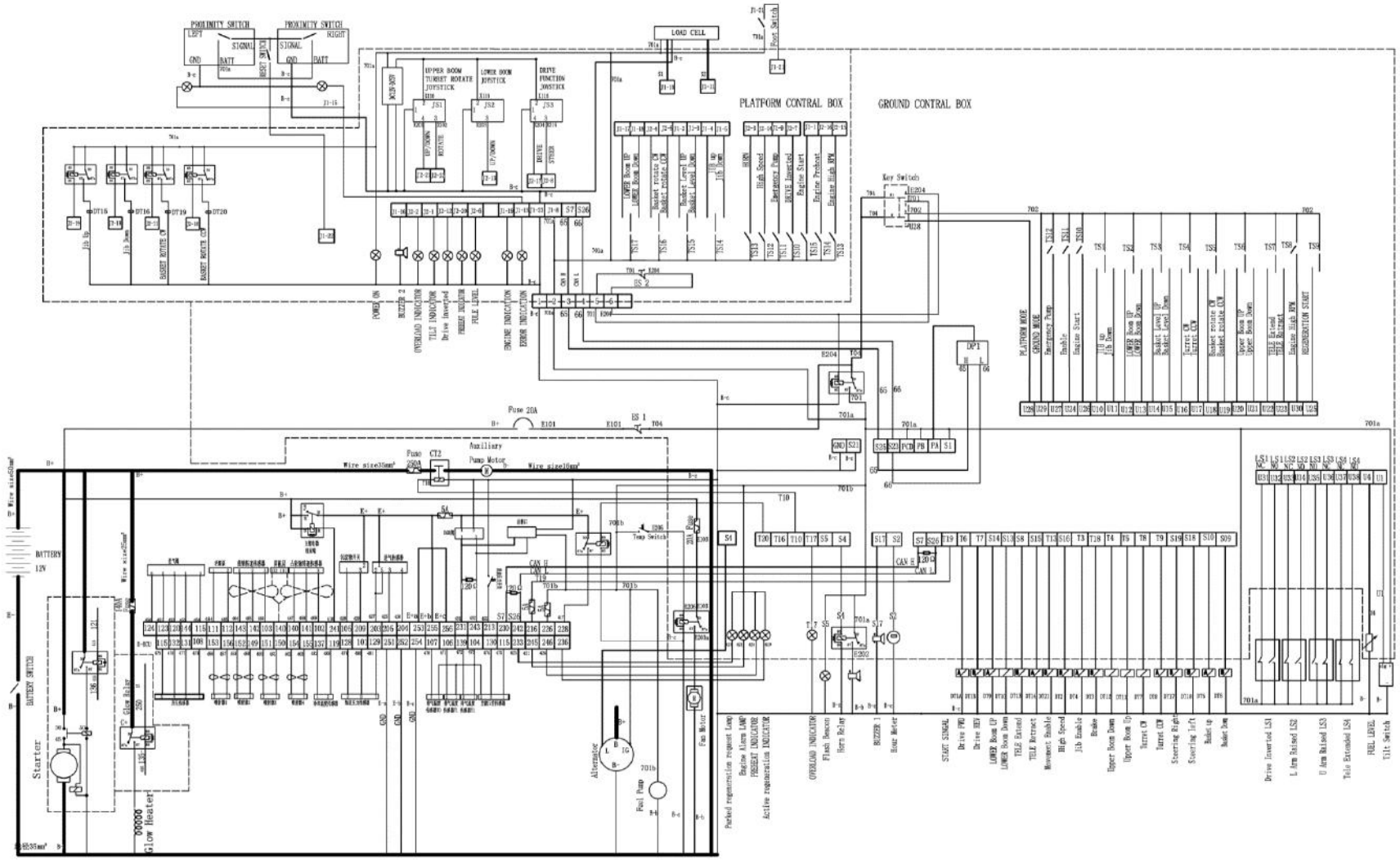
2: High			outside sensor/harness	sensor 2 voltage below 4.8V
Accelerator Position Sensor Error (CAN)	523543	2	Accelerator position sensor error signal (sensor/harness open or shorted to ground, etc.)	Accelerator position sensor error signal received via CAN
Accelerator Position Sensor Association Error	91	2	Deviation with two designed sensor associations	Deviation with two designed sensor associations
No.1 & No.4 Cylinder Injector Shorted to Ground, or All Cylinder Injectors Shorted to Ground	523523	3	Harness shorted to ground	Harness shorted to ground
No.1 & No.4 Cylinder Injector Shorted to +B, or All Cylinder Injectors Shorted to +B	523523	3	Harness shorted to +B	Harness shorted to +B
No.2 & No.3 Cylinder Injector Shorted to Ground, or All Cylinder Injectors Shorted to Ground	523524	3	Harness shorted to ground	Harness shorted to ground
No.2 & No.3 Cylinder Injector Shorted to +B, or All Cylinder Injectors Shorted to +B	108	4	Harness shorted to +B	Harness shorted to +B
Barometric Pressure Sensor Failure (Low Side)	108	3	Sensor/ECU internal circuit shorted to ground	Barometric pressure sensor voltage: below 0.2 V
Barometric Pressure Sensor Failure (High Side)	679	7	Sensor/ECU internal circuit shorted to +B	Barometric pressure sensor voltage: above 4.850 V
PLV Not Opened	679	16	PLV not opened as the rail pressure remains unchanged or the engine power is not high enough	The opened PLV responds, but the rail pressure is still too high or too low
Rail Pressure Error After PLV Opening	523575	7	Rail pressure above 160 MPa after PLV is opened by error	PLV is opened (with open response detected); The rail pressure is within 50 MPa ~ 120 MPa
EGR (DC Motor) Overheat	523576	2	EGR (DC Motor) overheat	EGR (DC motor) temperature error signal (thermistor: 125 ℃) received via CAN
EGR (DC Motor) Temperature Sensor Failure	523577	2	EGR (DC Motor) temperature sensor failure	EGR (DC motor) temperature sensor error signal received via CAN

Exhaust Gas Temperature Sensor 2: Low	3246	4	Sensor/harness shorted to ground	DPF outlet temperature sensor (T2) voltage: below 0.08 V
Exhaust Gas Temperature Sensor 2: High	3246	3	Sensor/harness open or shorted to +B	DPF outlet temperature sensor (T2) voltage: above 4.92 V
Differential Pressure Sensor 1: Low	3251	4	Sensor/harness shorted to ground	DPF differential pressure sensor voltage: below 0.2 V
Differential Pressure Sensor 1: High	3251	3	Sensor/harness open or shorted to +B	DPF differential pressure sensor voltage: above 4.8 V
Intake Throttle Lift Sensor: Low	523582	4	Intake throttle lift sensor low	Intake throttle lift sensor voltage: below 0.151 V
Intake Throttle Lift Sensor: High	523582	3	Intake throttle lift sensor high	Intake throttle lift sensor voltage: above 4.848 V
Emission Deterioration	3252	0	DOC is heated up due to unburned fuel	T1 - T0 ≥ 250℃ (482℉)
Exhaust Gas Temperature Sensor 0: Emergency High	4765	0	DOC inlet temperature (T0) high	DOC inlet temperature (T0): above 700 ℃ (1292℉)
Exhaust Gas Temperature Sensor 1: Emergency High	3242	0	DPF inlet temperature (T1) high	DPF inlet temperature (T1): above 715 ℃ (1319℉)
Exhaust Gas Temperature Sensor 2: Emergency High	3246	0	DPF outlet temperature (T2) high	DPF outlet temperature (T2): above 820 ℃ (1508℉)
Excessive PM3	3701	15	PM accumulation level 3	PM accumulation above trigger level Regeneration level = 3
Excessive PM4	3701	16	PM accumulation level 4	PM accumulation above trigger level Regeneration level = 4
Excessive PM5	3701	0	PM accumulation level 5	PM accumulation above trigger level Regeneration level = 5
Low Boost Pressure	132	15	Hose between turbo-blower outlet and inlet flanges disconnected Boost pressure sensor failure	Boost pressure sensor output below the target in high air flow operating condition
Low Coolant Temperature During Shutdown Regeneration	523589	17	Engine warm-up conditions not met during regeneration mode (Low coolant temperature)	Engine coolant temperature stays below 65℃ (149℉) for more than 1500 s during shutdown regeneration
Shutdown Regeneration Timeout	523590	16	Timeout error: incomplete regeneration due to low DPF temperature	Regeneration not completed in 2700 s

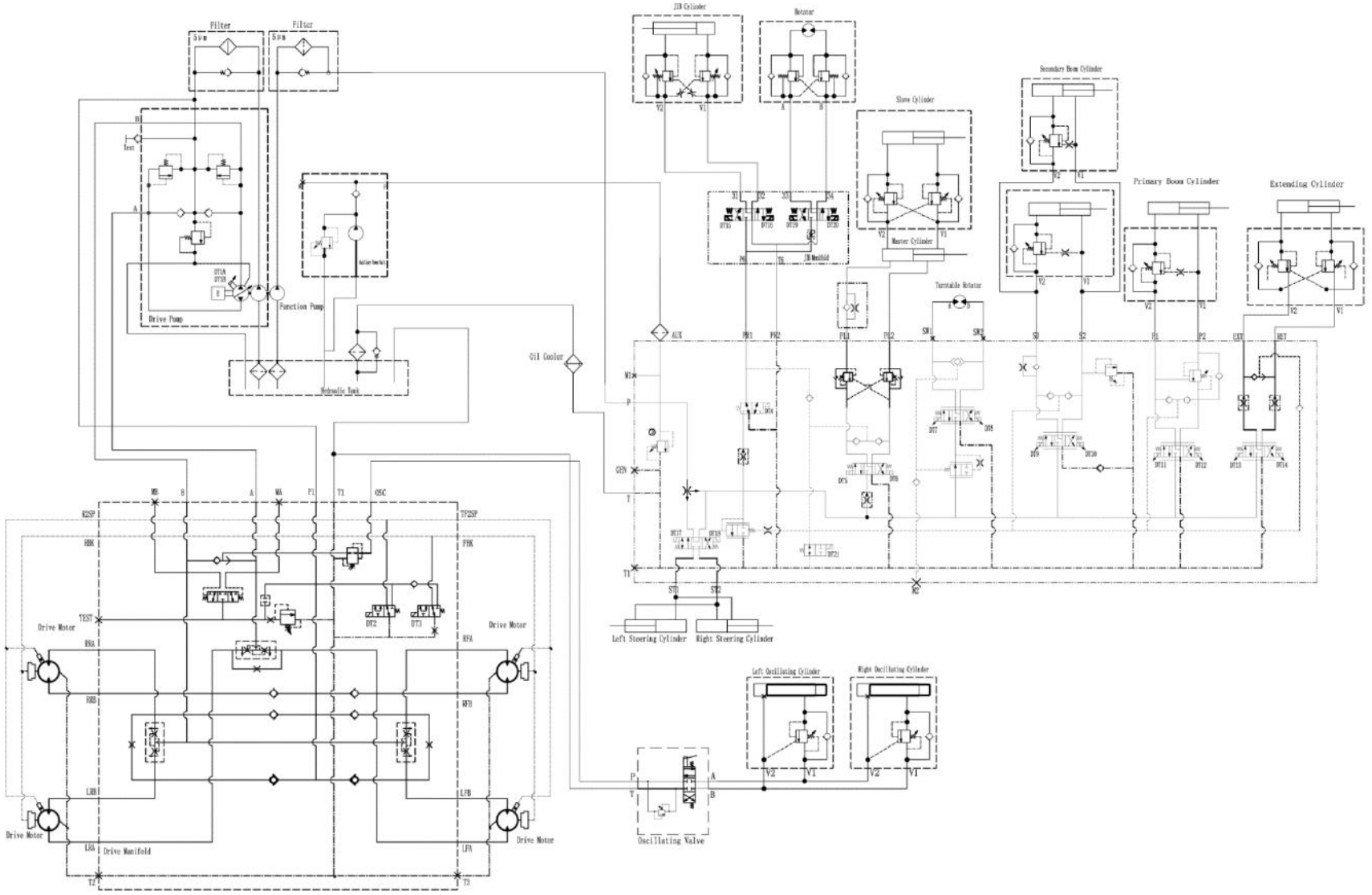
All Exhaust Temperature Sensors Failure	523599	0	Simultaneous failure of all exhaust temperature sensors	Simultaneous failure of all exhaust temperature sensors (sensor low)
Emergency High Temperature: DTC Downstream Exhaust Gas Temperature High	523601	0	Outputs of exhaust temperature sensors 0, 1, 2	All exhaust gas temperatures (T0, T1 and T2) reduced to 300℃ (572℉)
High Regeneration Frequency	523602	0	Time interval from the end time to the start time of the regeneration	The regeneration time interval occurs three times continuously within 30 min
Overheat Prevention	523603	15	Coolant temperature	Engine coolant temperature ≥ 110 ℃ (230℉)
CAN2 Bus Off	523547	2	CAN2 shorted to +B/GND, or high traffic error	CAN2 Bus Off
No Communication with EGR	523578	2	No communication with EGR	CAN off
CAN1 Bus Off	523604	2	CAN1 shorted to +B/GND, or high traffic error	CAN1 Bus Off
CAN-KBT Frame Error	523548	2	CAN-KBT original frame open circuit	CAN2 KBT frame open circuit
CAN CCVS (Stop Switch and Vehicle Speed) Frame Error	523591	2	CAN_CCVS communication interruption	CAN CCVS frame timeout
CAN CM1 (Regeneration Switch) Frame Error	523592	2	CAN_CM1 communication interruption	CAN CM1 frame timeout
CAN ETC5 (Neutral Switch) Frame Error	523595	2	CAN_ETC5 communication interruption	CAN ETC 5 frame timeout
CAN TSC1 Frame Error	523596	2	CAN_TSC1 communication interruption	No “C1 cache" request initiated for 3 consecutive times after the override control request (non-0x00) is issued
CAN EBC1 Frame Error	523598	2	CAN_EBC1 communication interruption	CAN EBC1 frame timeout

7.4 Kubota EUⅤ Schematic Diagram

Electrical schematic diagram



Hydraulic schematic diagram


Filter
Filter
Drive Pump
Function Pump
Hydraulic Tank
Oil Cooler
Drive Manifold
Drive Motor
Drive Motor
Drive Motor
Drive Motor
Oscillating Valve
Left Steering Cylinder
Right Steering Cylinder
Left Oscillating Cylinder
Right Oscillating Cylinder
Master Cylinder
Slave Cylinder
Primary Boom Cylinder
Extending Cylinder