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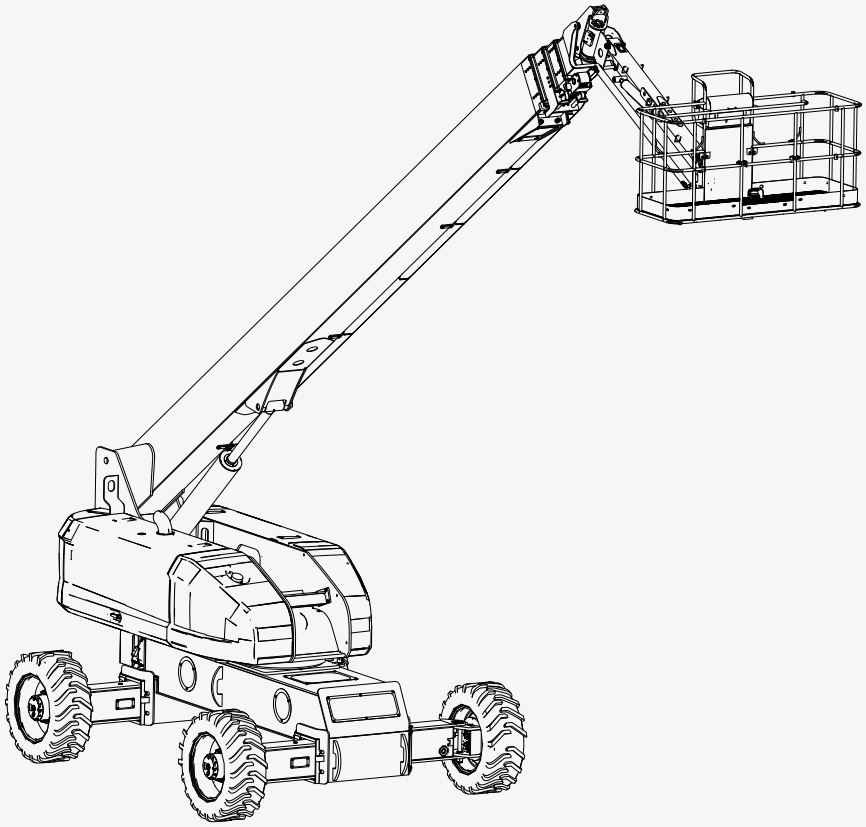
Translated version

Maintenance Manual

GTBZ42J/TB42RJ/TB1370RJ
TB42RJ/TB1370RJ



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⚠ WARNING

Operating, servicing and maintaining this vehicle or equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure and avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle or equipment in a well-ventilated area and wear gloves or wash your hands frequently when servicing. For more information, go to: www.P65warnings.ca.gov.

For disposal, please comply with local regulations.

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To Users

Thank you for choosing and using the machinery of **Hunan Sinoboom Intelligent Equipment Co., Ltd.**

Use this machine only to transport tools to work locations and for performing tasks on the work platform. Only authorized personnel who have received appropriate MEWP training may operate this machine. Before using the machine, carefully read and fully understand this manual and strictly follow its relevant instructions. Different countries, regions, or governments may have equipment operating regulations that conflict with this manual. The stricter safety operating regulations should be followed. Our company will not be liable for any adverse consequences arising from the failure to operate and use the machine in accordance with this manual or other relevant regulations.

This manual provides necessary safety precautions and maintenance instructions for users. This manual covers the basic configuration information of one or more models. Please refer to the information applicable to your machine model. Treat this manual as an integral part of the machine and keep it with the machine at all times This manual may not be copied, distributed, sold, or altered without written permission from Sinoboom.

Due to continuous improvement and upgrading of product design and different product models covered, some charts and textual content in the manual may be not applicable to your machine. Our company reserves the right to revise the contents of this manual due to technological improvements. Changes will be made without prior notice. Contact Sinoboom to obtain the most current version of the manual.

Please go to www.sinoboom.com.cn to download your desired Operation Manual, Maintenance Manual and Parts Manual.

If you have any questions, contact **Hunan Sinoboom Intelligent Equipment Co., Ltd.**

Manual Revision History:

Manual Version	Date	Description
A	December 2018	Original issue
B	November 2023	Updated manual, added maintenance and service intervals and items, specifications of major components, oil requirements, Hengli multi-way valve configuration, maximum working envelope limit, overload limit, and control system etc.

Applicable Models

The manual applies to the following models and serial numbers:

Model	Metric Trade Name	Imperial Trade Name	Serial No.
GTBZ42J	TB42RJ	TB1370RJ	0504400138 to current
TB42RJ	TB42RJ	TB1370RJ	

Note:

- Check the machine model and serial number on the machine nameplate. The location of the nameplate can be found in the ***Decals Diagram*** section of the Operation Manual.
- Product model numbers are indicated on the nameplates to distinguish products with different main technical parameters.
- Product trade names (product commercial codes) are used for marketing purposes and machine decals for the differentiation of products with different main technical parameters. Product trade names are categorized as metric and imperial trade names: metric trade names are applicable to regions/countries using the metric system or as specifically requested by customers; imperial trade names are applicable to regions/countries using the imperial system or as specifically requested by customers.

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1 SAFETY WARNING SYMBOLS AND SIGNS

The safety warning symbols used on the machine and in the manuals have the following meanings:

Safety warning symbol. This symbol is used to alert you to potential hazards. Observe all safety instructions following a symbol to avoid possible injuries.

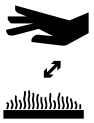
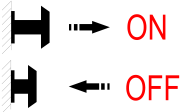
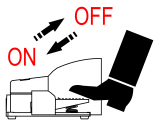
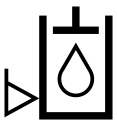
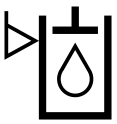
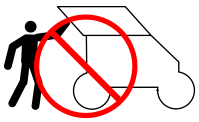
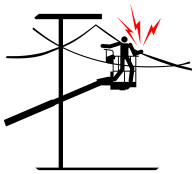
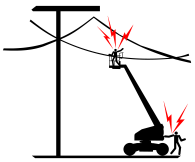
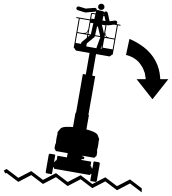
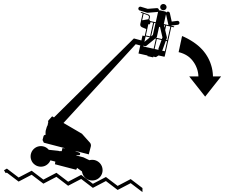
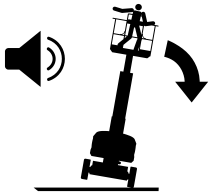
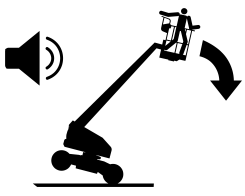
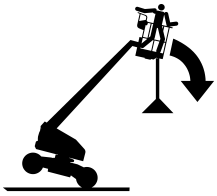
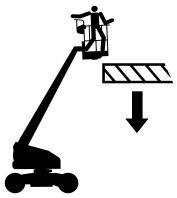
⚠ DANGER
Indicates an imminently hazardous situation that, if not avoided, *will* result in death or serious injury.

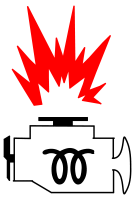
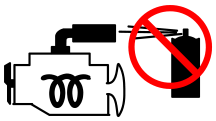
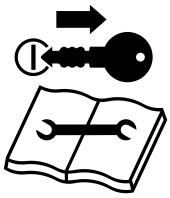
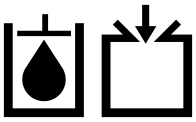
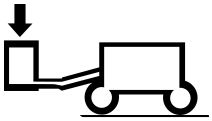
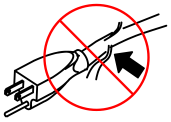
⚠ WARNING
Indicates an imminently hazardous situation that, if not avoided, *could* result in death or serious injury.

⚠ CAUTION
Indicates an imminently hazardous situation that, if not avoided, *could* result in minor or moderate injury.

Notice
Indicates information directly or indirectly related to personal safety, machine damage, or property loss.

The safety signs used on the machine and in the manuals have the following meanings:

 Read the Maintenance Manual	 Anchorage point only for 1 person	 Wind speed	 Chemical burns hazard	 Wedge the wheels
 Refer to the Operation Manual	 Add lubricant	 Crushing hazard – safety shoes required	 Danger of hot, high-pressure fluid spray	 Wind
 Noise level	 Burn hazard	 Keep a safe distance from high temperatures	 Pull out-ON Press-OFF	 Alarm sounding
 Depress – ON Release – OFF	 Hydraulic oil level - low	 Hydraulic oil level - high	 Temperature	 Replace with tires of the same specification
 Only qualified maintenance personnel may access the compartment	 Electrocution hazard on platform	 Electrocution hazard on the ground and platform	 Tipping hazard – avoid uneven ground	 Tipping hazard – avoid uneven ground
 Tipping hazard – never use machine in strong, gusty winds	 Tipping hazard – never use machine in strong, gusty winds	 Tipping hazard – never push or pull objects outside the platform	 Tipping hazard – never suspend objects from the platform	 Tipping hazard – never place ladders and scaffolding on the platform
				

Collision hazard – keep the platform clear of obstacles below when lowering the platform	Collision hazard – keep head clear of overhead obstacles when raising platform	Crushing hazard – keep hands clear from overhead obstacles when raising platform	Fall hazard – never climb on platform guardrails	Fall hazard – never climb on the boom
 Keep clear from the rotating platform	 Engine preheating explosion hazard	 Never use ether or other starting additives for machines equipped with a glow plug	 Fuel explosion hazard	 Wear protective clothing and safety goggles
 Only qualified maintenance personnel may perform maintenance work	 Lateral force	 Electrocution hazard	 Battery explosion hazard	 No smoking or open flames/sparks
 No smoking or open flames/sparks	 Lifting point	 Lashing point	 Tire ground pressure	 Hydraulic oil filler
 Platform load capacity	 Do not use damaged power cords	 Tool or weight	 Fast/high speed	 Slow/low speed
 Horn				

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2 MAINTENANCE SAFETY PRECAUTIONS

2.1 GENERAL

This chapter covers safety precautions that must be taken when servicing the mobile elevating work platform. Before carrying out any repair work, the maintenance personnel must carefully read and understand all warnings and precautions, and follow the maintenance instructions in this manual to perform all necessary maintenance on the mobile elevating work platform.

⚠ WARNING

It is forbidden to alter or modify the machine without the written permission of Hunan Sinoboom Intelligent Equipment Co., Ltd.

2.2 INSTRUCTIONS BEFORE MAINTENANCE

Requirements for Maintenance Personnel

The maintenance personnel are responsible for maintaining the machine and ensuring its safe use and normal operation. Before inspecting and maintaining this machine, the maintenance personnel should read, understand and comply with all applicable regulations and requirements of employers, local authorities and governments related to the application of this machine, and read and fully understand this manual.

The maintenance personnel shall:

- obtain appropriate qualification or authorization
- be experienced professional technicians or engineers
- be familiar with the machine being repaired and its hazards
- receive appropriate training, including but not limited to training on the use of special equipment
- be familiar with the safety precautions and related operating procedures for maintaining this machine

NOTICE

- *Only authorized personnel who have received appropriate training and obtained qualifications can repair this machine.*
- *People who have consumed alcohol or taken medicine, those who are overtired or depressed, and those who are physically unwell are prohibited from repairing the machine.*

Precautions before Maintenance

Before inspecting and maintaining the machine as well as during the process of maintenance, maintenance personnel must be careful and take measures to avoid dangerous situations. Those measures include, but are not limited to, the following:

1. Choose an appropriate location for the maintenance procedures.
   - Always park the machine on level, firm ground for maintenance, and ensure that the maintenance area is clean and unobstructed.
   - If the machine uses the engine as the main power source, ensure that the maintenance site is open and well ventilated. The exhaust gases from the engine contain chemicals that may cause suffocation or poisoning, so forced ventilation measures must be taken if it is necessary to start the engine in a restricted indoor area. A hose can be connected to the exhaust pipe to discharge the exhaust gases to the outside, and the doors and windows shall be opened for air circulation.
2. Choose appropriate safety equipment.
   - The maintenance personnel must find out various potential hazards that may arise during the inspection and maintenance work, and select appropriate safety protective devices according to the work type and work place conditions, such as safety helmets, protective masks, protective gloves, goggles, protective clothing, safety belts and safety shoes.
   - Before carrying out inspection and maintenance work, check that the protective devices are not damaged and are used correctly.
   - Safety protective devices must be inspected regularly and replaced if any damage is found.

2.3 MAINTENANCE SAFETY

3. Choose appropriate repair tools.
   - Before conducting any inspection and maintenance work, the maintenance personnel shall prepare appropriate maintenance tools as required by the work, such as wrench, screwdriver, pliers, multimeter, pressure gauge, lubrication device, jack and lifting equipment.
   - While choosing a jack or lifting equipment, confirm whether its carrying capacity can meet the requirements of use. Refer to the ***Weight of Major Components*** section to select the device with sufficient load capacity.
   - Service tools must be kept clean and in good condition.
4. Lock the wheels after the machine is parked to prevent it from rolling.
5. Do not perform inspection and maintenance work after the machine is started.
   - Before performing inspection and/or maintenance work, make sure the machine is turned off, and remove the key. An “Out of Service” warning sign can be placed next to the turntable control box and/or platform control box, or the main power switch can be pressed to prevent machine start up.

     ⚠ WARNING

     If an unrelated person inadvertently starts the machine during inspection or maintenance, it may cause machine damage or personal injury.

   - If inspection or maintenance work must be carried out while the machine is running at least two people should work together. One person must be close to the turntable control panel or platform control panel so as to be able to turn off the machine any time if necessary while a second person carries out inspection or maintenance work, both persons shall maintain close contact with each other at all times.
6. Before carrying out maintenance work on electrical components always press (shut off) the main power switch.
7. Before carrying out inspection and maintenance work, clean the machine. Prevent dust or debris from getting into the machine parts during maintenance to affect machine performance.

Please strictly follow the above requirements during the maintenance process. In addition, take other measures to ensure safety during the maintenance process as appropriate for the working environment.

Unsafe Maintenance Hazards

⚠ WARNING

- Before performing any adjustment or service operations, power off all control units and ensure that all moving parts are safely secured and cannot move unintentionally.
- Before performing any adjustment or service operations, ensure that the boom is stowed. Never work under a raised platform/boom. If it becomes necessary to work under the raised platform/boom, the platform and boom must be supported with appropriate safety supports.
- When lifting or moving heavy parts of the machine, use equipment with sufficient capacity, and never place heavy objects in an unstable position after moving.
- When machine parts are lifted by other equipment, ensure that there are no persons are under and/or around the equipment.
- When striking brass rods with a mallet, make sure to wear eye protection.
- If you need to replace parts, use only original parts specified by Sinoboom.
- Do not wash the machine with water. The machine contains electronic components such as solenoid valves and sensors, which may fail or operate erratically after water ingress. If it is necessary to wash with water, turn off the main power switch before proceeding. Only turn the power back on after ensuring the machine is completely dry.
- Make sure the machine is turned off before using flushing equipment (such as high-pressure water gun) to clean the machine. Do not direct water or steam ejected from the flushing equipment at electrical components, as this may cause short-circuits or electrical shocks.
- After maintenance is completed, thoroughly clean up any spilled hydraulic oil, and avoid allowing it to be spilled on the ground.
- After maintenance is completed, immediately wash off any hydraulic oil that may have come into contact with your skin.
- Waste hydraulic fluids, fuels, coolants and refrigerants must be recycled or disposed as per local regulations.

⚠ WARNING

High Temperature and High Pressure Hazards

⚠ WARNING



- High surface temperatures may be present on some components during the operation of the machine or after the machine has been operating for some time. High temperatures may cause burns through skin contact. Do not touch any hot parts!
- It is forbidden to repair or tighten hydraulic hoses or seals while the machine is operating or when the oil system is under pressure.
- Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and the hydraulic oil should completely cool down.
- For engine-powered machines, do not attempt to open the radiator cover when the machine has not cooled fully.
- Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.
- Never check for hydraulic leakages by hand. Use a piece of cardboard or stiff paper to locate leaks, and wear gloves to protect your hands from spraying hydraulic fluid.
- Do not operate the machine in case of hydraulic or air leaks. Oil or air leakage from the hydraulic system may penetrate and burn the skin.
- Never plug hydraulic leaks by hand. If there is a leak, the pressure of the hydraulic system should be released first, maintenance/repair should be carried out after the hydraulic oil has cooled down.
- If injury occurs due to high temperature and/or high pressure, seek immediate medical attention. If treatment is not carried out immediately, serious complications may result.

Welding and Grinding Operation Hazards

⚠ WARNING

- Welding, grinding and polishing operations must follow the appropriate local safety procedures.
- Before performing welding, grinding and polishing operations, turn off the machine's power, and ensure that all wires or cables are connected correctly.
- Do not use the machine as a ground wire during welding and grinding operations.
- Always make sure that all power tools are placed completely within the perimeter of the platform. Do not hang the cords of power tools on the guardrail of the platform or in any work area outside the platform, and do not hang the power tools directly by their cords.

Fire and Explosion Hazards

⚠ WARNING


- Do not operate the machine, charge the battery or refuel the machine in places where potentially flammable or explosive gases may be present.
- Refueling and charging should be carried out in a well-ventilated place without flames, sparks, and other hazards that may cause fire or explosion.
- For engine-powered machines, do not refuel the machine while the engine is running.
- Never spray ether or other starting agents into glow-plug-equipped engines (engine-powered machines).
- Never touch the battery terminals or cable clamps with tools that can generate sparks.
- Only approved non-flammable cleaning solutions should be used on the machine.

Battery Hazard

⚠ WARNING

- Be sure to read and adhere to the battery manufacturer's recommendations on proper battery use and maintenance procedures.
- Individuals without adequate professional qualification should not repair and maintain the battery system, otherwise this may cause personal injury or damage to the battery system.

- Individuals without adequate professional qualification should not modify parameters, signal lights, etc. during the operation of the battery system, otherwise this may cause personal injury or damage to the battery system.

- Always wear goggles, protective gloves and protective clothing, and remove all rings, watches and other accessories before servicing the battery. Contact with live circuits may result in death or serious injury.

- Before replacing the battery, be sure to select an appropriate number of personnel and suitable lifting methods.
- It is forbidden to modify the battery system without approval to avoid serious accidents.
- When maintaining electrical components, the battery should be disconnected.
- Do not place tools or other metal objects across the two terminals of the battery.
- The battery charger can only be connected to a grounded three-wire AC power outlet. Make sure the charger is working properly before charging. Do not connect the battery directly to a power outlet.
- If the battery becomes hot, deformed, leaks, emits an unusual smell, or produces smoke during use, stop using the battery immediately and report to the relevant maintenance personnel promptly.
- Batteries contain sulfuric acid and can produce explosive mixtures of hydrogen and oxygen. Keep any materials (including cigarette/smoking materials) that can cause sparks or flames away from batteries to prevent explosion.
- Never touch the battery terminals or cable clamps with tools that can generate sparks.
- Never charge the battery in direct sunlight. The battery should be charged in a well-ventilated place.

⚠ CAUTION

- Avoid spilling battery acid or allowing it to come into contact with unprotected skin. If battery acid spills, use water mixed with bicarbonate (baking soda) to neutralize the acid. In case of contact with battery acid, rinse the acid off immediately with plenty of water and seek medical attention promptly.
- Always keep the battery upright. If the battery is placed on its side or diagonally, liquid may spill from the battery.
- Discarded batteries can be hazardous. Do not dispose of them casually. If you need to discard them, please contact a battery recycling company.

Notice

- **Please use the charger provided by the manufacturer to charge the battery.**
- **The charging process must be completed in full. Frequent intermittent charging can damage the battery.**
- **The battery is only suitable for use with the equipment it was provided with at the time of manufacture. Do not use the battery for other purposes.**
- **Do not reverse the positive and negative terminals of the battery for use.**
- **Do not short-circuit the positive and negative terminals of the battery system.**
- **Do not place objects or tools on the battery to prevent short circuiting it.**
- **Do not strike, throw, step on, or hit the battery with sharp objects.**
- **Do not immerse the battery in water, acidic, alkaline or salty solutions, and protect the battery from rain.**
- **The battery should be fully charged immediately after each use of the machine, then the machine power switch should be turned off.**

Notice

Battery over-discharge (continued use of battery with level of less than 10%) or battery under-voltage caused by long-term non-charging (battery with level of less than 10% not charged for more than three days), resulting in battery capacity attenuation and failure, are not covered by the warranty.

2.4 CONSIDERATIONS AFTER MAINTENANCE

1. Check the machine functions so that faults such as oil leakage or poor operation can be detected as early as possible.
2. After maintenance, all maintained parts must be checked for abnormal operation, oil leakage, loose bolts and other problems.
3. The safety protective device needs to be restored or reinstalled, and if necessary, be recalibrated.
4. After maintenance, clear up the tools and equipment for maintenance, remove the replaced parts and loose objects, and clean up the site.
5. Record inspections and maintenance as required.

NOTICE

All maintenance work should include mandatory confirmation that the machine is operating properly.

⚠ WARNING

- **It is forbidden to dump waste liquids at will. Waste liquids should be discharged into appropriate containers.**
- **Waste hydraulic fluids, fuels, coolants and refrigerants should be recycled or disposed as per local regulations.**

3 TECHNICAL CHARACTERISTICS

3.1 MACHINE SPECIFICATIONS

Table 3-1 Specifications

Item	Metric	Imperial
Product Category		
Power type	Diesel engine-powered	
Axle type	Oscillating telescopic axle	
Dimensions		
Max. platform height	41.6 m	136 ft 6 in
Max. working height	43.6 m	143 ft 0.5 in
Maximum horizontal reach (restricted/unrestricted)	21.6 m/23.8 m	70 ft 10 in/78ft 1 in
Maximum horizontal working envelope (restricted/unrestricted)	22.2 m/24.4 m	72 ft 10 in/80 ft 1 in
Overall length (stowed)	14.96 m	49 ft 1 in
Overall length (transport)	12.3 m	40 ft 4 in
Overall width (stowed)	2.49 m	8 ft 2 in
Overall height (stowed)	3.15 m	10 ft 4 in
Wheelbase	3.81 m	12 ft 6 in
Ground clearance	0.65 m	2 ft 1.6 in
Platform dimensions (L×W×H)	2.44 m×0.91 m×1.1 m	8 ft×3 ft×3 ft 7 in
Performance		
Rated platform load capacity (restricted/unrestricted)	480 kg/250 kg	1058 lb/551 lb
Max. number of people on the platform (restricted/unrestricted)	2 persons and tools/2 persons and tools	
Travel speed (stowed)	0 ~ 4.4 km/h	0 ~ 2.7 mph
Travel speed (raised)	0 ~ 1 km/h	0 ~ 0.62 mph
Gradeability (4WD)	40%	
Turntable slewing (angle/continuity)	360°/continuous	
Platform rotation angle	180 °	
Jib rotation angle	235° (left 160°/right 75°)	
Max allowable tilt angle	5 °	
Turning radius (inside/outside)	4.37 m/6.81 m	14 ft 4 in/22 ft 4 in
Turntable tailswing	1.68 m	5 ft 6 in

Table 3-1 Specifications (continued)

Item	Metric	Imperial
Tire (spec/type)	445/50D710 18PR (foam-filled)	
Maximum operating noise level	82 dB	
IP rating	IP65	
Maximum total vibration on the platform	2.5 m/s²	
Maximum whole body vibration value (WBV)	0.5 m/s²	
Power		
Drive×steer	4WD×4WS	
Engine (power/rpm/spec/brand/emission standard)	54 kW/2400 rpm/QSF2.8t3TC72/Cummins/China III 55.4 kW/2600 rpm/TD2.9 L4/Deutz/EU Stage IIIB, EPA 4 55.8 kW/2200 rpm/YCF3075-T480/Yuchai/China IV	
Hydraulic tank capacity	280 L	61.6 gal (UK)/74.0 gal (US)
Hydraulic oil refueling volume	240 L	52.8 gal (UK)/63.4 gal (US)
Diesel tank capacity	200 L	44.0 gal (UK)/52.8 gal (US)
Hydraulic system pressure	28 MPa	4061 Psi
Battery (voltage, capacity)	12 V, 220 Ah	
System voltage	12 VDC	
Control voltage	12 VDC	
Weight		
Gross weight	22400 kg	49383 lb
Ground bearing data		
Maximum tire load	12700 kg	27999 lb
Ground pressure	865 kPa	125 Psi
Environment		
Maximum allowable lateral force (restricted/unrestricted)	400 N	90 lbf
Maximum allowable wind speed	12.5 m/s	28 mph
Maximum allowable altitude	1000 m	3280 ft
Allowable ambient temperature range	-20℃ ~ 40℃	-4℉ ~ 104℉
Maximum allowable relative humidity	90%	

Table 3-1 Specifications (continued)

Item	Metric	Imperial
Storage environment	Store at -20℃ to 50℃ (-4℉ to 122℉) in a well-ventilated environment with 90% relative humidity (max.) (20℃ [68℉]), protected from rain, sun, corrosive gas, flammable or explosive materials.	

Note:
a) The platform height plus the operator height (assumed to be 2 m [6 ft 7 in]) equals the working height.
b) The maximum horizontal reach plus the arm length of the operator (assumed to be 0.6 m [1 ft 11 in]) is the maximum horizontal working envelope.
c) The ground bearing data is approximate, without considering different options, thus it is applicable only when taking an adequate safety factor into account.
d) Different regions should use hydraulic oil, engine oil, coolant, fuel, lubricating oil, etc., that are suitable for the environmental temperature requirements.
e) In cold weather, auxiliary devices are needed to start the machine.
f) Rated platform load capacity refers to the maximum allowable load on the platform, including the weight of persons, materials, tools, accessories and other objects.

3.2 SPECIFICATIONS OF MAJOR COMPONENTS

Diesel Engine

Table 3-2 Cummins QFS2.8t3TC72

Type	Water-cooled
Number of cylinders	4
Bore	94 mm (3.7 in)
Stroke	100 mm (3.9 in)
Total displacement	2.8 L 0.62 gal (Imperial) 0.74 gal (US)
Compression ratio	16.7:1
Firing order	1-2-4-3
Output power	54 kW@2200 rpm
Torque	270 Nm (199 ft-lb)@1800 rpm
Cooling system capacity	3.5 L 0.77 gal (Imperial) 0.92 gal (US)
Engine oil capacity	8 L 1.76 gal (Imperial) 2.11 gal (US)
Idle speed	1000 rpm
Low speed	1600 rpm
High speed	2600 rpm

Table 3-3 Deutz TD2.9 L4

Type	Water-cooled
Number of cylinders	4
Bore	92 mm (3.6 in)
Stroke	110 mm (4.3 in)
Total displacement	2.9 L 0.64 gal (Imperial) 0.77 gal (US)
Compression ratio	17:1
Firing order	1-2-4-3
Output power	55.4 kW@2200 rpm
Torque	260 Nm (192 ft-lb)@1800 rpm
Cooling system capacity	3.3 L 0.73 gal (Imperial) 0.87 gal (US)
Engine oil capacity	8.9 L 1.96 gal (Imperial) 2.35 gal (US)
Idle speed	1200 rpm
Low speed	1600 rpm
High speed	2600 rpm

Table 3-4 Yuchai YCF3075-T480

Type	In-line, water-cooled, 4-stroke
Number of cylinders	4
Bore	96 mm (3.78 in)

Table 3-4 Yuchai YCF3075-T480 (continued)

Stroke	103 mm (4.06 in)
Total displacement	2.982 L 0.66 gal (Imperial) 0.79 gal (US)
Compression ratio	17.5:1
Firing order	1-3-4-2
Output power	55.8 kW@2200 rpm
Maximum torque	310 Nm (228.6 ft-lb)@1300–1600 rpm
Cooling system capacity	4 L 0.88 gal (Imperial) 1.06 gal (US)
Engine oil capacity	9.8 L 2.16 gal (Imperial) 2.59 gal (US)
Idle speed	1000±25 rpm

Reducer

Table 3-5 Drive Reducer (PN.204020000024)

Model	IFT017T3B076A
Maximum withstand voltage	25 MPa (3926 psi)
Braking torque	285 Nm (210 ft-lb)
Maximum output torque	17000 Nm (12538 ft-lb)
Transmission ratio	75.6

Table 3-6 Slewing Reducer (PN.204020000031)

Model	IHKN6B56EA
Output torque	5040 Nm (3717 ft-lb)
Output rpm	14.3 rpm
Input torque	107 Nm (79 ft-lb)
Input rpm	800 rpm
Transmission ratio	56

Table 3-6 Slewing Reducer (PN.204020000031) (continued)

Static brake torque (without back pressure)	200 Nm (147.5 ft-lb)
Starting oil pressure	1.8 MPa (261 psi)

Battery

Table 3-7 Maintenance-free AGM Battery (PN.203100000061)

Rated voltage	12 V
Capacity	110 Ah
Cold starting current	925 CCA @ –18℃ (0℉)

Table 3-8 Maintenance-free AGM Battery (PN.203100003158)

Rated voltage	12 V
Rated capacity	100 Ah
Low-temperature starting current	830 A @ –18℃ (0℉)

Turntable Rotation Motor

Table 3-9 Drive Motor (PN.202020000023)

Large displacement	45 ml/r
Small displacement	13.3 ml/r
Rated speed (large displacement)	3500 rpm
Rated speed (small displacement)	4500 rpm
Rated pressure	17.5 MPa (2538 psi)

Table 3-10 Hydraulic Motor (PN.202020000005)

Model	255060A6312BAAAA
Rated rpm	890 rpm
Maximum output torque	138 Nm (102 ft-lb)
Rated pressure	15.5 MPa (2250 psi)

Hydraulic Pump

Table 3-11 Open-circuit Variable-displacement Pump (PN.202010000029)

Type	Plunger pump
Maximum displacement	49 ml/r
Rated RPM	2200 rpm

Table 3-12 Open-circuit Variable-displacement Pump (PN.202010003068)

Type	Plunger pump
Maximum displacement	45 ml/r
Rated pressure	32 MPa (4641 psi)
Switch-off pressure	22 MPa (3191 psi)
Rated RPM	2700 rpm

Table 3-13 Closed-circuit Variable-displacement Pump (PN.202010000005)

Type	Plunger pump
Displacement	46 ml/r
Oil charging pump displacement	13.9 ml/r
Rated RPM	4100 rpm
Rated pressure	28 MPa (4061 psi)

Table 3-14 Closed-circuit Variable-displacement Pump (PN.202010000006)

Displacement	46 ml/r
RPM	2200 rpm
Input power	40 kW
High-pressure pressure-relief valve	30 MPa (4351 psi)
Pressure shut-off valve	28 MPa (4061 psi)
Throttle blipping pressure	2 MPa (290 psi)

Table 3-15 Closed-circuit Variable-displacement Pump (PN.202010000045)

Type	Plunger pump
Displacement	46 ml/r
Oil charging pump displacement	13.8 ml/r

Table 3-15 Closed-circuit Variable-displacement Pump (PN.202010000045) (continued)

Rated rpm	3300 rpm
High-pressure pressure-relief valve setting pressure	32 MPa (4641 psi)
Pressure shut-off valve setting pressure	30 MPa (4351 psi)

Table 3-16 Closed-circuit Variable-displacement Pump (PN.202010000054)

Type	Plunger pump
Displacement	45.9 ml/r
Oil charging pump displacement	13.9 ml/r
Rated rpm	3000 rpm
Rated pressure	28 MPa (4060 psi)

Power Unit

Table 3-17 Power Unit (PN.202010000041)

Electric motor	
Power	2.2 kW
Voltage	DC 12V
Current	300 A
Pump	
Displacement	4.3 ml/r
Rated operating pressure	15 MPa (2176 psi)
Maximum operating pressure	25 MPa (3626 Psi)
RPM	500 ~ 4000 rpm

Table 3-18 Power Unit (PN.202010003090)

Electric motor	
Power	2.2 kW
Voltage	DC 12V
Current	300 A
RPM	500 ~ 4000 rpm
Pump	

Table 3-18 Power Unit (PN.202010003090) (continued)

Displacement	4.2 ml/r
Rated operating pressure	16 MPa (2321 Psi)
Maximum operating pressure	25 MPa (3626 psi)
RPM	600 ~ 4000 rpm

3.3 MOVEMENT SPEED

Table 3-19

Item	Time
Raise main boom*	100 ~ 115 s
Raise main boom**	100 ~ 120 s
Lower main boom*	90 ~ 110 s
Lower main boom**	100 ~ 120 s
Rotate the turntable (360°)-stowed	175 ~ 190 s
Rotate the turntable (360°)-fully extended	500 ~ 550 s
Extend main boom*	81 ~ 101 s
Extend main boom**	120 ~ 140 s
Retract main boom*	81 ~ 101 s
Retract main boom**	120 ~ 140 s
Rotate platform (160°)	24 ~ 30 s
Level platform upward	50 ~ 60 s
Level platform downward	40 ~ 50 s
Raise jib	32 ~ 40 s
Lower jib	32 ~ 40 s
Rotate jib (full left to full right)	60 ~ 68 s
Rotate jib (full right to full left)	60 ~ 68 s
Drive-stowed position	22 ~ 28 s
Drive-operating position	100 ~ 120 s

Table 3-19 (continued)

Item	Time
Braking distance at maximum drive speed	0.8 ~ 1.2 m (2.62 ~ 3.9 ft)

a) The function speed depends on the start and end point of the movement rather than the controls/ switches.
b) The drive speed test results will vary with tires of different specifications.
c) All speed tests should be conducted from the platform controller. Test results will differ if tested from the ground controller.
d) All tests should be conducted with the hydraulic oil temperature at 50 - 60 ℃. If the hydraulic oil temperature is too low the test results will be affected.

Test requirements

Raise/lower main boom* : With the main boom fully retracted, raise the main boom from the level to the highest position, and lower it from the highest to the level position. Perform this maneuver for two times.

Raise/lower main boom** : With the boom fully extended, raise the main boom from the level to the highest position, and lower it from the highest to the level position. Perform this maneuver for two times.

Rotate turntable : With the boom centered, rotate the turntable through one full cycle for two times.

Extend/retract main boom* : With the main boom horizontally positioned, extend the main boom from the fully retracted to the fully extended position, and retract it from the fully extended to the fully retracted position again. Perform this maneuver for two times.

Extend/retract main boom** : With the main boom fully raised, extend the main boom from the fully retracted to the fully extended position, and retract it from the fully extended to the fully retracted position. Perform this maneuver for two times.

Rotate platform : With the platform horizontal, rotate the platform from the full left to the full right position, and rotate it again from the full right to the full left position. Perform this maneuver for two times.

Raise/lower the jib : With the platform horizontal, raise the jib from the lowest to the highest, and lower it from the highest to the lowest. Perform this maneuver for two times.

Rotate the jib : With the platform horizontal, rotate the jib from the full left to the full right position, and rotate it again from the full right to the full left position. Perform this maneuver for two times.

Drive-stowed position : With the machine on a level surface, switch to high engine speed and high travel speed, and push the travel joystick to maximum travel distance to drive the machine forward and reverse for 30 m (98.4 ft) respectively for two times.

Drive-operating position: With the machine on a level surface, switch to high engine speed, and push the travel joystick to maximum travel distance to drive the machine forward and reverse for 30 m (98.4 ft) respectively for two times.

Braking distance: With the machine on a level surface, switch to high engine speed, and push the travel joystick to maximum travel distance.

3.4 WEIGHT OF MAJOR COMPONENTS

⚠ WARNING

- **Never attempt to move heavy components without the assistance of mechanical equipment.**
- **It is forbidden to place heavy components in an unstable position.**

Table 3-20

Component	Metric (kg)	Imperial (lb)
Chassis assembly	6957	15338
Turntable assembly	9021	19888
Boom assembly	5869	12939
Base boom	1625	3583
First telescopic boom section	1003	2211
Second telescopic boom section	641	1413
Third telescopic boom section	525	1157
Jib assembly	197	434
Platform	195	430
Platform swing cylinder	29	64
Jib swing cylinder	80	176
Jib cylinder	36	79
Main boom upward leveling cylinder	51	112
Main boom lift cylinder	478	1054
Boom telescopic cylinder	601	1325
Counterweight	3730	8223
Slewing reducer	91	201
Slewing bearing	212	467
Slewing motor	8.5	19
Slewing mechanism	328	723
Engine - Cummins QSF2.8t3TC72	241	531
Engine - Deutz TD2.9L4	237	522
Engine - Yuchai YCF3075-T480	300	661
Engine assembly	515	1135
Drive reducer	116	256

Table 3-20 (continued)

Component	Metric (kg)	Imperial (lb)
Drive motor	15	35
Tire assembly	266	586
Axle telescopic cylinder	42	93
Steering cylinder	27	60
Oscillating cylinder	34	75
Note: The weight of certain components will vary with the options configured on the machine.		

3.5 PRESSURE LIMITS

Table 3-21

Movement	Maximum pressure
Steer	18 MPa (2611 psi)
Boom extending	18 MPa (2611 psi)
Boom up/down	12 MPa (1740 psi)
Turntable slewing	18 MPa (2611 psi)
Axle telescoping	22 MPa (3191 psi)
Platform leveling	20.7 MPa (3002 psi)
Jib up/down	19 MPa (2756 psi)

3.6 OIL SPECIFICATION DESCRIPTION

Notice

- *Please choose suitable oil according to the ambient temperature and local regulations; the use of unsuitable oil will damage the machine components.*
- *Oils of different grades or viscosities should not be mixed. When refilling oil, the oil being added must be of the same grade and viscosity as that of the oil currently in use in the machine.*
- *For special environments or special operating requirements please contact Sinoboom.*

⚠ WARNING

- **Before refilling oil, wait until the temperature of the machine drops to room temperature, otherwise it may cause splashes, burns or other personal injury.**
- **The use of inferior oils is strictly prohibited. Using inferior oil may damage the machine, and faults caused by this are not covered by Sinoboom's warranty.**

Hydraulic Oil

Factory-filled hydraulic oil is usually L-HV32 or L-HM46 or as specified by customers. Different regions have different temperature environments, so please select the hydraulic oil suitable for your region according to the recommendations in the table below.

Table 3-22

Ambient temperature range	Sinopec	Mobil	Shell	Castrol
0℃ ~ 40℃ (32℉ ~ 104℉)	AE46	DTE 10 Excel 46	S2M46	Hyspin AWH-M46
-25℃ ~ 25℃ (-13℉ ~ 77℉)	L-HV32	DTE 10 Excel 32	TELLUS-S3VE32	Hyspin HVI-32
> 40℃ (104℉)	AE68	DTE 10 Excel 68	S2M68	Hyspin AWH-M68
< -30℃ (-22℉)	Special oil required, to be determined			

Gear Oil

The viscosity grade of gear oil generally added when the machine leaves the factory is 80W-90, suitable for use in regions with an environmental temperature of -12 to 40℃ (10.4 to 104℉). If the ambient temperature is beyond the applicable range, please select a suitable gear oil.

Different regions have different temperature environments. Please refer to the table below for the recommended usage temperature of different viscosity grades of gear oil to select the appropriate gear oil.

Table 3-23

Viscosity grade	Recommended ambient temperature
75W-90	-40-30℃ (-40-86℉)
80W-90	-26-40℃ (-14.8-104℉)
85W-90	-12-40℃ (10.4-104℉)

Fuel Oil

⚠ WARNING

- **The machine should be refueled in a well-ventilated place with no flames, sparks, and other hazards that may cause fire or explosion.**
- **Do not refuel the machine while the engine is running.**

This machine uses diesel oil as the fuel, and the diesel oil filled in the factory is generally 0# diesel, which is suitable for use in areas with ambient temperature above 4℃ (39.2℉). The diesel oil has been basically emptied when the machine leaves the factory, and the user needs to fill diesel oil with appropriate grade according to the ambient temperature and emission regulations. The following table shows the recommended ambient temperature for different grades of diesel oil:

Table 3-24

Grade	Recommended ambient temperature
5#	Above 8℃ (46.4℉)
0#	Above 4℃ (39.2℉)
-10#	Above -5℃ (23℉)
-20#	Above -14℃ (39.2℉)
-35#	Above –29℃ (6.8℉)
-50#	Above -44℃ (-47.2℉)

NOTICE

Please go to a certified gas station to purchase qualified fuel oil. It is recommended prepare an oil storage tank with fuel filter and store the fuel oil in the tank for more than two days to precipitate impurities and water before use.

Engine Oil

The engine oil filled in the factory is generally 15W-40 oil of CJ-4 grade, which is suitable for use in areas with temperature range of -15℃ ~ 40℃ (5 ~ 104℉). If the ambient temperature is beyond the applicable range, please select other appropriate engine oil.

The ambient temperature varies from region to region, so please choose the oil viscosity grade that suits your region according to the recommendations in the table below.

Table 3-25

Viscosity grade	Recommended ambient temperature
0W-30	-35 ~ 0℃ (-31 ~ 32℉)
5W-40	-25 ~ 30℃ (-13 ~ 86℉)

Table 3-25 (continued)

Viscosity grade	Recommended ambient temperature
15W-40	-15 ~ 40℃ (5 ~ 104℉)
20W-50	0℃ ~ 50℃ (32 ~ 122℉)

Coolant

Different coolants will be filled as appropriate for different engines while the machine leaves the factory.

Table 3-26

Engine brand	Coolant type
Deutz	-45℃ coolant
Yanmar	-40℃ coolant
Other brands	-35℃ coolant

The above coolants could meet the requirements of use of most regions. If the machine is to be operated in special environments where the above coolants are not applicable, contact Sinoboom for appropriate coolants.

3.7 TORQUE SPECIFICATIONS

Special Torque Requirements

Please refer to the table below for special torque requirements:

Table 3-27 Special Torque Requirements

No.	Description	Torque value
1	Wheel nut	700 Nm (517 ft-lb)
2	Drive reducer bolt	280 Nm (206 ft-lb)
3	Slewing reducer bolt	450 Nm (332 ft-lb)
4	Slewing bearing bolt	650 Nm (479 ft-lb)
5	Slewing cushion valve bolt	35 Nm (26 ft-lb)
6	Counterweight bolt	770 Nm (567 ft-lb)
7	Cable nut M8	9 ~ 11 Nm (6.6 ~ 8.1 ft-lb)
8	Cable nut M10	18 ~ 23Nm (13.2 ~ 17ft-lb)
9	Wire rope adjusting nut	112 Nm (82.68 ft-lb)
9	Wire rope locking nut	14 Nm (10.3 ft-lb)
10	Jib swing cylinder top center bolt	1500 Nm (1106 ft-lb)
11	Jib swing cylinder top bolt	600 Nm (442 ft-lb)
12	Jib swing cylinder bottom bolt	300 Nm (221 ft-lb)
13	Platform swing cylinder nut	630 Nm (465 ft-lb)
14	Platform swing cylinder bolt	70 Nm (52 ft-lb)

Fastener Torque Specifications

Torque metric bolts to the values specified in the table below unless special torque requirements are stated in this manual or other instructions.

Table 3-28 Fastener Torque Specifications – Metric

Nominal diameter (mm)	Pitch (mm)	Class 8.8	Class 10.9	Class 12.9
5	0.8	7 Nm (5 ft-lb)	9 Nm (7 ft-lb)	10 Nm (7 ft-lb)
6	1	12 Nm (9 ft-lb)	15 Nm (11 ft-lb)	18 Nm (13 ft-lb)
8	1.25	30 Nm (22 ft-lb)	35 Nm (26 ft-lb)	42 Nm (31 ft-lb)
	1	30 Nm (22 ft-lb)	37 Nm (27 ft-lb)	45 Nm (33 ft-lb)
10	1.5	55 Nm (41 ft-lb)	75 Nm (55 ft-lb)	85 Nm (63 ft-lb)
	1.25	56 Nm (41 ft-lb)	77 Nm (57 ft-lb)	87 Nm (64 ft-lb)
	1	60 Nm (44 ft-lb)	80 Nm (59 ft-lb)	92 Nm (68 ft-lb)
12	1.75	95 Nm (70 ft-lb)	125 Nm (92 ft-lb)	150 Nm (111 ft-lb)
	1.5	100 Nm (74 ft-lb)	130 Nm (96 ft-lb)	155 Nm (114 ft-lb)
	1.25	105 Nm (77 ft-lb)	135 Nm (100 ft-lb)	160 Nm (118 ft-lb)
14	2	150 Nm (110 ft-lb)	200 Nm (148 ft-lb)	230 Nm (170 ft-lb)
	1.5	165 Nm (122 ft-lb)	210 Nm (155 ft-lb)	250 Nm (184 ft-lb)
16	2	230 Nm (170 ft-lb)	300 Nm (221 ft-lb)	360 Nm (266 ft-lb)
	1.5	250 Nm (184 ft-lb)	320 Nm (236 ft-lb)	380 Nm (280 ft-lb)
18	2.5	320 Nm (236 ft-lb)	420 Nm (310 ft-lb)	500 Nm (369 ft-lb)
	1.5	360 Nm (266 ft-lb)	470 Nm (345 ft-lb)	550 Nm (406 ft-lb)
20	2.5	450 Nm (332 ft-lb)	600 Nm (443 ft-lb)	700 Nm (516 ft-lb)
	1.5	500 Nm (369 ft-lb)	650 Nm (479 ft-lb)	770 Nm (568 ft-lb)
22	2.5	600 Nm (443 ft-lb)	800 Nm (590 ft-lb)	980 Nm (723 ft-lb)
	2	650 Nm (479 ft-lb)	850 Nm (627 ft-lb)	1050 Nm (774 ft-lb)
24	3	750 Nm (553 ft-lb)	1050 Nm (774 ft-lb)	1250 Nm (923 ft-lb)
	2	800 Nm (590 ft-lb)	1100 Nm (811 ft-lb)	1300 Nm (959 ft-lb)
27	3	1150 Nm (848 ft-lb)	1500 Nm (1106 ft-lb)	1800 Nm (1327 ft-lb)
30	3.5	1500 Nm (1106 ft-lb)	2000 Nm (1475 ft-lb)	2400 Nm (1770 ft-lb)

Unless special torque requirements are specified in this manual or other instructions, torque Unified Thread Standard bolts (label: UNF) to the values specified in the table below.

Table 3-29 Fastener Torque Specifications – Unified Thread Standard (UNC)

Nominal diameter (in)	Opposite nut size (s)	Class 5	Class 8
1/4-20	7/16"	10 Nm (7 ft-lb)	14 Nm (10 ft-lb)
5/16-18	1/2"	21 Nm (15 ft-lb)	29 Nm (21 ft-lb)
3/8-16	9/16"	37 Nm (27 ft-lb)	51 Nm (38 ft-lb)
7/16-14	5/8"	60 Nm (44 ft-lb)	82 Nm (60 ft-lb)
1/2-13	3/4"	90 Nm (66 ft-lb)	130 Nm (96 ft-lb)

Table 3-29 Fastener Torque Specifications – Unified Thread Standard (UNC) (continued)

Nominal diameter (in)	Opposite nut size (s)	Class 5	Class 8
9/16-12	13/16"	130 Nm (96 ft-lb)	180 Nm (133 ft-lb)
5/8-11	15/16"	178 Nm (131 ft-lb)	250 Nm (184 ft-lb)
3/4-10	1-1/8"	315 Nm (232 ft-lb)	445 Nm (328 ft-lb)
7/8-9	-	509 Nm (375 ft-lb)	715 Nm (527 ft-lb)

Unless special torque requirements are specified in this manual or other instructions, torque Unified Thread Standard bolts (label: UNF) to the values listed in the table below.

Table 3-30 Fastener Torque Specification-Unified Thread Standard bolts (UNF)

Nominal diameter (in)	Opposite nut size (s)	Class 5	Class 8
1/4-28	7/16"	11.5 Nm (8 ft-lb)	16 Nm (11 ft-lb)
5/16-24	1/2"	23 Nm (17 ft-lb)	32 Nm (24 ft-lb)
3/8-24	9/16"	41 Nm (30 ft-lb)	58 Nm (43 ft-lb)
7/16-20	5/8"	65 Nm (48 ft-lb)	92 Nm (68 ft-lb)
1/2-20	3/4"	100 Nm (74 ft-lb)	145 Nm (107 ft-lb)
9/16-18	13/16"	145 Nm (107 ft-lb)	200 Nm (148 ft-lb)
5/8-18	15/16"	200 Nm (148 ft-lb)	280 Nm (207 ft-lb)
3/4-16	1-1/8"	350 Nm (258 ft-lb)	495 Nm (365 ft-lb)
7/8-14	-	560 Nm (413 ft-lb)	780 Nm (575 ft-lb)

Hydraulic Hose Torque

The hydraulic hoses must be installed with the following torques.

Table 3-31 Hydraulic Hose Torque

Metric thread	L (light-duty)	S (heavy-duty)
M12 × 1.5	19±1 Nm (14±1 ft-lb)	
M14 × 1.5	26±2 Nm (19±2 ft-lb)	
M16 × 1.5	40±3 Nm (30±2 ft-lb)	
M18 × 1.5	50±4 Nm (37±3 ft-lb)	
M20 × 1.5	-	60±4 Nm (44±3 ft-lb)
M22 × 1.5	70±5 Nm (52±4 ft-lb)	-
M24×1.5	-	85±6 Nm (63±4 ft-lb)
M26 × 1.5	90±6 Nm (66±4 ft-lb)	-
M30 × 2	120±8 Nm (89±6 ft-lb)	140±10 Nm (103±7 ft-lb)
M36 × 2	150±12 Nm (111±9 ft-lb)	180±12 Nm (133±9 ft-lb)

Table 3-31 Hydraulic Hose Torque (continued)

Metric thread	L (light-duty)	S (heavy-duty)
M42 × 2	-	260±16 Nm (192±12 ft-lb)
M45 × 2	240±15 Nm (177±11 ft-lb)	-
M52 × 2	250±16 Nm (184±12 ft-lb)	280±18 Nm (207±13 ft-lb)

Hydraulic Fitting Torque

The hydraulic pipe fittings with metric thread must be installed with the following torques.

Table 3-32 Hydraulic Fitting Torque – Metric

Thread size	Installed with aluminum	Installed with steel	
	ED, O-ring + Circlip	ED, O-ring + Circlip	O-ring seal
L (light-duty)			
M10×1	18±1 Nm (13±1 ft-lb)	20±2 Nm (15±2 ft-lb)	18±1 Nm (13±1 ft-lb)
M12×1.5	30±2 Nm (22±2 ft-lb)	35±2 Nm (26±2 ft-lb)	30±2 Nm (22±2 ft-lb)
M14×1.5	42±3 Nm (31±2 ft-lb)	48±4 Nm (35±3 ft-lb)	35±2 Nm (26±2 ft-lb)
M16×1.5	55±4 Nm (41±3 ft-lb)	60±4 Nm (44±3 ft-lb)	40±3 Nm (30±3 ft-lb)
M18×1.5	75±5 Nm (55±4 ft-lb)	75±5 Nm (55±4 ft-lb)	45 ± 3 Nm (33 ± 4 ft-lb)
M22×1.5	90±6 Nm (66±4 ft-lb)	130±8 Nm (96±6 ft-lb)	60±4 Nm (44±3 ft-lb)
M27×2	120±8 Nm (89±6 ft-lb)	185±12 Nm (136±9 ft-lb)	100±7 Nm (74±5 ft-lb)
M30×2	140±8 Nm (103±6 ft-lb)	245±15 Nm (181±11 ft-lb)	135±8 Nm (100±6 ft-lb)
M33×2	180±10 Nm (133±7 ft-lb)	320±20 Nm (236±15 ft-lb)	160±10 Nm (118±7 ft-lb)
M42×2	240±15 Nm (177±11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	210±13 Nm (155±10 ft-lb)
M48×2	280±20 Nm (207±15 ft-lb)	540±30 Nm (398±22 ft-lb)	260±15 Nm (192±11 ft-lb)
S (heavy-duty)			
M12×1.5	33±2 Nm (24±2 ft-lb)	43±3 Nm (32±2 ft-lb)	35±2 Nm (26±2 ft-lb)
M14×1.5	42±3 Nm (31±2 ft-lb)	50±4 Nm (37±3 ft-lb)	45 ± 3 Nm (33 ± 2 ft-lb)
M16×1.5	55±4 Nm (41±3 ft-lb)	75±5 Nm (55±4 ft-lb)	55±4 Nm (41±3 ft-lb)
M18×1.5	75±5 Nm (55±4 ft-lb)	95±6 Nm (70±4 ft-lb)	70±5 Nm (52±4 ft-lb)
M22×1.5	90±6 Nm (66±4 ft-lb)	140±8 Nm (103±6 ft-lb)	100±10 Nm (74±7 ft-lb)
M27×2	120±8 Nm (89±6 ft-lb)	185±12 Nm (136±9 ft-lb)	160±10 Nm (118±7 ft-lb)
M30×2	140±8 Nm (103±6 ft-lb)	245±15 Nm (181±11 ft-lb)	210±13 Nm (155±10 ft-lb)
M33×2	180±10 Nm (133±7 ft-lb)	320±20 Nm (236±15 ft-lb)	260±15 Nm (192±11 ft-lb)
M42×2	240±15 Nm (177±11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	330±20 Nm (243±15 ft-lb)
M48×2	280±20 Nm (207±15 ft-lb)	540±30 Nm (398±22 ft-lb)	420±25 Nm (310±18 ft-lb)

The hydraulic pipe fittings with British Standard Pipe (BSP) thread must be installed with the following torques.

Table 3-33 Hydraulic Fitting Torque - British Standard Pipe (BSP)

Thread size	Installed with aluminum	Installed with steel	
	ED, O-ring + Circlip	ED, O-ring + Circlip	O-ring seal
L (light-duty)			
G1/8A	20±1 Nm (15±1 ft-lb)	20±1 Nm (15±1 ft-lb)	-
G1/4A	35±2 Nm (26±2 ft-lb)	40±2 Nm (30±2 ft-lb)	-
G3/8A	50±3 Nm (37±2 ft-lb)	75±5 Nm (55±2 ft-lb)	-
G1/2A	75±5 Nm (55±2 ft-lb)	95±6 Nm (70±4 ft-lb)	-
G3/4A	120±8 Nm (89±6 ft-lb)	185±12 Nm (136±9 ft-lb)	-
G1A	180±10 Nm (133±7 ft-lb)	320±20 Nm (236±15 ft-lb)	-
G1-1/4A	240±15 Nm (177±11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	-
G1-1/2A	280±20 Nm (207±15 ft-lb)	540±30 Nm (398±22 ft-lb)	-
S (heavy-duty)			
G1/4A	40±3 Nm (30±2 ft-lb)	43±3 Nm (32±2 ft-lb)	-
G3/8A	55±3 Nm (41±2 ft-lb)	85±5 Nm (63±4 ft-lb)	-
G1/2A	80±5 Nm (59±4 ft-lb)	120±8 Nm (89±6 ft-lb)	-
G3/4A	120±8 Nm (89±6 ft-lb)	185±12 Nm (136±9 ft-lb)	-
G1A	180±10 Nm (133±7 ft-lb)	320±20 Nm (236±15 ft-lb)	-
G1-1/4A	240±15 Nm (177±11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	-
G1-1/2A	280±20 Nm (207±15 ft-lb)	540±30 Nm (398±22 ft-lb)	-

The hydraulic pipe fittings with Unified Thread Standard (UNC/UNF) thread must be installed with the following torques.

Table 3-34 Hydraulic Fitting Torque - Unified Thread Standard (UNC/UNF)

Thread size	Installed with aluminum	Installed with steel
	O-ring seal	O-ring seal
L (light-duty)		
7/16-20	21±2 Nm (15±2 ft-lb)	21±2 Nm (15±2 ft-lb)
9/16-18	34±2 Nm (25±2 ft-lb)	35±2 Nm (26±2 ft-lb)
11/16-12	40±3 Nm (30±2 ft-lb)	50±4 Nm (37±3 ft-lb)
3/4-16	50±3 Nm (37±2 ft-lb)	65±4 Nm (48±3 ft-lb)
7/8-14	75±5 Nm (55±4 ft-lb)	110±8 Nm (81±6 ft-lb)
1-1/16-12	110±8 Nm (81±6 ft-lb)	140±10 Nm (103±7 ft-lb)
1-5/16-12	160±10 Nm (118±7 ft-lb)	210±15 Nm (155±11 ft-lb)
S (heavy-duty)		
7/16-20	21±2 Nm (15±2 ft-lb)	23±2 Nm (17±2 ft-lb)
9/16-18	34±2 Nm (25±2 ft-lb)	40±3 Nm (30±2 ft-lb)

Table 3-34 Hydraulic Fitting Torque - Unified Thread Standard (UNC/UNF) (continued)

Thread size	Installed with aluminum	Installed with steel
	O-ring seal	O-ring seal
11/16-12	40±3 Nm (30±2 ft-lb)	65±4 Nm (48±3 ft-lb)
3/4-16	50±3 Nm (37±2 ft-lb)	80±6 Nm (59±4 ft-lb)
7/8-14	75±5 Nm (55±4 ft-lb)	125±10 Nm (92±7 ft-lb)
1-1/16-12	110±8 Nm (81±6 ft-lb)	185±15 Nm (136±11 ft-lb)
1-5/16-12	160±10 Nm (118±7 ft-lb)	280±20 Nm (207±15 ft-lb)

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4 MAINTENANCE INSTRUCTIONS

4.1 INSPECTION AND PREVENTIVE MAINTENANCE SCHEDULE

This section provides safety and other vital information for machine operators. To extend the service life of the machine and ensure safe operation, all necessary inspections and maintenance work must be completed before the machine is put into service.

It is crucial to develop and adhere to a comprehensive inspection and preventive maintenance program. This manual outlines the regular inspections and maintenance procedures recommended by Hunan Sinoboom Intelligent Co., Ltd. Consult your national, regional or local regulations for aerial work platforms. The frequency of the inspection and maintenance must be increased as required by environmental conditions, requirements and frequency of usage.

Pre-delivery Inspection

The pre-delivery inspection shall be performed by qualified Sinoboom technicians.

A pre-delivery inspection shall be performed before each sale, lease or rental delivery.

Refer to the ***Inspection and Preventive Maintenance Schedule*** for items requiring a PDI. Refer to the corresponding section of this manual to perform inspection and maintenance procedures.

Pre-operation Inspection

A pre-operation inspection must be performed before each start or restart of work, change of operator, and after each maintenance operation. Refer to the pre-operation inspection section of the Operation Manual for detailed information. The Operation Manual must be entirely read and understood before performing the pre-operation inspection. The Operation Manual must be read and understood in its entirety before performing a pre-operation inspection.

Regular Inspections

Regular inspections shall be performed by qualified Sinoboom technicians.

Regular inspections must be performed after the machine has been in service for 3 months or 250 hours, whichever comes first, or if it has been out of service for more than 3 months. The frequency of the inspection and maintenance must be increased as required by environmental conditions, requirements and frequency of usage.

The items included in the regular inspections are identical to the pre-delivery inspection.

Annual Machine Inspection

An annual machine inspection must be performed once a year and no later than 13 months from the date of the previous annual inspection. Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends this task be performed by a factory-trained service technician, a person recognized by Sinoboom as one who, by qualification, certificate and training, has successfully demonstrated the ability and proficiency to service, repair and maintain the Sinoboom model in question.

Refer to the ***Inspection and Preventive Maintenance Schedule*** for items requiring annual inspection, and refer to the corresponding section of this manual to perform inspection and maintenance procedures.

Preventive Maintenance

Preventive maintenance procedures shall be performed by qualified Sinoboom technicians. The frequency of the inspection and maintenance must be increased as required by environmental conditions, requirements and frequency of usage.

Refer to the ***Inspection and Preventive Maintenance Schedule*** for items requiring preventive maintenance. Refer to the corresponding section of this manual to perform inspection and maintenance procedures.

Responsibilities and Qualifications for Performing Inspection and Maintenance

Table 4-1

Inspection Type	Inspection Frequency	Primary Responsible Persons	Service Qualifications
Pre-operation Inspection	Before starting/restarting work, change of user, after each maintenance activity.	User or operator	Properly trained user or operator
Pre-delivery Inspection (PDI)	Before each sale, lease or rental delivery	Owner, dealer or user	Qualified Sinoboom technician
Regular Inspections	In service for 3 months or 250 hours (whichever comes first) or out of service for more than 3 months	Owner, dealer or user	Qualified Sinoboom technician
Annual Machine Inspection	Once a year and no later than 13 months from the date of the previous annual inspection	Owner, dealer or user	Factory-trained service technician
Preventive Maintenance	At intervals specified in the ***Inspection and Preventive Maintenance Schedule***	Owner, dealer or user	Qualified Sinoboom technician

Inspection and Preventive Maintenance Schedule

Perform inspection and preventive maintenance for the items in the table below at the specified intervals. Maintenance and inspection intervals are calculated based on the months of service or the “accumulated operating hours” displayed on the turntable controls (whichever comes first).

Inspection intervals are based on the use of the machine under normal operating conditions. The intervals should be shortened accordingly when operating in harsh environmental conditions.

Table 4-2 Inspection and Preventive Maintenance Schedule

Item	Interval		
	Before each delivery[1] or quarterly[2]	Semiannually[3]	Annually[4]
Chassis assembly			
Chassis	2	2	2
Tires	1, 2	1, 2	1, 2
Wheel nuts	1[50]	1[50]	1[50]
Drive motor	1, 6	1, 6	1, 6
Drive reducer	1, 2, 6	1, 2, 6	1, 2, 6, 11
Steering components	1, 2	1, 2	1, 2
Axles/extending axles (if equipped)	1, 2, 3	1, 2, 3	1, 2, 3
Bearings	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12

Table 4-2 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1] or quarterly[2]	Semiannually[3]	Annually[4]
Turntable assembly			
Turntable	2	2	2
Slewing bearing or slewing reducer	1[50], 2, 6, 12	1[50], 2, 6, 12	1[50], 2, 6, 8, 12
Slewing reducer (if equipped)	1, 2, 6	1, 2, 6	1, 2, 6, 11
Central rotary joint	6	6	6
Slewing motor	1, 6	1, 6	1, 6
Turntable slewing pin (if equipped)	1, 2, 3	1, 2, 3	1, 2, 3
Turntable cover assembly	1, 2, 3	1, 2, 3	1, 2, 3
Hydraulic generator (if equipped)	1, 3, 6, 10[NO.1]	1, 3, 6, 10[NO.1]	1, 3, 6, 10[NO.1]
Boom assembly			
Boom weldment	1, 2	1, 2	1, 2
Hose, wire rope bracket	1, 2	1, 2	1, 2
Pulley and wear pad assembly	1, 2	1, 2	1, 2
Bearings	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Cover or protective guard (if equipped)	1, 2	1, 2	1, 2
Drag chain or wire rope system (if equipped)	1, 2, 3, 5	1, 2, 3, 5	1, 2, 3, 5
Pivot pins and retaining rings	1, 2	1, 2	1, 2
Platform assembly			
Guardrails	2	2	2
Access gate	1, 2, 3	1, 2, 3	1, 2, 3
Floor	2	2	2
Swing Cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Safety belt anchorage point	1, 2, 7	1, 2, 7	1, 2, 7
Power system			
Refer to the machine's maintenance manual for inspection and preventive maintenance schedule, and the engine manual provided with the machine for detailed instructions.			
Hydraulic system			
Hydraulic Pump	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Bleeding the oscillating cylinder (if equipped)	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic valves	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6

Table 4-2 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1] or quarterly[2]	Semiannually[3]	Annually[4]
Counterbalance valve, check of the locking function (if equipped)	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic hoses, pipes and fitting	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic tank, cap and vent	1, 2, 3, 5, 6	1, 2, 3, 5, 6	1, 2, 3, 5, 6
Hydraulic tank suction filter	1, 5, 6	1, 5, 6	1, 5, 6, 11
Hydraulic tank return filter	1, 5, 6, 11[50]	1, 5, 6, 11[50]	1, 5, 6, 11[50]
Hydraulic tank air filter	1, 5, 6	1, 5, 6, 11	1, 5, 6, 11
Hydraulic oil high-pressure filter	1, 5, 6, 11	1, 5, 6, 11	1, 5, 6, 11
Hydraulic oil	5, 6	5, 6	5, 6, 11
Electrical system			
Electrical wiring, connector	1, 2	1, 2	1, 2
Battery	1, 2, 6, 9, 12	1, 2, 6, 9, 12	1, 2, 6, 9, 12
Electrolyte	6	6	6
Charging function	3	3	3
Instruments, gauges, switches, lamps, horn	1, 3	1, 3	1, 3
Functions and controls			
Platform Controls	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Turntable controls	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Function control lock, secondary guarding device and brake	1, 3, 10	1, 3, 10	1, 3, 10
Foot switch	1, 3, 10	1, 3, 10	1, 3, 10
Emergency stop button (ground and platform)	1, 3, 10	1, 3, 10	1, 3, 10
Limit switches and power switch	1, 3, 10	1, 3, 10	1, 3, 10
Pothole protection device (if equipped)	1, 3, 10	1, 3, 10	1, 3, 10
Overload limit system	1, 3, 10	1, 3, 10	1, 3, 10
Tilt alarm	1, 3, 10	1, 3, 10	1, 3, 10
Drive brake	1, 3, 10	1, 3, 10	1, 3, 10
Slewing brake	1, 3, 10	1, 3, 10	1, 3, 10
Other inspection items			
Operation Manual in the manuals compartment	10	10	10
All decals/labels complete, clear and secure	10	10	10

Table 4-2 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1] or quarterly[2]	Semiannually[3]	Annually[4]
Annual inspection date of the machine	/	/	10
No unapproved changes or additions	10	10	10
All safety publications taken into account	10	10	10
General structural components and weldments	2	2	2
All fasteners, pins, protective guards and covers	1, 2	1, 2	1, 2
Greasing and lubricating according to specifications	10	10	10
Functional test of all systems	10	10	10
Paint and appearance	5	5	5
Inspection date stamped on the chassis	/	/	10
Notify Sinoboom of machine ownership (change)	/	/	10

Table 4-2 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1] or quarterly[2]	Semiannually[3]	Annually[4]
Note: [1] Before each sale, lease or shipment delivery; [2] In service for 3 months or 250 hours; or out of service for more than 3 months; [3] In service for 6 months or 500 hours; [4] Once a year and no later than 13 months from the date of the previous annual machine inspection; [50] The first inspection shall be performed once the machine reaches 50 hours in service for the first time. This occurs only once in the service life of the machine. [250] The first inspection shall be performed once the machine reaches 250 hours in service for the first time. This occurs only once in the service life of the machine. NO. [1] Before the machine is put into service for the first time, or before the first use after the oscillating cylinder or counterbalance valve has been replaced.			
Performance code: **1.** Check for correct installation (accurate position, firmly installed, tightened to the specified torque) **2.** Visual inspection for damage (cracks, cracked welds, deformation, wear, corrosion, excessive wear, gouges, abrasions and exposed threads) **3.** Check for normal function **4.** Return to neutral position or “off” position normally (the self-reset switch can return to neutral position or “off” position after released) **5.** Clean and free of foreign objects **6.** Check for correct level, sealing and leaks **7.** Labels complete, clear and secure **8.** Check for appropriate tolerances **9.** Fully charged **10.** Verify/perform **11.** Replace the oil or filter element **12.** Correctly lubricated			

4.2 GENERAL MAINTENANCE INSTRUCTIONS

Safety and Operating Standards

Before adjusting and repairing the machine, the following precautions should be taken:

1. Cut off the power source to make the machine unable to start, and have the machine marked.
2. All controls should be turned off to avoid accidental actuation of the control system.
3. If possible, lower the work platform to the lowest position; if not possible, ensure that the work platform will not fall.
4. Before loosening or removing the hydraulic components, the hydraulic oil pressure in the hydraulic lines should be released.

Some maintenance work may require the machine to be in a state other than those described in 1-4 above, and such work should be carried out in accordance with the specific safety measures listed in the Operation Manual and this manual.

During machine maintenance, personal safety should always be put first. Always take the weight of the parts into consideration and never attempt to move heavy parts without the assistance of mechanical equipment. It is forbidden to place heavy objects in an unstable position. Before lifting any machine parts, ensure the parts are sufficiently supported.

Cleaning

1. To extend the service life of the machine, the most important point is to prevent dirt or impurities entering the critical parts of the machine. Protective measures have been taken for the machine to prevent such ingress. Protective plates, covers, seals, and filters are installed to keep the air, fuel and oil supply clean. However, in order to ensure that protective measures function properly, they should be maintained at the prescribed interval.
2. When air, fuel, or oil lines are disconnected, their adjacent areas, openings and fittings should be cleaned. And immediately cover all openings to prevent foreign objects from entering.
3. During repair or maintenance, all components should be cleaned and inspected, and all piping and openings should be made clear. Cover all parts to keep them clean. All parts must be clean before installation. New parts should be stored in containers before use.

Components Disassembly and Installation

1. A safe and reasonable plan should be developed for the installation of machine components based on this manual and the site conditions.
2. The personnel carrying out the disassembly and installation should have appropriate ability, and should be able to use safety protection devices correctly.
3. Before installation, qualified personnel should inspect the ground, all concealed foundations and anchors, or there should be reliable documentation proving that the manufacturer's requirements are met.
4. The wind speed at the installation site should not be greater than 8.3m/s (18.6mph).
5. Before installation, check the site conditions such as power supply and ground conditions to make sure the installation requirements are met.
6. All components should be inspected prior to installation to verify they are in good condition.
7. High-strength bolts should be tightened in strict accordance with the requirements of this manual.
8. Acceptance of machine installed on site shall meet the following requirements:
   1) Relevant inspections and functional tests should be carried out to confirm that the machine has been installed correctly, that specific functional requirements are fulfilled and that all safety components are operating properly.
   2) Static and dynamic load tests should meet the relevant standards.
   3) Before putting the machine into service, the qualified person shall issue a handover certificate confirming the integrity of the machine. All test/inspection results should be recorded and an inspection report should be prepared (including the inspector’s name, title and company and inspection date).
9. Machine disassembly operation should also meet the safety requirements for installation.
10. If lifting tools are required to dis-assemble the machine, use the correct lifting points, lifting equipment and additional tools. Only use tested and certified tools and equipment.
11. If a component with the assembly angle relative to the support less than 90° needs to be removed, take special care since the eye bolt or similar bracket cannot provide adequate supporting force in such case.
12. If certain component is difficult to remove, check that all nuts, bolts, cables, brackets, wiring, etc. have been removed, and that adjacent components are not obstructing the removal.

Component Disassembling and Reassembling

When disassembling or reassembling a component, follow each step in sequence. If the disassembly or reassembly of one component has not been completed, do not proceed with another component. Always review the disassembly or assembly operation to make sure nothing is missing. No adjustments (except those recommended) may be made without prior approval.

Storage

Please follow the instructions below to ensure the best performance of cylinders and prevent corrosion due to long-term storage (indoor/outdoor):

- The machine should be in stowed position with all tires adjusted to keep aligned.
- Implement twice per week platform fully raising and lowering and steer left and right to lubricate the cylinders.

Scrap of Structural Parts

- When certain major structural parts fail to meet the requirements for safe use due to corrosion, wear or any other reasons, that part should be repaired or reinforced, or it should be scrapped.
- When certain stressed structural parts are permanently deformed and cannot be repaired, they should be scrapped.
- When certain major stressed structural parts lose overall stability and cannot be repaired, they should be scrapped.
- When certain structural parts or welds are cracked, the cause should be analyzed and reinforcing measures should be taken as appropriate for the force to be applied and the status of the crack. Continued use is only allowed if the structural part and weld meet the original design requirements; otherwise they should be scrapped.

Pressure-fit Parts

When assembling pressure-fit parts, use anti-seize or molybdenum disulfide-based compound to lubricate the meshing surface.

Bearing

1. After a bearing is removed, cover it to prevent staining with dust and abrasives. Use non-flammable cleaning solvent to clean bearings and allow them to dry in the shade. Compressed air can be used, but do not rotate the bearings.
2. If the races and balls (or rollers) have pits, notches or burn marks, the bearing should be scrapped.
3. If the bearing is still serviceable, apply a coat of oil on it and wrap it with clean paper (or wax paper). Do not unwrap reusable bearings or new bearings until they are ready to be installed.
4. Before installation, lubricate the new or reusable bearings. When try to press the bearing into the retainer or bore, apply the pressure on the outer race. If the bearing is to be mounted to a shaft, apply the pressure on the inner race.

Gaskets

Check if the hole in the gasket is aligned with the opening in the matching part.

Bolt Use and Torque Application

NOTICE

Self-locking fasteners such as nylon inserts and thread locking nuts must not be reinstalled after removal.

1. Always use a new replacement when installing locking fasteners. Use bolts with appropriate length. If the bolt is too long, it may be pressed against the adjacent part before tightening its head to the part to be mounted. If the bolt is too short, it will not have enough threads to bite and secure the parts. The replacement bolt must have the same or equivalent size as the original one.
2. In addition to the specific torque requirements given in this manual, standard torque values should be used on heat-treated bolts, studs, and steel nuts in accordance with recommended factory practice (see ***Page 20, Fastener Torque Specifications***).

Hydraulic Pipeline and Electrical Wiring

When unplugging or removing hydraulic lines or electrical wires from the machine, the hydraulic lines and electrical wires and their sockets should be clearly marked, so that reinstallation will be correct.

Hydraulic Hose and Fitting Tightening Procedures

The hydraulic hose and fitting must be installed as per the following requirements:

1. Before installation, check the seals on the hose and fitting, and replace the seal or even the hose assembly and fitting if the seal is found to be damaged or oil spills out of the seal. If not, clean the hose and fitting before installation.
2. If the seal is to be replaced, lubricate the replacement seal before installation.
3. To install the hose nut and fitting, align the fitting, hose and hose nut, and tighten the nut with the torque specified in and ***Page 23, Hydraulic Fitting Torque***. Once the tightening torque of the fitting or hose exceeds the specified value, its seal cannot be reused.
4. After installation, test all machine functions and check to ensure the hose, fitting and related components have no leaks.

Application of Insulating Silicone Grease to Electrical Connections

Insulating silicone grease should be applied to all electrical connections for the purpose of:

- Avoiding oxidization of the mechanical joints between the male pin and female pin.
- Avoiding electrical failure due to low conductivity between the pins in humid environment.

The following instructions should be observed to apply the insulating silicone grease to the electrical connections. Those instructions apply to all plugged connections outside of the power distribution box. The silicone grease is not suitable for the connectors with enclosed outer surface.

1. Prior to the machine assembling, apply silicone grease around the male pins and female pins inside the connectors to prevent oxidization. An injector may be used for the convenience of operation.

NOTICE

Oxidization exceeding a certain period will increase the resistance of the connector and eventually lead to electrical failure.

2. Silicone grease should be applied to each electrical cord that is exposed outside the connector to prevent short circuit. Besides, the joint between the male connector and female connector should also been applied with silicone grease. Other joints that may allow ingress of water into the connectors, like the area around the anti-pull buckle, should be properly sealed as well.

NOTICE

Since the electrical conductivity of cleaning solvents is superior to that of water, the conditions above are mostly likely to happen when using pressure cleaning method to clean the machine.

3. Silicone grease should be applied to each contact of the connectors for battery box and charger.

NOTICE

The setting-type sealant can be used to avoid short circuit and keep the connections tidy, but it will make the future removal of pins more difficult.

Lubrication

The relevant components should be lubricated at defined intervals using the lubricant with the quantity, type and grade as recommended in this manual. If the recommended lubricant is not available, contact local supplier to purchase the recommended or other satisfactory lubricant.

Hydraulic System

1. Contaminants are the primary hazard to the hydraulic system. Contaminants can enter the hydraulic system in various ways, such as improper use of hydraulic oil, moisture, grease, metal chips, sealing elements and sand entering the system during maintenance, or cavitation of the hydraulic pump due to insufficient system preheating or leakage of pump supply (suction) lines.
2. Oil in cloudy color indicates a high moisture or air content, which contributes to organic growth, leading to oxidation or corrosion. In such case, drain the waste oil in the hydraulic system, and fill with clean hydraulic oil after rinsing the hydraulic system.
3. Check the filter frequently for the presence of metal particles. Because hydraulic components are designed and manufactured to very tight tolerances, even a small amount of contaminants entering the system can cause wear or damage to hydraulic components and often lead to malfunction during machine operation. Hydraulic system filters should be inspected, cleaned or replaced as needed at required intervals.
4. Keep the hydraulic system clean. After disconnecting the hydraulic lines, seal the pipeline ports immediately to prevent contaminants from entering the hydraulic system. If signs of metal or rubber particles are found in the hydraulic system, the hydraulic oil should be drained immediately and the entire system flushed.

NOTICE

Metal particles may appear in the hydraulic oil or filter of a new machine due to wear of hydraulic components.

5. Disassemble or reassemble parts on clean workbenches. Clean all metal parts using a non-flammable cleaning solvent. Lubricate parts as needed to facilitate assembly.
6. Hydraulic oils of different brands or types should not be mixed. Because they may contain different essential additives or may have different oil viscosity. It is recommended to use high-quality mineral oil with the viscosity that is suitable for the operating environment temperature of the machine.
7. Unless otherwise expressly stated in this manual, the filter element must be replaced at least once a year or every 1000 working hours, and the replacement interval should be shorter in harsh working conditions.If hydraulic oil needs to be changed, use hydraulic oil meeting or exceeding the type and specification requirements in this manual. If the hydraulic oil with same type as that supplied with the machine is not available, consult local supplier to help you select the appropriate hydraulic oil. Do not mix petroleum with synthetic base oil.

8. Take all precautions to keep the hydraulic oil clean. If hydraulic oil must be poured from the original vessel into another vessel, ensure that the second vessel is kept clean and does not contain any contaminants. Make sure to clean the filter screen, and replace the filter element when changing the hydraulic oil in the hydraulic system.
9. After the machine is shut down, take proper preventive maintenance measures, thoroughly check all hydraulic components, piping, fittings, etc., and test each system for normal function before putting the machine into service again.

Battery

Clean the battery with a non-metallic brush and sodium bicarbonate aqueous solution, and then rinse it with clean water. After cleaning, allow the battery to dry completely, and apply anti-corrosion compound to the battery terminals.

Pins and Composite Bearing

1. The connecting pins should be removed and inspected in case any of the following defects is found:
   - Excessively tilted joint
   - Noise originating from the joint during operation
2. The composite bearing should be replaced in any of the following conditions:
   - Frayed or separated fiber on the sleeve surface
   - Cracked or damaged sleeve housing
   - Bearing moved or rotated into the housing
   - Debris embedded in the sleeve surface.
3. Replace the pivot pin after any of the following is detected (properly clean the pivot pin before inspection):
   - Wear in the bearing area
   - Flaking, pealing, scratches or abrasions on the pivot pin surface
   - Rusty pivot pin in the bearing area
4. Reassemble the connecting pin and composite bearing
   - Blow off the dirt and debris on the housing. Remove any foreign objects on the bearing and housing.
   - Clean the bearing and pivot pin with a cleaning agent to remove all grease and oil. The composite bearing uses dry coupling which does not require lubrication.
   - During installation and operation, inspect the pivot pin to ensure that there are no burrs, nicks or abrasions that could damage the bearing.

4.3 MAJOR MODIFICATION AND REPAIR

A major modification/repair is a modification/repair made to the entire machine or its parts that affects the stability, strength or performance of the machine.

Each time the machine owner/company makes a major modification/repair to the machine, it should be recorded using the ***Major Modification/Repair Record*** in the attachment to this manual. Keep the record properly until the machine is taken out of service, or as required by the machine owner/company.

Major modifications/repairs to the machine must be performed by a qualified service technician. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the ***Inspection and Preventative Maintenance Schedule*** . After all the inspection and verification results are good, the machine can be put back into service.

5 CHASSIS AND TURNTABLE ASSEMBLY

5.1 CHASSIS AND TURNTABLE SYSTEM

Chassis Tilt Sensing System

The chassis tilt sensing system measures the tilt angle of the chassis relative to the horizontal plane by means of a level sensor mounted in the turntable. The chassis tilt indicator on the platform display panel indicates if the chassis inclination exceeds the maximum allowable tilt angle. When the chassis tilt sensing system detects that the chassis inclination exceeds the maximum allowable tilt angle, the chassis tilt indicator will flash, all movements will be disabled. Refer to ***Tilt Protection Function*** for details.

Travel Drive System

This machine adopts four-wheel drive. The four-wheel drive system consists of one closed-circuit variable-displacement pump, four variable-displacement plunger motors, four drive reducers and one travel control valve. The drive speed depends on the closed-circuit variable-displacement pump, engine speed and motor displacement. Full-time control is applied for traction control. The drive function is limited by the position of the boom. See ***Page 37, Travel Speed Reduction System*** for details.

Steering Control System

The machine has the following four steering modes: rear-wheel steering, front-wheel steering, crab steering, and four-wheel steering modes. Each wheel is equipped with an angle sensor and a steering cylinder, and the control system will adjust the wheels to the desired angle as required by different steering modes and commands. When the operator moves the steering mode selector switch on the platform controls to select the desired steering mode, the corresponding steering mode indicator will illuminate to indicate the current steering mode. The steering control system can't be activated if the extending axles have not fully extended. Refer to the ***Axle Telescope Control System*** for details.

Travel Speed Reduction System

When the boom is in operating position, the travel speed of the machine is automatically limited to the operating travel speed.

Reverse Drive Confirmation System

The reverse drive confirmation system warns the operator of a situation in which the machine travels and steers in the direction opposite to the travel direction of the joystick. The reverse position indicator on the platform control box indicates such situation. When the boom is positioned between the two rear wheels, the system does not impose any restrictions on the travel of the machine. If the boom is positioned beyond any rear wheel while the machine is traveling, the reverse position indicator will flash, and the machine's driving and steering functions will be blocked. To restore the travel and steer functions, press the reverse position travel drive switch at the platform control box. The reverse position indicator will then illuminate, indicating that the machine's actual travel and steer direction is opposite to the travel direction of the joystick.

Axle Telescope Control System

The axle telescope control system controls the extending and retracting movements of four extending axles while the machine is traveling in straight driving mode. The axle extending and retracting movements are allowed only when the boom is in stowed position. The system detects if the axles have extended to the maximum length by the proximity switch mounted in the chassis, and the extending axle telescope indicator on the platform controls indicates such situation. To extend or retract the axles, press the extending axle telescope switch on the platform controls, the extending axle telescope indicator icon will flash to indicate the axles are extending/retracting. When the axles have fully extended, the extending axle telescope indicator icon will change to illuminate. When the axles have not fully extended, the boom will be limited in the non-operating position, and the steer function will be disabled.

5.2 TIRE ASSEMBLY

Checking Tires and Rims

Check the tires and rims daily and replace a tire if any of the following defects is found:

- The tire is severely cracked, broken, deformed or shows other abnormalities.
- The tire ply shows a smooth, uniform cut with a total length of more than 75 mm (3 in).
- The tire ply shows a crack or fissure that exceeds 25 mm (1 in) in either direction.
- The tire has a puncture with a diameter of more than 25 mm (1 in).
- The tire shows severe bulging.
- The wear extent of the tire's ground-supporting surface exceeds 25 %.

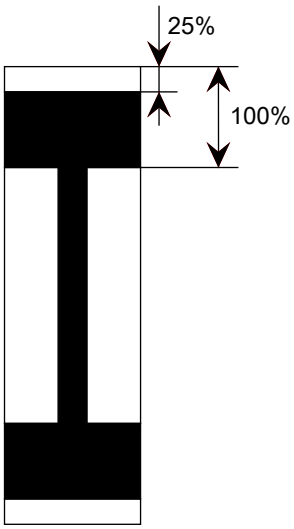


Fig. 1

Checking Wheel Nuts

The wheel nuts should be tightened before the machine is put into service for the first time and after each tire is removed. Check and tighten the wheel nuts to the specified torque every 3 months or 250 operating hours.

Replacement Requirements

⚠ WARNING

- **The tires and rims on the machine have been designed and selected according to the overall performance and load stability requirements of the machine. Therefore, the model specifications, rim width, installation center surface, diameter, etc. must not be changed, otherwise this could lead to an unstable and hazardous condition.**
- **Wheel-specific nuts must be used that match the wheel bolts. The wheel nuts must be installed and maintained with the proper tightening torque to prevent loose rims, broken bolts and wheels loosening from the axle. Be sure to only use nuts that match the mounting angle of the rim holes.**

Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends the replacement tire be of the same size, ply rating and brand as the original tire. For the tire part numbers of specific machine models, please refer to the Parts Manual of the corresponding machine. If you choose not to use the replacement tires recommended by Hunan Sinoboom Intelligent Equipment Co., Ltd., the following specifications should be adhered to:

- The ply rating/rated load capacity and size should be the same as the original tire or superior to it.
- The tire tread contact width should be the same as or superior to the original tire.
- The wheel diameter, width and offset dimensions must be the same as the original tires.
- The replacement tire must be approved for the application by the tire manufacturer (including intended purpose, maximum travel speed, maximum tire load, etc.).
- Due to size differences between different tire brands, both tires on the same axle should be of the same brand.

NOTICE

Unless specifically approved by Sinoboom, do not replace foam-filled tires with pneumatic tires.

Replacing Tires

⚠ WARNING

Tighten the wheel nuts to the specified torque to prevent the wheel from loosening. Use a torque wrench to tighten the nuts. If no torque wrench is available use a socket wrench to tighten the nuts and then immediately have a service station or dealer tighten the nuts to the specified torque. Over-tightening will cause the nuts to break or permanently deform the bolt holes in the rims.

The correct steps to replace a tire are as follows:

1. Make sure the machine is in stowed position.
2. Turn the power switch off and disconnect all power sources (such as battery charger) from the machine.
3. Use a wrench to loosen but do not remove the wheel nuts yet.
4. Use a jack with sufficient load capacity to lift the machine to the appropriate height so that the wheel assembly is off the ground.
5. Remove the wheel nuts in an alternating sequence, then remove the wheel.
6. Align the mounting holes of the new wheel assembly with the corresponding mounting holes on the hub.
7. Apply Loctite 272 thread locking adhesive to the bolts and nuts, then install the nuts in sequence.
8. Tighten all nuts by hand first to prevent loosening of the bolts and nuts. Never apply lubricant to threads or nuts.
9. Then tighten the nuts step by step in the sequence as shown below. Please refer to the recommended torque settings in the table below.

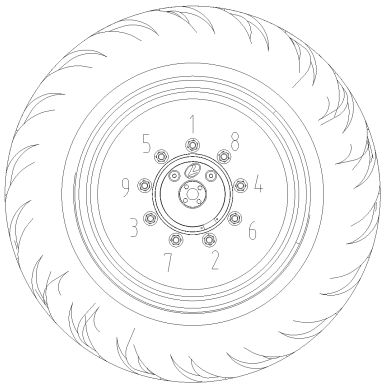


Fig. 2 Diagram, wheel nuts tightening sequence

Table 5-1 Table of wheel nuts tightening torque

First step	Second step	Third step
150 Nm (110 ft-lb)	240 Nm (177 ft-lb)	300 Nm (221 ft-lb)

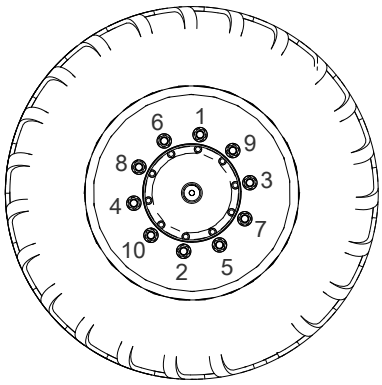


Fig. 3 Diagram, wheel nuts tightening sequence

Table 5-2 Table of wheel nuts tightening torque

First step	Second step	Third step
250 Nm (185 ft-lb)	550 Nm (406 ft-lb)	700 Nm (517 ft-lb)

5.3 DRIVE SYSTEM COMPONENTS

The drive system is mainly composed of a drive reducer and a drive motor.

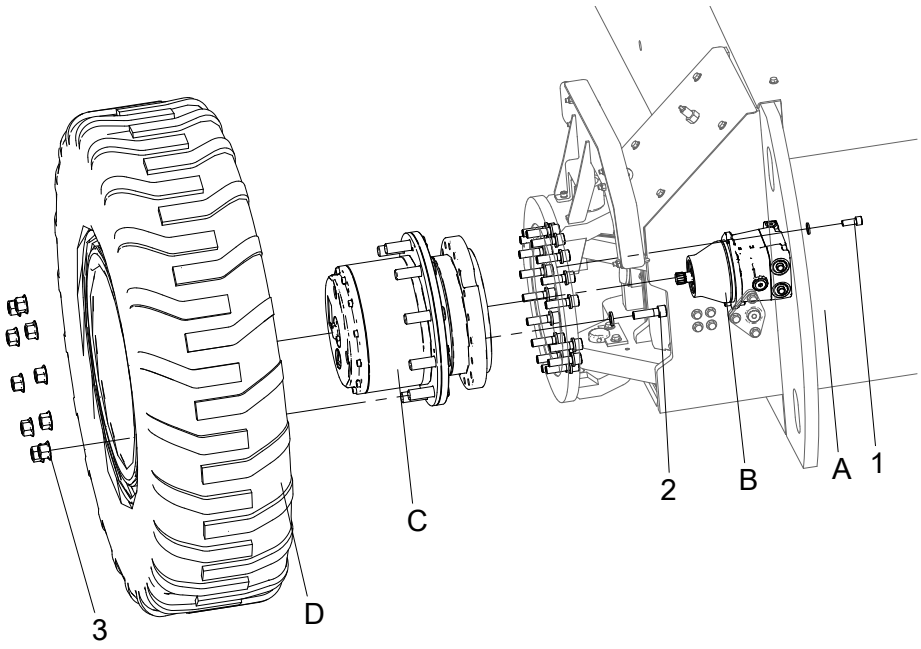


Fig. 4 Diagram of the Drive System

Table 5-3 Drive System Components

No.	Description
A	Chassis structure
B	Drive motor
C	Drive reducer
D	Tire

Checking Drive Reducer Disconnect Cap

The drive reducer in the drive system can be engaged and disengaged. The two positions can be achieved by mounting the disconnect cap on the side of the drive reducer in the normal or in the reverse position, as shown below.

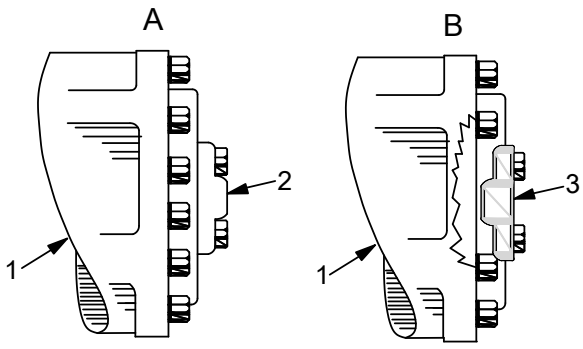


Fig. 5

A Normal position - engaged

B Reverse position - disengaged

1. Drive reducer
2. Disconnect cap (normal position)
3. Disconnect cap (reverse position)

The drive reducer must be engaged for the machine to operate normally. To ensure the normal and safe operation of the machine, check the disconnect cap on the side of the drive reducer visually before oepration.

The drive reducer must be disengaged for the machine to be towed or dragged. To ensure safety, check and ensure that the drive reducer is disengaged before towing or dragging, and return the drive reducer to its original position once the towing or dragging procedure is completed.

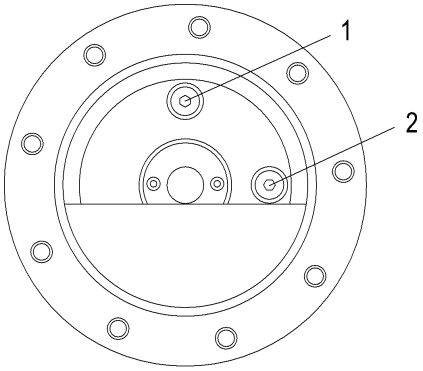
For detailed procedures of mounting the disconnect cap in normal and reverse position as well as towing and dragging, refer to the section ***Emergency Towing*** in the Operation Manual.

Checking Oil Level in Drive Reducer

Insufficient gear oil in the drive reducer will lead to degraded machine performance and potential component damage. It's recommended to check the oil level in the drive reducer every 3 months or after 250 operating hours.

1. Drive the machine to rotate one oil port on the reducer to the top (as shown below).

2. Remove the oil plug from the oil port 2, and check the oil level in the reducer, it should be level with the oil port.
3. Add oil as needed, until the oil is level with oil port 2.
4. Check the oil level in the other drive reducers by repeating the above steps.



1. Oil port 1
2. Oil port 2

Fig. 6 Diagram, Drive Reducer Gear Oil Check

Replacing Gear Oil in Drive Reducer

Regularly replacing the gear oil in the drive reducer is vital to maintaining machine performance and extending service life of the machine. It's recommended to replace the gear oil in the drive reducer every year or after 1000 working hours.

Replace the gear oil in the drive reducer by draining the oil and filling with clean oil as follows:

Drain oil from the drive reducer:

1. Drive the machine to rotate one oil port on the reducer to the bottom.
2. Place a suitable container under the oil port at the bottom of reducer.
3. Remove the oil plug from the oil port at the bottom to drain the gear oil from the drive reducer into the container.
4. Reinstall the oil plug.

Fill with clean oil:

1. Drive the machine to rotate one oil port on the reducer to the top (as shown above).
2. Remove the oil plugs from the oil port 1 and oil port 2.
3. Add clean gear oil from port 1 (for the viscosity reference, refer to the ***Oil Requirements***)until the oil is level with oil port 2.
4. Reinstall the oil plug.
5. Clean up any gear oil spills.

Drive Reducer and Drive Motor

Disassembly

1. Make sure the machine is in stowed position.
2. Press the power switch and disconnect all power sources (such as battery charger) connected to the machine.
3. Place a jack of sufficient capacity under the chassis side to be removed.
4. Remove the tires and place them in an appropriate area using suitable lifting equipment.
5. Mark and disconnect the hydraulic pipelines on the drive motor and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
6. Remove the drive motor after removing the mounting bolts and washers from the motor.
7. Use suitable lifting equipment to support the drive reducer.
8. Remove the mounting bolts and washers on the drive reducer, and slowly remove the drive reducer from the chassis with the assistance of lifting equipment.

NOTICE

Each of the four reducers on the chassis is installed in different directions. Mark the direction of each reducer brake oil port before removing the reducer for the convenience of future installation. The position of brake oil port is as indicated by the arrow in the below figure of ***Drive Reducer Brake Oil Port*** *.*

Installation

1. Use suitable lifting equipment to support the chassis side to be installed.
2. Align the reducer brake oil port with the marked direction.
3. Fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install the bolts one by one.
4. Tighten the bolts with a torque wrench to the specified torque.
5. After installation, fill appropriate amount of gear oil (refer to the ***Oil Requirements*** for the viscosity grade).
6. Install an O-ring on the motor brake oil port, mesh the motor spline shaft with the inner teeth of the reducer, and slowly rotate the motor housing to align the motor oil port with the brake oil port on the reducer and align the motor mounting groove with the mounting hole on the reducer.

7. Fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install and pre-tighten the bolts one by one.
8. Tighten the bolts with a torque wrench to the specified torque.
9. Connect the hydraulic hoses.

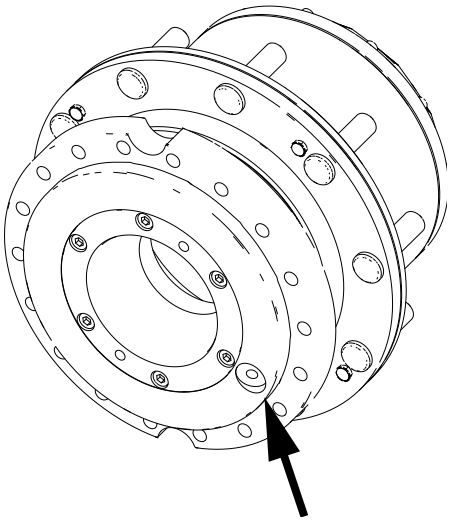


Fig. 7 Brake Oil Port - Drive Reducer

5.4 SLEWING MECHANISM

The slewing mechanism, installed on the turntable, is mainly composed of a slewing bearing, a slewing reducer and a slewing motor, and acts as the drive device for slewing action of the machine. The inner ring of the slewing bearing is connected to the turntable by bolts, and the outer ring meshes with the pinion on the slewing reducer. The slewing reducer is driven by the motor to realize the rotation of the slewing bearing engaged, so as to rotate the turntable.

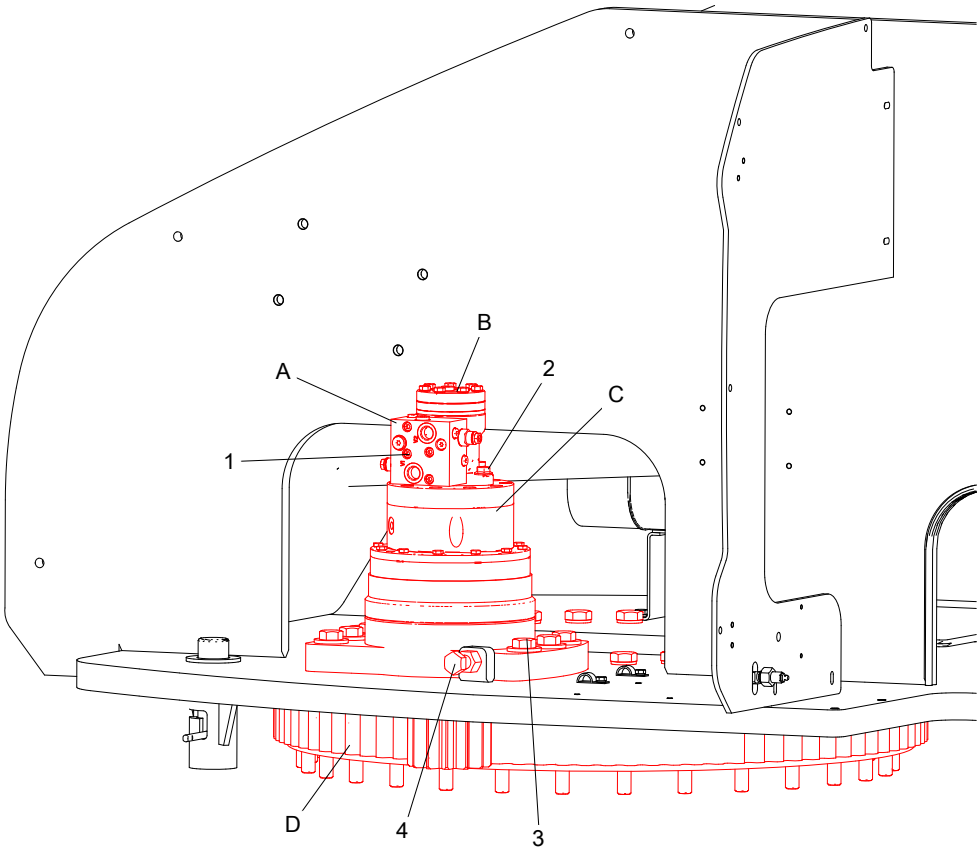


Fig. 8 Diagram, Slewing Mechanism

Table 5-4 Slewing mechanism

No.	Description
A	Slewing cushion valve
B	Slewing motor
C	Slewing reducer
D	Slewing bearing

Checking Oil Level in Slewing Reducer

An inappropriate gear oil level in the slewing reducer will lead to reduced machine performance and even component damage. It's recommended to check the oil level in slewing reducer every 3 months or after 250 operating hours.

1. As shown in the ***Diagram, Slewing Mechanism*** , find the slewing reducer.
2. Remove the oil filler plug from the reducer, and check the oil level, which should be even with the oil port.
3. Remove the oil inlet plug from the brake, and check the oil level, which should be even with the oil port.
4. Add oil as needed, until the oil level is even with the oil port.

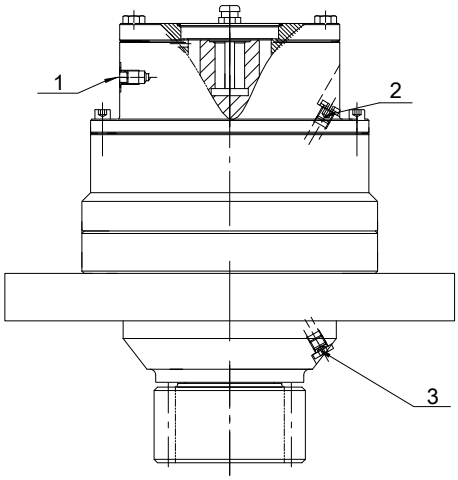


Fig. 9 Position of Slewing Reducer Oil Ports

Table 5-5 Description of slewing reducer oil ports

No.	Description
1	Brake oil inlet
2	Oil filler
3	Oil outlet

Changing Gear Oil in Slewing Reducer

Regularly changing the gear oil in slewing reducer is vital to maintaining machine performance and extending service life of the machine. It's recommended to change the gear oil in slewing reducer every year or after 1000 operating hours.

Drain oil from the reducer:

1. As shown in the ***Diagram, Slewing Mechanism*** , find the slewing reducer.
2. Place a suitable vessel under the oil outlet of the slewing reducer.
3. Remove the oil outlet plug to drain the gear oil in the reducer to the vessel.
4. Install the oil outlet plug.

Fill with clean oil:

1. Open the oil filler plug from the reducer, add clean gear oil (refer to the ***Oil Requirements*** to obtain viscosity values) to the oil inlet until the oil level is even with the oil port, and then reinstall the oil filler plug.
2. Remove the oil inlet plug from the brake, add clean gear oil (refer to the ***Oil Requirements*** to obtain viscosity values) to the oil inlet until the oil level is even with the oil port, and then reinstall the oil filler plug.
3. Clean up any gear oil spills.

Lubricating Slewing Bearing

Regular lubrication of the slewing bearing is essential for maintaining the machine's normal operation and for ensuring a long service life. Failure to lubricate the slewing bearing regularly may lead to abnormal operation of the machine and premature component damage. It is recommended to lubricate the slewing bearing every 3 months or 250 hours of operation, and when the machine is operated in multiple shifts or exposed to harsh environments, the lubrication frequency and amount of lubricant should be increased accordingly.

1. As shown in the figure below, connect the slewing bearing and the grease nipple with a hose.
2. Position the oil gun nozzle on the grease nipple and fill with ZL-3 lithium-based grease which will be transported to the turntable slewing bearing through the hose.
3. Then, rotate the turntable by 100-130mm (4-5in) each time until the whole slewing bearing is fully lubricated.
4. Apply lubricating grease on the outer gear of the slewing bearing and the gear on the slewing reducer evenly with a brush.
5. Remove excess grease.

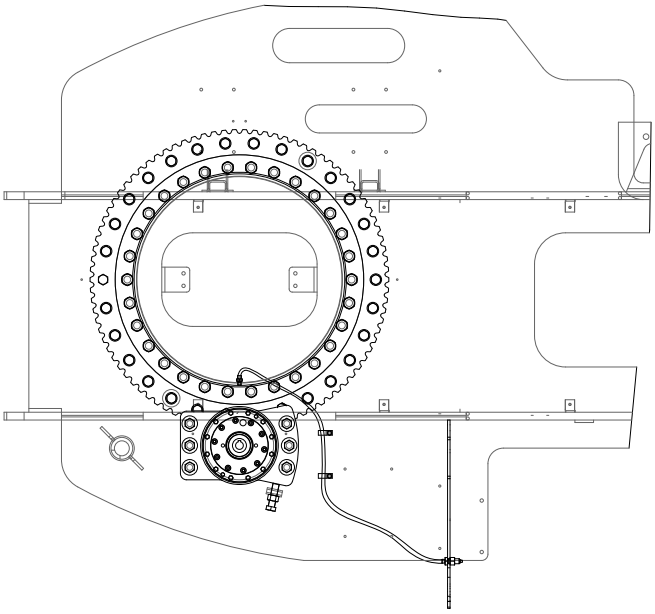


Fig. 10 Diagram of Lubricating Slewing Bearing Remotely

Inspecting Slewing Bearing Bolts

It is recommended to check the slewing bearing bolts after the first 50 hours of operation, and afterwards every 3 months or 250 hours of operation.

If any bolt is found to be missing or slack, replace it with a new bolt, apply Loctite 272 threadlocking adhesive to the bolt thread and tighten the bolt with the torque specified in the ***Torque Specifications*** section. After replacing and tightening the slewing bearing bolt, re-inspect the bolt for tightness.

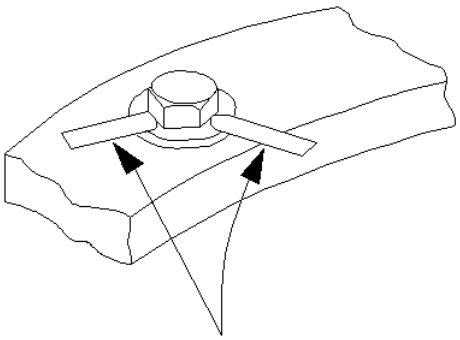


Fig. 11 Instruction for inserting a feeler gauge

Check the connecting bolt between the chassis and the slewing bearing

1. Set the machine to the position shown in the Figure ***(b)*** below.
2. Locate the connecting bolt between the chassis and the slewing bearing.
3. As indicated by ***Page 44, Instruction for inserting a feeler gauge***, insert a 0.04 mm (0.0016 in) feeler gauge between the bolt and the washer in the quadrant opposite to the turntable counterweight.
4. Make sure that the feeler gauge does not penetrate under the bolt head to the bolt shaft.
5. Rotate the turntable 90° to check the bolts in the next quadrant.
6. Rotate the turntable 90°again until all bolts have been inspected.

Check the connecting bolts between the turntable and the slewing bearing

1. Set the machine to the position shown in the Figure ***(b)*** below.
2. Locate the connecting bolt between the turntable and the slewing bearing.
3. As indicated by ***Page 44, Instruction for inserting a feeler gauge***, insert a 0.04 mm (0.0016 in) feeler gauge between the bolt and washer in the semicircle opposite to the turntable counterweight.
4. Make sure that the feeler gauge does not penetrate under the bolt head to the bolt shaft.
5. Set the machine to the position as shown in the Figure ***(a)*** below.
6. As indicated by ***Page 44, Instruction for inserting a feeler gauge***, insert a 0.04 mm (0.0016 in) feeler gauge between the bolt and washer in the other semicircle (turntable counterweight).
7. Make sure that the feeler gauge does not penetrate under the bolt head to the bolt shaft.

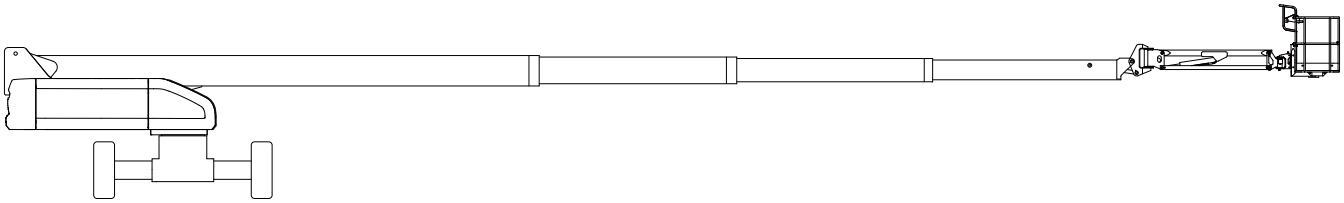


Fig. 12 Checking the Slewing Bearing Connecting Bolts (a)

1. Main boom fully extended;
2. Main boom kept horizontal.

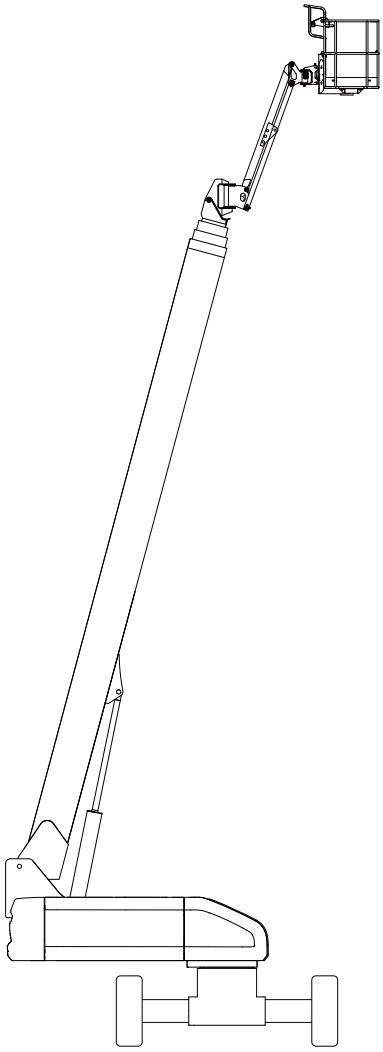


Fig. 13 Checking the Slewing Bearing Connecting Bolts (b)

1. Main boom fully retracted;
2. Boom fully lifted.

Adjusting Gear Backlash of Slewing Mechanism

1. Make sure the turntable is locked (lock the slewing pin if so equipped).
2. Loosen the fastening bolt at position #3 securing the slewing reducer and turntable.
3. Push the slewing reducer mounting disc towards the slewing bearing as much as possible, so that the slewing reducer gears enter the slewing bearing gear ring.
4. Loosen the locking nut at position #4 and turn the adjusting bolt there.
5. Measure the gear backlash between the slewing reducer and the slewing bearing with a feeler gauge, and repeatedly adjust the adjusting bolt at position #4 until the gear backlash is within 0.15-0.25mm (0.006–0.01in).
6. Hold the adjusting bolt at position #4, and tighten the locking nut there.
7. Tighten the fastening bolt at position #3 securing the slewing reducer and the turntable.

Disassembly and Installation

Disassemble slewing drive device

1. Make sure the turntable is locked (lock the slewing pin if so equipped).
2. Mark and disconnect the hydraulic pipelines on the slewing drive device and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
3. Remove the slewing cushion valve from the slewing motor after disassembling its fastening bolt at position #1.
4. Remove the slewing motor after disassembling the fastening bolt at position #2 connecting the slewing motor and the slewing reducer.

5. Loosen the locking nut and adjusting bolt at position #4.
6. Remove the slewing reducer after disassembling the fastening bolt at position #3 connecting the slewing reducer and the turntable.

Install slewing drive device

1. Make sure the turntable is locked (lock the slewing pin if so equipped).
2. Remove foreign objects and burrs on the mounting surface and gears of the slewing reducer.
3. Position the slewing reducer on the mounting surface of the turntable, and measure the gear backlash relative to the slewing bearing with a feeler gauge which should be kept within 0.15-0.25mm (0.006-0.01in).

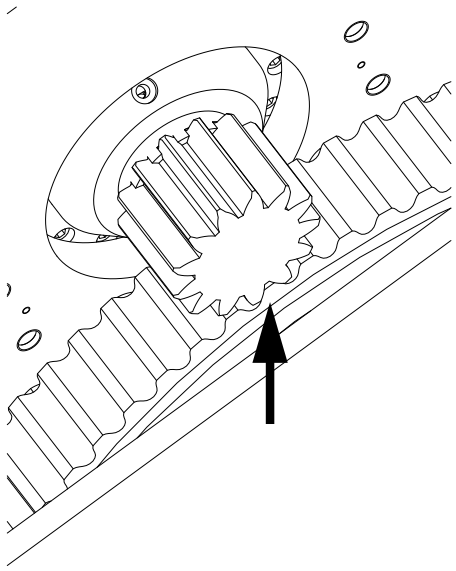


Fig. 14 Gear backlash

4. If the measured gear backlash exceeds the specified value, adjust the gear backlash to the specified value with the adjusting bolt and locking nut at position #4, and the specific method is described in ***Adjusting Slewing Mechanism Gear Backlash*** .
5. Apply Loctite 272 threadlocking adhesive to the bolts with washers fitted, install the bolts at position #3 one by one to secure the slewing reducer and the turntable, and then pre-tighten the bolts diagonally.
6. Ensure that the slewing reducer fits perfectly to the turntable mounting surface.
7. Tighten the bolts diagonally with a wrench.
8. Fill the slewing reducer with gear oil to cover the gear surface.
9. Clean the mounting surface of the slewing reducer, and match the slewing motor pivot pin with the reducer pin hole.
10. Turn the motor housing so that the bolt hole on the slewing motor is aligned with that on the reducer. Apply Loctite 272 threadlocking adhesive to the bolts with washers fitted, install and tighten the bolts at position #2 according to the specified torque.
11. Match the bolt hole on the slewing cushion valve with the mounting hole on the slewing motor, apply Loctite 272 threadlocking adhesive to the bolts with washers fitted, install and tighten the bolts at position #1 with the specified torque (refer to the ***Torque Specifications***).

Install slewing bearing

1. Use suitable lifting equipment to lift the slewing bearing to the chassis mounting surface.
2. Check the clearance between the slewing bearing mounting surface and the chassis mounting surface with a feeler gauge, ensuring the clearance ≤ 0.2mm (0.008in).
3. Using the special high-strength washers for high-strength bolts, fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install the bolts to the outer ring of the slewing bearing.
4. Then tighten the bolts in the sequence shown in the following diagram and follow the steps in the table below.
5. Rotate the inner ring of the slewing bearing by hand to ensure smooth movement.
6. Remove the lifting equipment from the slewing bearing.
7. Rotate the inner ring of slewing bearing so that the soft belt area on the inner ring and that on the outer ring are symmetrically distributed with the slewing bearing as the center.
8. Use suitable lifting equipment to lift the turntable to the slewing bearing mounting surface.
9. Check the clearance between the slewing bearing mounting surface and the turntable mounting surface with a feeler gauge, ensuring the clearance ≤ 0.2mm (0.008in).
10. Using the special high-strength washers for high-strength bolts, fit the washer face with the mounting surface, and apply Loctite 272 threadlocking adhesive, and then install the bolts to the inner ring of the slewing bearing.
11. Then tighten the bolts in the sequence shown in the following diagram and follow the steps in the table below.

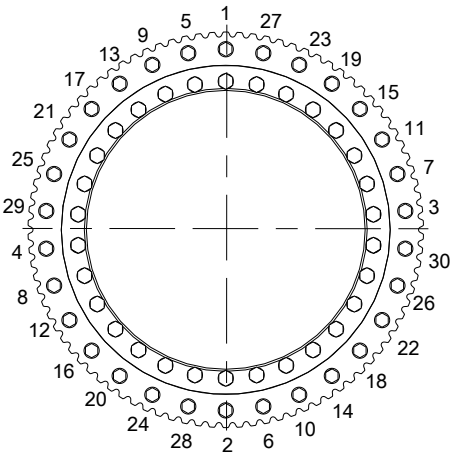


Fig. 15 Tightening Sequence of Slewing Bearing Bolts

Table 5-6 Table of Slewing Bearing Bolt Tightening Torques

First step	Second step	Third step
195 Nm (144 ft-lb)	390 Nm (291 ft-lb)	650 Nm (479 ft-lb)

5.5 COUNTERWEIGHT

⚠ WARNING

The counterweight is essential for maintaining the stability of the machine. Do not modify or remove counterweight without the manufacturer's written authorization. Improperly assembled counterweights may cause the machine to tip over, causing serious injury, death, or machine damage.

Disassembly

1. Adjust the machine to the stowed position and make sure the turntable is locked (lock the slewing pin if so equipped).
2. Use suitable lifting equipment to provide reliable support for the boom and prevent the machine from tipping over once the counterweight is removed.
3. Use suitable lifting equipment to support the counterweight.
4. Remove the bolts securing the counterweight to the turntable.
5. Slowly remove the counterweight by means of the lifting equipment.

Installation

1. Use suitable lifting equipment to lift the counterweight to the installation position on the turntable.
2. Align the mounting holes of the counterweight with that of the turntable structure.
3. Apply Loctite 272 threadlocking adhesive to the fastening bolt threads and counterweight threads, and install the bolts one by one.
4. Confirm that the bolts are tightened with the correct torque, refer to the ***Torque Specifications*** section for the tightening torque.

5.6 HYDRAULIC GENERATOR

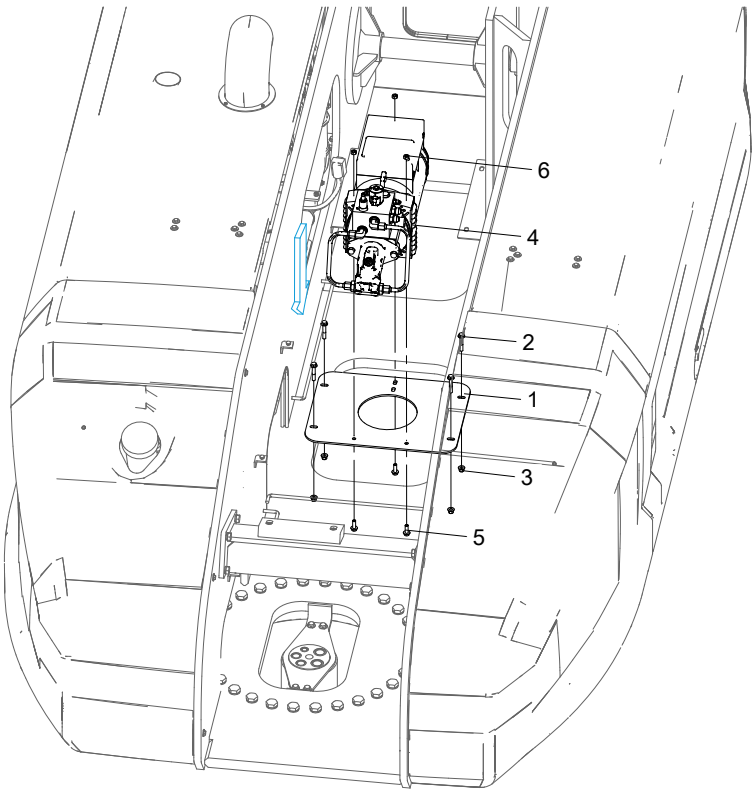


Fig. 16 Diagram of Hydraulic Generator

Table 5-7

1. Hydraulic generator mounting plate	2. Mounting plate bolt	3. Mounting plate nut
4. Hydraulic generator	5. Hydraulic generator bolt	6. Hydraulic generator nut

Installation

The hydraulic generator is optional, so please find out whether the machine can be installed with a hydraulic generator firstly.

1. Raise the boom tube about 45° to leave enough space for the installation of the hydraulic generator.

⚠ WARNING

If the boom is not lifted by lifting equipment, do not work under the platform or boom.

2. Install the mounting plate #1 of the hydraulic generator and secure it with bolt #2 and nut #3.
3. Use suitable lifting equipment to lift the hydraulic generator #4 to be above the turntable, and adjust the orientation so that the hydraulic generator can enter the turntable structure smoothly.

⚠ WARNING

Always check the position of the hydraulic generator during the installation process to ensure that the hydraulic generator does not interfere with other parts of the machine.

4. After the hydraulic generator enters the turntable structure safely, align the mounting holes of hydraulic generator with the holes in the mounting plate.
5. Install and secure the hydraulic generator with bolt #5 and nut #6.

Debugging

After the hydraulic generator is installed, the machine needs to be debugged as follows:

1. Start the engine, and after the engine operates stably, move the hydraulic generator switch to warm up the hydraulic system until the oil temperature exceeds 45°C (113°F).
2. Measure whether the output voltage of the generator meets the requirements of use. If the output voltage is less than the required voltage, the motor runs too slow; if the output voltage is too high, the motor runs too fast.
3. The speed of the motor depends on the input flow rate, so the output voltage can be used to determine whether the motor flow rate is appropriate. The position of the flow valve is shown by the arrow in the figure below. Adjust the valve clockwise to decrease the flow rate, or counterclockwise to increase the flow rate. Adjust the flow valve based on the output voltage until the output voltage meets the requirements of use in your region.

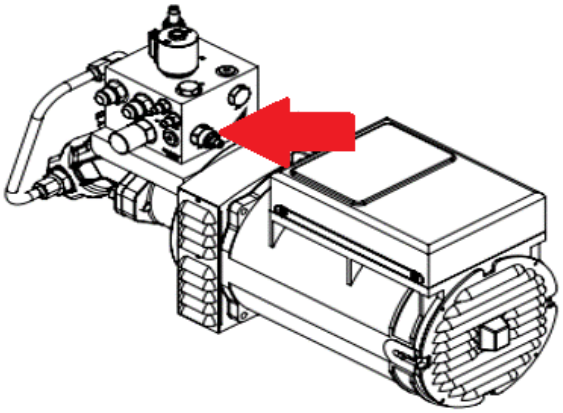


Fig. 17 Diagram of Flow Valve

NOTICE

If the flow valve is fully opened, but the voltage still can not meet the requirements of use, the reason may be that:

- *The hydraulic system does not warm up sufficiently, so the oil temperature has not reached the required temperature. Wait for the oil temperature to rise above 45°C (113°F), then determine the output flow based on the actual output voltage, and adjust the flow valve until the voltage reaches the requirements of use;*
- *The pump LS set pressure is too low, resulting in insufficient output flow of the pump, so the LS set pressure needs to be increased.*

4. After the voltage is adjusted, run the machine with or without load for about 30min. If the motor makes a buzzing sound or the pump outlet hose vibrates at certain frequency, the pump LS set pressure value is not suitable and needs to be decreased. Turn the screw in the figure below clockwise to increase the LS set pressure value, or counterclockwise to decrease the LS set pressure value.

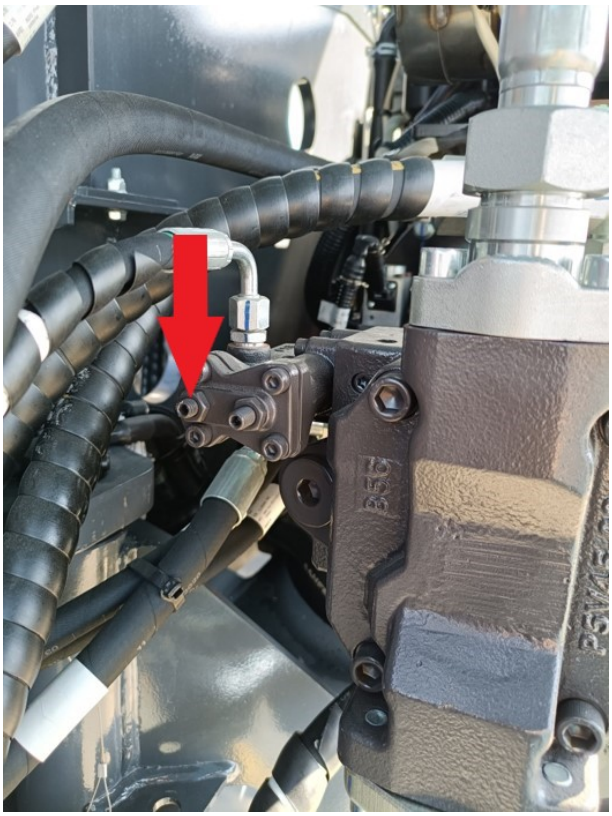


Fig. 18 Position of LS Set Pressure Adjusting Screw

NOTICE

Adjusting the LS set pressure will affect the time of boom movement, so please contact Sinoboom after-sales personnel for the operation.

⚠ WARNING

Electrocution hazard. The output voltage of generators in North America is 208/120V normally, while the output voltage of generators in Australia is 230V normally. Electric shock may cause serious personal injury or death. The debugging personnel should be extra careful during operation, and follow national or local electrical safety regulations and precautions to avoid possible electric shock hazard.

5.7 BATTERY

⚠ WARNING

- **Before removing the battery, the charger power supply and the working power of the whole machine must be cut off.**
- **Only specialist personnel may disassemble the battery case; otherwise system damage may occur.**

1. Place the machine in a ventilated and spark-free environment.
2. Open the turntable cover to locate the batteries.
3. Mark and disconnect the harness connection on the negative terminal of the battery, and then disconnect the harness connection on the positive terminal of the battery.
4. Fasten the battery with the sling of appropriate lifting equipment and remove it from the machine.

6 BOOM AND PLATFORM ASSEMBLY

6.1 BOOM AND PLATFORM SYSTEM

Broken Wire Rope Detection System

This machine is equipped with 4-section proportionally-driven telescopic boom. The first telescopic boom section is directly driven by a telescopic cylinder. The second and third telescopic boom sections are driven by a separate wire rope system which is equipped with a spare wire rope, allowing the operator to continue using the machine in the event of one wire rope broken. The retracting wire rope is mounted on the outside of the boom for easy detection of failure. While the extending wire rope depends on the broken rope detection system to warn the operator of wire rope failure in time. The system uses proximity sensors to detect unwanted movement of the wire rope to determine whether the wire rope is faulty. When the proximity sensor detects unwanted movement of the wire rope, the broken rope detection result will be displayed on the turntable controls display, and an alarm will be triggered. Then the boom will be restricted from extending and rising, but be allowed to retract and lower. The operator should take necessary measures to correct the fault.

Platform Control Enable System

The platform control system uses time-dependent support circuits, limiting the time availability for active or enabled controllers. The foot switch must be depressed before any movement can be performed. When the foot switch is depressed, the controller will be activated, and the operator may perform any movement within 7 seconds. The controller will remain enabled as long as the operator keeps activating any function until 7 seconds after the last movement stops. When the controller is active, the indicator on the platform control panel will illuminate. After the preset time, the illuminated indicator will turn off, and the controller will be disabled. To continue operating the machine, the controller must be re-enabled in order to start the timing system again. To activate the timing system again, follow these steps: release all control buttons, handles, and the foot switch, then depress the foot switch again.

Transport Position Sensing System

The transport position sensing system detects the position of the boom by means of the angle sensor and length sensor on the boom head (near the turntable). When the angle sensor detects that the boom is raised more than 15° above the horizontal, or the length sensor detects that the boom extends more than 1.2m (3.9ft), the machine is considered as in operating position, otherwise, it is considered as in non-operating position. The position of the jib is not taken into account.

This system is used to control the travel speed reduction system.

Load Sensing System

The load sensing system on this machine detects the load on the platform through the load cell installed at the joint between platform and boom. The overload indicator on the platform display panel provides a warning when the load on the platform exceeds the rated load. When the load sensing system detects that the platform load exceeds the rated load, the overload indicator will flash, and all movements of the machine will be restricted in the KG (overload limit) mode. In other modes, the telescopic section of the boom may be retracted, the turntable may be rotated slowly, and the boom can be lowered once it is fully retracted. Once the excess load is removed, the overload indicator will go out, and all machine movements may be resumed.

6.2 PLATFORM AND JIB

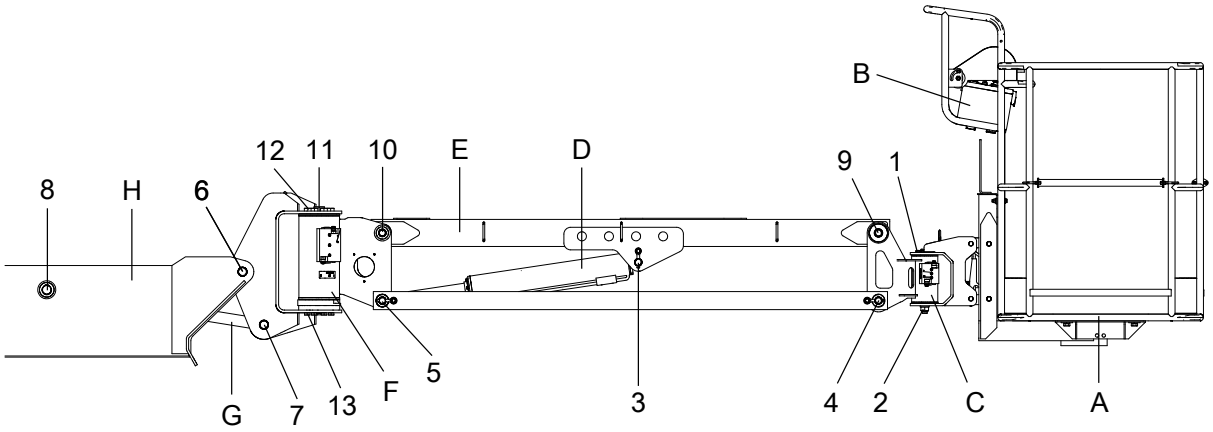


Fig. 1 Diagram, Platform and Jib Structure

Table 6-1 Description of Platform and Jib Structure

No.	Description
A	Platform
B	Platform controls
C	Platform swing cylinder
D	Jib lift cylinder
E	Jib
F	Jib swing cylinder
G	Upward leveling cylinder
H	Boom

Platform Controls

Disassembly

⚠ WARNING

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

1. Make sure the machine is in stowed position.
2. Turn off the machine and press the emergency stop button at the platform control box and turntable control box.
3. Mark and disconnect the harness connections in the platform control box.
4. Remove the fastening bolts on the bottom of the platform control box.
5. Slowly remove the platform control box.

Installation

Follow the reverse order of the disassembly procedures.

Platform Assembly

Disassembly

1. Remove the platform control box from the platform.
2. Remove the foot switch from the platform.
3. Use suitable lifting equipment to support the work platform.
4. Remove the fastening bolt #1 from the swing cylinder and the nut from pivot pin #2.
5. Knock out pivot pin #2 with a brass rod and a mallet.
6. Slowly remove the platform assembly with the aid of the lifting equipment.

Installation

For installation, follow the disassembly procedure in reverse order.

NOTICE Make sure that the bolt at position #1 and the nut at position #2 of the swing cylinder have been tightened with the correct torque. Refer to the ***Torque Specifications*** section for the tightening torque.

Jib Assembly

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and the hydraulic oil should completely cool down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and causing injuries.**

Removing the jib assembly

1. Play the main boom in horizontal position and remove the platform assembly.
2. Support the jib and upward leveling cylinder using suitable lifting equipment.
3. Mark and disconnect the hydraulic lines from the jib and collect the hydraulic oil from the lines with a suitable container. Plug the lines and the ports.
4. Remove the bolt from pivot pin #7 of the upward leveling cylinder, and drive out pivot pin #7 with a brass rod and a mallet.
5. Remove the bolt and nut from pivot pin #6, and drive out pivot pin #6 with a brass rod and mallet.
6. Slowly remove the jib assembly with the aid of the lifting equipment.

Removing the jib lift cylinder

1. Support the jib lift cylinder with suitable lifting equipment.
2. Remove the bolt and stop pin from pivot pin #3 and drive out pivot pin #3 with a brass rod and a mallet.
3. Remove the bolt and stop pin from pivot pin #5 and drive out pivot pin #5 with a brass rod and a mallet.
4. Using suitable lifting equipment, slowly remove the jib lift cylinder from the jib.

⚠ WARNING

When disassembling the cylinder, use caution to prevent it from falling and getting damaged, and also to avoid impacts that could lead to high-pressure oil leaks.

Inspection

- Inspect the jib pivot pin for wear, scratches, deformation or other damage. Replace the pivot pin if necessary.
- Check the inner race of the pivot pin bearing for scratches, deformation, wear or other damage. Replace the bearing if necessary.
- Check the connecting pin of the jib lift cylinder for wear, scratches, deformation or other damage. Before installation, ensure that the surface of the pin has received protective treatment. Replace the pivot pin if necessary.
- Check the inner race of the platform swing cylinder bearing for scratches, deformation, wear or other damage. Replace the bearing if necessary.
- Check all threaded parts for elongation, thread deformation, torsion or other damage. Replace the part if needed.
- Check all structures of the jib assembly for deformation, cracks, weld separation or other damage. Replace the structure if necessary.

Installation

Follow the reverse order of the disassembly procedures.

Swing Cylinder

Check the swing cylinder fasteners

The swing cylinder fasteners are essential for the normal and safe operation of the machine. It is recommended to check the swing cylinder fasteners every 3 months or 250 hours of operation.

1. Make sure the machine is in stowed position. Locate the swing cylinder at the joint between platform and boom.
2. Check if the bolts at positions #1, #2, #11, #12 and #13 of the cylinder are tightened with the correct torque. Refer to the ***Torque Specifications*** section for the tightening torques.
3. If any fastener is replaced make sure to tighten the fastener with the torque as indicated in the ***Torque Specifications*** section and apply Loctite 272 threadlocking adhesive.

Disassemble platform swing cylinder

1. Remove the platform assembly.
2. Mark and disconnect the hydraulic pipelines on the platform swing cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
3. Support the platform swing cylinder with suitable lifting equipment.
4. Remove the bolt and stop pin from the pivot pins #4 and #9 of the platform swing cylinder.
5. Knock out pivot pins #4 and #9 with a brass rod and a mallet.
6. Slowly remove the platform swing cylinder with the aid of the lifting equipment.

Disassemble jib swing cylinder

1. Remove the jib assembly.

2. Support the jib swing cylinder with suitable lifting equipment.
3. Support the jib rotation bracket with suitable lifting equipment.
4. Remove the fastening bolts #11, #12 and #13 from the swing cylinder and then remove the jib rotation bracket.
5. Remove the bolts and stop pins from the pivot pins #5 and #10 of the jib swing cylinder.
6. Knock out the pivot pins #5 and #10 with a brass rod and mallet.
7. Slowly remove the jib swing cylinder with the aid of the lifting equipment.

Installation

Follow the reverse order of the disassembly procedures.

Upward Leveling Cylinder

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and the hydraulic oil should completely cool down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and causing injuries.**

Disassembly

1. Set the main boom and the jib to a horizontal position, extend the main boom slightly until the connecting pivot pin at the cylinder bottom is accessible and can easily be removed.
2. Mark and disconnect the hydraulic lines from the upward leveling cylinder and collect the hydraulic oil from the lines using a suitable container. Plug the lines and the ports.
3. Use suitable lifting equipment to support the platform and jib assembly.
4. Remove the fastening bolt at pivot pin #7 at the piston rod end of the upward leveling cylinder. Do not remove the pivot pin at this time.
5. Remove the retaining ring at shaft #8. Do not remove the shaft at this time.
6. Use suitable lifting equipment to support the piston rod head of the upward leveling cylinder to protect the piston rod from damage.
7. Knock out pivot pin #7 and shaft #8 with a brass rod and mallet.
8. Using suitable lifting equipment, slowly remove the upward leveling cylinder from the main boom.

⚠ WARNING

When disassembling the cylinder, take care to prevent the cylinder from falling and impacting, and also prevent the high-pressure oil leakage due to impacting.

Installation

Follow the reverse order of the disassembly procedures.

6.3 BOOM

Cable Track Assembly

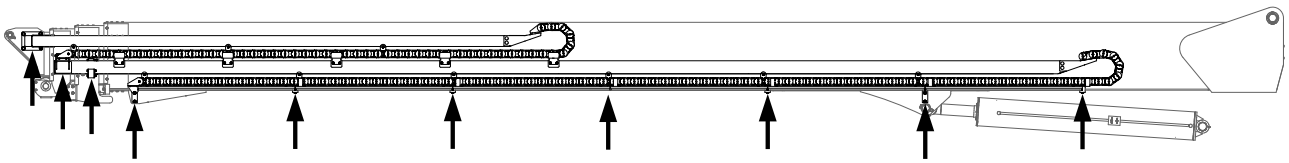


Fig. 2 Fastening Bolts on Cable Track Assembly

Disassembly

1. Make sure the machine is in stowed position.
2. Mark and disconnect the harness connections on the cable track assembly.
3. Mark and disconnect all hydraulic lines from the cable track guide to the platform and collect the hydraulic oil from the lines with a suitable container. Plug the lines and the ports.
4. Remove the hydraulic lines and wiring harnesses from the cable track guide.
5. Support the cable track assembly along its length with suitable lifting equipment.
6. Remove the fastening bolts as indicated by the arrows above.
7. Take appropriate preventive measures and slowly remove the cable track assembly from the boom tube with the aid of the lifting equipment.

8. To disassemble the cable track separately, simply remove the fastening bolts at both ends of the cable track.

Inspection

- Check all threaded parts for elongation, thread deformation, torsion or other damage. Replace the part if needed.
- Check all components of the cable track assembly for deformation, cracks, weld separation or other damage. Replace the structure if necessary.

Installation

Follow the reverse order of the disassembly procedures.

Main Boom Lift Cylinder

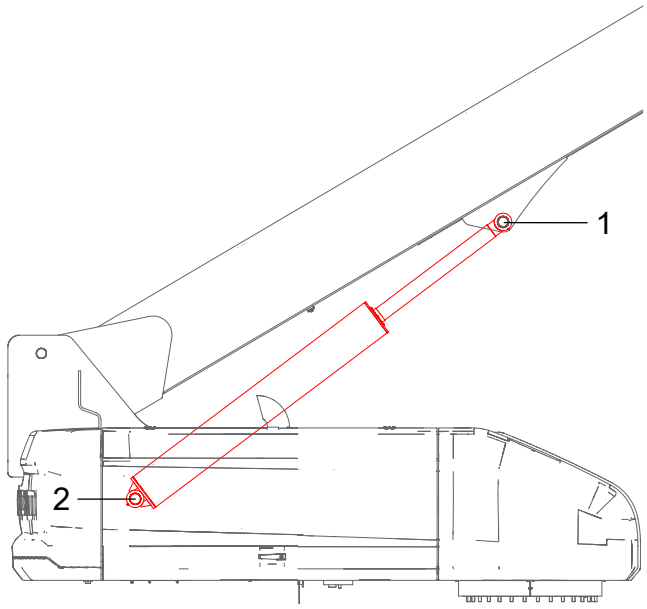


Fig. 3 Lift Cylinder

Disassembly

⚠ WARNING

- **Before disassembling the lift cylinder, rotate the boom tube to be parallel to the travel direction of the chassis, and make sure the turntable is locked (lock the slewing pin if so equipped).**
- **Before disassembling the lift cylinder, place sufficiently strong jacks under the counterweight for support, otherwise the machine may tip over causing severe personal injury and/or machine damage.**

⚠ WARNING

- **Before loosening or disassembling the hydraulic parts (especially the counterbalance valve on the cylinder), the hydraulic pressure of all hydraulic lines should be released and the hydraulic oil should completely cool down.**
- **Disassemble the hydraulic components slowly to prevent the hydraulic oil from splashing and injuring people.**

1. Raise the boom tube slightly until the lift cylinder is accessible and can be easily removed.
2. Support the main boom at its approximate center position with the lifting equipment enough to lift the boom assembly (with the lifting capacity not less than 5t/11023lb) to prevent it from falling during disassembly.
3. Mark and disconnect the hydraulic pipelines on the lift cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
4. Support the two ends of the lift cylinder with suitable lifting equipment.
5. Remove the bolt and nut at the pivot pin #1 connecting the lift cylinder with the boom, and knock out the pivot pin #1 with a brass rod and mallet.
6. Remove the bolt and nut at the pivot pin #2, and knock out the pivot pin #2 with a brass rod and mallet.
7. Slowly remove the lift cylinder with the aid of the lifting equipment.
8. Slowly lower the boom to stowed position with the aid of the lifting equipment.

⚠ WARNING

When disassembling the cylinder, take care to prevent the cylinder from falling and impacting, and also prevent the high-pressure oil leakage due to impacting.

Installation

Follow the reverse order of the disassembly procedures.

Main Boom Assembly

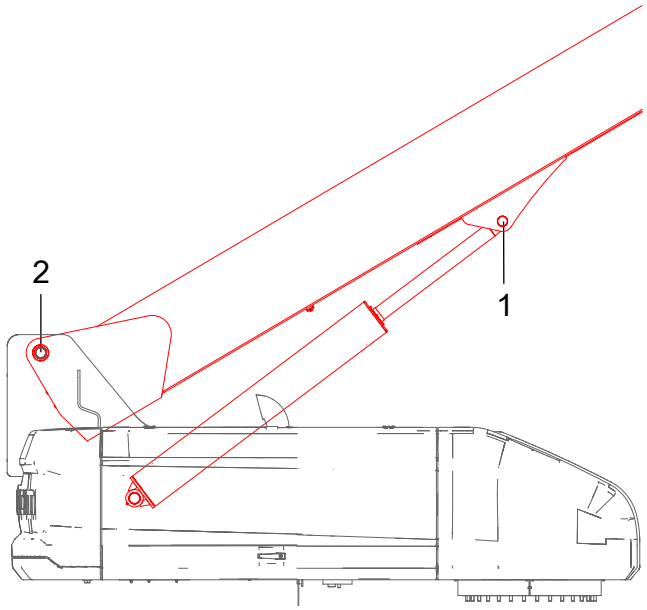


Fig. 4 Main Boom Assembly

Disassembly

⚠ WARNING

- **Before disassembling the main boom assembly, rotate the boom to be parallel to the travel direction of the chassis, and make sure the turntable is locked (lock the slewing pin if so equipped).**
- **Before disassembling the main boom assembly, place sufficiently strong jacks under the counterweight for support; otherwise the machine may tip over causing sever personal injury and/or machine damage.**

1. Make sure to remove the platform assembly, jib assembly and upward leveling cylinder firstly.
2. Raise the boom slightly until the lift cylinder is accessible and the main boom assembly can be easily removed.
3. Mark and disconnect the harness connections on the main boom assembly.
4. Mark and disconnect all hydraulic pipelines on the main boom assembly and collect the hydraulic oil in the pipelines with a suitable vessel. Plug the lines and the ports.
5. Use suitable lifting equipment (with a lifting capacity not less than 5 t/11023 lb) to support the main boom tail (near the platform).
6. Use suitable lifting equipment to provide reliable support for the main boom lift cylinder.
7. Remove the bolt and nut at the pivot pin #1 connecting the lift cylinder with the boom, and knock out the pivot pin #1 with a brass rod and mallet.
8. Use suitable lifting equipment (with a lifting capacity not less than 5 t/11023 lb) to support the main boom head (near the turntable).
9. Remove the bolt and nut securing the pivot pin #2 connecting the main boom assembly with the turntable.
10. Knock out the pivot pin #2 with a brass rod and mallet.
11. With the assistance of the lifting equipment, slowly remove the main boom assembly from the turntable and carefully place it on a suitable support.

Installation

Follow the reverse order of the disassembly procedures.

Boom Wear Pads

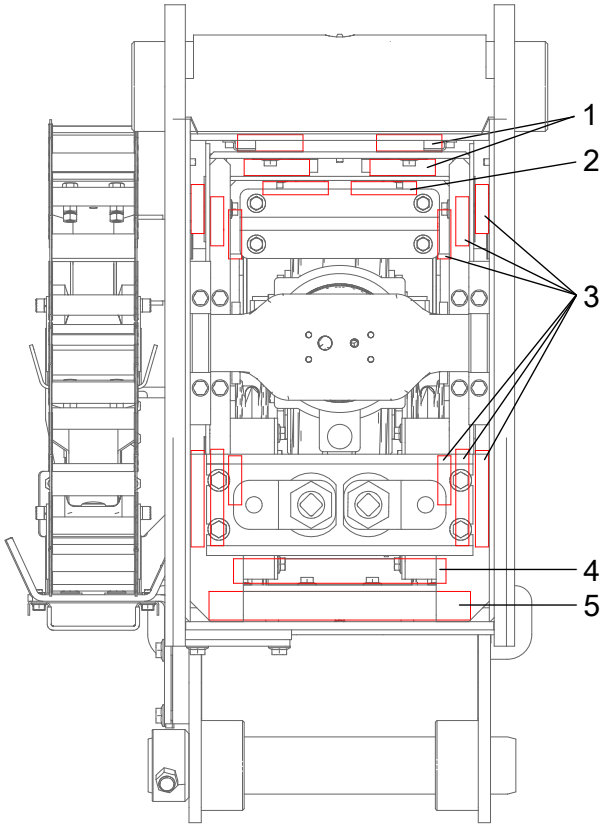


Fig. 5 Diagram, Boom Head Wear Pads

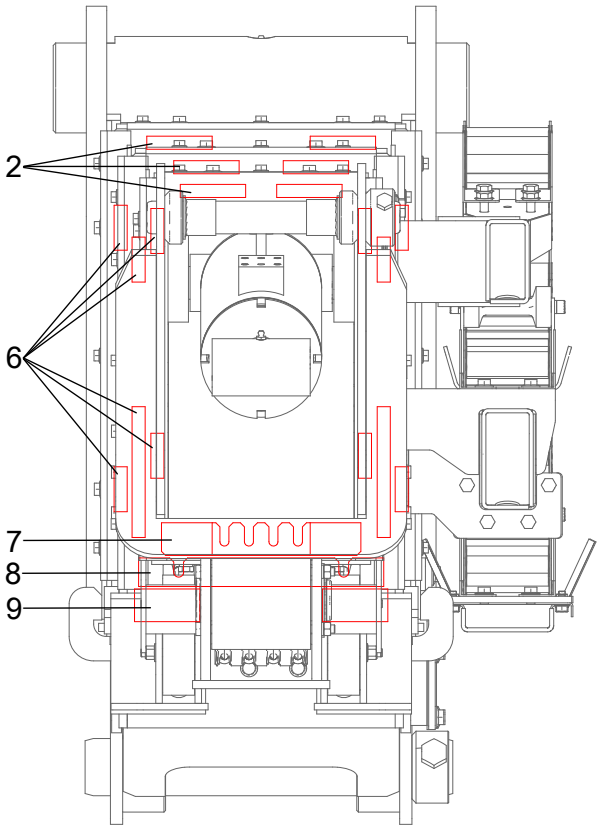


Fig. 6 Diagram, Boom Tail Wear Pads

Table 6-2 Boom Wear Pad Thickness

No.	Wear pad thickness
1	20 mm (0.79 in)
2	16 mm (0.63 in)
3	16 mm (0.63 in)
4	30 mm (1.18 in)
5	35 mm (1.38 in)
6	16 mm (0.63 in)
7	40 mm (1.57 in)
8	35 mm (1.38 in)
9	40 mm (1.57 in)

The boom wear pads are critical for the safe operation of the machine. As a friction pair will develop between each wear pad and the surface of the boom's telescopic section, improper gaskets or continued use of extremely worn pads may result in component damage and unsafe operation. It is recommended to check the boom wear pad thickness once a year or after 1000 hours of operation.

1. Remove the cover plate from the head of the main boom (near the turntable) or the nylon brush at the tail of the main boom (near the platform).
2. Measure the thickness of each wear pad at the head and tail of the main boom.
3. If the telescopic cylinder has wear pads, measure the wear pad thickness after the telescopic cylinder is removed.
4. Compare the measured thickness value of each wear pad with the value specified in the above table, and replace the wear pad assembly in time if the wear extent of the wear pad is greater than or equal to 3 mm (0.118 in).

NOTICE

The disassembled wear pad cannot be reused and must be replaced with a new wear pad assembly.

Telescopic Wire Rope

⚠ WARNING

When extending/retracting the boom, all boom segments should extend/retract together at the same speed. In case of any abnormality, there may be a delay in movement and loose wire ropes. Before using the machine each time, extend/retract each boom segment. If there is any abnormality, immediately lower the platform to the stowed position, turn off the machine, and have the wire rope inspected and repaired by qualified service technicians after marking the wire rope.

NOTICE

The telescopic wire ropes have sharp edges, and touching the wire ropes with bare hands can cause serious injury.

Check wire ropes and sheaves

The telescopic wire ropes are used to extend and retract the boom. In order to ensure that the boom extending and retracting are smooth, without shaking and abnormal noise, it is recommended to check the wire ropes and sheaves every quarter or after 250 hours of operation.

1. Remove the cover plate from the head of the main boom (near the turntable).
2. Perform the following checks on the wire ropes:
   - Check the rope for wear, breakage, corrosion or entanglement, and check the pulley for excessive wear or damage. Replace the wire rope and sheave if necessary.

Note: Before installing the wire rope, the wire rope needs to be lubricated.

- Check the wire rope sheave bearing for wear, scratching or damage. Replace the bearing if necessary.
- Check the wire rope for foreign debris. If any, clean it up immediately.
- Check the relative position between the wire rope and sheave. If the wire rope is outside the sheave, adjust the wire rope to the correct position.
- Manually deflect the wire rope to check the tension of the wire rope. Appropriately tensioned wire ropes should be unable or difficult to move. If the wire rope is inappropriately tensioned, adjust it according to the method below.

3. After checking and making sure there are no problems, install the cover to the main boom head.
4. Start the machine from the turntable controls and extend the main boom approximately 0.6m (2ft).
5. Retract the main boom and check the movements of the 2nd, 3rd and 4th boom sections. The retraction displacement of the 2nd boom segment should not exceed 1/2 of that of the 3rd boom segment and should not exceed 1/3 of that of the 4rd boom segment.

Indications for replacing wire ropes

The wire rope must be replaced in any of the following situations:

1. The wire rope is rusted or corroded.
2. The wire rope appears to be tangled, knotted or wrinkled.
3. The wire rope reaches the limit position and can't be adjusted any more.
4. The sheave has excessive wear.
5. Six wire ropes in a wire rope bundle are damaged, 3 wire ropes in one of the strands of a wire rope bundle are damaged, 1 valley wire is broken, or 1 wire rope connector is broken.

NOTICE

The wire rope and sheave must be replaced together.

Adjust the tension of wire rope

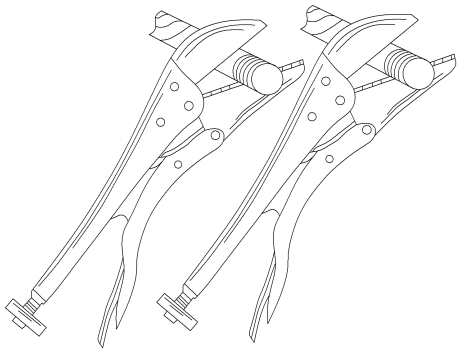
Before perfoming wire rope tensioning procedure, visually check each threaded fastener, check the wire rope adjustment travel, and ensure each boom section meets the requirements in ***Boom Position Tolerance*** while the main boom is fully retracted.

NOTICE

If the boom sections have been properly positioned, but there is not enough adjustment travel remaining on a wire rope to achieve proper torque, do not continue with the procedure. Replace the wire rope and sheave.

1. Adjust the main boom to horizontal and extend it 1.5-1.8 m (5-6 ft).
2. Loosen the locking nuts on the outside of retracting wire rope connector.
3. Using a wrench, alternately tighten the adjusting nuts inside the connectors of two retracting wire ropes of the second telescopic boom section to the torque in the ***Torque Specifications*** section.

   Note: While adjusting the retracting and extending wire rope nuts, clamp both threaded ends of wire rope with the tool as shown below to prevent the wire rope from rotation and thus damaging the wire rope, but do not clamp on the threads.



4. Using a wrench, alternately tighten the adjusting nuts inside the connectors of two retracting wire ropes of the third telescopic boom section to the torque in the ***Torque Specifications*** section.
5. Retract the main boom such that it moves 0.6–0.9 m (2–3 ft) from the originally extended position, ensuring the main boom does not fully retract.
6. Loosen the locking nuts on the outside of extending wire rope connector.
7. Using a wrench, alternately adjust the adjusting nuts inside the connectors of two extending wire ropes of the second telescopic boom section to the torque in the ***Torque Specifications*** section.
8. Using a wrench, alternately adjust the adjusting nuts inside the connectors of four extending wire ropes of the third telescopic boom section to the torque in the ***Torque Specifications*** section.
9. Tighten the locking nuts of extending/retracting wire ropes to the torque as required in ***Torque Specifications*** , and then remove all clamps.
10. Fully retract the main boom, ensuring that each main boom section meets the requirements in ***Boom Position Tolerance*** in the figure below.

11. Check whether each boom section functions properly.

Note: Verification of the rope tension should be determined by proper functions of the boom. Repeat wire rope tensioning procedure only as necessary to achieve proper tension.

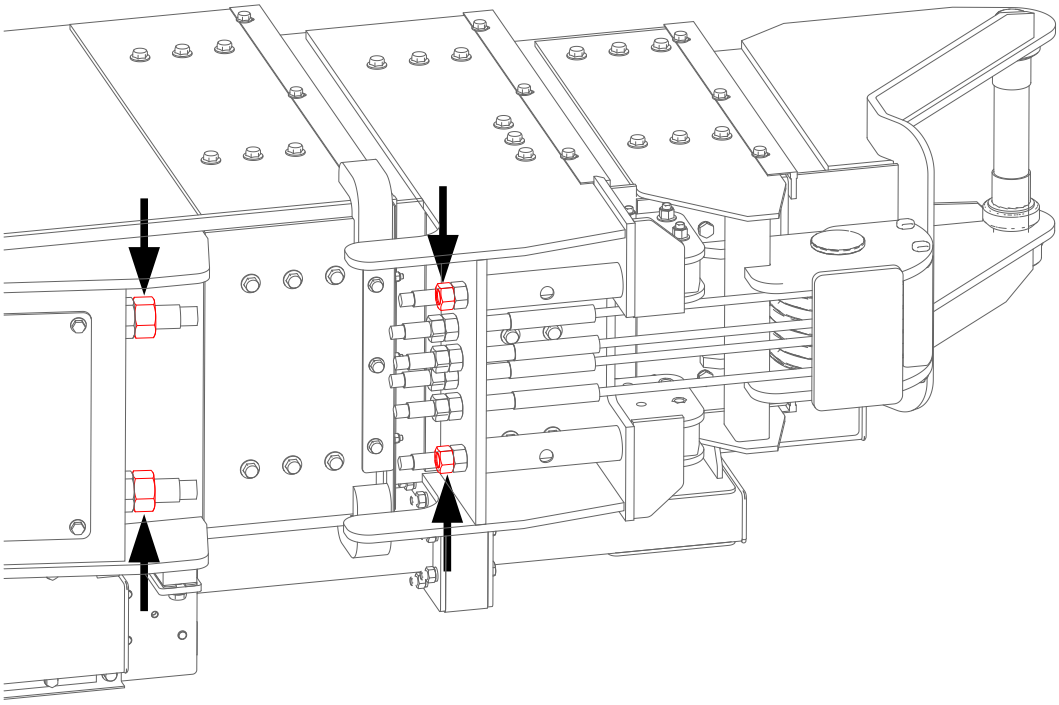


Fig. 7 Positions of Locking Nuts on Retracting Wire Rope

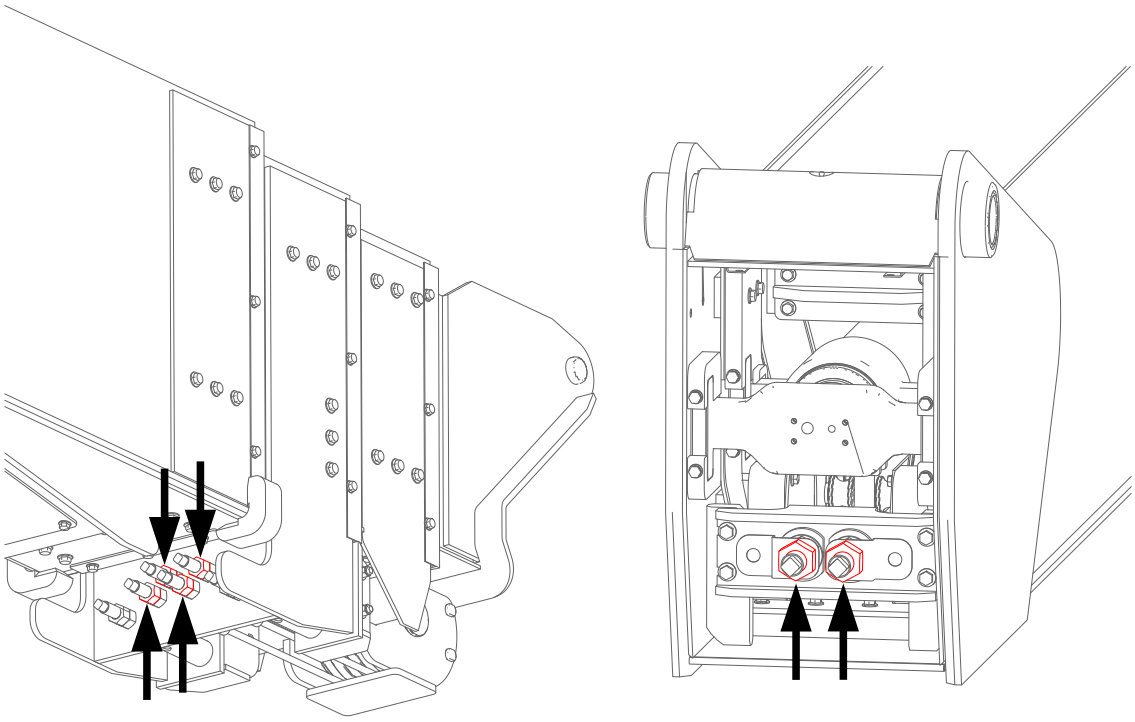


Fig. 8 Positions of Locking Nuts on Extending Wire Rope

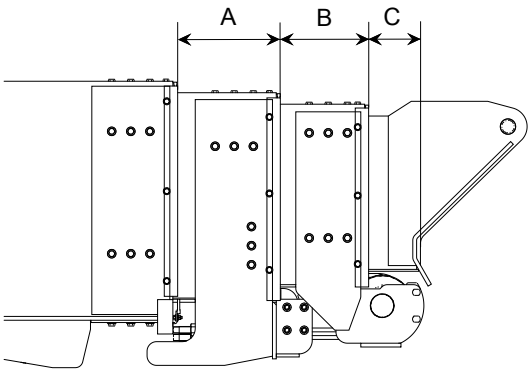


Fig. 9 Boom Position Tolerance

A: 271±15 mm (10.7±0.6 in)

B: 231±15 mm (9.1±0.6 in)

C: 146±15 mm (5.7±0.6 in)

Telescopic Cylinder

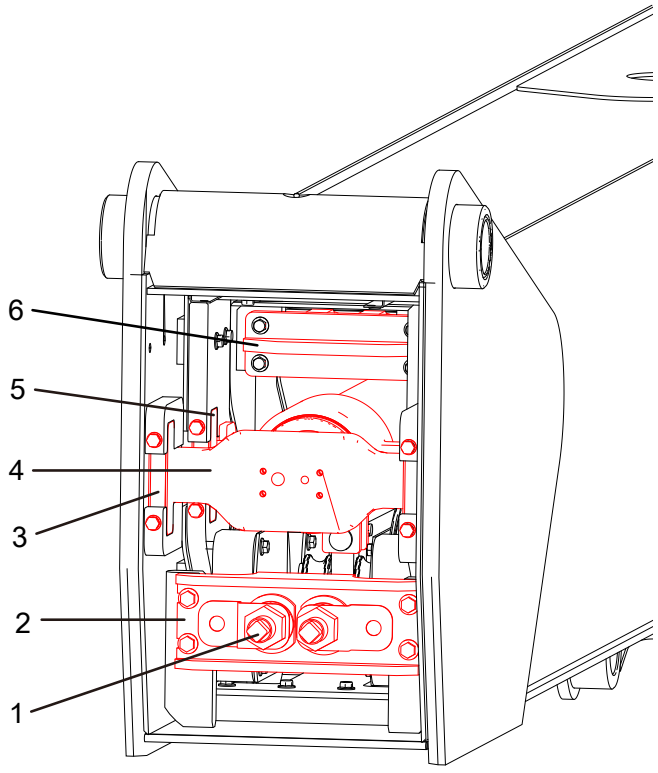


Fig. 10 Telescopic Mechanism

Disassembly

1. Adjust the boom to fully retracted position and slightly raise the main boom to horizontal position.
2. Remove the cover plate from the head of the main boom (near the turntable).
3. Use suitable lifting equipment to support the boom.
4. Mark and disconnect the hydraulic pipelines on the telescopic cylinder and collect the hydraulic oil in the pipelines with a suitable vessel. Then seal the pipelines and ports.
5. Remove the nuts and plates at position #1 of the extending wire rope.
6. Remove the bolts on the stop brackets #3 and #5 of the telescopic cylinder, and then remove the stop brackets.
7. Remove the bolts on the brackets #2 and #6 of extending wire rope, and then remove the upper and lower wire rope brackets.
8. Secure the extending wire rope onto the telescopic cylinder #4, and pull out the telescopic cylinder along with the wire rope. Ensure the wire rope isn't twisted or entangled.

NOTICE

When pulling the telescopic cylinder out of the main boom, take use extreme caution to avoid damaging other parts of the boom.

9. Before the telescopic cylinder is fully pulled out of the main boom, position/adjust the lifting equipment to provide sufficient support for the entire cylinder.
10. With the assistance of the lifting equipment, slowly remove the cylinder from the main boom and carefully place it on a suitable support.
11. The telescopic cylinder and head pulley assembly can be separated by removing the connecting bolts.

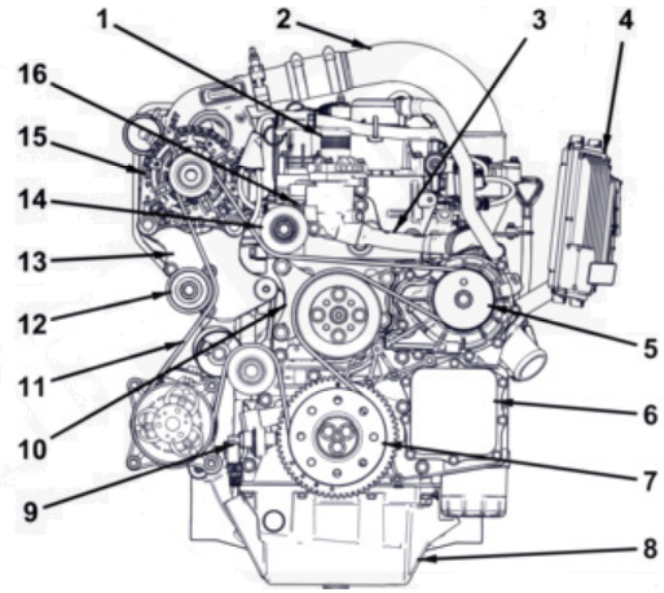
Installation

Follow the reverse order of the disassembly procedures.

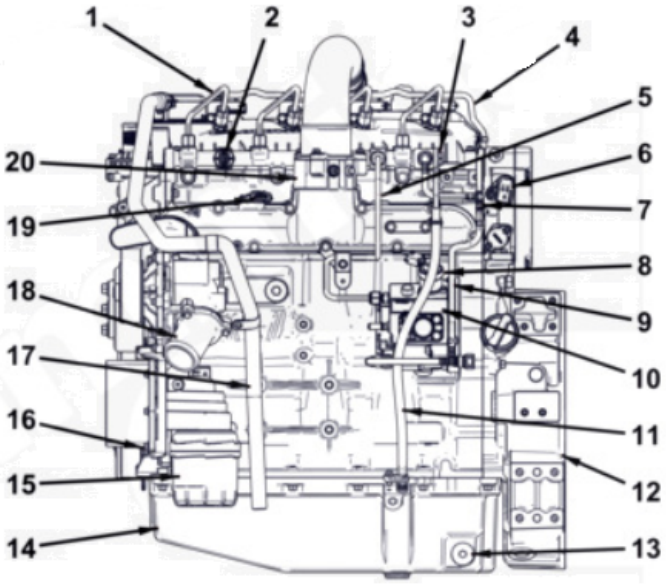
7 POWER SYSTEM

The machine is powered by one of the following engines and equipped with an auxiliary power system. This manual only provides brief maintenance instructions of the engines. For detailed instructions, please refer to the engine maintenance manual provided with the machine.

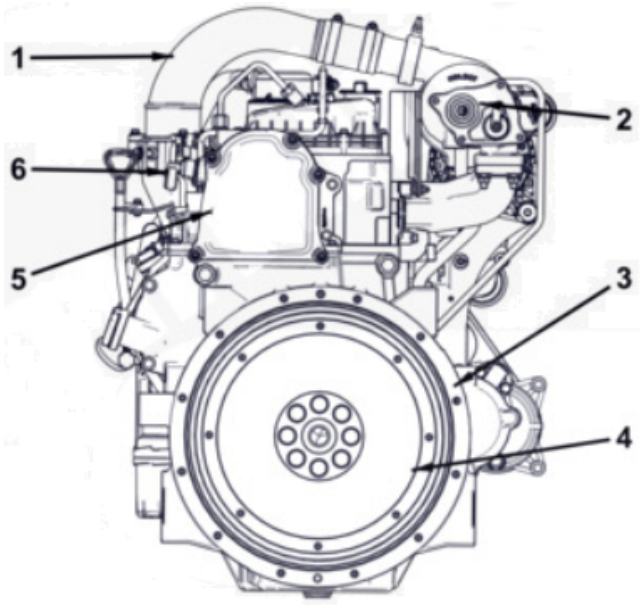
7.1 CUMMINS QSF2.8



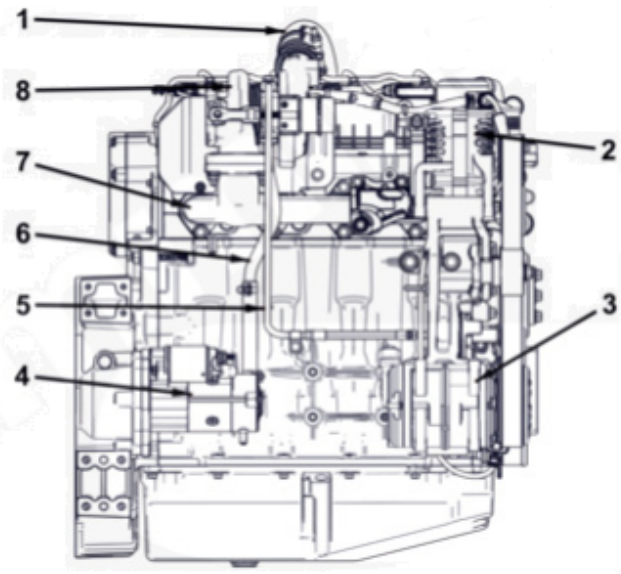
1. Coolant outlet connection
2. Air crossover tube
3. Thermostat housing pipeline
4. Engine control module (ECM)
5. Pump drive device
6. Front gear housing cover
7. Crankshaft pulley
8. Oil pan
9. Crankshaft position sensor
10. Fan hub bracket
11. Fan belt
12. Belt tensioner
13. Charger mounting bracket
14. Idler pulley
15. Charger
16. Coolant temperature sensor



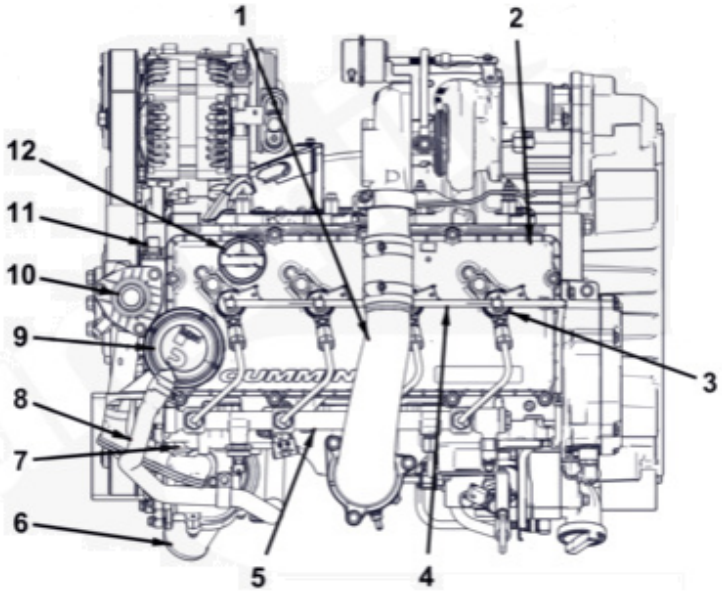
1. High-pressure fuel supply to oil injector
2. Fuel rail pressure sensor
3. Fuel rail pressure-reducing valve
4. Fuel rail return pipe
5. High-pressure fuel supply to fuel rail
6. Camshaft position sensor
7. Connecting fuel return pipe
8. Fuel pump actuator
9. Fuel pump return pipe
10. High-pressure fuel pump
11. Engine oil gauge (dipstick)
12. Flywheel housing
13. Drain plug
14. Oil pan
15. Oil filter
16. Crankshaft position sensor
17. Crankcase breather pipe
18. Water inlet connection
19. Intake air temperature/pressure sensor
20. Intake connection



1. Air crossover tube
2. Exhaust outlet connection
3. Flywheel housing
4. Flywheel
5. Overhead camshaft sprocket housing cover
6. Camshaft position sensor



1. Air crossover tube
2. Charger
3. Refrigerant compressor (optional)
4. Starting motor
5. Turbocharger oil supply pipe
6. Turbocharger oil return pipe
7. Exhaust manifold
8. High level-mounted turbocharger



1. Air crossover tube
2. Rocker arm housing cover
3. Fuel injector
4. Fuel injector return pipe
5. High-pressure fuel rail
6. Water inlet connection
7. Coolant temperature sensor
8. Crankcase breather pipe
9. Crankcase breather
10. Water outlet connection
11. Coolant temperature sensor
12. Engine oil filling port

Regular Maintenance Chart

Daily and regular maintenance is essential for the engine to maintain optimal performance. The following chart describes regular maintenance items with different intervals. The maintenance intervals vary with different engine applications, loads, diesel oils and engine oils. The following instructions are only for normal operating conditions.

Table 7-1 Regular Maintenance Chart

○: Inspection ◇: Replacement

Systems	Inspection Items	Daily	Regular Maintenance Interval			
			Every 250 hours	Every 500 hours	Every 1000 hours	Every 2000 hours
Cooling system	Check and fill coolant	○				
	Check cooling fan for normal operation	○				
	Check cooling system		○or every 3 months[1]			
	Check radiator hose					
	Check if the radiator pressure cap can be reused					
	Check the belt tensioner of cooling fan				○or every 1 year[1]	
	Check belt drive fan					
	Flush the cooling system					◇ or every 2 years[1]
Intake system	Check the intake pipe	○				
	Check the air resistance of air cleaner		○or every 3 months[1]			
Belt drive	Check drive belt	○				
Fuel oil	Drain the fuel-water separator	○				
	Replace the fuel filter (cartridge)			◇ or every 6 months[1]		
Engine oil	Check the engine oil level	○				
	Change engine oil and filter			◇ or every 6 months[1]		

[1]: Whichever comes first.

Notes: The above are general maintenance procedures, and the maintenance costs shall be borne by the user.

Fuel System

Checking Fuel Level

The fuel level can be checked from the energized turntable or platform control panel.

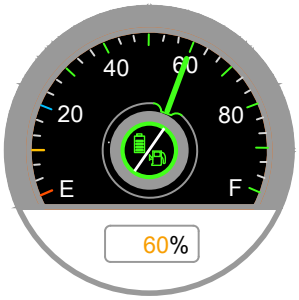


Fig. 1 Fuel level (at the turntable controls)

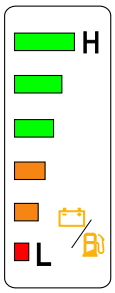


Fig. 2 Fuel level (at the platform controls)

Filling Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Specification Description*** , and never overfill the tank.

⚠ WARNING

- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replacing Fuel Filter Element

NOTICE

- *Do not pre-fill the fuel filter on the pressure side. Pre-filling the pressure-side fuel filter can cause debris to enter the fuel system and damage fuel system components.*
- *After installing the fuel filter, the fuel system must be filled.*
- *Tightening the filter too tightly can cause thread distortion, or bring damage to the filter element gasket or filter tank.*

It is recommended to replace the fuel filter element every 6 months or after 500 hours of operation.

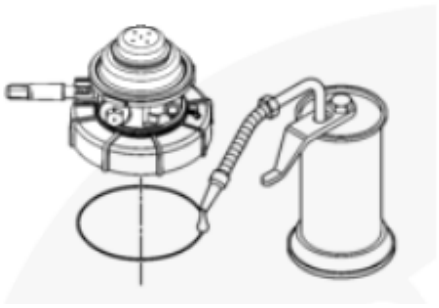


Fig. 3

1. Disconnect the battery.
2. If necessary, disconnect the fuel heater wire harness.
3. Disconnect the fuel pipe.
4. Loosen the top of the fuel filter housing and remove the O-ring and fuel filter element.
5. Lubricate the O-ring with clean oil.
6. Install the new fuel filter element into the fuel filter housing.
7. Reinstall the top of the fuel filter housing and tighten it by hand.
8. Connect the fuel pipe.
9. If necessary, connect the fuel heater wire harness.
10. Connect the battery.
11. Vent the fuel line.

Draining the Fuel-water Separator

It is recommended to drain the fuel-water separator daily.

Drain the tank-type fuel-water separator:

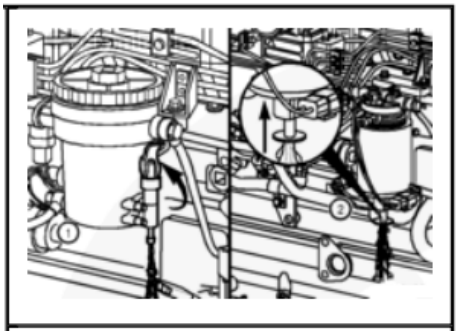


Fig. 4

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.

4. Lift the drain valve lever up until all liquid is drained from the drain pipe.
5. Drain the water from the separator until clean fuel is seen.
6. Push the drain valve up until all liquid is drained from the drain pipe.
7. Connect the cable connectors.

Drain the spin-on fuel-water separator:

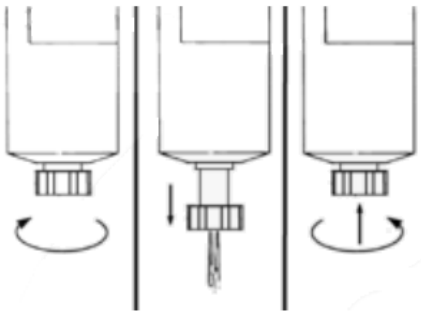


Fig. 5

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Open the drain valve until all liquid is drained from the drain pipe.
5. Drain the water from the separator until clean fuel is seen.
6. Lift the drain valve up and rotate it clockwise until tightened by hand.
7. Connect the cable connectors.

Bleeding Fuel System

NOTICE

Failure to vent the fuel lines may bring damage to the high-pressure pump of the injection system.

The fuel lines are vented through the electric fuel supply pump.

To avoid false fault messages, do not attempt to start the fuel system while venting.

1. Ignition: Turn on the electronic fuel supply pump for 20 seconds to vent the fuel lines and build up the required fuel pressure.
2. Wait until the fuel supply pump is disconnected from the control unit.
3. Turn off the ignition.
4. Repeat the above steps at least 4 times until the fuel lines are fully vented.

Lubrication System

Checking Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are level.
3. Wait until the engine oil temperature drops to below 80°C (176°F), remove the oil dipstick from the engine and wipe it clean with non-fiber cleaning cloths.
4. Reinsert the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Changing Engine Oil

It is recommended to change the engine oil every 6 months or after 500 hours of operation.

NOTICE

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, run the engine until the coolant reaches approximately 60°C (140°F), and then turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Remove the drain plug to drain the oil. Make sure to remove all oil and suspended dirt from the engine.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

5. Clean and inspect the threads and sealing surfaces of the drain plug. If damaged, replace the O-ring with a new one.

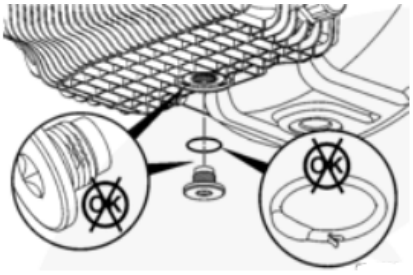


Fig. 6

6. Reinstall the drain plug after the oil is fully drained.
7. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
8. Idle the engine and check the drain plug for leakage.
9. Turn off the engine. Wait about 5 minutes for the oil to flow back from the upper parts of the engine.
10. Check the oil level, which should be in the proper position.

Replacing Engine Oil Filter Element

It is recommended to replace the engine oil filter element every 6 months or after 500 hours of operation.

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Disassemble the oil filter with special tools.
3. Collect the drained fuel.
4. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Fill the filter with clean oil.
7. Mount the filter on the oil filter bracket.
8. Screw on the filter by hand until the gasket is touching, then tighten it.
9. Idle the engine and check the oil filter gasket for leakage.

Cooling System

It is recommended to replace the coolant every two yearsor after 2000 hours of operation.

Checking Coolant Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. Check the coolant level, which should be between the upper mark and lower mark.
4. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Emptying Cooling System

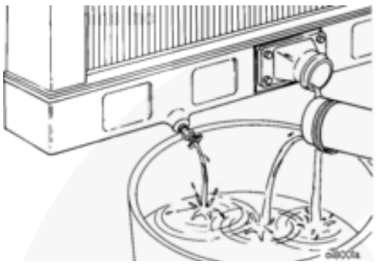


Fig. 7

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the radiator cap.
2. Place an appropriate container under the discharge outlet.
3. Remove the drain plug at the bottom of the radiator.
4. Drain the engine coolant.
5. Install the drain plug.

Filling with Coolant

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the pressure cap on the radiator.
2. Fill with correct coolant to the maximum mark level according to the ***Oil Requirements*** .
3. Reinstall the pressure cap.
4. Run the engine to operating temperature.
5. Turn off the engine.
6. Check the coolant level in the cooled engine.

Intake System

Checking the Intake Pipe

Visually inspect the intake pipe daily for signs of wear, damaged pipelines or loose clamps that could damage the engine. If necessary, replace the damaged pipe and tighten the loose clamp to ensure that the air system does not leak.

Check the clamp and hose of the intake pipe for corrosion, which may allow the corrosive and dirt to enter the air intake system. If necessary, disassemble and clean the system.

Checking the Resistance of Air Filter

Mechanical resistance indicator

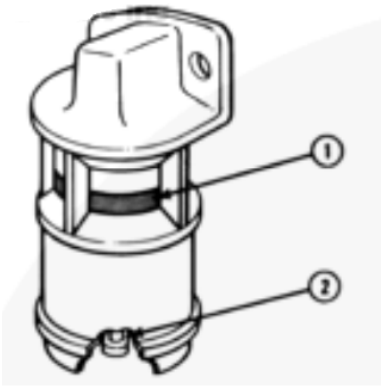


Fig. 8

Note: Do not remove the felt washer of the indicator. The felt washer is used to absorb moisture.

The mechanical resistance indicator indicates if the resistance for air to go through the dry air filter is too high. The indicator can be mounted on the air filter outlet or the dashboard. As dirt accumulates in the filter element, the red mark (1) in the window will gradually rise. After replacing the filter element, press the reset button (2) to reset the indicator.

Vacuum indicator

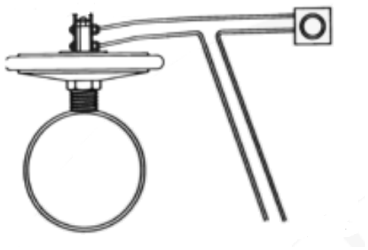


Fig. 9

The resistance or vacuum indicator should be installed as close as possible to the turbocharger inlet to obtain actual resistance. When the air resistance is too high, the vacuum switch will activate the alarm indicator on the dashboard.

Mechanical indicator for industrial gas

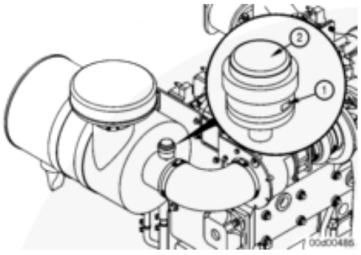


Fig. 10

The mechanical resistance indicator indicates if the resistance for air to go through the dry air filter is too high. The indicator can be mounted on the air filter outlet. As dirt accumulates in the filter element, the red mark (1) in the window will gradually rise. After replacing the filter element, press the reset button (2) to reset the indicator.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspecting the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned
- Come off
- Glazed or hardened

If the belt is not properly tensioned, it should be adjusted:

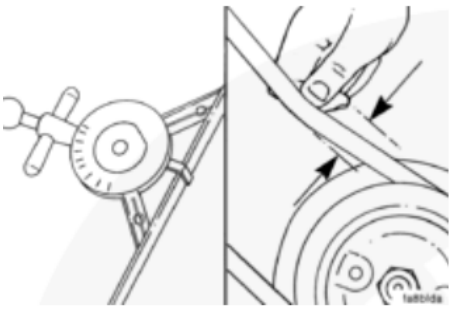


Fig. 11

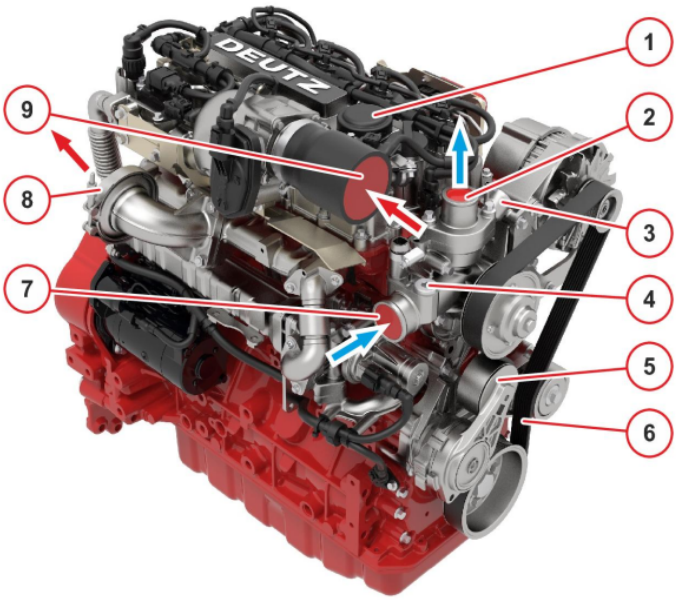
1. Check the belt tension at its center.
2. Refer to the chart of engine belt tension to select the correct test gauge and tension value based on the width of the belt used.
3. Use alternative method (deflection method) to apply a force of 110N (25lbf) on the V-belt between two pulleys to check the belt tension. If the deflection of the pulley center distance per foot exceeds the belt thickness, the belt tension must be adjusted.

Replacing V-ribbed Belt

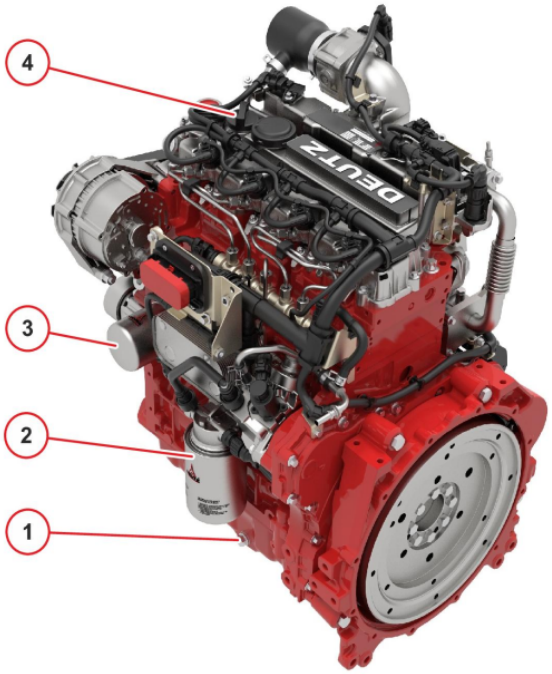
It is recommended to replace the V-ribbed belt every 2 years or after 2000 hours of operation.

7.2 DEUTZ D&TD2.9L4

Deutz D2.9L4

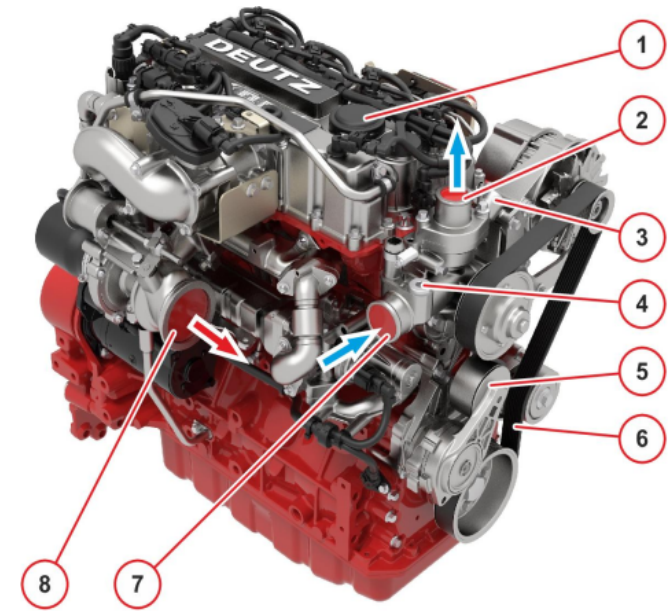


1. Crankcase ventilation
2. Coolant outlet
3. Coolant supply flow to the cab heating
4. Coolant return flow from the cab heating
5. Tensioning pulley
6. V-ribbed belt
7. Coolant inlet
8. Air outlet
9. Air inlet

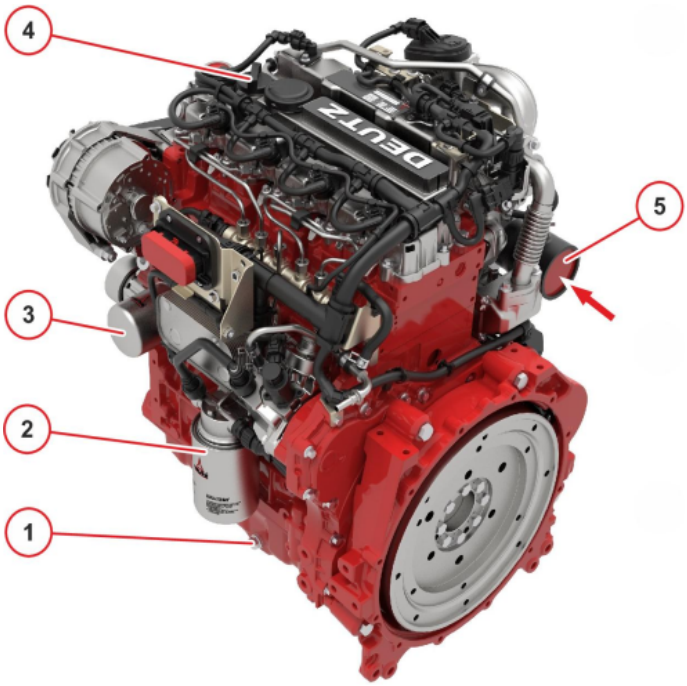


1. Engine oil drain plug
2. Fuel filter
3. Engine oil spare filter
4. Engine oil filler port

Deutz TD2.9L4



1. Crankcase ventilation
2. Coolant outlet
3. Coolant supply flow to the cab heating
4. Coolant return flow from the cab heating
5. Tensioning pulley
6. V-ribbed belt
7. Coolant inlet
8. Air outlet



1. Engine oil drain plug
2. Fuel filter
3. Engine oil spare filter
4. Engine oil filler port
5. Air inlet

Regular Maintenance Chart

Daily and regular maintenance is essential for the engine to maintain optimal performance. The following chart describes regular maintenance items with different intervals. The maintenance intervals vary with different engine applications, loads, diesel oils and engine oils. The following instructions are only for normal operating conditions.

Table 7-2 Regular Maintenance Chart

○: Inspection ◇: Replacement

Systems	Inspection Items	Daily	Regular Maintenance Interval			
			Every 500 hours	Every 1000 hours	Every 3000 hours	Every 4 years
Cooling system	Check the coolant level (refill if needed)	○				
	Coolant (additive concentration)		○			
	Change coolant					◇
	Check the inlet area of charge air cooler (drain lubricating oil/condensation)			○		
	Check cold starting device			○		
Electrical equipment	Check battery and cable connectors			○		
Intake system	Check the intake pipe		○			
	Check the air filter	○				
	Change dry air filter			◇ or every 2 years[1]		
Belt drive	Check generator V-belt		○			
	Replace generator V-belt			◇ or every 2 years[1]		
	Check V-belt and adjust tension			○		
	Replace V-belt and adjust tension				◇	
Exhaust system	Check the exhaust system	○				
	Filter element of selective catalytic reduction pump			◇ or every 3 years[1]		
Fuel oil	Drain the fuel pre-filter	○				
	Replace the fuel pre-filter			◇ or annually[1]		
	Change fuel filter (for filter size 0.6 L)		◇ or annually[1]			
	Change fuel filter (for filter size 0.9 L)			◇ or annually[1]		
Lubrication system	Check the engine oil level (add if needed)	○				
	Change the engine oil		TD2.9L4: ◇ or annually[1]	D2.9L4: ◇ or annually[1]		
	Change engine oil filter element					

Table 7-2 Regular Maintenance Chart (continued)

○: Inspection ◇: Replacement

Systems	Inspection Items	Daily	Regular Maintenance Interval			
			Every 500 hours	Every 1000 hours	Every 3000 hours	Every 4 years
Diesel engine	Check the diesel engine for tightness	○				
	Check diesel engine bracket (retighten if necessary, or replace if damaged)			○		
	Check fasteners, hose connectors and clamps (change if damaged)			○		

[1]: Whichever comes first.

Notes: The above are general maintenance procedures, and the maintenance costs shall be borne by the user.

Fuel System

Checking Fuel Level

The fuel level can be checked from the energized turntable or platform control panel.

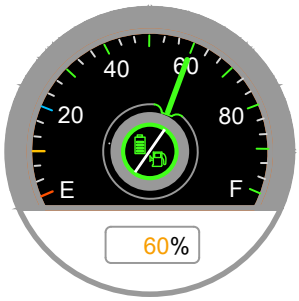


Fig. 12 Fuel level (at the turntable controls)

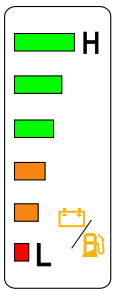


Fig. 13 Fuel level (at the platform controls)

Filling Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Specification Description*** , and never overfill the tank.

⚠ WARNING

- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replacing Fuel Filter Element

It is recommended to replace the fuel filter element every year or after 500 hours of operation.

Notice

Do not pre-fill the filter, or the filter may be contaminated.

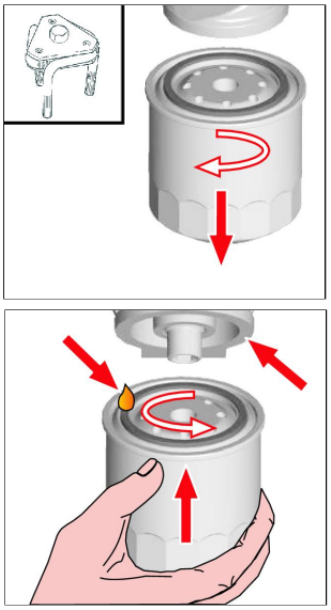
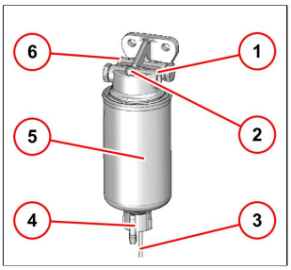


Fig. 14 Diagram of replacing fuel filter element

1. If twist protection is installed (optional), remove the clamp first.
2. Place an appropriate oil-collecting vessel under the fuel filter.
3. Use a special tool to loosen and unscrew the filter element.
4. Collect the drained fuel.
5. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
6. Apply a thin layer of oil to the sealing surface of the new filter.
7. Screw on the new filter by hand until the gasket is touching, then tighten it with the torque of 10-12Nm (7-9ft-lb).
8. Secure the clamp on the twist protection (optional).
9. Vent the fuel line.

Replacing and Draining Fuel Pre-filter

It is recommended to drain the fuel pre-filter daily, and replace the fuel pre-filter element every year or after 1000 hours of operation.



1. Fuel transfer pump
2. Venting bolt
3. Electrical connection for level sensor
4. Drain valve
5. Filter element
6. Fuel supply from fuel tank

Fig. 15 Fuel pre-filter

Drain the fuel pre-filter:

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Open the drain valve to allow the liquid to flow out completely.
5. Mount the drain valve.
6. Connect the cable connectors.

Replace the fuel pre-filter:

1. Turn off the engine.
2. Close the fuel shut-off valve to disconnect the fuel supply to the engine (with high-lying tank).
3. Place an appropriate oil-collecting vessel under the drain valve.
4. Disconnect the cable harness.
5. Open the drain valve to allow all liquid to flow out.
6. Remove the filter element.
7. Clean any dirt off the sealing surface of the new filter element and opposite side of the filter head with clean, non-fiber cloths.
8. Apply a thin layer of oil to the sealing surface of the new filter element.
9. Screw on the new filter by hand until the gasket is touching, then tighten it with the torque of 17-18Nm (12.5-13.3ft-lb).
10. Mount the drain valve.
11. Open the fuel shut-off valve to vent the fuel lines.

Bleeding Fuel System

NOTICE

Failure to bleed the fuel system may bring damage to the high-pressure pump of the injection system.

The fuel lines are bled through the electric fuel supply pump.

Note: To avoid false fault messages, do not attempt to start the fuel system while bleeding.

1. Ignition: Turn on the electronic fuel supply pump for 20 seconds to bleed the fuel lines and build up the required fuel pressure.
2. Wait until the fuel supply pump is disconnected from the control unit.
3. Turn off the ignition.
4. Repeat the above steps at least 4 times until the fuel lines are fully bled.

Lubrication System

Checking Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are level.
3. Wait until the engine oil temperature drops to below 80℃ (176℉), remove the oil dipstick from the engine and wipe it clean with non-fiber cleaning cloths.
4. Reinsert the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Changing Engine Oil

It is recommended to change engine oil after the machine is put into service for 50–100 hours for the first time, and every 250hours of operation thereafter.

Notice

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, warm up the engine so that the engine oil reaches approximately 80°C (176°F), and then turn off the engine.
2. Make sure the machine and engine are level.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Open the drain valve to allow the oil to flow out.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

5. Install the drain valve after the oil is fully drained.
6. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
7. Warm up the engine so that the engine oil reaches approximately 80°C (176°F) and then shut down the engine.
8. Check the oil level, which should be in the proper position.

Replacing Engine Oil Filter Element

TD2.9L4: it is recommended to replace the engine oil filter element every year or after 500 hours of operation.
D2.9L4: it is recommended to replace the engine oil filter element every year or after 1000 hours of operation.

Notice

Do not pre-fill the filter, or the filter may be contaminated.

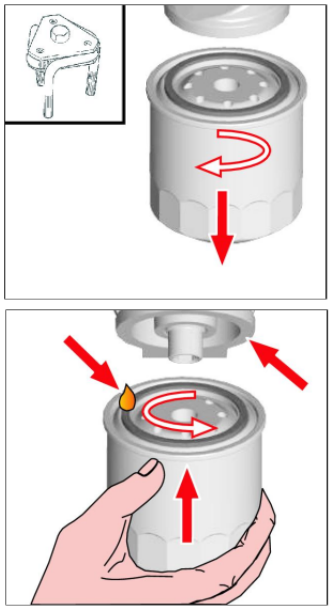


Fig. 16 Diagram of replacing engine oil filter element

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Use a special tool to loosen and unscrew the filter element.
3. Collect the drained fuel.

4. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Screw on the new filter by hand until the gasket is touching, then tighten it with the torque of 10-12Nm (7-9ft-lb).

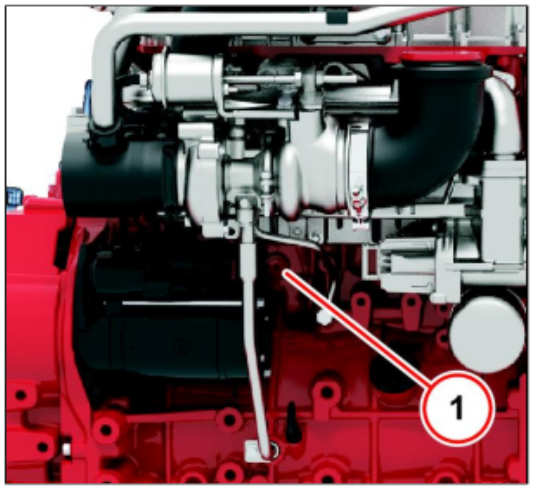
Cooling System

It is recommended to replace the coolant every two yearsor after 2000 hours of operation.

Checking Coolant Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. After the coolant temperature drops below 50°C (122°F), slowly open the coolant filler cap to check the coolant level.
4. The coolant level should be between the MIN and MAX marks on the box body.
5. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Emptying Cooling System

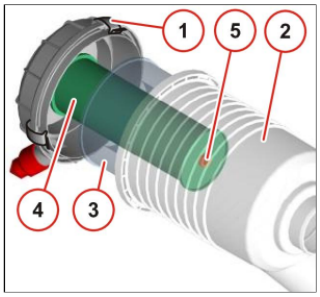


1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C /122°F), carefully open the cooler locking cap.
2. Place an appropriate container under the discharge outlet.
3. Remove the locking screw #1 inside the crankcase.
4. Drain the coolant.
5. Install the locking screw #1 with a new sealing ring.
6. Install the cooler locking cap.

Filling Coolant

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C /122°F), carefully open the coolant filler cap.
2. If necessary, loosen the venting screw on the cooler.
3. Fill with correct coolant to the maximum mark level according to the ***Oil Requirements*** .
4. Install the coolant filler cap.
5. Run the engine to operating temperature.
6. Turn off the engine.
7. Check the coolant level in the cooled engine.

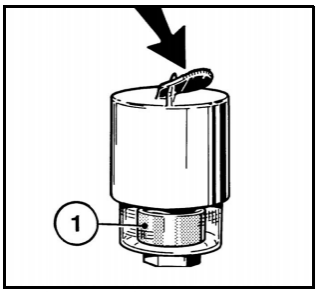
Intake System



1. Clamping yoke
2. Filter hood
3. Filter element
4. Safety cartridge
5. Hex bolt

Fig. 17 Air Filter

Air Filter Service Indicator



1. Red field

Fig. 18 Air filter service indicator

Clean or replace the filter as indicated by the service indicator or service gauge mounted on the air filter intake pipe. Cleaning or replacement is required when:

- The yellow indicator of the service switch flashes with the engine running;
- The red field of the service indicator is fully visible.

After maintenance, push the reset button of the service gauge. The service indicator is ready for operation again.

Checking the Air Filter

1. Lift up the clamping yoke.
2. Remove the filter hood and pull out the filter element.
3. Check the filter element:
   1) Blow out with dry compressed air (max. 0.5MPa/72.5psi) from the inside to the outside if soiling is only slight;
   2) Renew if heavily soiled.

Replacing the Safety Cartridge of Air Filter

It is recommended to replace the safety cartridge of air filter every 3 months or after 250 hours of operation, or as indicated by the status indicator.

NOTICE

Never clean the safety cartridge.

1. Unscrew the hex bolt and pull out the safety cartridge.
2. Install a new safety cartridge and screw on the hex bolt.
3. Install the filter element, mount the filter hood and secure it with the clamping yoke.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspecting the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned
- Come off
- Glazed or hardened

If the belt is not properly tensioned, it should be adjusted:

Press firmly the belt midpoint of the longest extension between two pulleys, and the proper deflection is 10-15mm (0.4-0.6in).

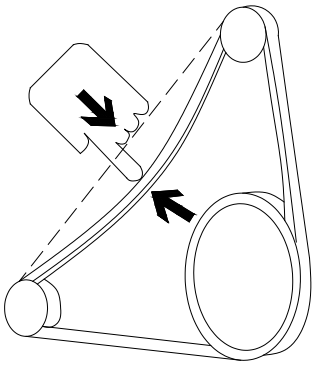
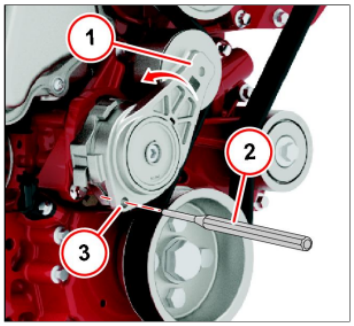


Fig. 19 Belt deflections

Replacing V-ribbed Belt

It is recommended to replace the V-ribbed belt after 3 000 hours of operation.



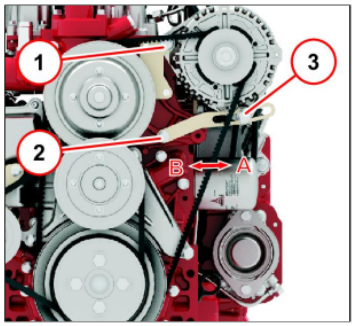
1. Tensioning pulley
2. Retaining pin
3. Assembly bore

Fig. 20 Engine V-ribbed belt

1. Press tensioning pulley with socket wrench in the direction of the arrow until the retaining pin can be fixed in the assembly bore. The V-ribbed belt is now tension-free.
2. First pull the V-ribbed belt off the tensioning pulley.
3. Mount new V-ribbed belt.
4. Retain the tensioning pulley using the pin wrench and remove the retaining pin.
5. Tension the V-ribbed belt using the tensioning pulley and socket wrench. Check whether the V-ribbed belt is correctly in its guide.

Replacing the V-belt

It is recommended to replace the generator V-belt every 2 years or after 1000 hours of operation.



1. Screw
2. Screw
3. Screw

Fig. 21 Generator V-belt

1. Loosen all screws and locking nuts.
2. Move the generator in direction B until the V-belt slackens.
3. Remove the belt and install a new belt.
4. Move the generator in direction A until the V-belt is properly tensioned.
5. Check the tension of the V-belt.
6. Tighten all screws and locking nuts again.

Cleaning the Engine

The following causes of contamination make cleaning the engine necessary:

- High dust content in the air
- Chaff and chopped straw in the area of the engine
- Coolant leaks
- Lubricating oil leakage
- Fuel leaks

Because of the different application conditions, cleaning depends on the degree of soiling.

Cleaning with compressed air

Blowing dirt off or out. Always blow the cooler and cooling fins from the exhaust air side to the fresh air side.

Cleaning with cold cleaner

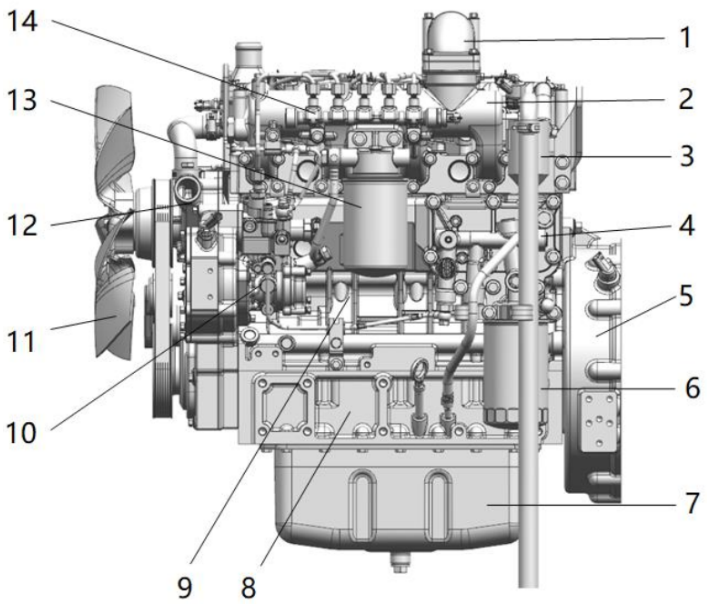
- Spray the engine with cold cleaner and leave it for about 10 minutes to take effect.
- Spray the engine clean with a high pressure water jet.
- Warm up the engine so that the water residues evaporate.

Cleaning with a high pressure cleaner

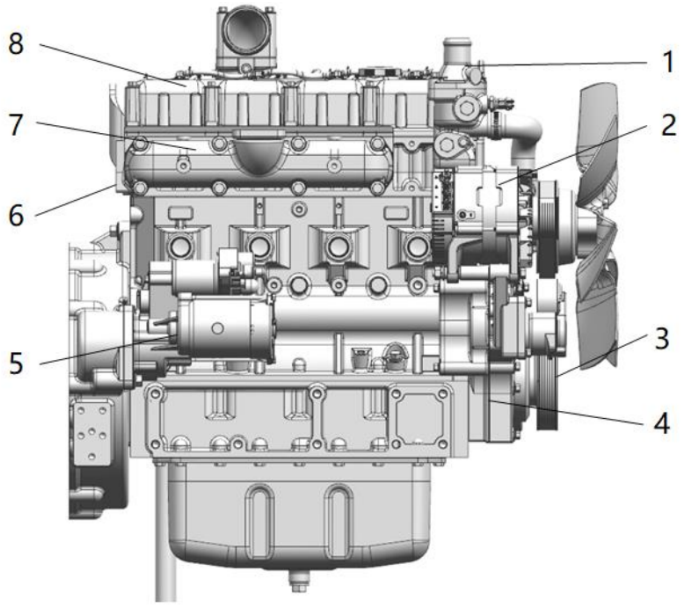
- Clean the engine with a steam jet with the maximum spray pressure of 6MPa (870psi), the maximum steam temperature of 90℃ (194℉), and the distance at least 1m (3.3ft).
- Warm up the engine so that the water residues evaporate.
- Always clean the cooler and cooling fins from the exhaust air side to the fresh air side.

7.3 YUCHAI YCF30

Naturally Aspirated Engine Series (vary with different models):

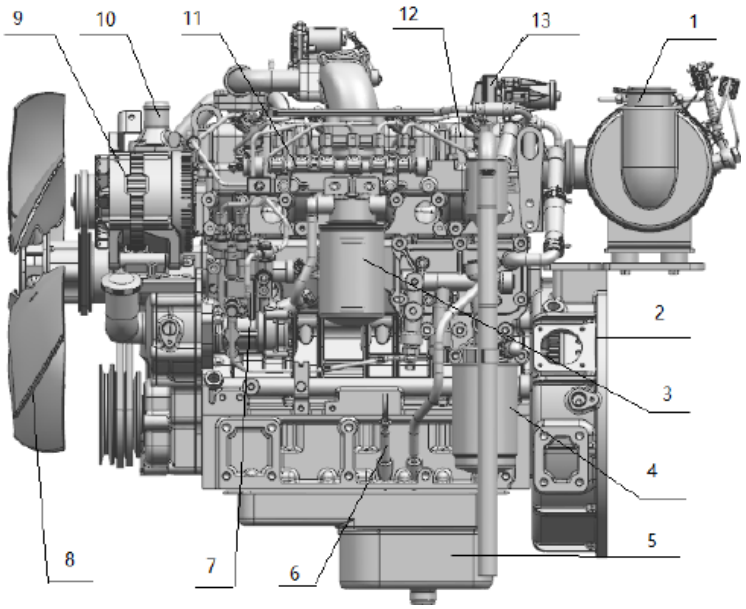


1. Intake connecting pipe
2. Intake pipe
3. Oil-gas separator
4. Engine oil cooler
5. Flywheel housing
6. Oil filter
7. Oil pan
8. Crankcase
9. Cylinder block
10. Fuel injection pump
11. Fan
12. Water pump
13. Diesel filter
14. Common rail pipe

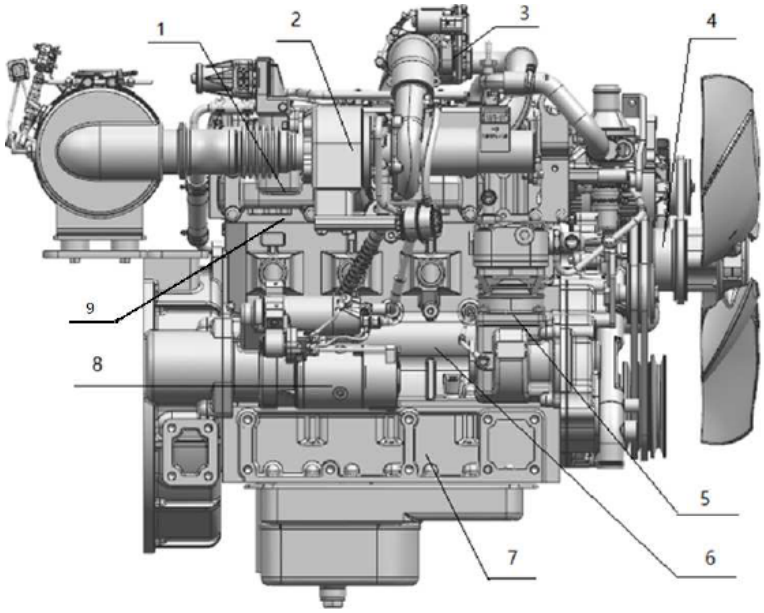


1. Thermostat cover
2. Generator
3. Crankshaft pulley
4. Gear housing and cover
5. Starter
6. Cylinder head
7. Exhaust pipe
8. Cylinder head cover

Turbocharged Engine Series (vary with different models):



1. Catalytic filter components
2. Flywheel housing
3. Diesel filter
4. Oil filter
5. Oil pan
6. Oil dipstick
7. Fuel injection pump
8. Fan
9. Generator
10. Thermostat
11. Common rail pipe
12. Cylinder head cover
13. EGR valve



1. Exhaust pipe
2. Turbocharger
3. Throttle valve
4. Water pump
5. Air compressor
6. Cylinder block
7. Crankcase
8. Starter
9. Cylinder head

Regular Maintenance Chart

Daily and regular maintenance is essential for the engine to maintain optimal performance. The following chart describes regular maintenance items with different intervals. The maintenance intervals vary with different engine applications, loads, diesel oils and engine oils. The following instructions are only for normal operating conditions.

Table 7-3 Regular Maintenance Chart

No.	Inspection Items	Daily	Regular Maintenance Interval	
			Initial maintenance[2]	Every 500 hours
1	Check engine for leakage (water, oil and air leakage)	√	√	√
2	Check fuel level	√	√	√
3	Check the engine oil condition and level	√	√	√
4	Check and clean air cleaner element[1]	√	√	√
5	Check engine coolant level and color	√	√	√
6	Check wire connections for poor contact, interference and wear		√	√
7	Check water pump for normal operating		√	√
8	Check the belt for wear and adjust belt tension		√	√
9	Check crankshaft position sensor, camshaft sensor head for foreign matters		√	√
10	Check pipe and wire connections			√
11	Change the engine oil		√	√
12	Change the engine oil filter element		√	√
13	Replace the fuel filter element (including fuel-water separator and fine filter)			√
14	Drain the fuel-water separator	√	√	√
15	Clean diesel engine			√
16	Read fault codes of electronic control system with a fault diagnosis instrument and clear troubles		√	√
17	Check acceleration and deceleration performance and exhaust color		√	√

[1]: perform maintenance every 50 hours. Perform maintenance every 5-10 hours in harsh working conditions. The filter element must be changed if the element is deformed or after 3-4 times of maintenance, or as required in the air filter instructions.

[2]: initial maintenance shall be performed after the machine is put into service for 50–100 hours for the first time.

Fuel System

Checking Fuel Level

The fuel level can be checked from the energized turntable or platform control panel.

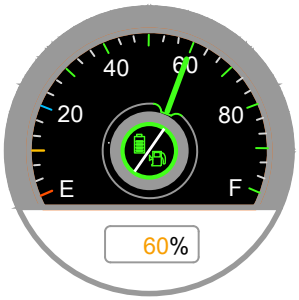


Fig. 22 Fuel level (at the turntable controls)

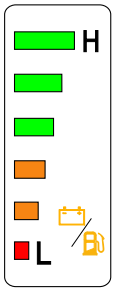


Fig. 23 Fuel level (at the platform controls)

Filling Fuel Tank

Turn off the engine, fill with correct diesel fuel according to the ***Oil Specification Description*** , and never overfill the tank.

⚠ WARNING

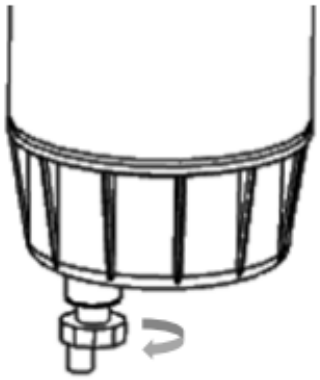
- **Do not mix gasoline, alcohol, or their mixture with diesel fuel.**
- **Do not refuel the machine while the engine is running.**
- **Due to the extremely accurate tolerance match of the diesel injection system, it is critical to keep the fuel clean and free of dirt or water. The dirt or water entering the combustion system can cause severe damage to the fuel pump and injectors.**

Replacing Fuel Filter Element

It is recommended to replace the fuel filter element after 500 hours of operation.

Draining Fuel Pre-filter and Replacing Filter Element

It is recommended to drain the fuel pre-filter daily, and replace the pre-filter element after 500 hours of operation.



Drain the the fuel pre-filter:

1. Turn off the engine.
2. Place an appropriate collecting vessel under the drain valve.
3. Disconnect the cable harness.
4. Open the drain valve to allow the liquid to flow out completely.
5. Mount the drain valve.
6. Connect the cable connectors.

Replace the fuel pre-filter element:

1. Turn off the engine.
2. Close the fuel shut-off valve to disconnect the fuel supply to the engine (with high-lying tank).
3. Place an appropriate oil-collecting vessel under the drain valve.
4. Disconnect the cable harness.
5. Open the drain valve to allow all liquid to flow out.
6. Remove the filter element.
7. Clean any dirt off the sealing surface of the new filter element and opposite side of the filter head with clean, non-fiber cloths.
8. Apply a thin layer of oil to the sealing surface of the new filter element.
9. Screw on the new element by hand until the gasket is touching, then tighten it with proper torque.
10. Mount the drain valve.
11. Open the fuel shut-off valve to bleed the fuel lines.

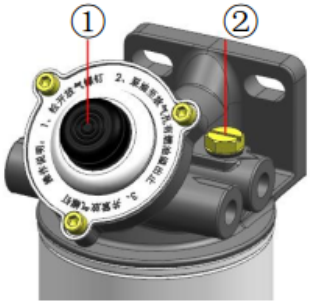
Bleeding Fuel System

NOTICE

Failure to bleed the fuel lines may bring damage to the high-pressure pump of the injection system.

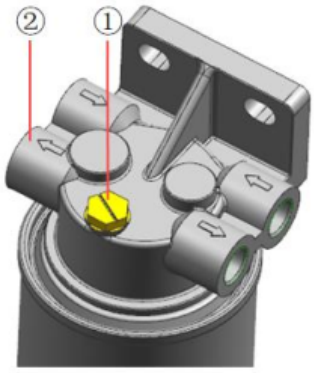
The fuel lines are bled through the electric fuel supply pump. If the pre-filter is of integrated electronic fuel transfer pump structure, this operation is not necessary.

To avoid false fault messages, do not attempt to start the fuel system while bleeding.



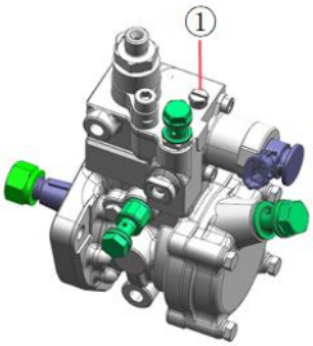
1. Hand pump (on pre-filter)
2. Venting screw

Fig. 24 Fuel pre-filter



1. Venting screw
2. Oil outlet connection

Fig. 25 Fuel fine filter



1. Venting screw

Fig. 26 Fuel injection pump

1. Loosen the venting screw on the pre-filter, press the hand pump on the pre-filter, and tighten the venting screw on the pre-filter when there is continuous bubble-free fuel flowing out of the venting screw.
2. Loosen the venting screw on the fine filter (if there is no venting screw, loosen the oil outlet connection of the fine filter), press the hand pump on the pre-filter, tighten the venting screw (or oil outlet connection) on the fine filter when there is continuous bubble-free fuel flowing out of the venting screw (or fine filter oil outlet).

   Note: The oil outlet on the fine filter is generally indicated by an arrow, and what needs to be loosened is the connection with the oil pipe.
3. Loosen the venting screw on the fuel injection pump, press the hand pump on the pre-filter, and tighten the venting screw on the fuel injection pump after there is continuous bubble-free fuel flowing out of the venting screw.
4. Continuously press the hand pump on the pre-filter to keep more fuel flowing into the injection pump.
5. After the engine starts, it is recommended to run the engine at idle speed for 2min-3min, and then run it at 60%-80% of the rated speed for 3min-5min to fully empty the air in the fuel line.

Lubrication System

Checking Engine Oil Level

1. Turn off the engine.
2. Make sure that the machine and engine are level.
3. Wait until the engine oil temperature drops to below 80℃ (176℉), remove the oil dipstick from the engine and wipe it clean with non-fiber cleaning cloths.
4. Reinsert the clean dipstick back to its original position.
5. Remove the dipstick again and check the oil level, which should be between the FULL (HOT) mark and LOW (COLD) mark on the dipstick.
6. If necessary, fill with correct engine oil to the FULL (HOT) mark on the dipstick according to the ***Oil Requirements*** , and do not overfill the tank.

Changing Engine Oil

It is recommended to change engine oil after the machine is put into service for 50–100 hours for the first time, and every 250hours of operation thereafter.

Notice

- *Every time the engine oil is changed, the engine oil filter must also be replaced.*
- *Changing the oil with the engine warmed up can make the engine oil flow smoother and remove more impurities.*

1. Before changing the oil, warm up the engine so that the engine oil reaches approximately 80°C (176°F), and then turn off the engine.
2. Make sure the machine and engine are level.
3. Place an appropriate oil-collecting vessel under the engine oil drain valve.
4. Open the drain valve to allow the oil to flow out.

⚠ WARNING

Hot engine oil poses a risk of burns, so avoid contact with hot oil when draining oil.

5. Install the drain valve after the oil is fully drained.
6. Fill with correct and clean engine oil according to the ***Oil Requirements*** , and never overfill the tank.
7. Warm up the engine so that the engine oil reaches approximately 80°C (176°F) and then shut down the engine.
8. Check the oil level, which should be in the proper position.

Replacing Engine Oil Filter Element

It is recommended to change engine oil filter element after the machine is put into service for 50–100 hours for the first time, and every 250hours of operation thereafter.

Notice

Do not pre-fill the filter, or the filter may be contaminated.

1. Place an appropriate oil-collecting vessel under the engine oil filter.
2. Use a special tool to loosen and unscrew the filter element.
3. Collect the drained fuel.
4. Wipe the sealing surface of the filter holder with clean, non-fiber cloths.
5. Apply a thin layer of oil to the sealing surface of the new filter.
6. Screw on the new filter by hand until the gasket is touching, then tighten it with proper torque.

Cooling System

It is recommended to replace the coolant every two yearsor after 2000 hours of operation.

Checking Coolant Level

1. Turn off the engine.
2. Make sure that the machine and engine are horizontal.
3. After the coolant temperature drops below 50°C (122°F), slowly open the coolant filler cap to check the coolant level.
4. The coolant level should be between the MIN and MAX marks on the box body.
5. If necessary, fill with correct coolant according to the ***Oil Requirements*** , and do not overfill the tank.

Empty the Cooling System

1. After the engine and radiator have cooled suffi-ciently (to the temperature below 50°C/122°F), carefully remove the pressure cap on the radiator.

Fig. 27 Pressure cap on the radiator

2. Place an appropriate container under the discharge outlet.
3. Loosen the drain valve on the engine oil cooler.

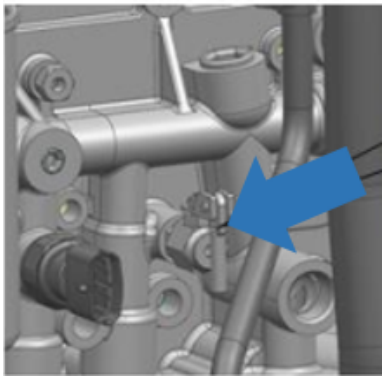


Fig. 28 Drain valve on the engine oil cooler

4. Drain the coolant.
5. Reinstall the pressure cap and drain valve.

Filling Coolant

1. After the engine and radiator have cooled sufficiently (to the temperature below 50°C/122°F), carefully remove the pressure cap on the radiator.
2. Fill with correct coolant to the maximum mark level according to the ***Oil Requirements*** .
3. Install the coolant filler cap.
4. Run the engine to operating temperature.
5. Turn off the engine.
6. Check the coolant level in the cooled engine.

Intake System

Filtration Principle of Air Filter

- **Primary filter:** air director (to make the air form a vortex and remove dirt through the dust bag after the dust settles to the bottom under the action of gravity and centrifugal force).
- **Secondary filter:** main filter element (as major filtration, with the filtration rate of more than 95%).
- **Third-stage filter:** safety filter element (as auxiliary filtration while preventing foreign matter from entering).

Air Filter Service Indicator

For machines equipped with air filter blockage alarm function, if the alarm is triggered, clean or replace the air filter.

For machines not equipped with air filter blockage alarm function, the user can find out the air filter blockage by checking the air resistance indicator installed on the intake pipe behind the air filter, and when the indication window of the air resistance indicator changes from green to red, it indicates that the air intake resistance exceeds the limit value and the filter needs to be cleaned or replaced.

Air Filter Maintenance

It is recommended to maintain the air filter after 50 hours of operation.

Air filter housing: Remove the dust in the filter cavity, air director and dust bag, and do not throw the air director away without recognizing its function.

Main filter element: Remove the dust from the surface of the filter element with a brush, then blow the element with compressed air (pressure of 0.4-0.6 MPa/58-87 psi) from the inside to the outside.

Safety filter element: Clean it by hand patting and avoid blowing with air.

Maintenance instructions for swirl tube air filter:

1. Shut down the machine for ash discharge if the scale mark of the dust cup is covered by impurities. It is recommended to perform ash discharge every 6 hours (or more frequently for harsh operating environments).
2. Turn off the engine, remove the ash cover from the dust cup, tap the outside of dust collector gently to remove the ash.
3. After ash discharge, check the rubber ring of ash cover for normal function and tighten the ash cover.

Replacing the Air Filter Element

If the air filter element is deformed or after the filter element is maintained for 3-4 times, the entire air filter must be replaced.

Before installing the element, check if the sealing gasket is damaged or missing. For tightening, first rotate the element to make it positioned in place, and ensure airtightness to avoid air flow short-circuit.

Belt Drive

⚠ WARNING

- **Do not carry out work on the belt drive unless the engine is at standstill.**
- **After repairs: Check that all protective devices have been installed and that all tools have been removed from the engine.**

Inspecting the Belt

The belt should be replaced/reinstalled immediately if the belt has:

- Cracked or broken
- Worn or unaligned
- Come off
- Glazed or hardened

Check the tension of the belt frequently during use to ensure the belt is properly tensioned. If the belt is too loose, it will reduce the transmission efficiency and decrease the speed of the water pump, fan and generator, affecting the cooling effect, while the vibration generated will cause unnecessary wear of the belt and pulley. If the belt is too tight, it will shorten the service life of the belt, bearings and other parts.

Belt deflection detection: Generally, when a force of 40–50N (9–11lbf) is applied between two pulleys, the belt will deflect 3-5mm (0.1-0.2in).

Replacing Fan Belt

It is recommended to replace the belt every 2 years or after 2000 hours of operation.

NOTICE

For applications with multiple belts, the entire set of drive belts needs to be replaced, and replacing only one belt in a set will make the new belt bear more loads, because the old belt has been stretched, and the additional load will be applied to the new belt, causing the new belt to break.

7.4 AUXILIARY POWER SYSTEM

The auxiliary power system relies on two 12V batteries in parallel to provide power for a 12V DC motor which drives the gear pump to work. When the main power source fails, the auxiliary power system can be used to lower the operator in the platform to the ground. The auxiliary power system cannot be used as the main power source to drive the travel function, but can be used to return the machine to the stowed position in a short time.

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8 HYDRAULIC SYSTEM

8.1 LAYOUT OF HYDRAULIC ELEMENTS

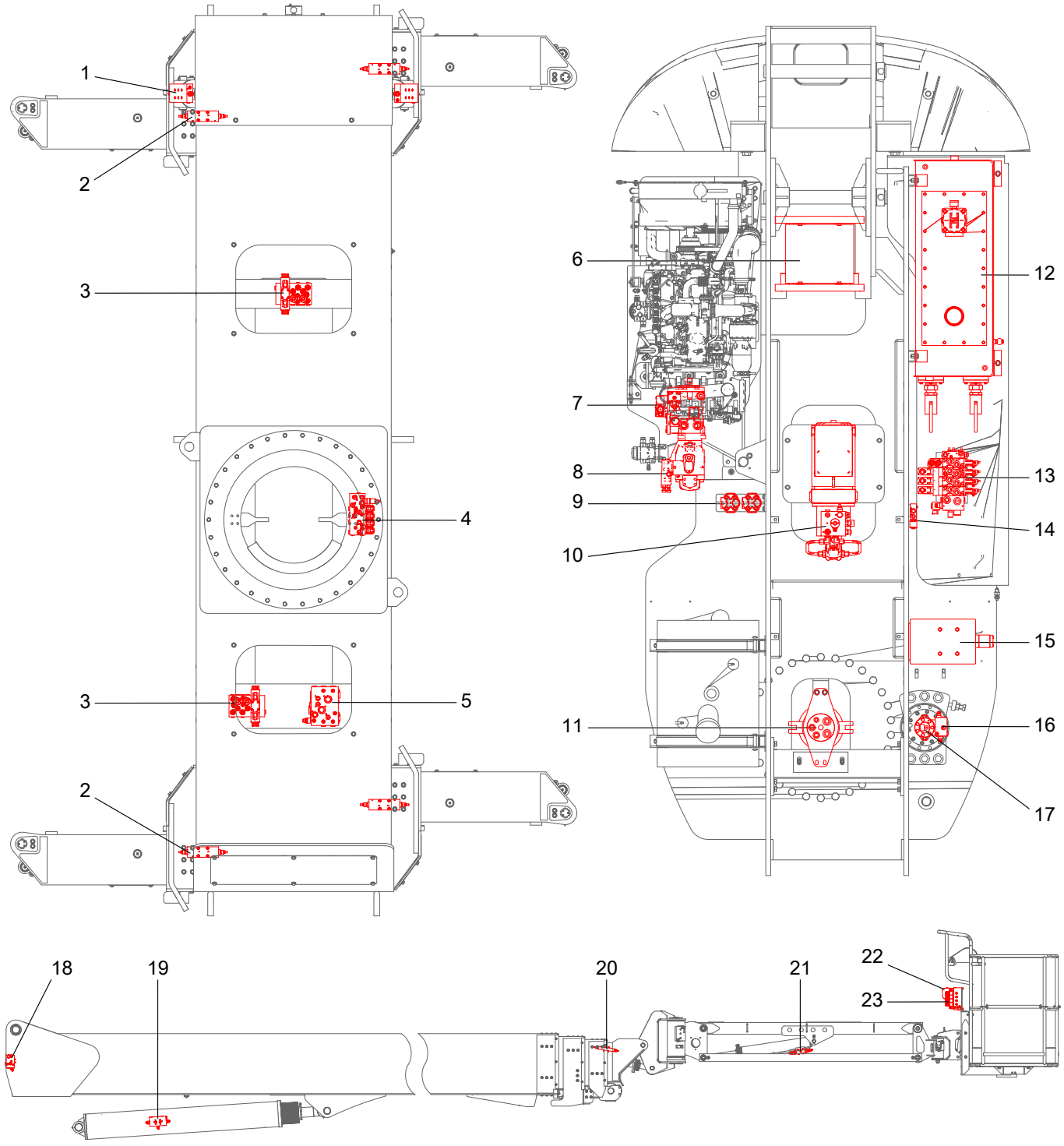


Fig. 1

Table 8-1

1. Oscillating counterbalance valve	**2.** Leveling counterbalance valve	**3.** Axle control valve
4. Brake & two-speed oscillating control valve	**5.** Travel control valve	**6.** Oil cooler
7. Closed-circuit variable displacement pump	**8.** Open-circuit variable displacement pump	**9.** High-pressure filter
10. Hydraulic generator (optional)	**11.** Central rotary joint	**12.** Hydraulic tank
13. Multi-way valve	**14.** Emergency lowering valve	**15.** Power unit
16. Slewing cushion valve	**17.** Hydraulic motor	**18.** Telescoping counterbalance valve
19. Luffing counterbalance valve	**20.** Leveling counterbalance valve	**21.** Luffing control valve
22. Accumulator	**23.** Platform control valve	

8.2 FUNCTION MANIFOLD

Oscillation Counterbalance Valve (PN.202040003224)

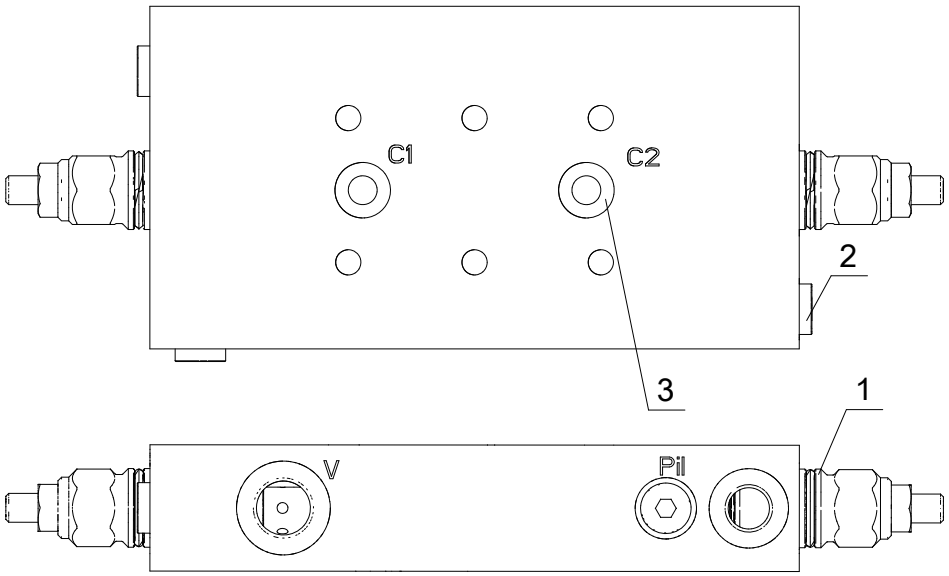


Fig. 2 Oscillation Counterbalance Valve (PN.202040003224)

Table 8-2 Oscillation Counterbalance Valve (PN.202040003224)

No.	Name	Installation Torque	Function
1	Counterbalance valve	45 ~ 50 Nm (33 ~ 37 ft-lb)	Keep the load balanced
3	O-ring	\	\

Leveling Counterbalance Valve (PN.202040000011)

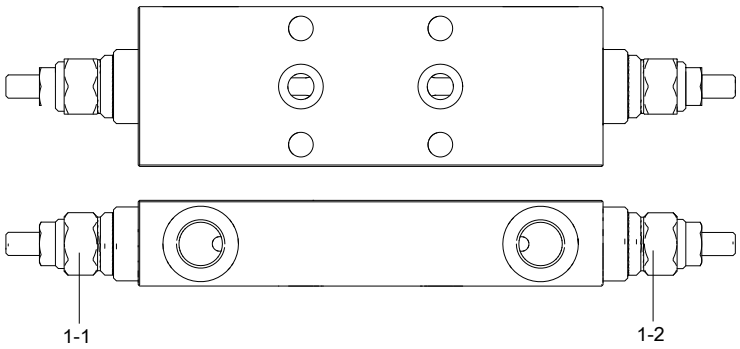


Fig. 3 Leveling Counterbalance Valve (PN.202040000011)

Table 8-3 Leveling Counterbalance Valve (PN.202040000011)

No.	Name	Installation Torque	Function
1	Counterbalance valve	70-75 Nm (52-55 ft-lb)	Keeps the load balanced

Axle Control Manifold (PN.202040003266)

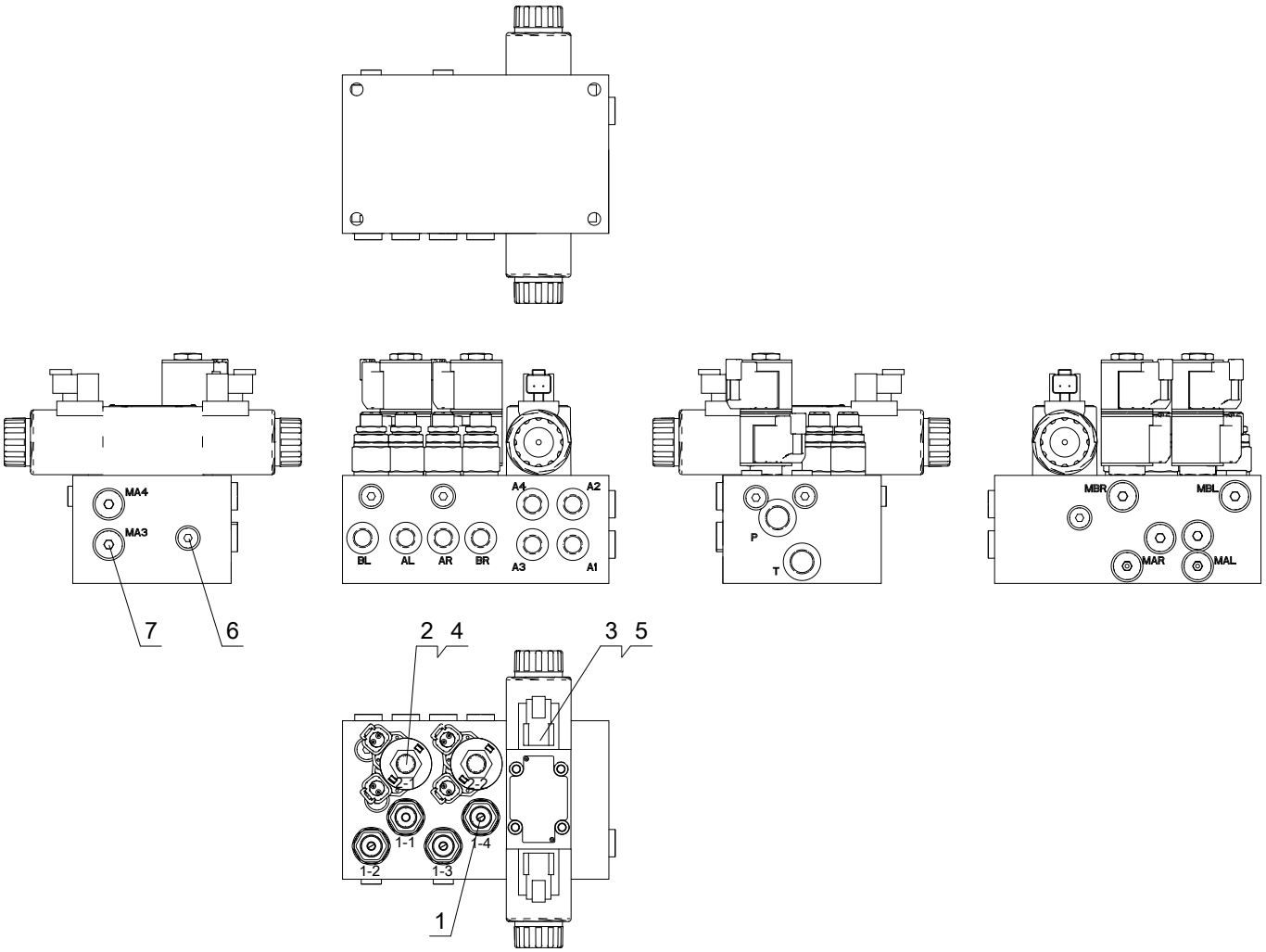


Fig. 4 Axle Control Manifold (PN.202040003266)

Table 8-4 Axle Control Manifold (PN.202040003266)

No.	Name	Installation Torque	Function
1–1	Overflow valve	40-45 Nm (30-33 ft-lb)	Limits pressure in rod cavity of left wheel steering cylinder
1–2	Overflow valve	40-45 Nm (30-33 ft-lb)	Limits pressure in rodless cavity of left wheel steering cylinder
1–3	Overflow valve	40-45 Nm (30-33 ft-lb)	Limits pressure in rodless cavity of right wheel steering cylinder
1–4	Overflow valve	40-45 Nm (30-33 ft-lb)	Limits pressure in rod cavity of right wheel steering cylinder
2-1	Proportional solenoid valve	25 ~ 27 Nm (18 ~ 20 ft-lb)	Controls left wheel steering
2–2	Proportional solenoid valve	25 ~ 27 Nm (18 ~ 20 ft-lb)	Controls right wheel steering

Table 8-4 Axle Control Manifold (PN.202040003266) (continued)

No.	Name	Installation Torque	Function
3	DN6 O-subplate valve	8 Nm (6 ft-lb)	Controls axle extending and retracting
4	Coil	4 Nm (3 ft-lb)	\

Brake & Two-speed Oscillating Control Valve (PN.202040003183)

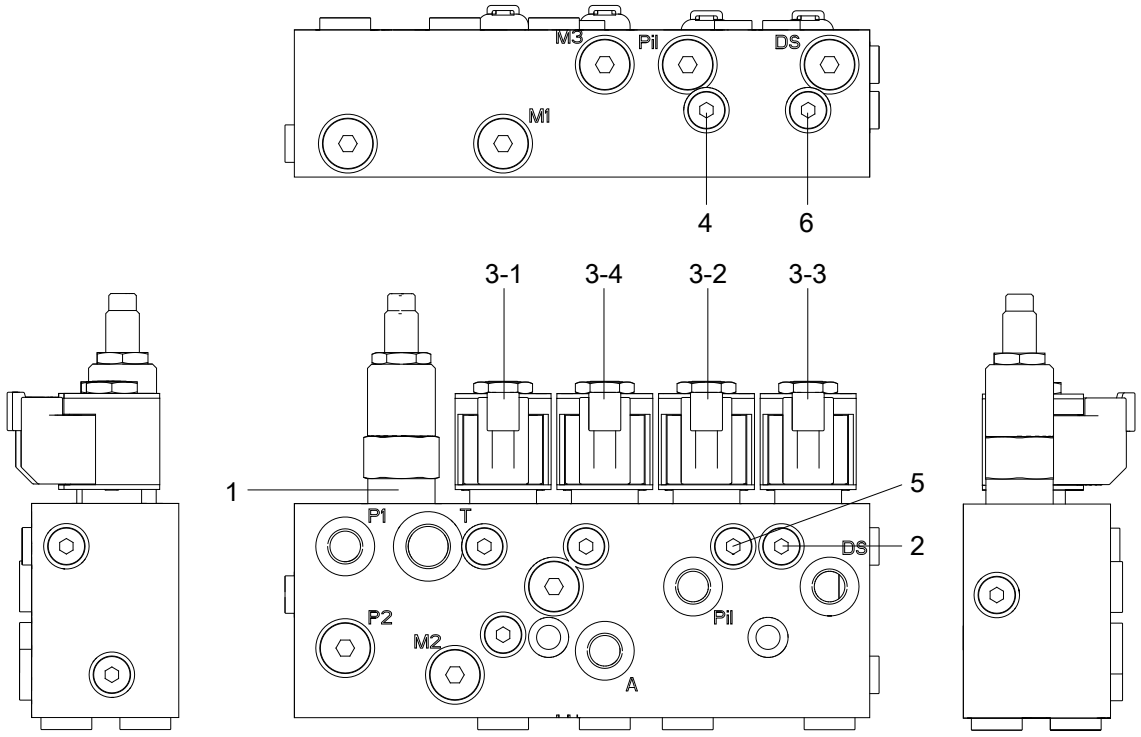


Fig. 5 Brake & Two-speed Oscillating Control Valve (PN.202040003183)

Table 8-5 Brake & Two-speed Oscillating Control Valve (PN.202040003183)

No.	Name	Installation Torque	Function
1	Pressure reducing valve	33.9 Nm (25 ft-lb)	Controls pressure of brake and high/low speed
2	Damper	5 Nm (9 ft-lb)	\
3–1	Solenoid valve	27.1 Nm (20 ft-lb)	Activates oscillating function
3–2	Solenoid valve	27.1 Nm (20 ft-lb)	Controls braking
3–3	Solenoid valve	27.1 Nm (20 ft-lb)	Controls high-low speed switching
3–4	Solenoid valve	27.1 Nm (20 ft-lb)	Activates oscillating function
4	Damper	5 Nm (9 ft-lb)	\
5	Damper	5 Nm (9 ft-lb)	\
6	Damper	5 Nm (9 ft-lb)	\

Travel Control Manifold (PN.202040000153)

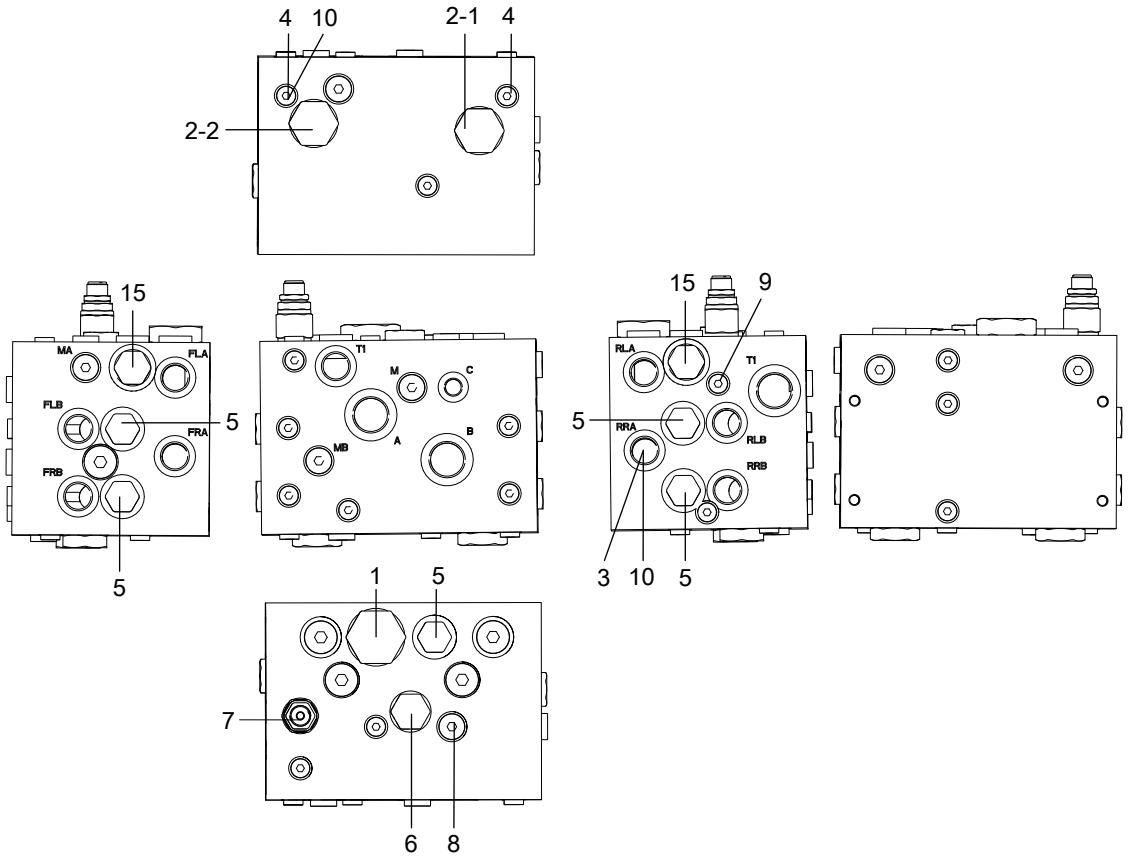


Fig. 6 Travel Control Manifold (PN.202040000153)

Table 8-6 Travel Control Manifold (PN.202040000153)

No.	Name	Installation Torque	Function
1	Flow divider/ flow-combining valve	133 ~ 138 Nm (98 ~ 102 ft-lb)	Controls flow
2-1	Flow divider/ flow-combining valve	99 ~ 104 Nm (73 ~ 77 ft-lb)	Controls flow for front wheel traveling
2–2	Flow divider/ flow-combining valve	99 ~ 104 Nm (73 ~ 77 ft-lb)	Controls flow for rear wheel traveling
3	Damper	5 Nm (4 ft-lb)	\
4	Damper	5 Nm (4 ft-lb)	\
5	Check valve	40-45 Nm (30-33 ft-lb)	Keeps oil flowing in one direction
6	Flush valve	33 ~ 35 Nm (24 ~ 26 ft-lb)	Drains oil on the low-pressure side
7	Overflow Valve	40-45 Nm (30-33 ft-lb)	Controls travel pressure
8	Shuttle valve	12 ~ 15 Nm (9 ~ 11 ft-lb)	Switches between oil lines
9	Damper	5 Nm (4 ft-lb)	\

Table 8-6 Travel Control Manifold (PN.202040000153) (continued)

No.	Name	Installation Torque	Function
10	Damper	5 Nm (4 ft-lb)	\
11	Check valve	55 ~ 65 Nm (41 ~ 48 ft-lb)	Keeps oil flowing in one direction

Electric Proportional Multi-way Valve (PN.202040003166)

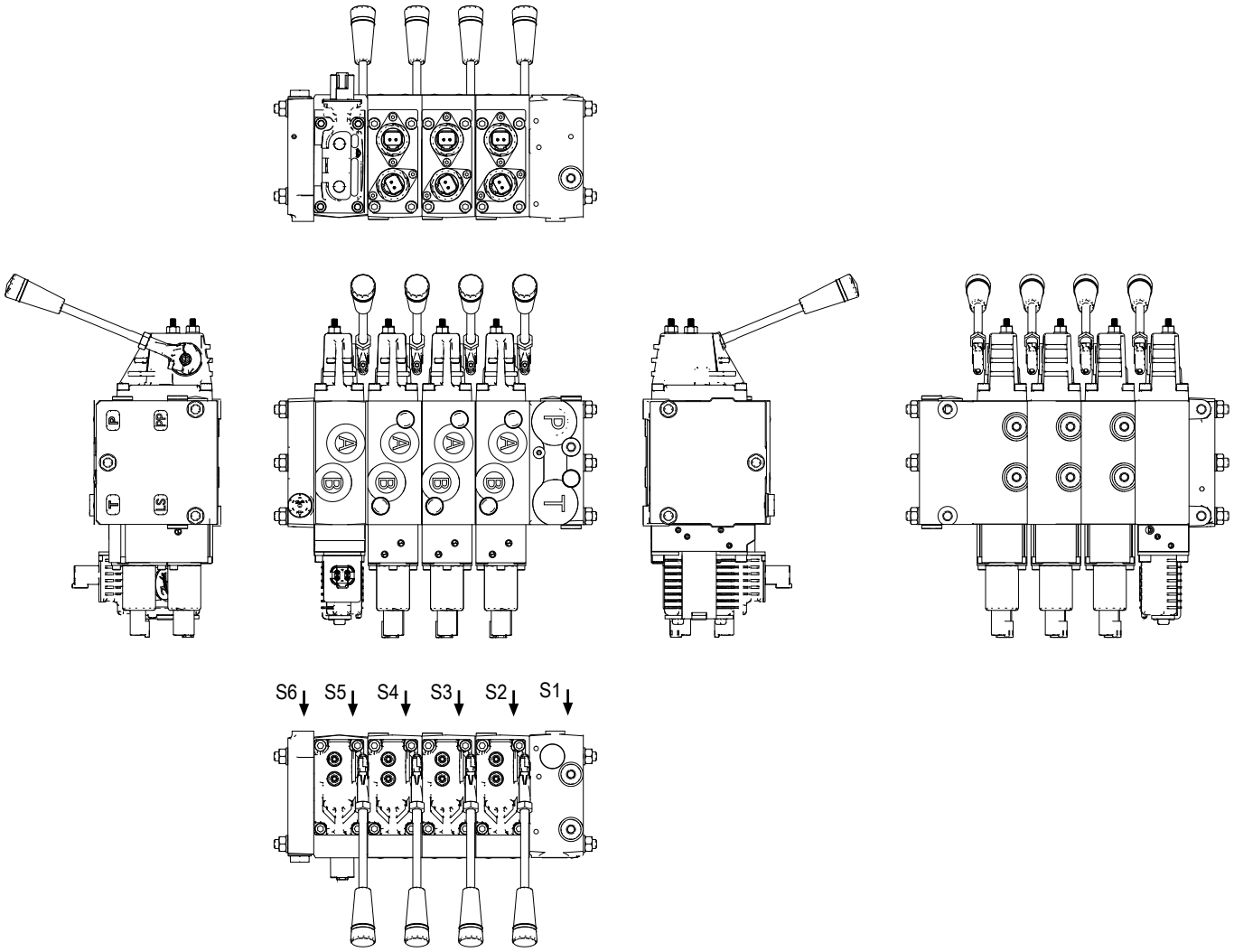


Fig. 7 Electric Proportional Multi-way Valve (PN.202040003166)

Table 8-7 Electric Proportional Multi-way Valve (PN.202040003166)

No.	Description	Function
S1	Oil inlet section	Primary overflow valve limits the maximum system pressure
S2	Telescoping section	Controls boom extending and retracting
S3	Luffing section	Controls main boom lifting/lowering
S4	Slewing section	Controls the left/right slewing of turntable

Table 8-7 Electric Proportional Multi-way Valve (PN.202040003166) (continued)

No.	Description	Function
S5	Common section	Switches between platform and chassis movement enabling
S6	Oil return section	Collects return oil and returns oil to the hydraulic tank

Quadruple Multi-way Valve (PN.202040003337)

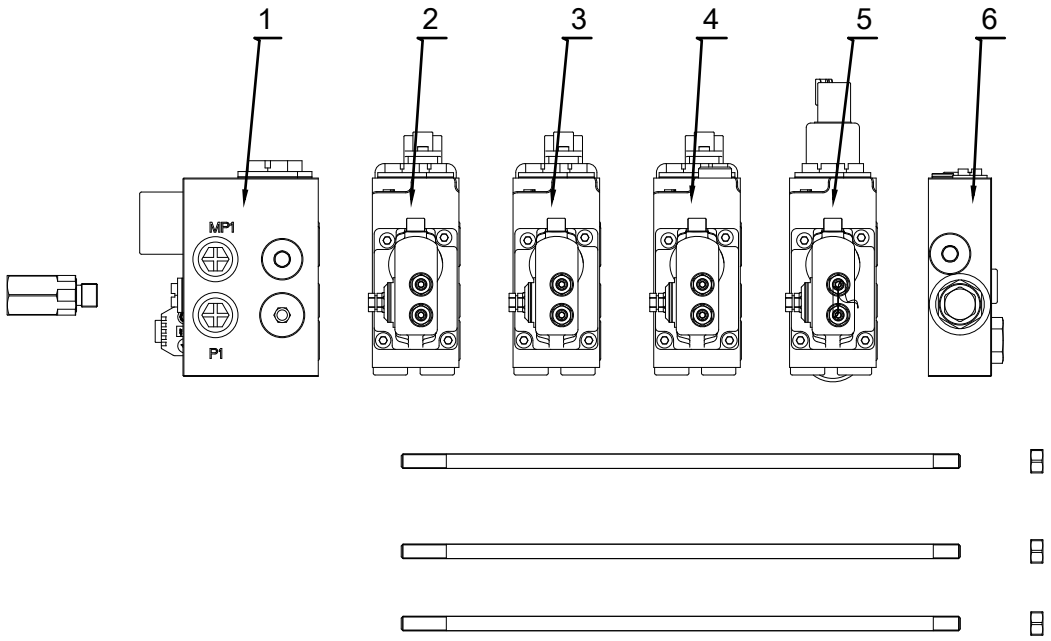


Fig. 8 Quadruple Multi-way Valve (PN.202040003337)

Table 8-8 Quadruple Multi-way Valve (PN.202040003337)

No.	Description	Function
1	Oil inlet and return section	Primary overflow valve limits the maximum system pressure; controls load sensitive movement enabling
2	Lift work section	Controls main boom lifting/lowering
3	Telescope work section	Controls boom extending and retracting
4	Turntable rotation work section	Controls the left/right slewing of turntable
5	Common proportion section	Switches between platform and chassis movement enabling, controls the speed of platform and chassis movements
6	End section	Distributes the high-pressure oil from the pump outlet that flows through the pressure relief valve to each work section valve element for pilot precise control

Emergency Lowering Valve (PN.202040003268)

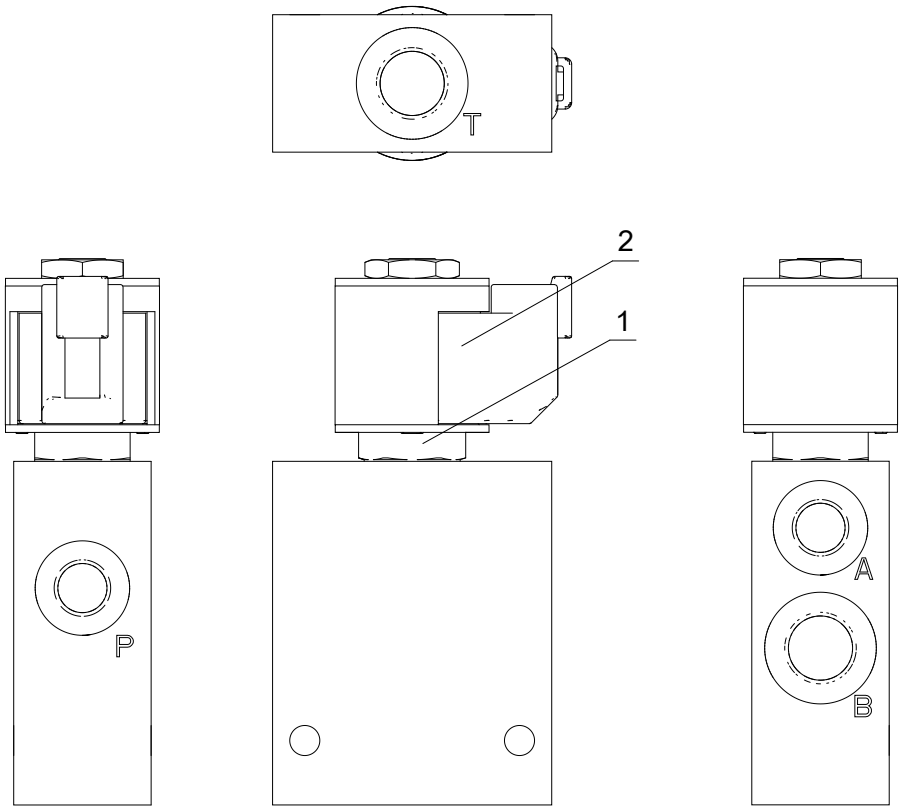


Fig. 9 Emergency Lowering Valve (PN.202040003268)

Table 8-9 Emergency Lowering Valve (PN.202040003268)

No.	Name	Installation Torque	Function
1	Solenoid valve	25.8-28.5 Nm (19-21 ft-lb)	Controls eergency lowering
2	Coil	4 Nm (3 ft-lb)	\

Slewing Cushion Valve (PN.202040003061)

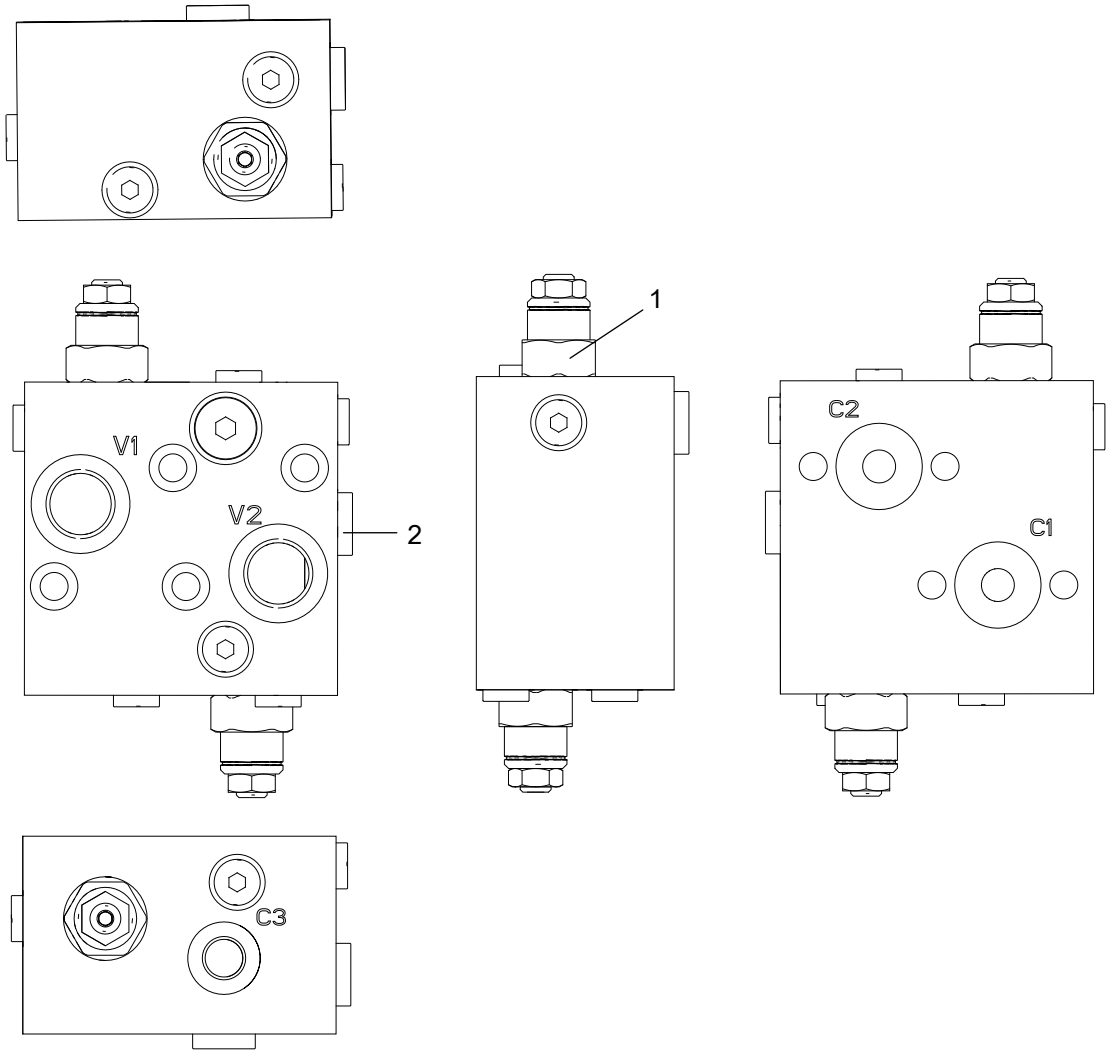


Fig. 10 Slewing Cushion Valve (PN.202040003061)

Table 8-10 Slewing Cushion Valve (PN.202040003061)

No.	Name	Installation Torque	Function
1	Counterbalance valve	40-45 Nm (30-33 ft-lb)	Keep the load balanced
2	Shuttle valve	\	Changes oil lines

Telescopic Counterbalance Valve (PN.202040003270)

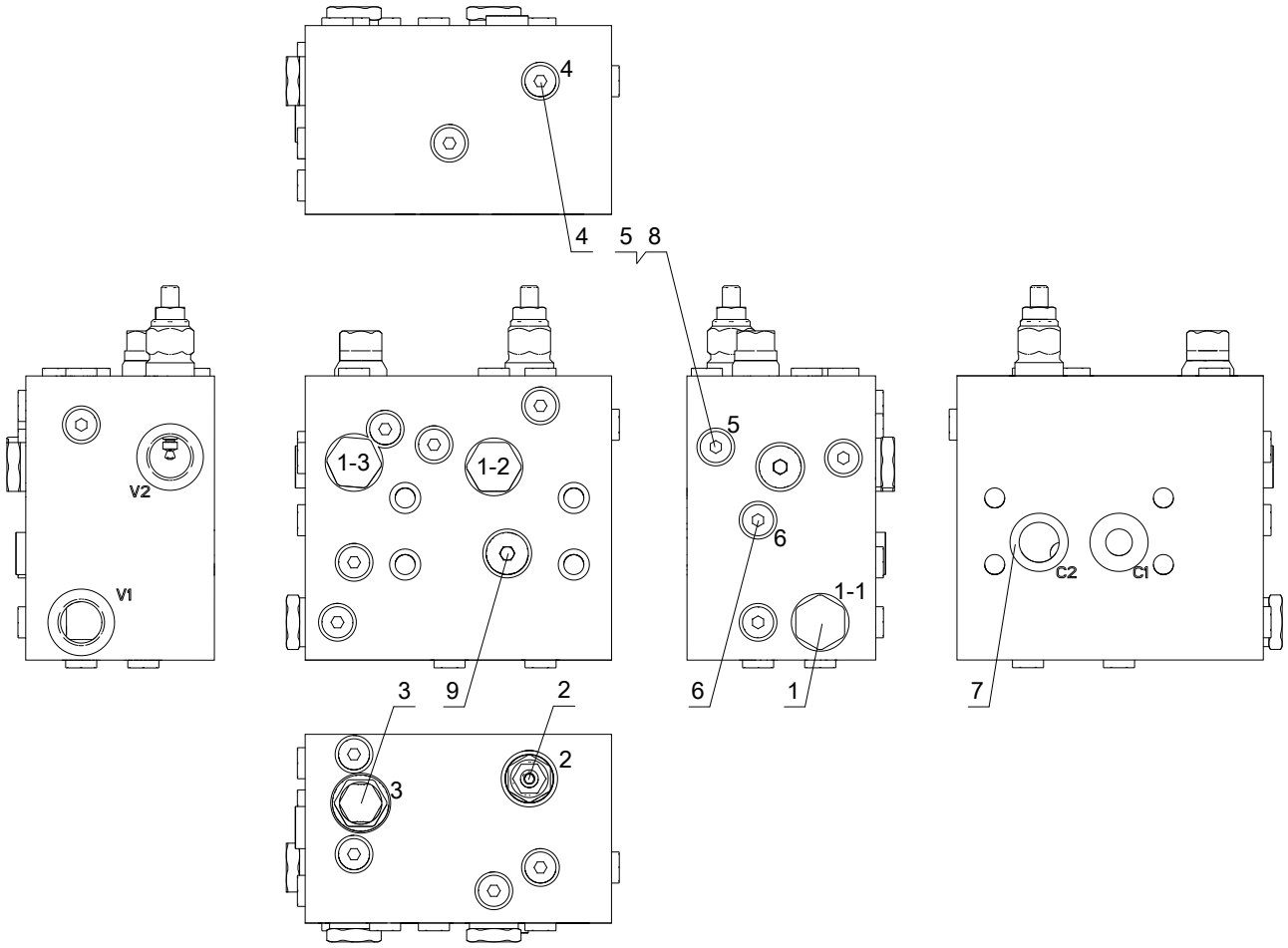


Fig. 11 Telescopic Counterbalance Valve (PN.202040003270)

Table 8-11 Telescopic Counterbalance Valve (PN.202040003270)

No.	Name	Installation Torque	Function
1	Check Valve	40-45 Nm (30-33 ft-lb)	Keeps oil flowing in one direction
2	Counterbalance valve	40-45 Nm (30-33 ft-lb)	Keeps the load balanced
3	Counterbalance valve	50 ~ 60 Nm (37 ~ 44 ft-lb)	Keeps the load balanced
4	Damper	4 Nm (3 ft-lb)	\
5	Damper	4 Nm (3 ft-lb)	\
7	O-ring	\	\
10	Damper	4 Nm (3 ft-lb)	\

Luffing Counterbalance Valve (PN.202040003269)

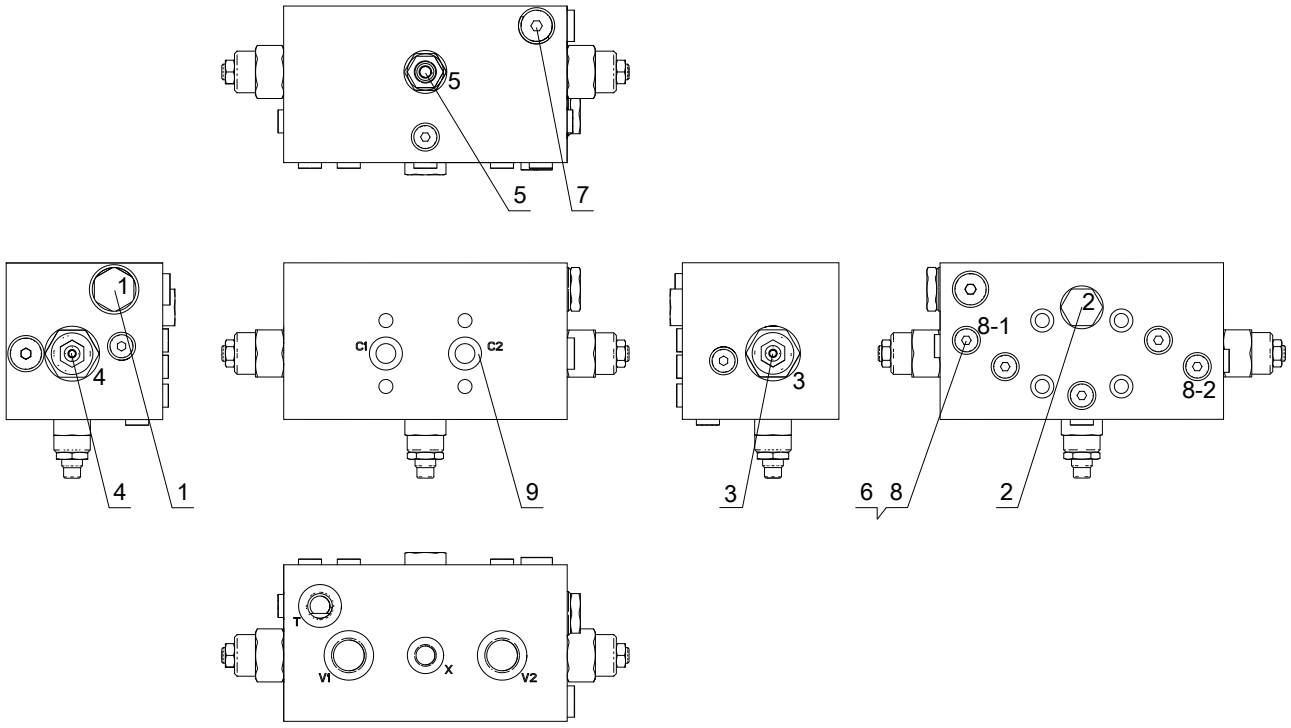


Fig. 12 Luffing Counterbalance Valve (PN.202040003269)

Table 8-12 Luffing Counterbalance Valve (PN.202040003269)

No.	Name	Installation Torque	Function
1	Check valve	55 ~ 65 Nm (41 ~ 48 ft-lb)	Keeps oil flowing in one direction
2	Pilot-operated check valve	27.1 Nm (20 ft-lb)	To control the flow direction of oil
3	Counterbalance valve	61 ~ 68 Nm (45 ~ 50 ft-lb)	Keeps the load balanced
4	Counterbalance valve	60 ~ 70 Nm (44 ~ 52 ft-lb)	Keeps the load balanced
5	Throttle valve	40-45 Nm (30-33 ft-lb)	Controls flow for lifting and lowering movements
8	Damper	5 Nm (4 ft-lb)	\
9	O-ring	\	\

Luffing Counterbalance Valve (PN.202040000377)

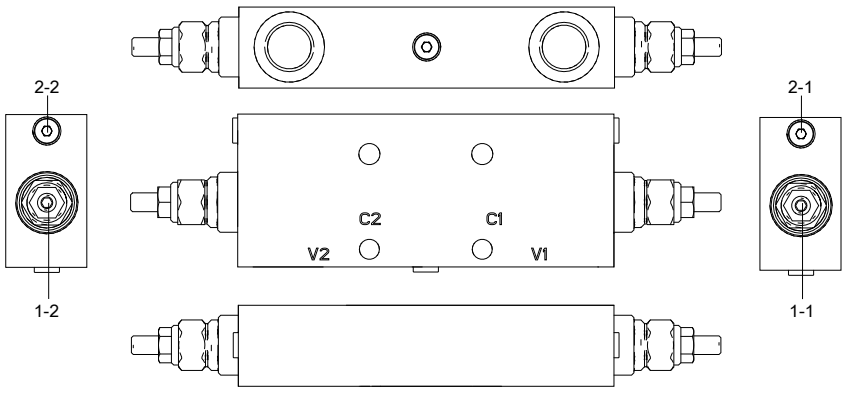


Fig. 13 Luffing Counterbalance Valve (PN.202040000377)

Table 8-13 Luffing Counterbalance Valve (PN.202040000377)

No.	Name	Installation Torque	Function
1	Counterbalance valve	70-75 Nm (52-55 ft-lb)	Keeps the load balanced
2	Damper	5 Nm (4 ft-lb)	\

Platform Control Manifold (PN.202040003267)

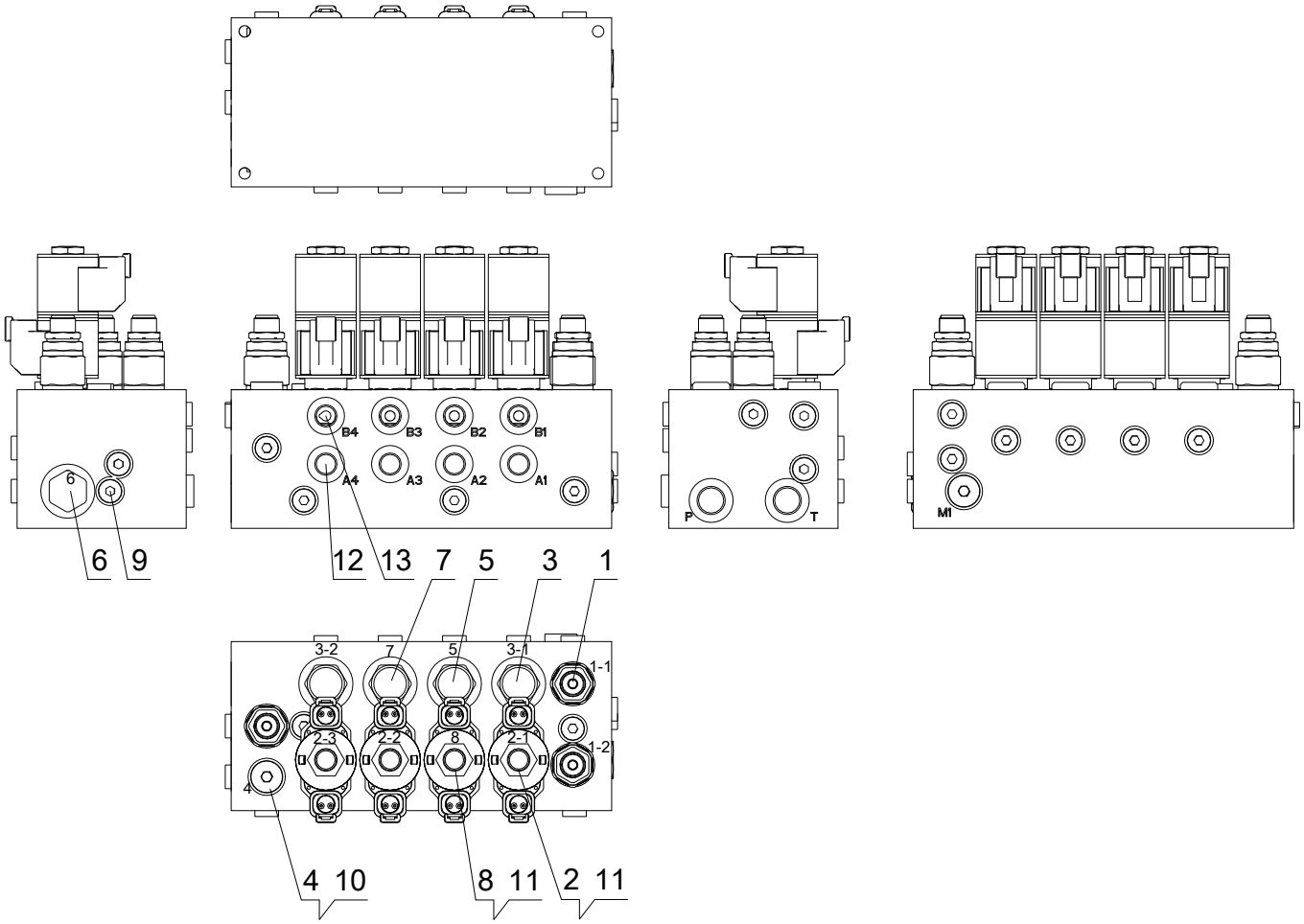


Fig. 14 Platform Control Manifold (PN.202040003267)

Table 8-14 Platform Control Manifold (PN.202040003267)

No.	Name	Installation Torque	Function
1–1	Overflow Valve	40-45 Nm (30-33 ft-lb)	Controls the pressure for leveling the platform downward
1–2	Overflow Valve	40-45 Nm (30-33 ft-lb)	Controls the pressure for leveling the platform upward
1–3	Overflow Valve	40-45 Nm (30-33 ft-lb)	Controls pressure for jib lifting and lowering movements
2-1	Proportional solenoid valve	25 ~ 27 Nm (18 ~ 20 ft-lb)	Controls the direction and speed of platform leveling
2–2	Proportional solenoid valve	25 ~ 27 Nm (18 ~ 20 ft-lb)	Controls the direction and speed of jib rotating
2–3	Proportional solenoid valve	25 ~ 27 Nm (18 ~ 20 ft-lb)	Controls direction and speed of jib lifting/lowering movements
3–1	Flow valve	45 ~ 50 Nm (33 ~ 37 ft-lb)	Controls the speed of platform leveling

Table 8-14 Platform Control Manifold (PN.202040003267) (continued)

No.	Name	Installation Torque	Function
3–2	Flow valve	45 ~ 50 Nm (33 ~ 37 ft-lb)	Controls speed of jib lifting/lowering movements
4	Shuttle valve	12 ~ 15 Nm (9 ~ 11 ft-lb)	Changes oil lines
5	Flow valve	45 ~ 50 Nm (33 ~ 37 ft-lb)	Controls the speed of platform rotating
6	Check Valve	40-45 Nm (30-33 ft-lb)	Keeps oil flowing in one direction
7	Flow valve	45 ~ 50 Nm (33 ~ 37 ft-lb)	Controls the speed of jib rotating
8	Solenoid valve	25.8-28.5 Nm (19-21 ft-lb)	Controls the direction of platform rotating
11	Coil	4 Nm (3 ft-lb)	\
12	Damper	5 Nm (9 ft-lb)	\
13	Damper	5 Nm (9 ft-lb)	\

8.3 HYDRAULIC OIL

Checking the Oil Level

Maintaining the hydraulic oil at the right level is essential for the normal operation of the machine. If the hydraulic oil level is too high, the oil will overflow from the oil tank during the operation of the machine; if the hydraulic oil level is too low, the oil pump will have entrained air during the operation of the machine and hydraulic components will be damaged.

1. Make sure that the machine is in stowed position.
2. Locate the hydraulic tank, and visually inspect the side of the tank. The hydraulic oil level should be within the scale range of the tank's level gauge
3. If necessary, fill with suitable hydraulic oil according to the ***Oil Requirements*** , do not overfill the tank.
4. Check the hydraulic tank and fittings for leakage.

Checking the Cleanliness of Hydraulic Oil

Check the hydraulic oil, and if any of the following conditions are found, replace the hydraulic oil:

- The hydraulic oil is milky white and cloudy.
- The hydraulic oil is black.
- Take some hydraulic oil and check it in the sun to find there are luminous metal spots, or rub the hydraulic oil with two fingers to find there are metal particles obviously.
- The hydraulic oil stinks.

Replacing the Hydraulic Oil

It is recommended to replace the hydraulic oil every year or after 1000 hours of operation. The replacement interval should be shorter in harsh working environments.

NOTICE

Every time the hydraulic oil is changed the hydraulic tank suction filter must be replaced.

1. Turn off the machine and make sure the hydraulic oil has cooled to room temperature.
2. Locate the hydraulic tank.
3. Close the hydraulic shut-off valve located on the side of the tank.
4. Place a suitable container under the drain plug at the bottom of the tank.
5. Remove the drain plug at the bottom of the tank and completely drain the oil into the container.
6. Install the drain plug.
7. Disconnect and plug the hydraulic tank suction pipe and return pipe.
8. Remove the cover from the tank after removing the upper cover fastening bolts of the hydraulic tank.
9. After cleaning the inside of the tank with a neutral solvent, open the drain plug to drain the solvent.
10. After the hydraulic tank is dry, install the cover and connect the suction pipe and return pipe to the hydraulic oil tank.
11. Fill with suitable hydraulic oil according to the ***Oil Requirements*** , never overfill the tank.

8.4 HYDRAULIC TANK

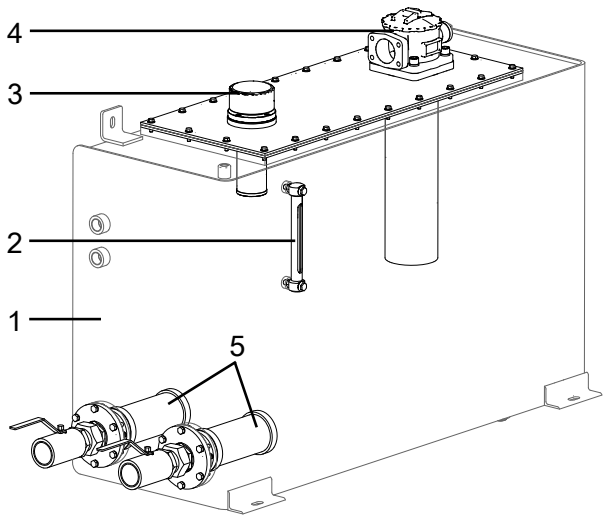


Fig. 15 Schematic Diagram, Hydraulic Tank Structure

Table 8-15 Hydraulic tank structure

No.	Description
1	Tank body
2	Level indicator
3	Air filter
4	Return filter
5	Suction filter

Suction Filter

It is recommended to replace the hydraulic tank suction filter screen every year or after 1000 hours of operation. The replacement interval should be shorter in harsh operating environments.

Every time the hydraulic oil is replaced, the hydraulic tank oil suction filter screen should also be replaced.

Return Filter

It is recommended to replace the hydraulic tank return filter element after the first 50 hours of operation and every 3 months or 250 hours of operation thereafter. The replacement interval should be shorter in harsh working environments.

1. Turn off the machine.
2. Open the turntable cover, and locate the return filter on top of the hydraulic tank.
3. Remove the return filter.
4. Loosen the cover at the top of the filter and remove the filter element.
5. Apply a thin film of oil to the gasket of the new return filter element.
6. Clean the return filter housing, install a new element and then reinstall the return filter.
7. Clean the hydraulic oil spilled during the process.
8. Start the machine from the ground.
9. Check the return filter and related components for leakage.

Air Filter

It is recommended to clean the hydraulic tank air filter every 3 months or after 250 hours of operation, and replace it every 6 months or after 500 hours of operation. The replacement interval should be shorter in harsh operating environments.

The steps to check and clean the air filter are as follows:

1. Turn off the machine.
2. Locate the air filter at the top of the hydraulic tank.
3. Remove the air filter.
4. Check the hydraulic tank air filter: air should pass through the air filter smoothly.
5. If the air cannot pass through the air filter smoothly, clean the air filter with a neutral solvent and then blow dry with an air gun.
6. Check the air filter again until the air can pass through the air filter smoothly.
7. Install the air filter back onto the tank.

8.5 HYDRAULIC OIL HIGH-PRESSURE FILTER

It is recommended to replace the fuel filter element every 3 months or after 250 hours of operation. The replacement interval should be shorter in harsh working environments.

1. Turn off the machine.
2. Locate the high-pressure filter.
3. Place a suitable container under the high-pressure filter.
4. Use a wrench to remove the filter housing.
5. Remove the filter element from the housing.
6. Check the seal on the mounting surface of the housing and, if necessary, replace the seal.
7. Install a new filter element into the housing.

8. Tighten the housing onto the filter fully and then loosen it by 1/4 turn.
9. Clean up any hydraulic oil that was spilled during the process.
10. Start the machine.
11. Check the high-pressure filter and related components for leakage.

8.6 BLEEDING THE OSCILLATING CYLINDER

Bleed the oscillating cylinder before the machine is put into service for the first time, and after replacing the oscillating cylinder or the counterbalance valve.

1. Make sure the machine is in stowed position.
2. Place a beveled wooden block with the height of 180 mm (7.1 in) in front of the machine.
3. Drive machine to place the left front wheel onto the wooden block, and then drive off the wooden block.
4. Drive machine to place the right front wheel onto the wooden block, and then drive off the wooden block.
5. Repeat steps 3 and 4 until bleeding of the left/right oscillating cylinders is complete.
6. Perform a counterbalance valve locking check.

8.7 OSCILLATION FUNCTION CHECK

After bleeding the oscillating cylinder perform a counterbalance valve locking check. The oscillating function must be checked every 3 months or 250 hours of operation, or after any system components have been replaced, or in case of abnormal system operation.

Checking Counterbalance Valve Locking

It is recommended to check the counterbalance valve locking before the machine is put into use for the first time, and afterwards every 3 months or 250 hours of operation. If any hydraulic component such as the oscillation cylinder or the counterbalance valve is replaced later, the counterbalance valve must also be checked for locking.

Non-operating position:

1. Place a beveled wooden block with the height of 180 mm (7.1 in) in front of the machine.
2. Make sure the machine is in non-operating position.
3. Drive machine to place the left front wheel onto the wooden block.
4. Check that the remaining three wheels have close contact to the ground.
5. Repeat the above steps and drive machine to place the right front wheel onto the wooden block to check other wheels.

Operating position:

1. Place a beveled wooden block with the height of 180 mm (7.1 in) in front of the machine.
2. Make sure that the machine is in operating position.
3. Drive machine to place the left front wheel onto the wooden block.
4. Check the right front wheel and left oscillation cylinder. The right front wheel shall be off the ground, and the left oscillation cylinder shall not retract.
5. Repeat the above steps to check the left front wheel and right oscillation cylinder.

Boom in horizontal and fully extended position:

1. Place a load 1.5 times of the rated load on the platform.
2. Adjust the boom to horizontal and fully extended position, and slowly rotate the turntable approximately 90° to the right.
3. Check the length of the right front wheel oscillation cylinder after 15 minutes: it shall not retract.
4. Repeat the above steps to check the left front wheel oscillation cylinder.

If the oscillation cylinder does not work properly have qualified maintenance personnel rectify the issue before you continue to operate the machine.

Oscillating Axle Function Test

1. Make sure the boom is in stowed position.
2. Place a beveled wooden block with the height of 180 mm (7.1 in) in front of the machine.
3. Drive machine to place the right steered wheel onto the wooden block.
4. Have an assistant check that the remaining three wheels have close contact to the ground.
5. Drive the machine off the wooden block.
6. Drive machine to place the left steered wheel onto the wooden block.
7. Have an assistant check that the remaining three wheels have close contact to the ground.
8. Drive the machine off the wooden block.

9. Place a beveled wooden block with the height of 180 mm (7.1 in) in front of each steering wheel of the machine.
10. Drive machine to place both steered wheels onto the wooden block.
11. Have an assistant check that the other two wheels have close contact to the ground.

8.8 INSPECTING CYLINDER DRIFT

The cylinder will drift down due to leakage, and the drift is normal within a certain range. In order to ensure normal operation of the machine, it is recommended to conduct a drift inspection on the platform every 3 months or after 250 hours of operation to determine whether a drift inspection of the cylinder is required.

Fully extend the main boom and place a weight that matches the rated load onto the platform. Measure the drift from the platform to the ground with the machine powered off. If the platform drifts down more than 50 mm (1.97 in) in 10 minutes, perform a cylinder drift inspection as per the following procedures.

1. Place the machine in an environment with stable ambient temperature.
2. Place the maximum rated load on the platform.
3. Measure the drift at cylinder piston rod with a calibrated dial gauge.
4. The maximum allowable drift for cylinders with different bores is shown in the table below. If the measured value is less than the maximum allowable drift, the cylinder is working normally. If the measured value is greater than the maximum allowable drift, it indicates that the cylinder is not working normally. Contact qualified service technicians for inspection and repair.

Table 8-16 Maximum allowable drift for different cylinder bore

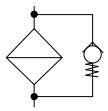
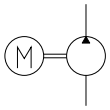
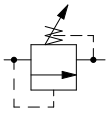
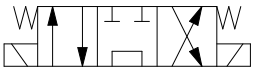
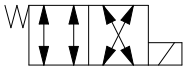
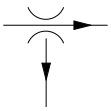
Cylinder bore diameter (mm/in)	Maximum allowable drift in 10 minutes (mm/in)
63/2.48	0.96/0.037
80/3.15	0.63/0.025
100/3.94	0.39/0.015
125/4.92	0.23/0.009
160/6.30	0.14/0.006
180/7.09	0.13/0.005
200/7.87	0.10/0.0038
220/8.66	0.08/0.0030

NOTICE

The data is based on cylinder leakage of 6 drops per minute. Since the hydraulic oil expands with heat and contracts with cold, the test value of cylinder drift may have a tolerance of 7/10000 for each temperature change of 1℃.

8.9 HYDRAULIC SYMBOLS

Table 8-17

Symbols	Description
	Filter
	Brake
	Auxiliary power unit
	Hydraulic motor
	Overflow valve
	3-position 4-way solenoid directional valve
	2-position 4-way solenoid directional valve
	Pressure-gradient control valve
	Check valve

8.10 HYDRAULIC SCHEMATIC DIAGRAM

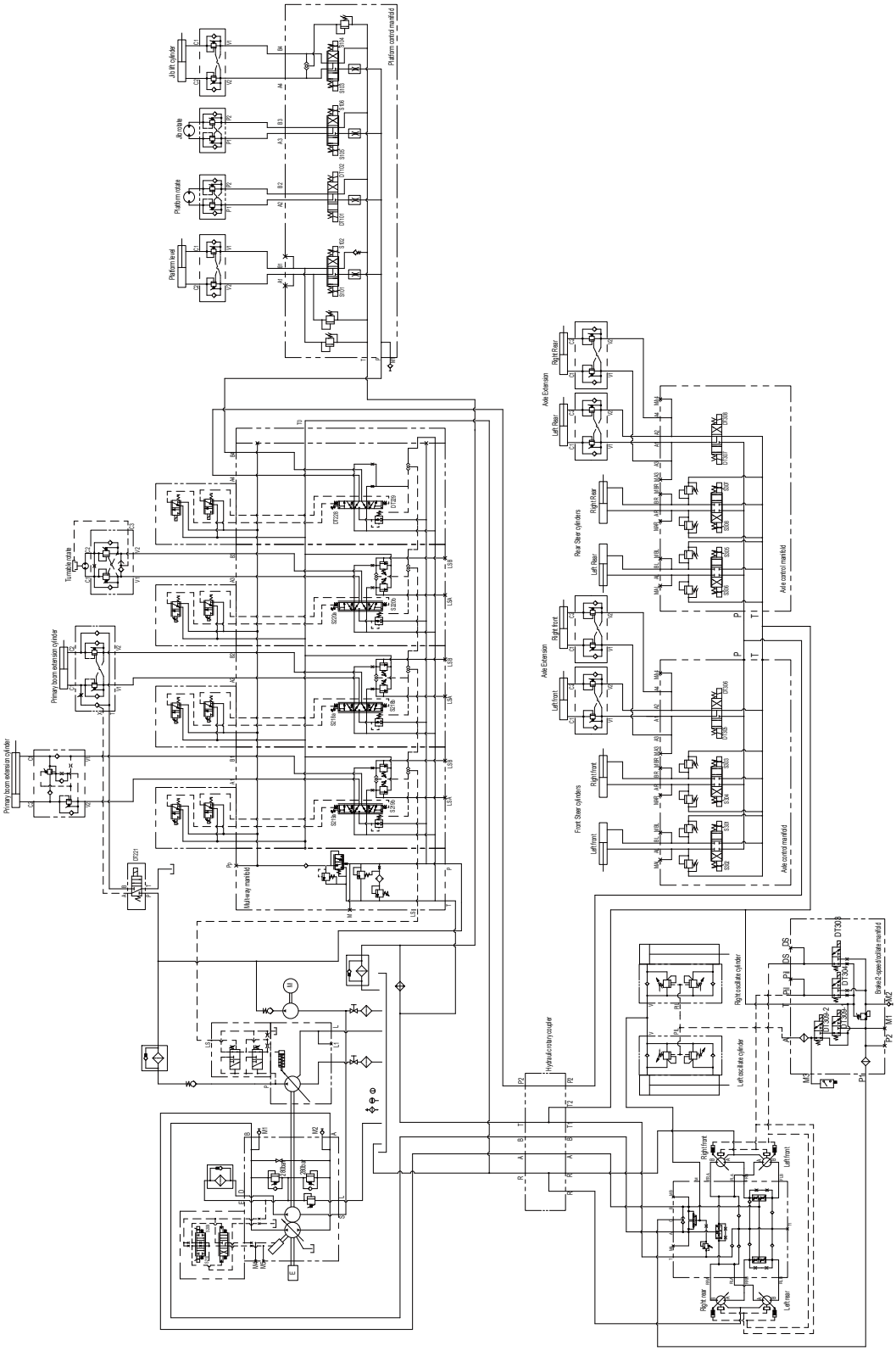


Fig. 16 Hydraulic Schematic Diagram (Danfoss Multi-way Valve)

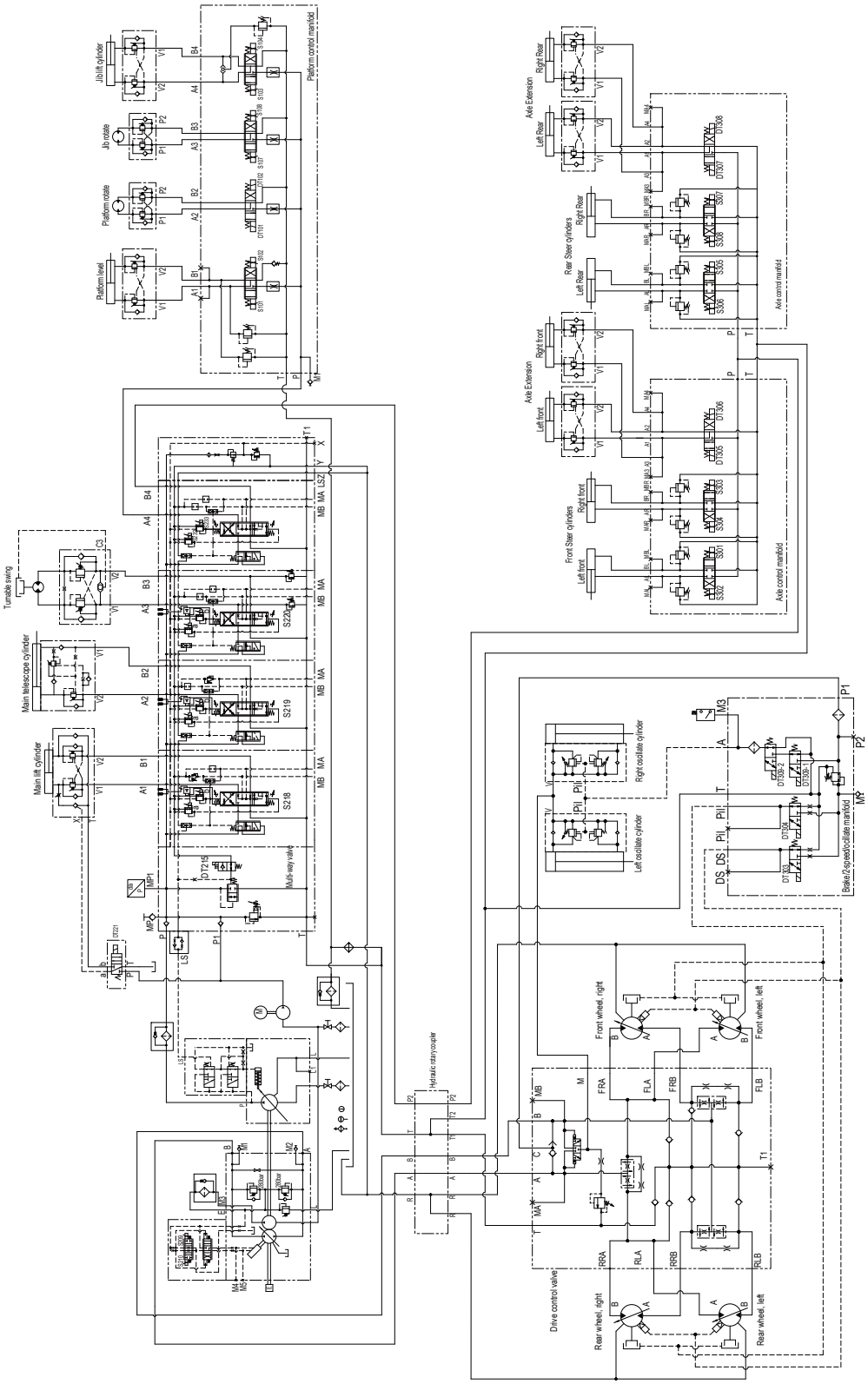


Fig. 17 Hydraulic Schematic Diagram (Hengli Multi-way Valve - without Hydraulic Generator)

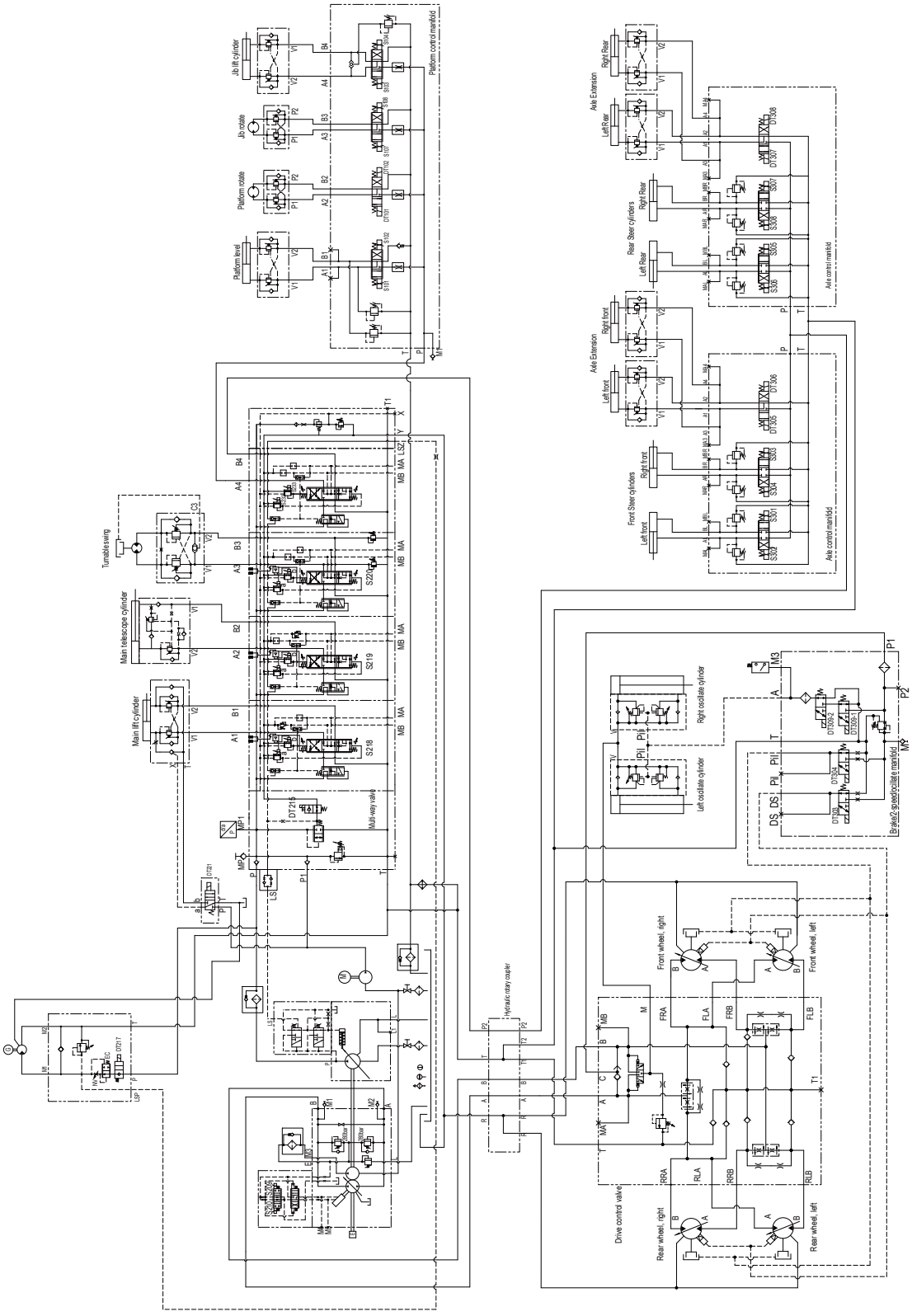


Fig. 18 Hydraulic Schematic Diagram (Hengli Multi-way Valve - with (Optional) Hydraulic Generator)

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9 ELECTRICAL SYSTEM

Two 12V lead-acid batteries in parallel provide power for the engine, emergency pump and electrical control system. The batteries are charged through the DC generator in the engine. A power switch is used to protect the control system.

The maintenance of electrical equipment is essential for the proper and safe operation of the machine. If the machine operates with the electrical components damaged or corroded, it may lead to unsafe operation or serious personal injury.

9.1 BATTERY

There are three types of batteries that may be used in this machine: lead acid batteries, lead acid maintenance-free batteries and lithium batteries, and the latter two batteries do not need maintenance.

Inspection

Battery condition will affect machine performance and operation, and the following checks should be performed on the battery at specified intervals.

- Check the battery level. The battery should not be discharged more than 80% of the total capacity, and should be charged immediately after each discharge.
- Check the harness retaining nuts between the battery cells. Make sure that the retaining nuts are tightened with the correct torque, and refer to the ***Torque Specifications*** section for the tightening torques.
- Check the battery harness connections. Make sure that the battery harness connections are firmly connected and not corroded, and the positive and negative poles are not reversed.

NOTICE

Improper connection may result in reduced performance and damaged terminals, fusion, or even fire.

- Check whether the inside and outside paint of the battery is damaged. If any damage is found, repair the paint immediately to protect the outer box insulation and from corrosion.
- Check the battery box for water accumulation. If any, blot up the accumulated water immediately.
- Clean the area around the battery regularly. Use cloths or brushes to regularly clean the top, terminals and connections of the battery with mixed liquid of baking soda and water, dry it with cloths after cleaning, and apply a thin layer of petroleum jelly or add terminal protectors to prevent cleaning solution from entering the battery.

NOTICE

Adding terminal protectors and anti-corrosion sealants will prevent the battery terminals and cables from corrosion.

The instructions below are applicable only for batteries requiring maintenance: Before performing inspection, please fully charge the battery and hold it still for 24 hours to equalize the battery cells.

1. Wear protective clothing, protective gloves and protective glasses.
2. Remove the battery vent cover.
3. Top up the hydrometer and drain it two or three times, then take a sample from the battery electrolyte.
4. Measure the specific gravity of all battery cells in sequence and note down the readings.
5. If the ambient temperature is above 27℃ (80℉), add 0.004 to calibrate the specific gravity reading for every 5℃ (40℉) higher; if the ambient temperature is below 27℃ (80℉), reduce 0.004 to calibrate the specific gravity reading for every 5℃ (40℉) lower.
   - Result 1: if the specific gravity reading of all battery cells is 1.250 or higher, and the reading difference between any two cells is less than 0.050, proceed with the next step.
   - Result 2: if the specific gravity reading of one or more battery cells is below 1.250, it indicates that the battery is running low and needs charging. After charging, measure the specific gravity reading, if it meets the Result 1, proceed with the next step.
   - Result 3: If the specific gravity reading difference between any two cells in the battery pack exceeds 0.050, equalize the battery pack and hold it still for 6 hours before re-measurement of the specific gravity readings. If satisfying the Result 1, proceed with the next step.

NOTICE

If the Result 1 cannot be met even after several attempts, the battery may have malfunctions.

6. Check the battery electrolyte level. Make sure the electrolyte level is at the right height and add distilled water to the required level if needed.
7. Install the battery vent cover.

Adding Fluid

Notice

- *For lead-acid batteries (requiring maintenance), the electrolyte level should be checked after each charging, and if the level is found to be low, add water in time.*
- *The water shall be added after charging. Adding water before charging may cause acid overflow during charging.*

- For batteries equipped with an automatic water refilling system, when the electrolyte is at the lowest level with the battery fully charged (the white dot of the battery observation hole is not at the top), add water immediately. It is recommended to use an automatic water refilling machine for refilling, with the operation steps as follows:
  1. Open the bucket cover of the water refilling machine.
  2. Add deionized water.
  3. Put back the bucket cover and connect the water refilling plug.
  4. Connect the quick connector between the water refilling machine and the battery and turn on the power switch to start automatic water refilling.
  5. After water refilling is completed, the automatic water refilling system will automatically stop.
  6. Turn off the power switch and disconnect the water refilling plug to complete water refilling.
- If the battery is not equipped with an automatic water refilling system, check the electrolyte level after charging. If the level is lower than the allowable height (the white dot of the battery observation hole is not at the top), wear gloves to add conforming distilled water or deionized water to the standard level (1-2cm above the minimal level of the water filler plug). Never add any acid solution.

Equalization

Equalization is the deliberate process of overcharging the flooded/wet battery after it has been fully charged. Equalize the battery only when its specific gravity is low (less than 1.25) or its specific gravity exceeds the scope (greater than 0.030) after the battery is fully charged.

NOTICE

- *Verify whether the battery is flooded/wet battery.*
- *To prevent battery damage, the battery must be equalized after a storage period of up to three months from the date of delivery.*

1. Check the electrolyte level height to ensure that the level meets the specified requirements.
2. Verify that all vent caps are properly secured to the battery.
3. Set the charger to equalization mode.
4. Charge the battery in equalization mode. The battery will bleed air in the equalization process (forming bubbles).
5. Remove the vent cap every hour to measure the specific gravity of all battery cells, and stop the charging in equalization mode if the specific gravity doesn't increase any more.

Storage

- Fully charge the battery before storage.
- The battery should be stored in cool and dry environment (temperature 10℃-25℃/50–77℉, RH < 90%), and charge the battery every 3 months using the charger provided by the manufacturer.
- Turn off power switchand emergency stop button, to eliminate potential hazards that could cause electrical leakage of the battery.
- The battery will self-discharge gradually during storage. Monitor the specific gravity or the voltage every 4 to 6 weeks. The comparison of the state of charge, specific gravity and open-circuit voltage is shown in the following table.

Table 9-1

State of charge (%)	Specific gravity	Open-circuit voltage (V)		
		Battery cell	6V	12 V
100	1.277	2.122	6.37	12.73
90	1.258	2.103	6.31	12.62
80	1.238	2.083	6.25	12.50
70	1.217	2.062	6.19	12.37
60	1.195	2.040	6.12	12.24
50	1.172	2.017	6.05	12.10
40	1.148	1.993	5.98	11.96
30	1.124	1.969	5.91	11.81
20	1.098	1.943	5.83	11.66
10	1.073	1.918	5.75	11.51

- Recharge the battery in quick charging mode when the battery level is 70% or lower.
- Recharge the battery before use after removing it from storage.
- Storage in hot environments (above 32℃/90℉): Direct exposure of the battery to heat sources should be avoided during battery storage, and the battery self-discharges faster at high temperatures. If storing the battery in hot summer months, monitor the specific gravity or voltage more frequently (approximately every 2-4 weeks).
- Storage in cold environments (below 0℃/32℉): Avoid placing batteries in places where the temperature is expected to reach the freezing point during storage, as batteries may freeze at low temperatures if not fully charged. If the battery is to be stored in the icy winter months, the battery must be fully charged.

NOTICE

Do not store the battery more than 6 months in hot or cold environments.

9.2 FAULT CODES DESCRIPTION

In case of failure, query the fault code on the fault inquiry interface of the turntable control box.

Machine Fault Codes

Table 9-2 Description of Machine Fault Codes

Fault code	Description	Cause	Solution
01	Platform communication fault	Communication anomaly between the platform and the turntable controls	Check the signal lines between the platform and the turntable controls, and check the power supply.
02	Drive controller communication fault	Communication anomaly between the drive and the turntable controllers	Check the signal lines between ground and drive controllers, and check the power supply.
03	Turntable tilt alarm	Turntable tilt alarm	Check whether the machine tilt exceeds 5°or whether the level switch is properly connected.
04	Overload alarm	Overload alarm	Check whether the platform load exceeds the rating.
05	Weighing sensor fault	Weighing sensor fault	Check the weighing sensor for proper function.
06	Drive joystick error	Drive joystick data error	Check the drive joystick data.

Table 9-2 Description of Machine Fault Codes (continued)

07	Steer joystick error	Steer joystick data error	Check the steer joystick data.
08	Main boom luffing joystick error	Main boom luffing joystick data error	Check the main boom luffing joystick data.
09	Slewing joystick error	Slewing joystick data error	Check the slewing joystick data.
10	Telescoping joystick error	Telescoping joystick data error	Check the telescoping joystick data.
11	Jib rotation joystick error	Jib rotation joystick data error	Check the jib rotation joystick data.
12	Hydraulic system pressure sensor error	Hydraulic system pressure sensor error	Check the hydraulic system pressure sensor for proper function.
13	Level switch fault	Level switch fault	Check the level switch for proper function.
14	Lift controller communication fault	Lift controller communication fault	Check the signal lines between platform and drive controllers, and check the power supply.
15	Footswitch or enable switch 7-second limit alarm	Footswitch or enable switch 7-second limit alarm	Check the foot switch or enable switch for proper function.
16	Obstacle detection alarm	Obstacle detection alarm	Check the obstacle detection switch for proper function.
17	Drive controller error alarm	Drive controller error alarm	Check the drive controller for errors.
18	Lift controller error alarm	Lift controller error alarm	Check the lift controller for errors.
19	Heavy load alarm	Heavy load alarm	Check the platform load and the actual measurement of the sensor’s AD value.
20	Envelope alarm	Envelope alarm	Check the boom position and the actual measurement of the sensor’s AD value.
21	Broken rope alarm	Broken rope alarm	Check the boom wire ropes and the wiring of the proximity switch.
22	Weighing sensor comparison error	Weighing sensor comparison error	Check the actual values and the AD values of weighing sensors 1 and 2; check the wiring.
23	Platform tilt alarm	Platform tilt alarm	Check whether the platform tilt angle exceeds the limit.
24	Solenoid clutch fault	Solenoid clutch fault	Check the solenoid clutch for proper operation and check the wiring harness.
25	Turntable slewing (left) solenoid valve error	Turntable slewing (left) solenoid valve error	Check the wiring of the turntable slewing (left) solenoid valve
26	Turntable slewing (right) solenoid valve fault	Turntable slewing (right) solenoid valve fault	Check the wiring of the turntable slewing (right) solenoid valve
27	Main boom extension solenoid valve fault	Main boom extension solenoid valve fault	Check the wiring of the main boom extension solenoid valve
28	Main boom retraction solenoid valve fault	Main boom retraction solenoid valve fault	Check the wiring of the main boom retraction solenoid valve

Table 9-2 Description of Machine Fault Codes (continued)

29	Main boom lifting solenoid valve fault	Main boom lifting solenoid valve fault	Check the wiring of the main boom lifting solenoid valve
30	Main boom lowering solenoid valve fault	Main boom lowering solenoid valve fault	Check the wiring of the main boom lowering solenoid valve
31	Tower boom lifting solenoid valve fault	Tower boom lifting solenoid valve fault	Check the wiring of the tower boom lifting solenoid valve
32	Tower boom lowering solenoid valve fault	Tower boom lowering solenoid valve fault	Check the wiring of the tower boom lowering solenoid valve
33	Steer left solenoid valve fault	Steer left solenoid valve fault	Check the wiring of the solenoid valve for left steer
34	Steer right solenoid valve fault	Steer right solenoid valve fault	Check the wiring of the solenoid valve for right steer
35	Platform swing left solenoid valve fault	Platform swing left solenoid valve fault	Check the wiring of the solenoid valve for left platform swing
36	Platform swing right solenoid valve fault	Platform swing right solenoid valve fault	Check the wiring of the solenoid valve for right platform swing
37	Platform leveling up solenoid valve fault	Platform leveling up solenoid valve fault	Check the wiring of the solenoid valve for platform leveling up
38	Platform leveling down solenoid valve fault	Platform leveling down solenoid valve fault	Check the wiring of the solenoid valve for platform leveling down
39	Jib up solenoid valve fault	Jib up solenoid valve fault	Check the wiring of the jib upward solenoid valve
40	Jib down solenoid valve fault	Jib down solenoid valve fault	Check the wiring of jib downward solenoid valve
41	Function enable valve fault	Function enable valve fault	Check the wiring of the function enable valve
42	Main boom anti-fall valve fault	Main boom anti-fall valve fault	Check the wiring of the main boom anti-drop valve
43	Drive enable valve fault	Drive enable valve fault	Check the wiring of the drive enable valve
44	Brake valve fault	Brake valve fault	Check the wiring of the brake valve
45	Slewing enable valve fault	Slewing enable valve fault	Check the wiring of the slewing enable valve
46	Front pump unloading valve fault	Front pump unloading valve fault	Check the wiring of the front pump unloading valve
47	Rear pump unloading valve fault	Rear pump unloading valve fault	Check the wiring of the rear pump unloading valve
48	Electro-proportional relief valve fault	Electro-proportional relief valve fault	Check the wiring of the electro-proportional relief valve
49	Tower boom angle sensor comparison error	Tower boom angle sensor comparison error	Check whether the tower boom angle sensor is correctly installed
50	Tower boom angle sensor fault	Tower boom angle sensor fault	Check the wiring of the tower boom angle sensor

Table 9-2 Description of Machine Fault Codes (continued)

51	Main boom angle sensor comparison error	Main boom angle sensor comparison error	Check whether the main boom angle sensor is correctly installed
52	Main boom angle sensor fault	Main boom angle sensor fault	Check the wiring of the main boom angle sensor
53	Tower boom relative angle sensor comparison error	Tower boom relative angle sensor comparison error	Check whether the tower boom relative angle sensor is correctly installed
54	Tower boom relative angle sensor fault	Tower boom relative angle sensor fault	Check the wiring of the tower boom relative angle sensor
55	Main boom relative angle sensor comparison error	Main boom relative angle sensor comparison error	Check whether the main boom relative angle sensor is correctly installed
56	Main boom relative angle sensor fault	Main boom relative angle sensor fault	Check the wiring of the main boom relative angle sensor
57	Low battery level alarm	Low battery level alarm	Check the battery voltage
58	Front right steer sensor fault	Front right steer sensor fault	Check the wiring of the front right steer sensor
59	Clutch fault	Clutch fault	Check whether the clutch can be properly engaged or the sensor is correctly wired
60	Low fuel level fault	Low fuel level fault	Check whether the fuel level is too low and/or if the sensor is correctly wired.

Engine Fault Codes

For the description of fault codes, please refer to the engine maintenance manual provided with the machine.

9.3 BASIC TROUBLESHOOTING

Table 9-3 Table of Faults and Solutions

Fault	Cause	Solution
Power indicator not ON	Machine is not powered on.	The key switch is in the neutral position. The emergency stop button at the upper controller or lower controller is pressed. The upper controller is malfunctioning or failure to power off the upper controller after downloading program. The lower controller is malfunctioning or failure to power off the lower controller after downloading program.
	CAN equipment offline	Inspect all fuses and the power supply. Check whether all pins of the Deutsch connectors for the platform control and the ground control cables are wired according to the drawing. Check whether the platform controls plug or the plug of the connecting cable between the platform controls and the ground controls are in good contact. Check whether the platform controls are malfunctioning. Check whether the Deltatech plug of the ground controls is firmly and correctly connected

Table 9-3 Table of Faults and Solutions (continued)

Fault	Cause	Solution
Tilt alarm always sounding while in level status	The level switch is not connected or defective.	Check whether the level switch is inserted properly and firmly. Check the level switch for malfunctions.
Platform fails to be leveled	Electrical failure	Check the wiring and the control program
	Function solenoid problem	Check the function solenoid, adjust the pressure or replace the function solenoid
	Cylinder or line leakage	Check the line and connectors for leakage. Check the cylinder or its seal for leakage.
Platform leveling function not responding	Electrical failure	Check the wiring and the control program
	Low hydraulic oil level	Check the hydraulic oil level
	Function solenoid problem	Check the function solenoid, adjust the pressure or replace the function solenoid
	Oil lines blocked	Check the oil lines
	Slave cylinder failure	Repair or replace the cylinder
	Pump damaged	Replace the pump
Boom movement switches on platform controller not responding	The switch is not in correct position	The key switch is in neutral position. The lower controller is in ground control position. The emergency stop button at the upper controller or lower controller is pressed.
	Boom function switch not enabled with the foot switch depressed	Depress the foot switch again
	Boom function switch failure	Repair or replace the control switch and perform a system test
	Lift cylinder counterbalance valve failure	Repair or replace the holding valve
	Bypass valve malfunctioning	Repair or replace the valve, check the wiring diagram or perform a system test
	Low hydraulic oil level	Check the hydraulic oil level
	Supply lines in valve housing or hydraulic pump restricted or damaged	Clean or replace the line
	Directional valve malfunctioning	Repair or replace the valve
	Lift/luffing cylinder failure	Repair or replace the cylinder
Boom movement switches on ground controls not responding	The switch is not in correct position	The key switch is in neutral position. The lower controller is in platform control position. The emergency stop button at the lower controller or upper controller is pressed.
	Boom function switch failure	Repair or replace the control switch and perform a system test
	Lift cylinder counterbalance valve failure	Repair or replace the holding valve

Table 9-3 Table of Faults and Solutions (continued)

Fault	Cause	Solution
	Bypass valve malfunctioning	Repair or replace the valve, check the wiring diagram or perform a system test
	Low hydraulic oil level	Check the hydraulic oil level
	Supply lines in valve housing or hydraulic pump restricted or damaged	Clean or replace the line
	Directional valve malfunctioning	Repair or replace the valve
	Lift/luffing cylinder failure	Repair or replace the cylinder
Turntable fails to rotate into a certain direction	Hydraulic line or connector blocked	Clean, repair or replace the line or connector
	Directional valve malfunctioning	Clean, repair or replace the directional valve
	Foreign matters squeezed between the rotation motor pinion and rotation gear	Clean foreign matters and check the gear for wear
	Malfunctioning rotation control handle	Clean, repair or replace the rotation control handle
Turntable rotating abnormally to the left/ right	Low hydraulic oil level	Check the hydraulic oil level
	Insufficient lubricating for rotation gear or rotation motor pinion	Lubricate the gear as needed
	Abnormal rotation motor function	Repair or replace the rotation motor
	Worn rotation gear or rotation motor pinion	Replace the worn gear
	Throttle valve blocked	Clean or replace the throttle valve
Chassis fails to steer	Function solenoid failure or low steering pressure	Check the function solenoid and adjust the pressure
	Cylinder failure	Clean, repair or replace the cylinder
	Low hydraulic oil level	Check the hydraulic oil level
	No pump oil pressure	Check the pump for damage
Travel control not responding	The switch is not in correct position	The key switch is in neutral position. The lower controller is in ground control position. The emergency stop button at the lower controller or upper controller is pressed.
	Electrical failure	Check the wiring and the control program
	Damaged travel motor	Replace the travel motor
	Pump damaged	Replace the pump
	Invalid brake release valve	Check the valve for blocking and leakage.
	Insufficient brake release pressure	Adjust the brake release pressure

Table 9-3 Table of Faults and Solutions (continued)

Fault	Cause	Solution
Forward traveling function fails without warning	Forward travel operation malfunctioning.	Check whether the PWM plug of the ground controls is inserted correctly and securely. Check whether the connection of the forward valve is in good order. Check the ground controls for malfunctions.
Reverse traveling function fails without warning	Reverse travel operation malfunctioning.	Check whether the PWM plug of the ground controls is inserted correctly and securely. Check whether the connection of the forward valve is in good order. Check the ground controls for malfunctions.
Tilt warning	Level switch not functioning properly	Level switch air bubble is not centered. The level switch is not connected properly or firmly. Ground controls are malfunctioning.
No overload warning	Weight sensor not calibrated for the rated load or calibrated with wrong height	The sensor is not calibrated. The wiring of the load sensor is incorrect. The sensor is malfunctioning.
Machine travels and then stops intermittently	Battery level low/incorrect calibration	Re-calibrate the parameters. Battery is depleted, not as indicated by the battery gauge.
Parameters after setting could not be saved successfully after several attempts.	Saving error	Parameters exceeding the limit. Ground controls malfunctioning.

9.4 ELECTRICAL SYMBOLS

Table 9-4

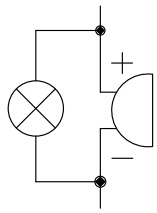
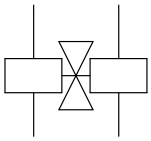
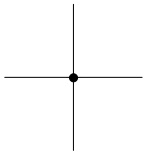
Symbols	Description
	Buzzer
	Valve
	Two lines connected

Table 9-4 (continued)

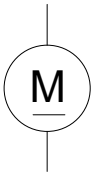
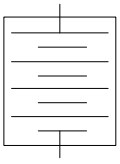
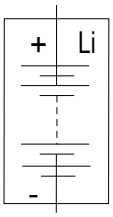
Symbols	Description
	Electric motor
	Storage battery
	Lithium battery

Table 9-4 (continued)

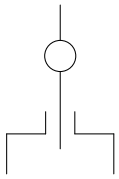
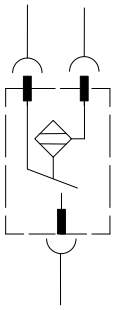
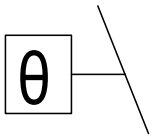
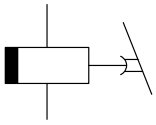
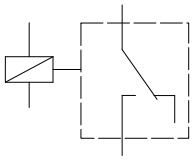
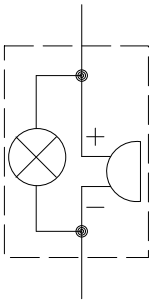
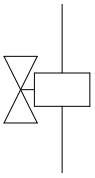
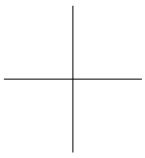
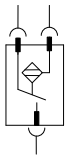
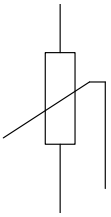
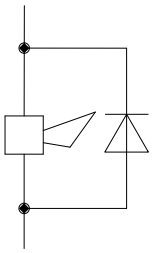
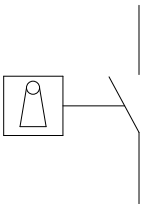
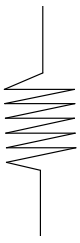
Symbols	Description
	Toggle switch
	Level switch
	Oil temperature switch
	Delay relay
	Power switch
	Relay
	Warning light

Table 9-4 (continued)

Symbols	Description
	Valve
	Two lines not connected
	Proximity switch pressure sensor
	Fuel level sensor
	Horn
	Key switch
	Preheating wire

9.5 ELECTRICAL SCHEMATIC DIAGRAM

Electrical Schematic Diagram of Chassis

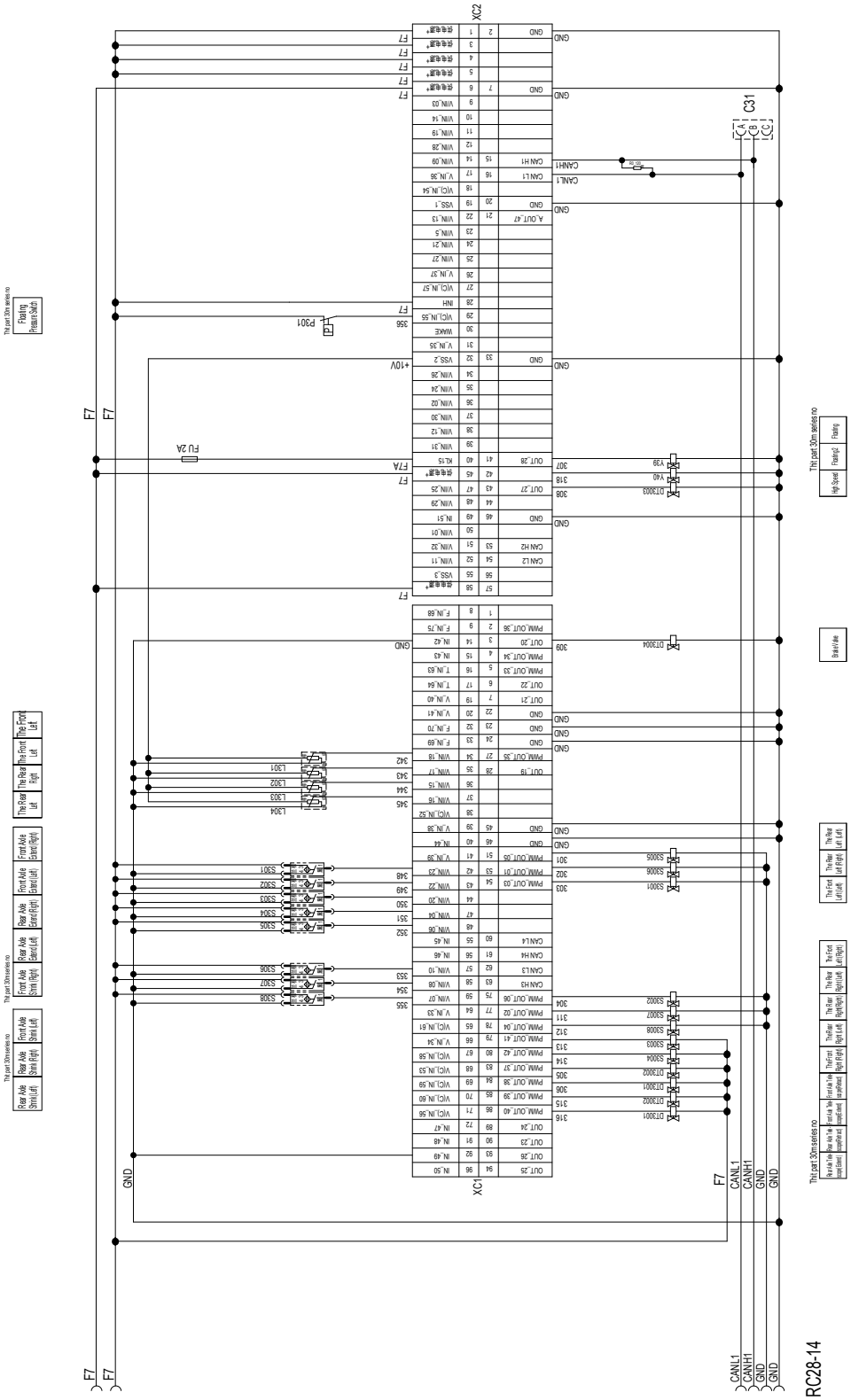


Fig. 1 Electrical Schematic Diagram of Chassis

Electrical Schematic Diagram of Turntable

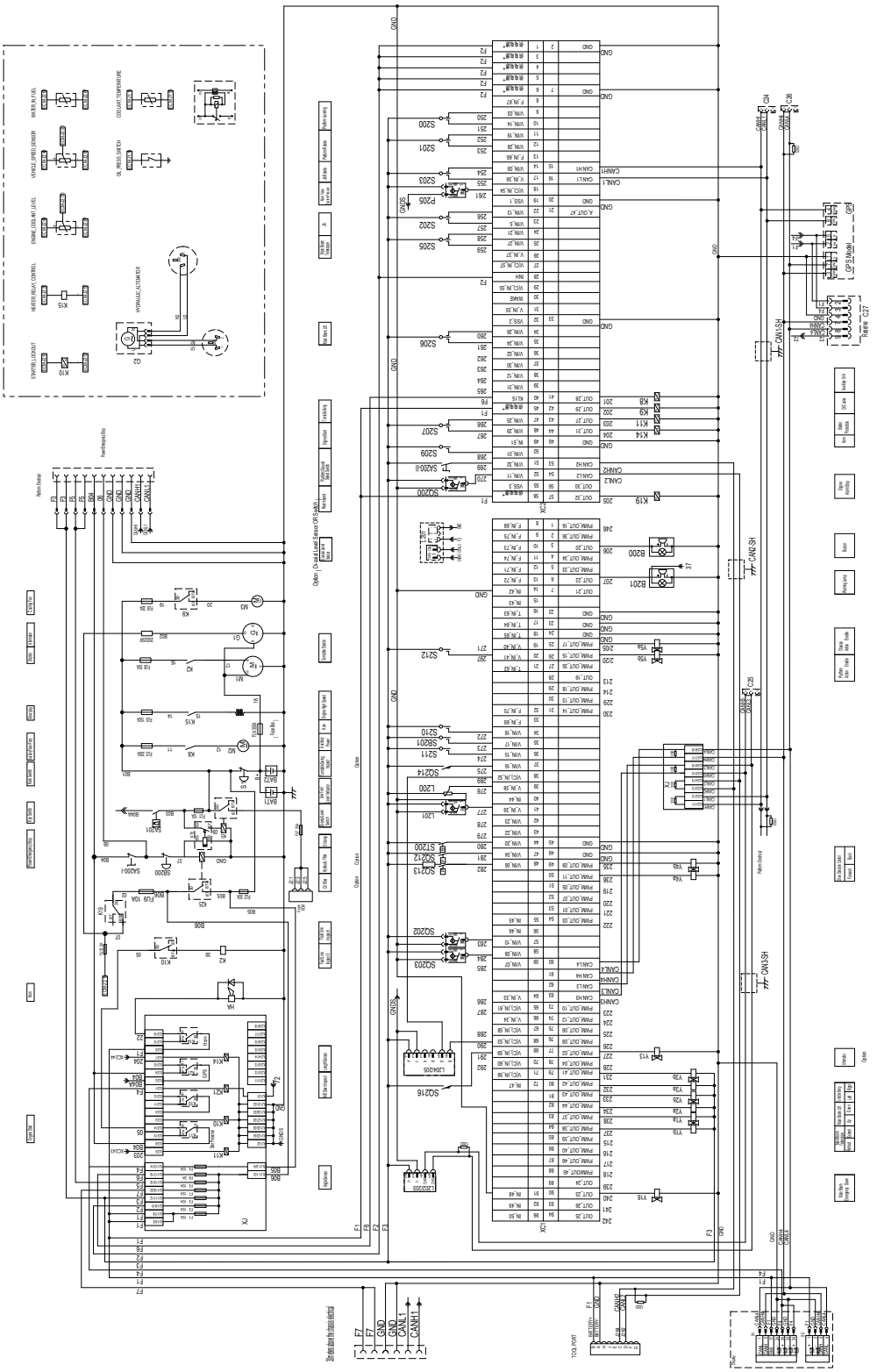


Fig. 2 Electrical Schematic Diagram of Turntable (Cummins - Danfoss Multi-way Valve)

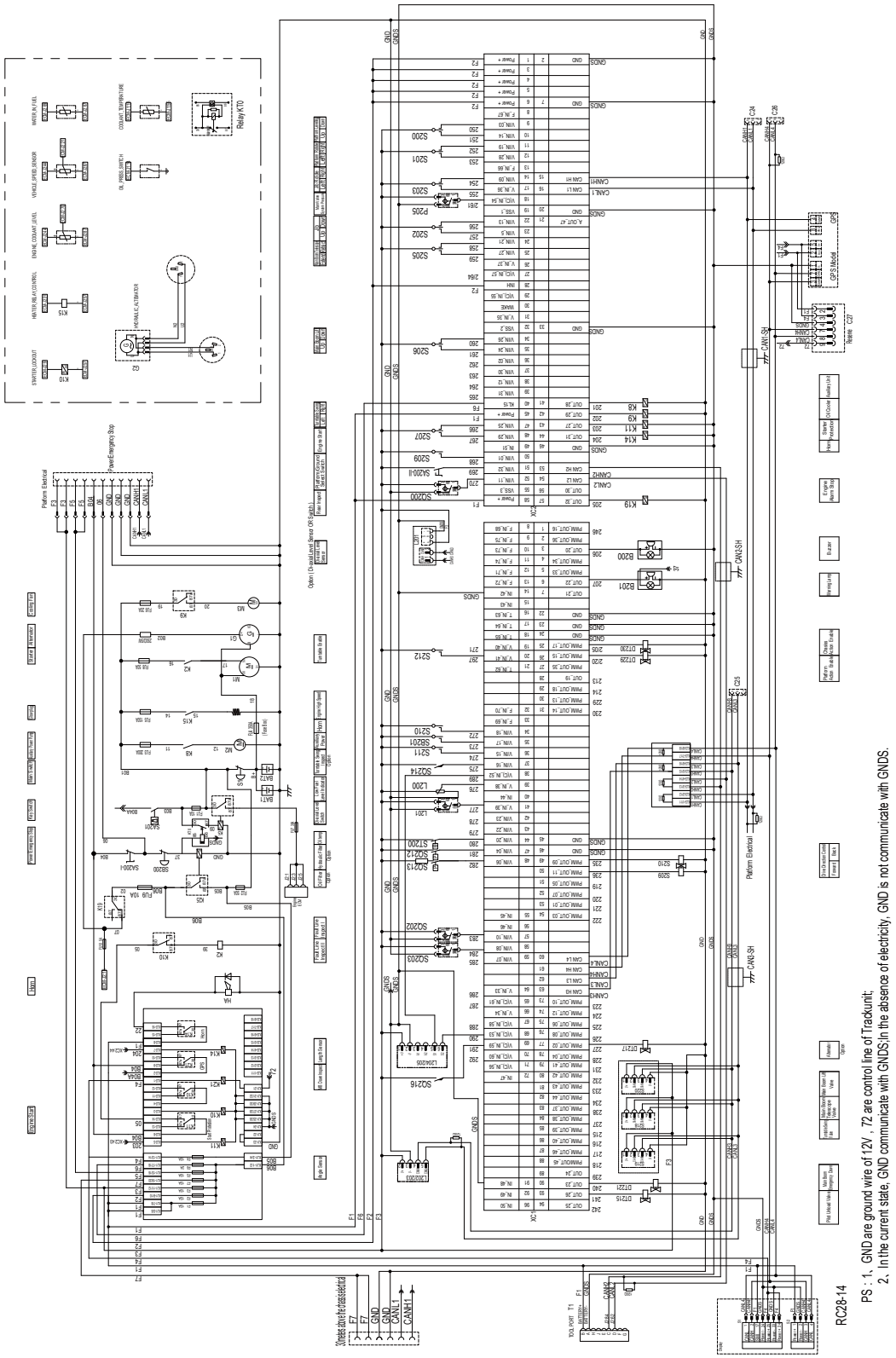


Fig. 3 Electrical Schematic of Turntable (Cummins - Hengli Multi-way Valve)

Electrical Schematic Diagram

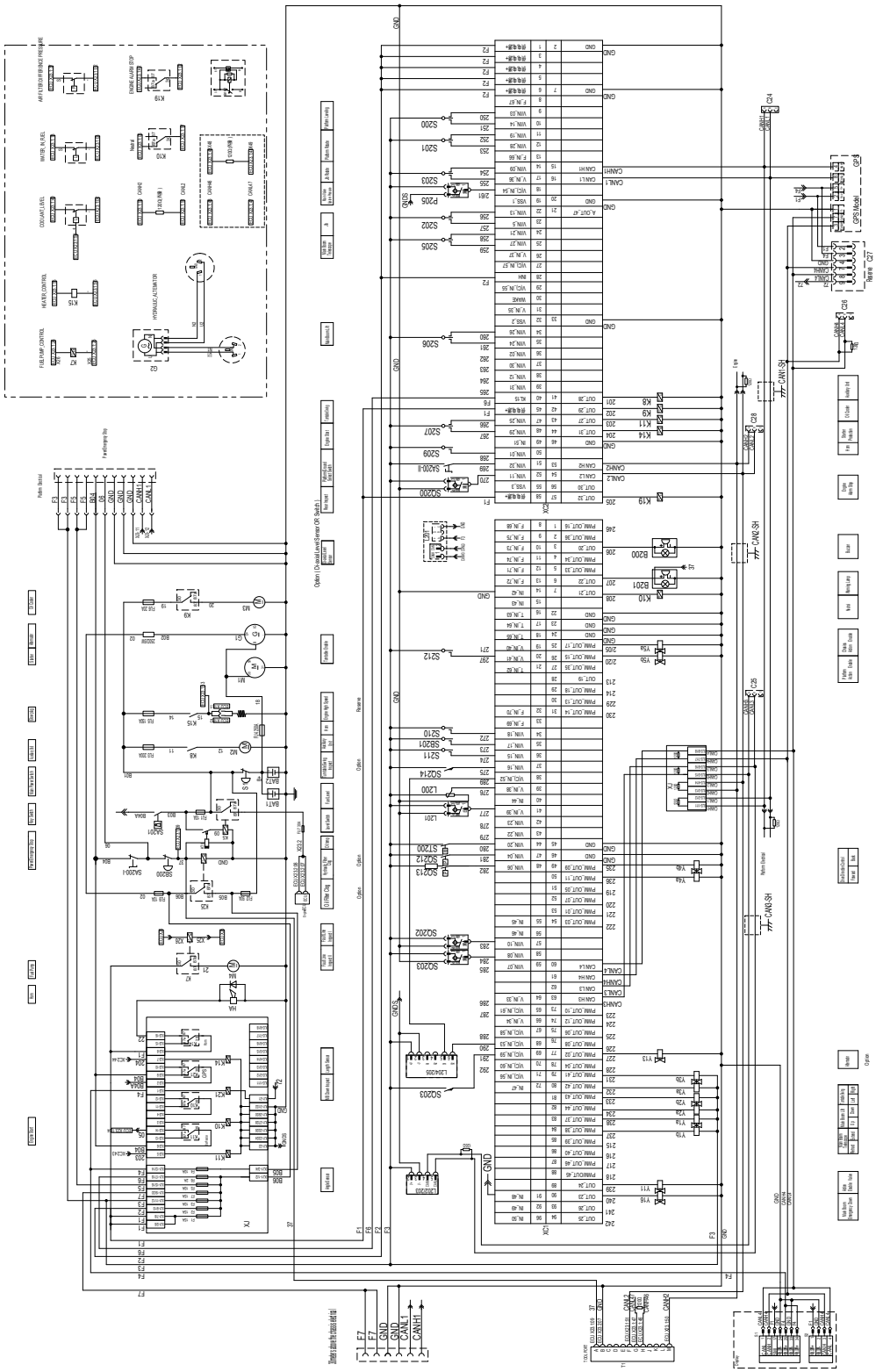


Fig. 4 Electrical Schematic Diagram of Turntable (Deutz)

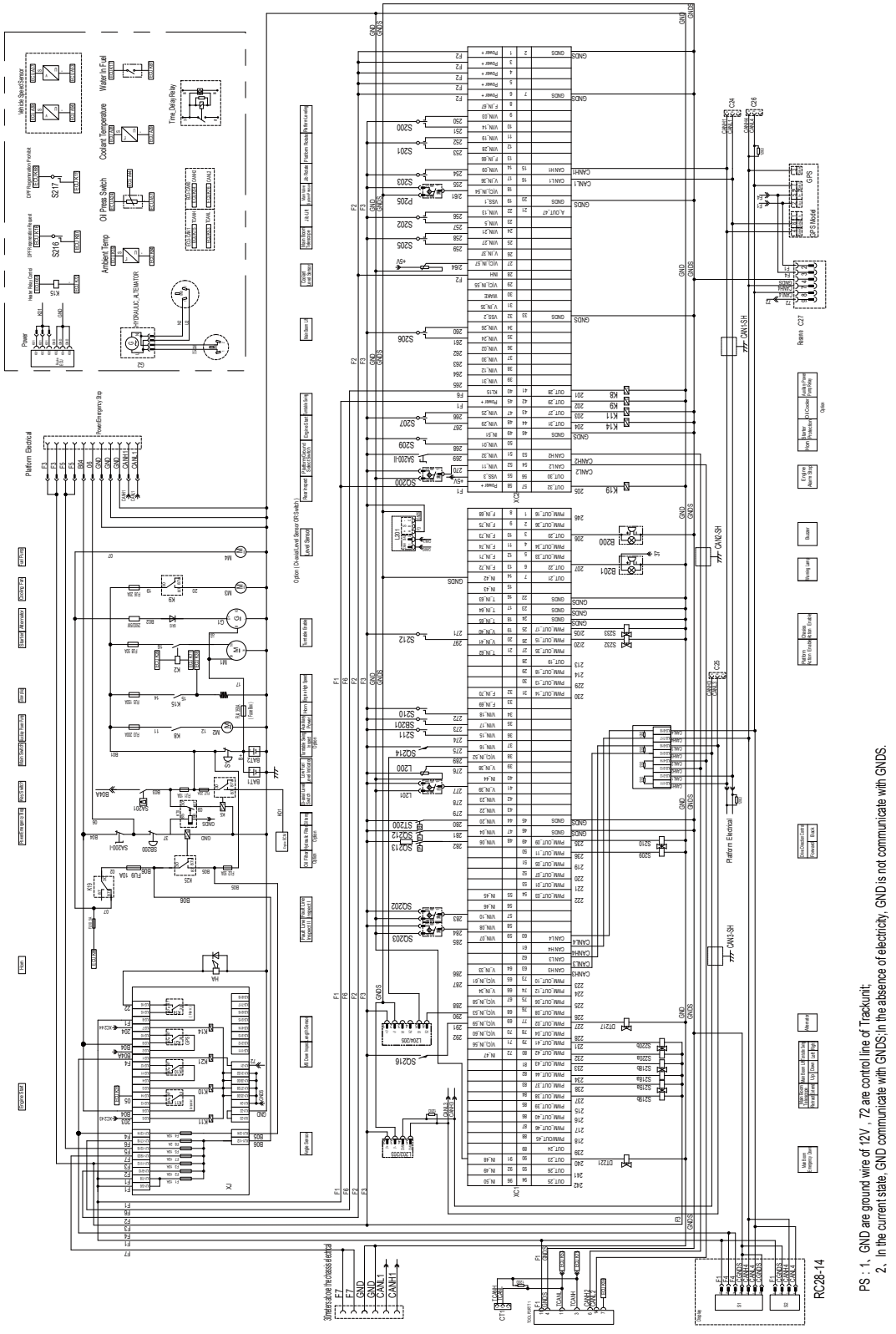


Fig. 5 Electrical Schematic Diagram of Turntable (Yuchai - Danfoss Multi-way Valve)

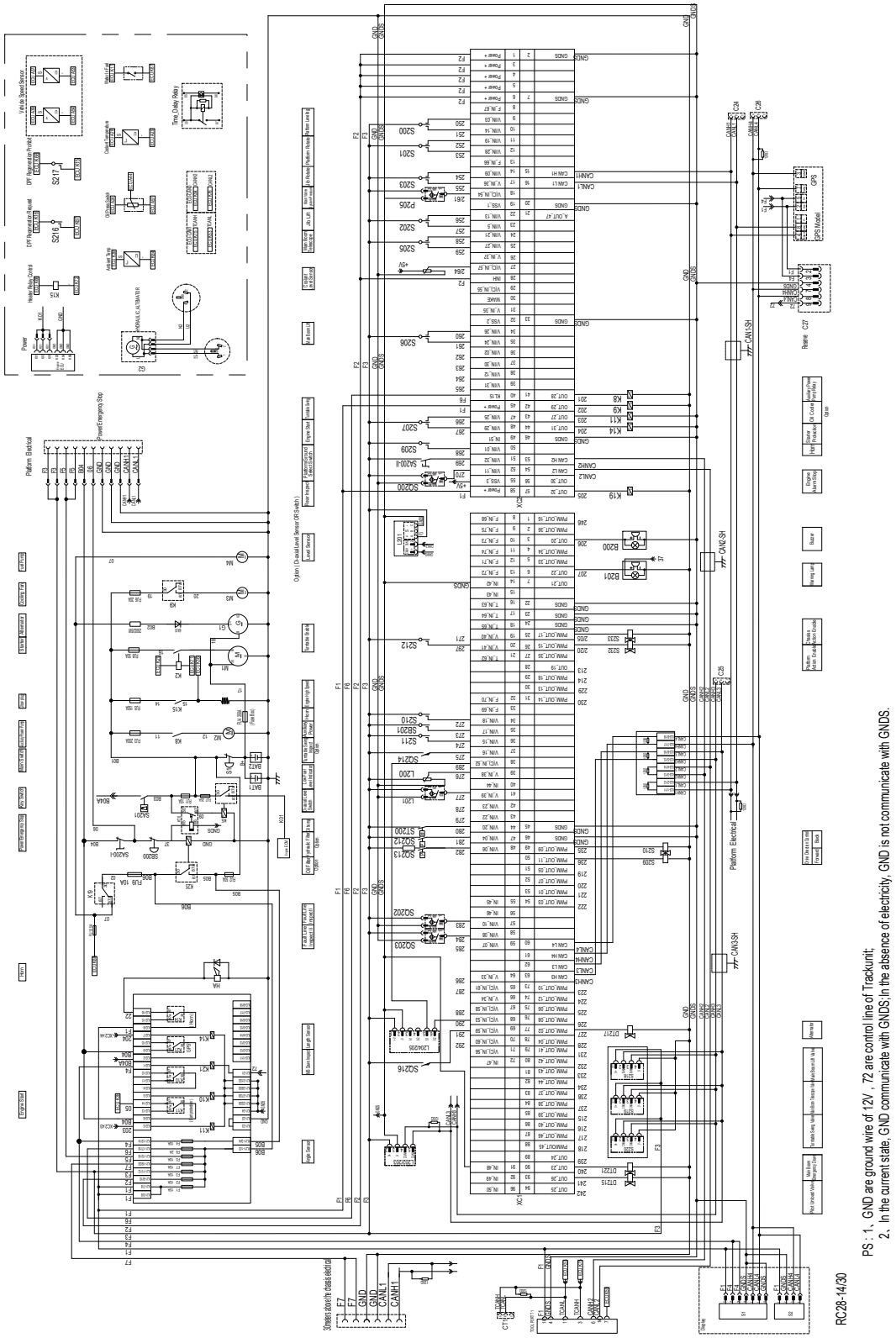


Fig. 6 Electrical Schematic Diagram of Turntable (Yuchai - Hengli Multi-way Valve)

Electrical Schematic Diagram of Engine

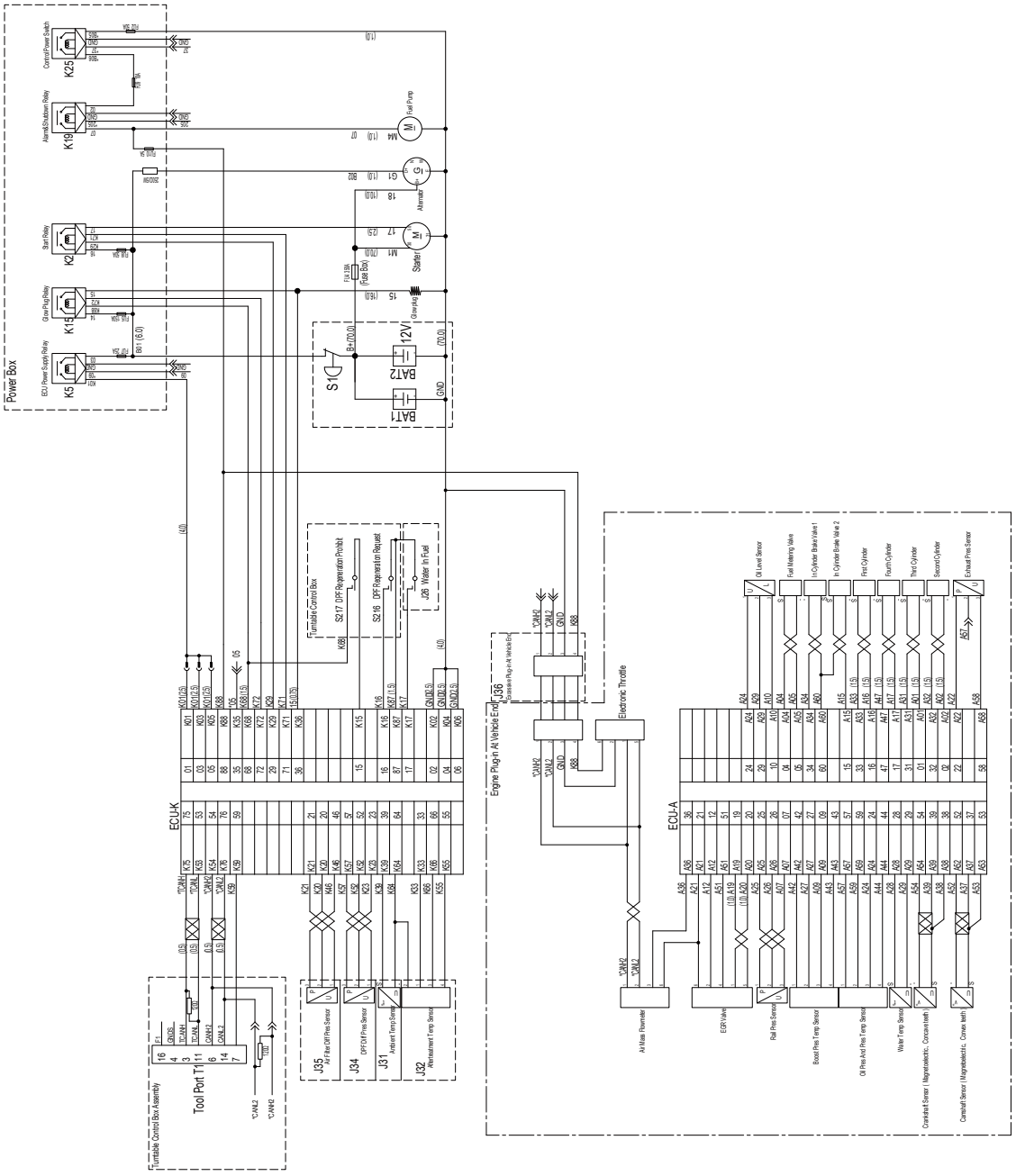


Fig. 7 Electrical Schematic Diagram of Engine (Yuchai YCF3075/YCF36100-T480 China IV)

Electrical Schematic of Hydraulic Generator

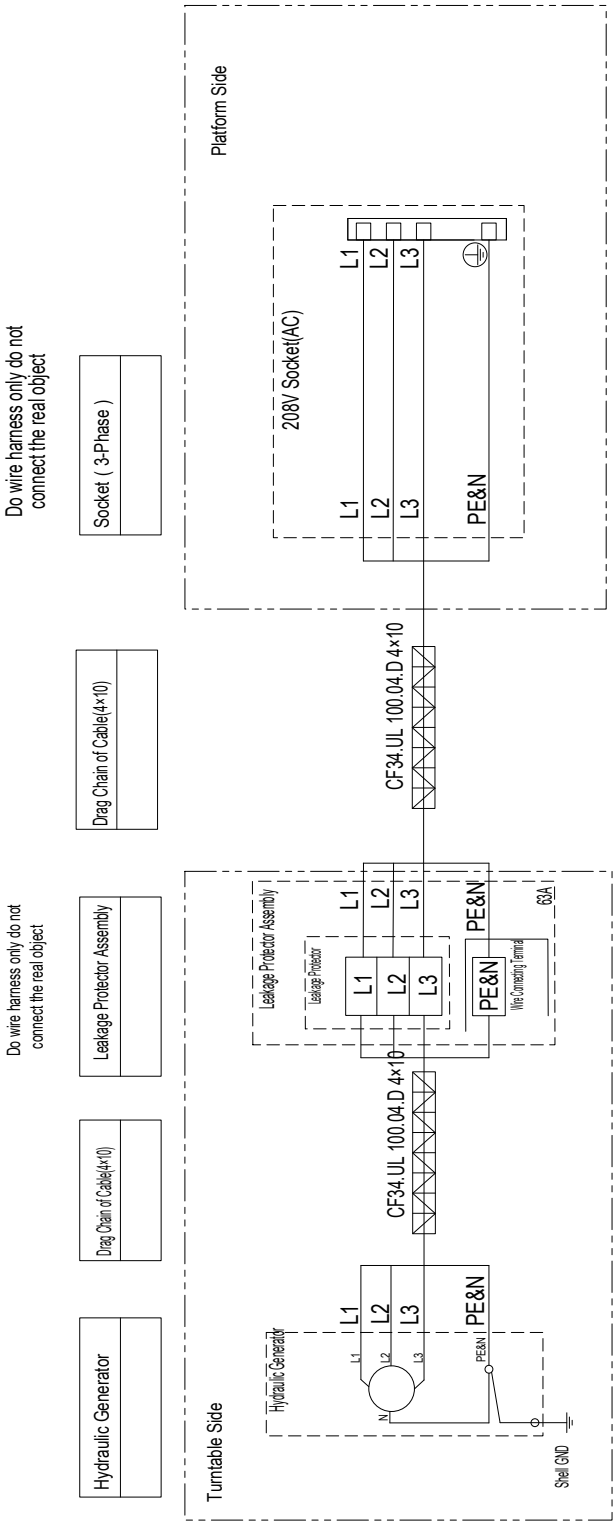


Fig. 8 Electrical Schematic of Hydraulic Generator (North America)

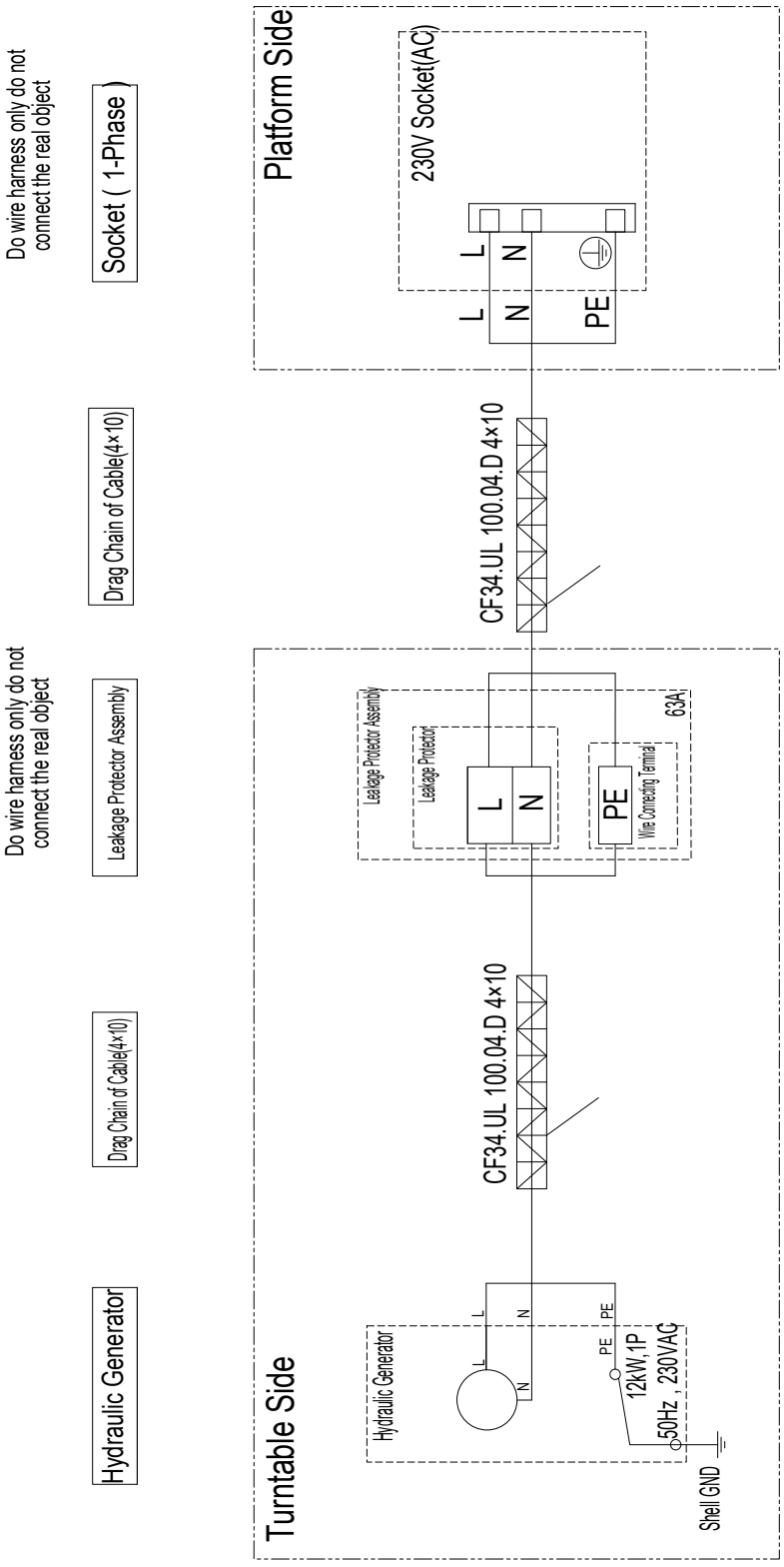


Fig. 9 Electrical Schematic of Hydraulic Generator (Australia)

Electrical Schematic Diagram of Platform

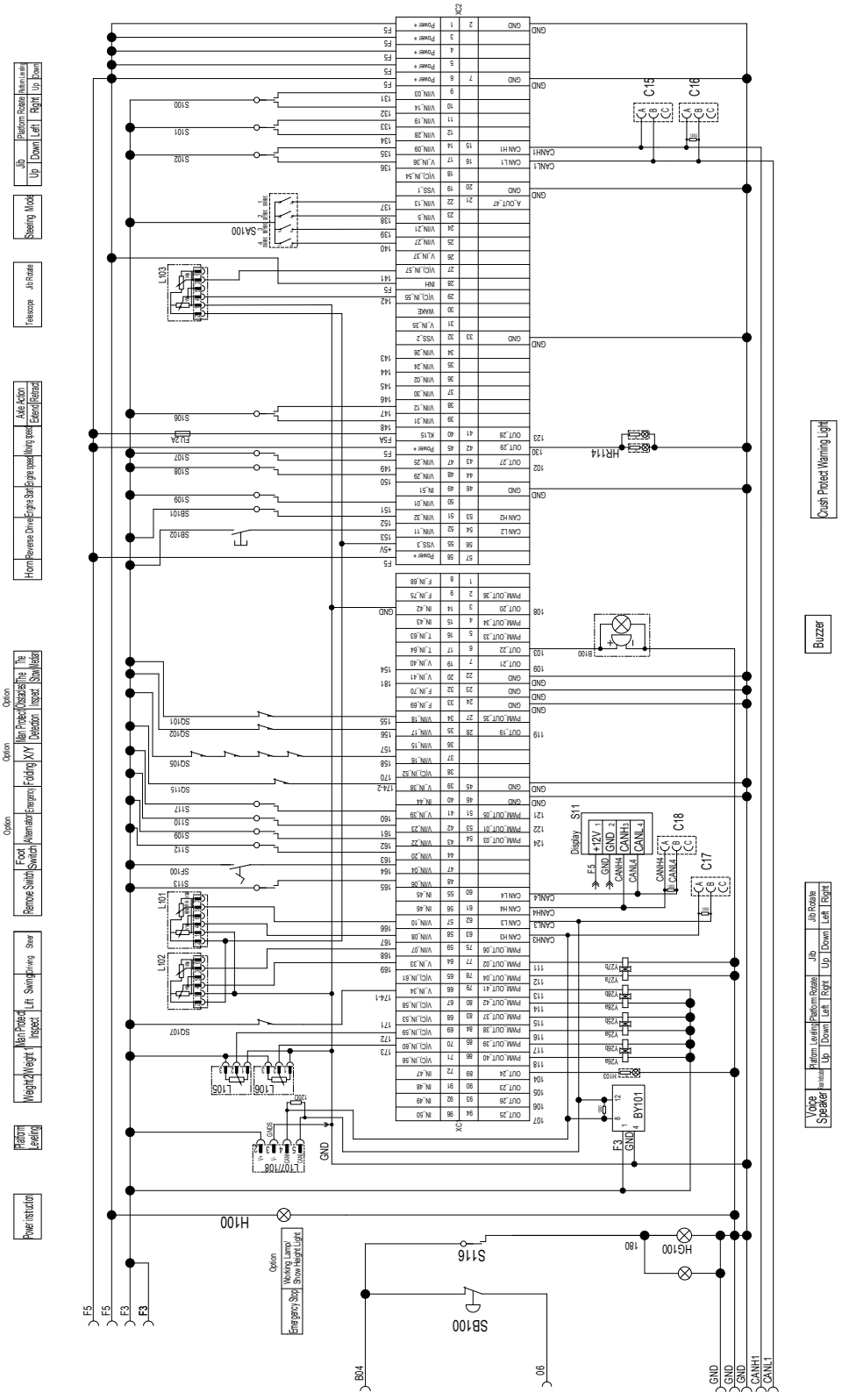


Fig. 10 Electrical Schematic Diagram of the Platform

10 FUNCTIONS AND CONTROLS

10.1 MACHINE POSITIONS

The machine positions/states covered in this manual are stowed position, transport position, operating position, and non-operating position. Each position is described in detail below:

- **Stowed position:** The boom is fully retracted and lowered.
- **Transport position:** The extending axles are fully retracted, and the boom is level and fully retracted. The jib and the platform are positioned as appropriate for transportation by trailer or other means.
- **Operating position (elevated position):** The main boom is elevated more than 15° above horizontal, or the boom extends more than 1.2 m (3.9 ft).
- **Non-operating position:** The main boom is elevated no more than 15° above horizontal, or the boom extends no more than 1.2m (3.9ft).

10.2 DRIVE FUNCTION

Driving at reasonable speed is essential for ensuring machine safety. The drive function should respond quickly and smoothly to the control of the operator. The machine should travel without shaking, shocks and abnormal noise over the controllable speed range. To ensure that the drive unit runs smoothly and keeps good condition, it is recommended to check the drive function every 3 months or after 250 hours of operation.

Select flat, level, unobstructed and solid ground to perform the following tests with the platform stowed and carrying one person:

1. Mark two straight lines with the distance of 30m (98.4ft) on the ground as the test start and stop lines.
2. Start the machine.
3. Depress the foot switch.
4. Slowly push the travel/steer control handle forward to the full drive position.
5. Push the high/low travel speed selector switch at the platform controls upwards to switch the travel speed to high speed.

Notice

Before switching to high travel speed mode, make sure the engine (if equipped) is running at high speed.

6. When the front wheels touch the test start line, press a timer to start timing.
7. Keep the machine running at high speed. Stop the timer when the front wheel touches the test stop line.
8. Calculate the travel speed with the measured data and compare it with the specified maximum travel speed in the stowed position.

NOTICE

If the above calculation result exceeds the maximum travel speed in the stowed position by 10%, immediately turn off and mark the machine, and contact a qualified service technician for inspection and repair.

10.3 BRAKING FUNCTION

Proper braking function is essential for the safe operation of the machine. The braking device should respond quickly and smoothly without any abnormal noise to the control of the operator. To ensure that the brake device works smoothly and keeps good condition, it is recommended to check the brake device every 3 months or after 250 hours of operation.

The braking distance of the machine controlled within the normal range is an important indicator of the normal braking function of the machine. Select flat, level, unobstructed and solid ground to perform the following tests with the platform stowed and carrying one person:

1. Check and make sure that brakes have not been released.
2. Mark a test line on the ground as a reference.
3. Start the machine.
4. Depress the foot switch.
5. Slowly push the travel/steer control handle forward to the full drive position.
6. Push the high/low travel speed selector switch at the platform controls upwards to switch the travel speed to high speed.

Notice

Before switching to high travel speed mode, make sure the engine (if equipped) is running at high speed.

7. When the front wheel contacts with the test start line, ensure the machine is traveling at high speed and release the travel/steer control handle quickly.
8. Measure the horizontal distance between the test line and the contact point between the front wheel and the ground, which is the braking distance.
9. Compare the measured distance with specified braking distance at full travel speed.

NOTICE

If the measured distance exceeds the specified maximum braking distance, immediately lower the platform to the stowed position, turn off and mark the machine, and contact a qualified service technician for inspection and repair.

10.4 TILT PROTECTION FUNCTION

The proper functioning of the tilt sensing system is essential for the safe operation of the machine. It is recommended to check the tilt sensing system every 3 months or after 250 hours of operation.

Select a flat, level, unobstructed and solid surface to perform the following tests:

In the non-operating position:

1. Start the machine.
2. Push the level switch in the X (left-right)/Y (front-rear) direction by more than 5°. At this point, the tilt alarm should be triggered, the chassis tilt indicator light should flash, all functions should remain unrestricted.
3. Drive the machine so the two wheels on the left (or right) side travel on a slope with an angle greater than 5°.At this point, the tilt alarm should be triggered, the chassis tilt indicator light should flash, all functions should remain unrestricted.
4. Drive the machine off the wooden blocks and remove the wooden blocks.
5. Drive the machine so the two front (or rear) wheels travel on a slope with an angle greater than 5°.At this point, the tilt alarm should be triggered, the chassis tilt indicator light should flash, all functions should remain unrestricted.
6. Drive the machine off the wooden blocks and remove the wooden blocks.

In the operating position:

1. Start the machine.
2. Push the level switch in the X (left-right)/Y (front-rear) direction by more than 5°. Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and certain actions will be restricted. But the boom can be retracted, and then lowered after retracted to less than 1.2m (3ft 11in), and the turntable can rotate slowly.
3. Drive the machine so the two wheels on the left (or right) side travel on a slope with an angle greater than 5°.Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and certain actions will be restricted. But the boom can be retracted, and then lowered after retracted to less than 1.2m (3ft 11in), and the turntable can rotate slowly.
4. Place the boom tube into non-operating position, drive the machine off the wooden blocks and remove the wooden blocks.
5. Drive the machine so the two front (or rear) wheels travel on a slope with an angle greater than 5°.Then, the tilt alarm should be triggered, the chassis tilt indicator should flash, and certain actions will be restricted. But the boom can be retracted, and then lowered after retracted to less than 1.2m (3ft 11in), and the turntable can rotate slowly.
6. Place the boom tube into non-operating position, drive the machine off the wooden blocks and remove the wooden blocks.

NOTICE

If during the test it is found that the machine's movements are not restricted as expected, lower the platform to the stowed position, shut down the machine, tag it accordingly, and contact qualified maintenance technicians for inspection and repair.

10.5 WORKING ENVELOPE LIMIT AND OVERLOAD LIMIT FUNCTIONS

The system measures the main boom angle and the main boom extension length by means of the angle sensors and length sensors. When the boom reaches the maximum position, the machine movement will be limited.

The system measures the platform load weight by means of the load sensor on the platform. When the platform is overloaded, the machine movement will be limited.

The working envelope limiting function and overload limiting function are essential for the safe operation of the machine. Their failure may affect the stability of the machine. It is required to check the maximum working envelope limit function and overload limit function every 3 months or after 250 hours of operation.

NOTICE

If the machine fails the working envelope test that is described below, immediately lower the platform to the stowed position, turn off and lockout the machine. Contact a qualified service technician for inspection and repair.

Select flat, level, unobstructed and solid ground to perform the following tests with the machine unloaded:

1. Start the machine from the ground control position.
2. Fully raise and lower the boom, retract and extend it twice to make sure that the machine operates free from obvious vibrations and other abnormalities, and is properly lubricated.

Working Envelope Diagram

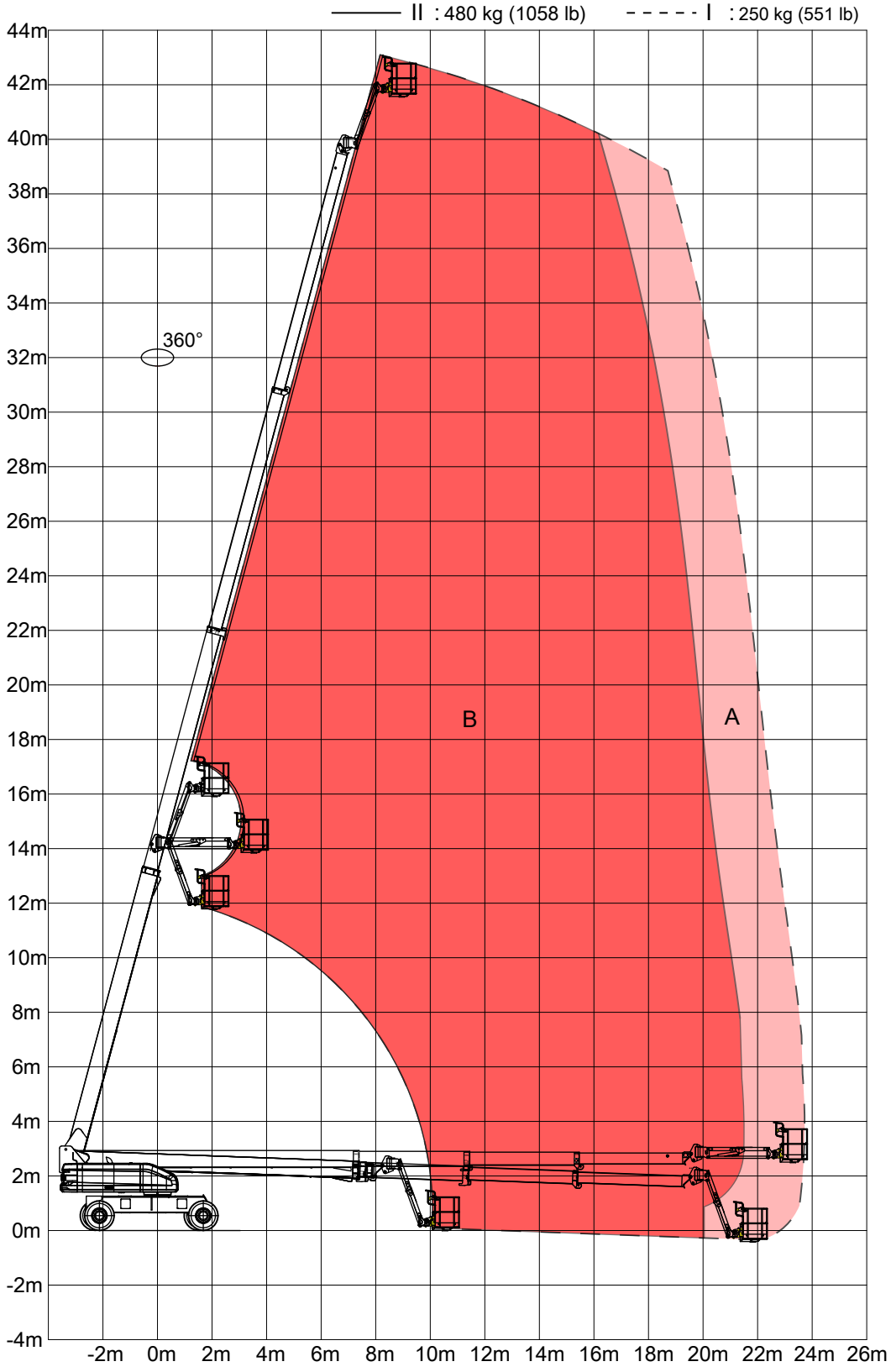


Fig. 1 Working Envelope Diagram (5°)

Note:

The overload limit function is tested in the static state, which decides the working envelope. However, during operating machine, the boom extends and lifts up and down, the load measured by the weighing sensor will change due to the acceleration and deceleration up and down, which will cause overload warning and stopping repeatedly. So the logic divides static and dynamic state, the platform load capacity in the dynamic state increases by 10%. The factory is doing overload test of 1.25 rated capacity for each machine before warehouse, so there is no safety risk of tipping over within the error range of 10%.

After lowering the platform to the stowed position, gradually apply loads to the platform according to the rated platform load capacity in the ***Machine Specifications*** section of this manual.

0 kg < platform load≤250 kg (551 lb)

Apply 250 kg (551 lb) load to the platform for test. The test results should be as follows:

- Curve I is the working envelope of the machine.
- When the boom extends to the max. horizontal reach, the buzzers in the ground controls and platform controls should sound, the main boom is allowed to retract and the turntable is allowed to rotate, but the main boom cannot extend any more nor lift/descend.
- When the main boom is raised to the upper/lower limit angle, the boom should be prevented from further rising/lowering.
- In the area A, when the load on the platform exceeds 250 kg (551 lb), the buzzers in the ground controls and platform controls should sound, the overload indicator light will flash, the display will indicate overload. In the KG mode, all functions will be disabled. In the Non-KG mode, certain functions will be disabled, but the main boom can be retracted, the jib can lift and lower, the platform can be leveled manually within ±10°, the turntable can rotate slowly, and the main boom can be lowered after fully retracted. After the excess load is removed, all functions will be resumed.

Static state

250 kg (551 lb) < platform load≤480 kg (1058 lb)

Apply 480 kg (1058 lb) load to the platform for test. The test results should be as follows:

- Curve II is the working envelope of the machine.
- When the boom extends to the max. horizontal reach, the buzzers in the ground controls and platform controls should sound, the main boom is allowed to retract and the turntable is allowed to rotate, but the main boom cannot extend any more nor lift/descend.
- When the main boom is raised to the upper/lower limit angle, the boom should be prevented from further rising/lowering.
- In the area B, when the load on the platform exceeds 480 kg (1058 lb), the buzzers in the ground controls and platform controls should sound, the overload indicator light will flash, the display will indicate overload. In the KG mode, all functions will be disabled. In the Non-KG mode, certain functions will be disabled, but the main boom can be retracted, the jib can lift and lower, the platform can be leveled manually within ±10°, the turntable can rotate slowly, and the main boom can be lowered after fully retracted. After the excess load is removed, all functions will be resumed.

Dynamic state

275 (606 lb) < platform load≤528 (1164 lb)

Apply 528 kg (1164 lb) load to the platform for test. The test results should be as follows:

- Curve II is the working envelope of the machine.
- When the boom extends to the max. horizontal reach, the buzzers in the ground controls and platform controls should sound, the main boom is allowed to retract and the turntable is allowed to rotate, but the main boom cannot extend any more nor lift/descend.
- When the main boom is raised to the upper/lower limit angle, the boom should be prevented from further rising/lowering.
- In the area B, when the load on the platform exceeds 528kg (1164 lb), the buzzers in the ground controls and platform controls should sound, the overload indicator light will flash, the display will indicate overload. In the KG mode, all functions will be disabled. In the Non-KG mode, certain functions will be disabled, but the main boom can be retracted, the jib can lift and lower, the platform can be leveled manually within ±10°, the turntable can rotate slowly, and the main boom can be lowered after fully retracted. After the excess load is removed, all functions will be resumed.

NOTICE

With the machine in the KG (overweight limit) mode, if an overload alarm is triggered and the platform needs to be lowered, the override operation should be activated.

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11 CONTROL SYSTEM

DANGER

All operations in this section must be performed by qualified personnel who have been professionally trained and authorized by Sinoboom, otherwise the consequences will be at your own risk.

WARNING

Unsafe Operation Hazard

- **The machine has been commissioned before delivery. It's forbidden to modify the system settings and update the program without authorization from Sinoboom.**

  Due to different machine configurations, certain descriptions below may be inapplicable to your machine. In case of any operational questions when operating the machine as per the manual, please stop operation and contact Sinoboom after-sales personnel in time.

- **Incorrect operation may result in death, serious injury or machine damage.**

NOTICE

PCU, ECU, sensors, etc. are precisely adjusted and protectively treated before delivery. Therefore, personnel who have not been professionally trained and authorized by Sinoboom cannot disassemble their housings, otherwise moisture and dust will enter the internal mechanism and normal operation will not be guaranteed.

This section is applicable to the Rexroth control system equipped with the Huaxing display screen.

11.1 DISPLAY INTERFACE NAVIGATION

The system interface is as shown in the figure below:

Note: some interfaces can only be accessed with a password (the password can only be provided to personnel professionally trained and authorized by Sinoboom).

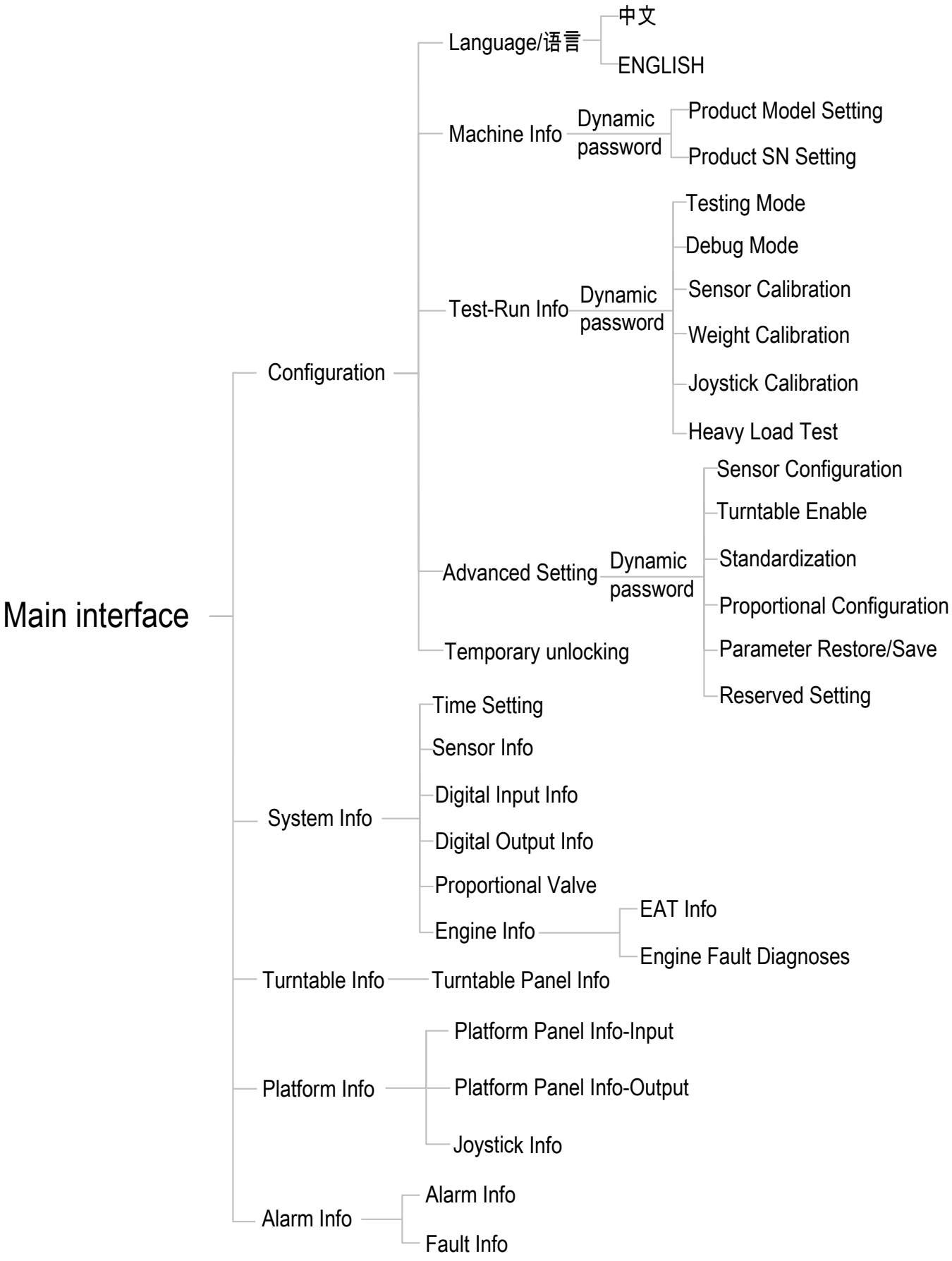
Main interface
Configuration
Language/语言
中文
ENGLISH
Machine Info
Dynamic password
Product Model Setting
Product SN Setting
Test-Run Info
Dynamic password
Testing Mode
Debug Mode
Sensor Calibration
Weight Calibration
Joystick Calibration
Heavy Load Test
Advanced Setting
Dynamic password
Sensor Configuration
Turntable Enable
Standardization
Proportional Configuration
Parameter Restore/Save
Reserved Setting
Temporary unlocking
System Info
Time Setting
Sensor Info
Digital Input Info
Digital Output Info
Proportional Valve
Engine Info
EAT Info
Engine Fault Diagnoses
Turntable Info
Turntable Panel Info
Platform Info
Platform Panel Info-Input
Platform Panel Info-Output
Joystick Info
Alarm Info
Alarm Info
Fault Info

Fig. 1 Display interface navigation diagram

11.2 MAIN INTERFACE AFTER BOOTING

Turn the ground/platform selector switch at the turntable controls to the ground control position, pull out the emergency stop button to the ON position, and turn the key switch to the ON position, and the system will be powered on.

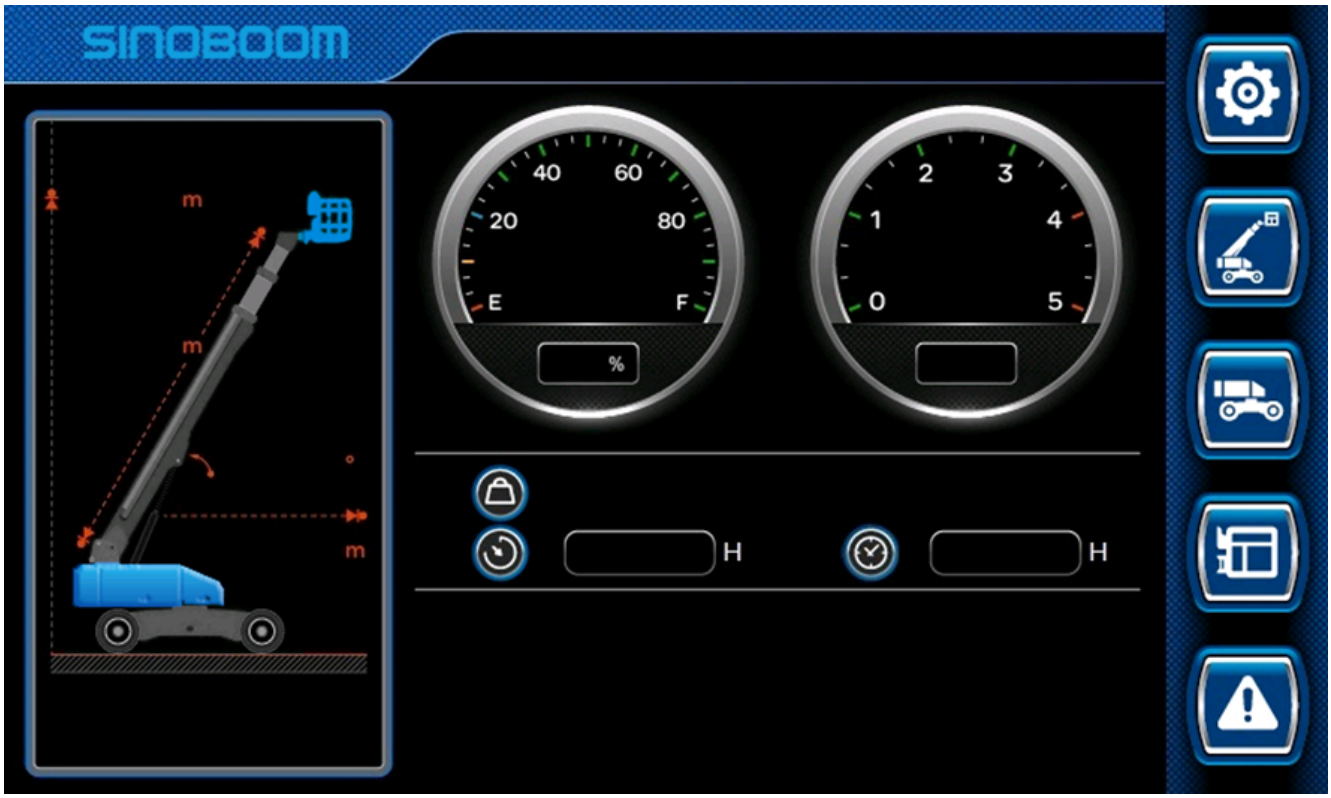

Fig. 2 Main interface after booting

11.3 DESCRIPTION OF ICON FUNCTIONS

Table 11-1

Icon	Description	Icon	Description
	Configuration		Left/Right arrow key

Table 11-1 (continued)

	Turntable panel information		Increase key
	System information		Decrease key
	Platform information		Return key
	Alarm information		Enter key
	Up arrow key		Previous page
	Down arrow key		Enter/next page
	Right arrow key		Press and hold the icon for 3s to save the current page parameters and jump to the next page /Press the icon to directly jump to the next page
	Left arrow key		Press and hold the icon for 3s to save the current page parameters and return to the previous menu /Press the icon to directly return to the previous menu
	Up/Down arrow key		

11.4 LANGUAGE SETTING

1. On the main interface, press  on the main interface to enter CONFIGURATION interface.

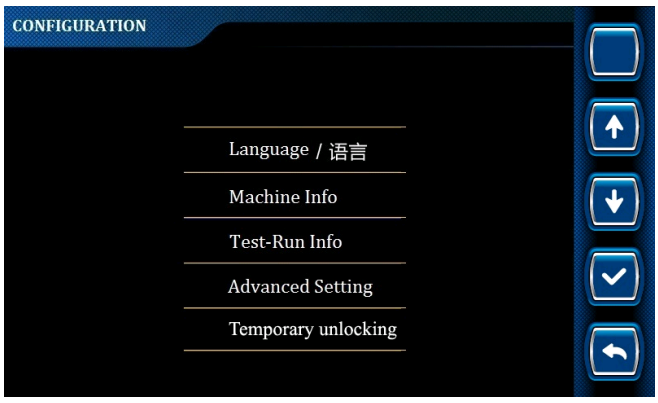

Fig. 3 CONFIGURATION Interface

2. Press or until “Language” is displayed，and press to enter the LANGUAGE Interface.

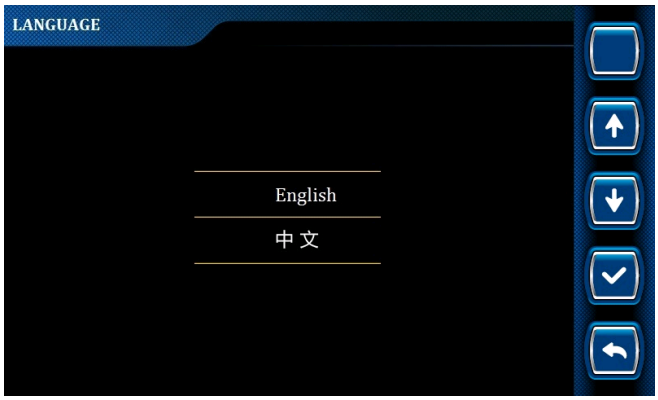

Fig. 4 LANGUAGE Interface

3. Press or to select “中文” or “English”, and press and hold for 3s to complete language setting.
4. Press successively to return to the main interface, and power off the machine as required.

11.5 TEST-RUN INFORMATION

1. On the main interface, press on the main interface to enter CONFIGURATION interface.
2. According to the display interface navigation diagram, enter TEST-RUN INFO interface by pressing , or .

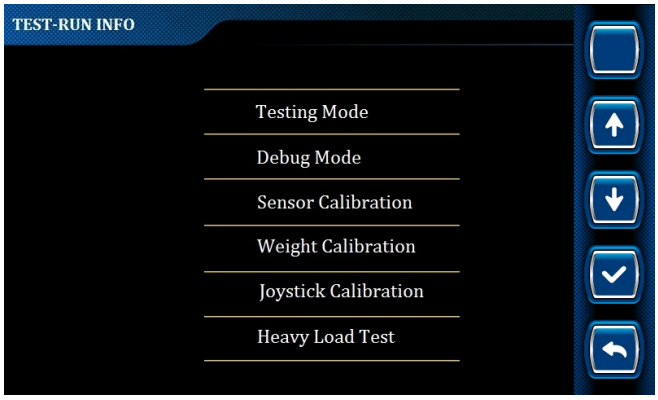

Fig. 5 TEST-RUN INFO Interface

Sensor Calibration

- This operation is to calibrate sensors other than the weighing sensor (its calibration method will be described in detail in the subsequent ***weight calibration***).
- If the machine is equipped with a dual-channel sensor, it is sufficient to select only one channel for calibrating the maximum and minimum values.

1. On the TEST-RUN INFO interface, press or until “Sensor Calibration” is displayed, and press to enter SENSOR CALIBRATION interface.

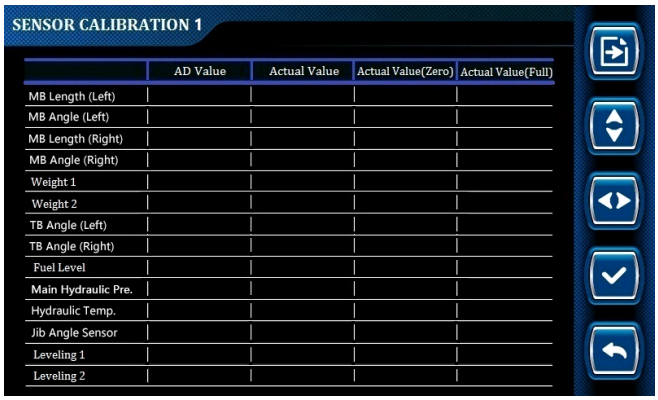

Fig. 6 SENSOR CALIBRATION 1 interface

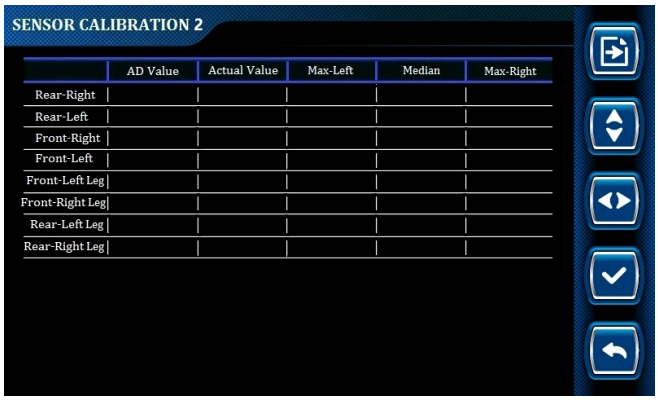

Fig. 7 SENSOR CALIBRATION 2 interface

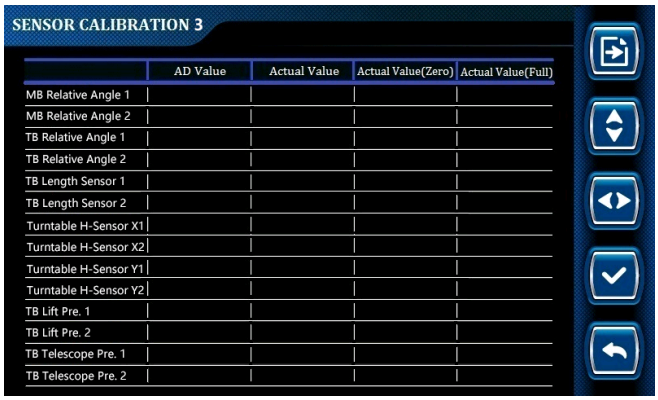

Fig. 8 SENSOR CALIBRATION 3 interface

2. On the SENSOR CALIBRATION interface, press or to select the position to be calibrated (there will be the flashing before the selected option), press and hold for 3s to complete the calibration (the icon before the selected option is switched from to , indicating calibration succeeded, and the corresponding actual value will be changed).
3. If the parameters at this position is to be re-calibrated, press to return to the TEST-RUN INFO interface, then re-enter the SENSOR CALIBRATION interface, and repeat the previous step.
4. Press successively to return to the main interface, and power off the machine as required.

Weight Calibration

1. Make sure that no heavy objects are placed on the platform and that the platform is stable without shaking.
2. Enter the TEST-RUN INFO interface.
3. On the TEST-RUN INFO interface, press or until Weight Calibration is displayed, and press to enter the WEIGHT CALIBRATION interface.

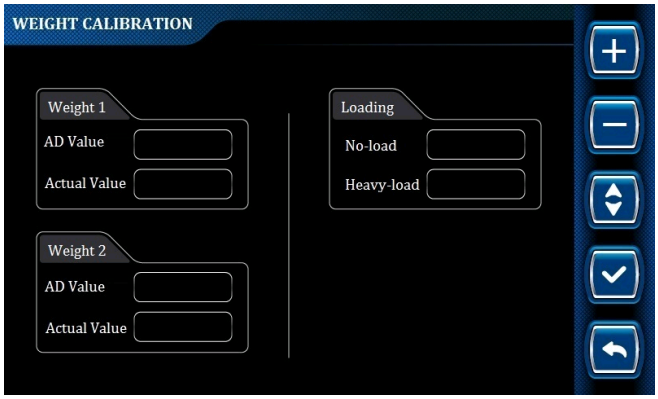

Fig. 9 WEIGHT CALIBRATION interface

4. On the WEIGHT CALIBRATION interface, select No-load in the Loading column on the right side of the display screen through , adjust the value to 0 by pressing or , and press and hold for 3s to complete the no-load calibration.
5. Place a heavy object with the weight equal to the rated load of the machine on the platform making sure that the platform is stable/not moving/shaking.
6. Select Heavy-load in the Loading column on the right side of the display screen by pressing , adjust the value to the weight value of the heavy object on the platform by pressing or , and press and hold for 3s to complete the heavy-load calibration (the actual weight value on the left side of the corresponding display screen is equal to the weight value of loads on the platform).
7. If re-calibration is required, press to return to the TEST-RUN INFO interface, then re-enter the WEIGHT CALIBRATION interface, and repeat the previous step.
8. Press successively to return to the main interface, and power off the machine as required.

- If the machine is equipped with a dual-channel sensor, when pressing and holding for no-load and heavy-load calibration, the weight of two channels will be calibrated at the same time.

Calibrate Joystick

1. On the TEST-RUN INFO interface, press or until Joystick Calibration is displayed, and press to enter the JOYSTICK CALIBRATION interface.

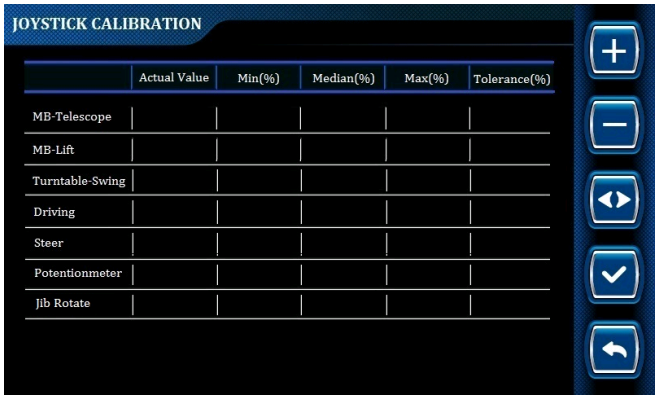

Fig. 10 JOYSTICK CALIBRATION interface

2. On the JOYSTICK CALIBRATION interface, select the joystick option to be calibrated by pressing , change the tolerance by pressing or , and press to save the value and complete the calibration (the icon before the selected option will be changed from to , indicating calibration succeeded; there will be the icon on the interface when tolerance value is saved.)
3. If re-calibration is required, press to return to the TEST-RUN INFO interface, then re-enter the JOYSTICK CALIBRATION interface, and repeat the previous step.
4. Press successively to return to the main interface, and power off the machine as required.

11.6 ADVANCED SETTING

DANGER

Personnel who have not been professionally trained and authorized by Sinoboom are not allowed to modify the advanced setting (including sensor configuration, turntable enable, standardization, proportional configuration, parameter restore/save and reserved setting); otherwise they will be responsible for the consequences.

1. Press on the main interface to enter CONFIGURATION interface.
2. According to the navigation diagram of display interface, enter Advanced Setting interface (password required) by pressing , or .

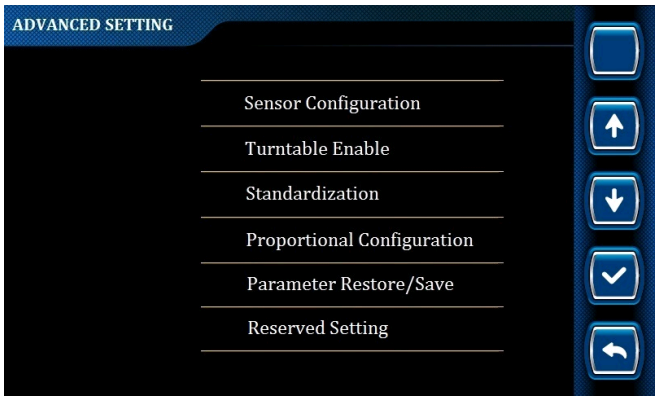

Fig. 11 ADVANCED SETTING interface

Sensor Configuration

- The sensor configuration is mainly used to turn on/off switches or sensors on the machine.
- The configuration of switches is subject to the actual machine configurations.

1. On the ADVANCED SETTING interface, press or until Sensor Configuration is displayed, and press to enter SENSOR CONFIGURATION interface.

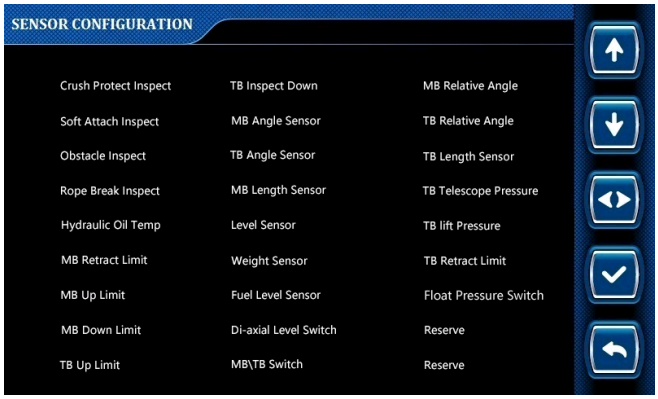

Fig. 12 SENSOR CONFIGURATION interface

2. On the SENSOR CONFIGURATION interface, select the desired item by pressing , , or , and press to turn on/off the selected item.
3. Press successively to return to the main interface, and power off the machine as required.

Turntable Enable

1. On the ADVANCED SETTING Interface, press or until Turntable Enable is displayed, and press to enter TURNTABLE ENABLE Interface.

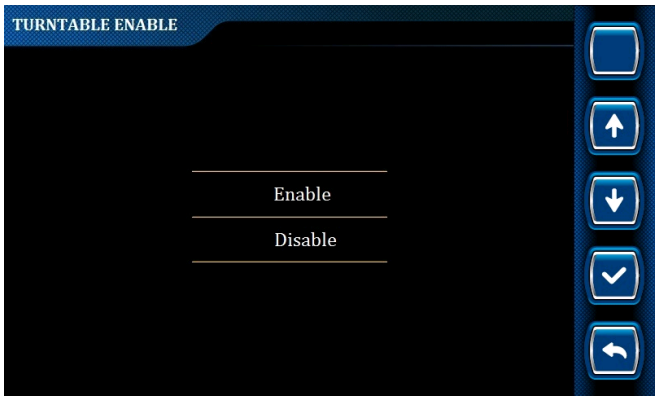

Fig. 13 TURNTABLE ENABLE Interface

2. On the TURNTABLE ENABLE Interface, press or until Enable or Disable is displayed, and press and hold for 3s to confirm the setting (there will be the icon before the selected option after successful setting).
3. To re-select the test option, press to return to the ADVANCED SETTING Interface, re-enter the TURNTABLE ENABLE Interface, and repeat the above steps.
4. Press successively to return to the main interface, and power off the machine as required.

Standardization

1. On the ADVANCED SETTING interface, press or until Standardization is displayed, and press to enter STANDARDIZATION interface.

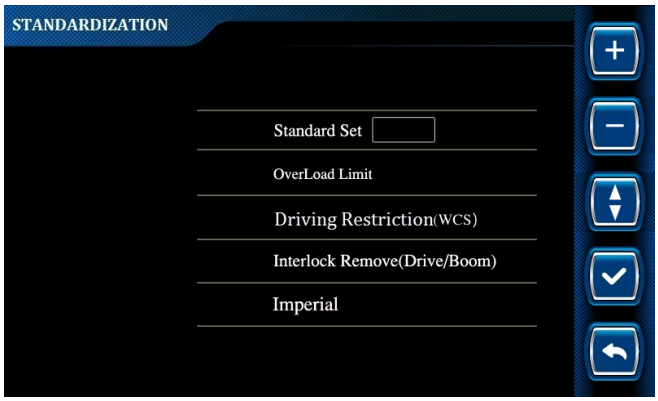

Fig. 14 STANDARDIZATION interface

2. **Setting of standards:** On the STANDARDIZATION interface, select Standard Set option by pressing , press or to change the value, and press and hold for 3s to confirm the setting (there will be the icon before the selected option after successful setting).
   - After changing the value to “0” and confirming the setting the program will not apply any restrictions that may be required by certain standards.
   - After changing the value to “1” and confirming the setting, the program will implement the restrictions of CE standard, and the icon of CE standard (CE) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “2” and confirming the setting, the program will implement the restrictions of ANSI standard, and the icon of ANSI standard (ANSI) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “3” and confirming the setting, the program will implement the restrictions of CSA standard, and the icon of CSA standard (CSA) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “4” and confirming the setting, the program will implement the restrictions of AS standard, and the icon of AS standard (AS) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “5” and confirming the setting, the program will implement the restrictions of KCS standard, and the icon of KCS standard (KCS) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “6” and confirming the setting, the program will implement the restrictions of JIS standard, and the icon of JIS standard (JIS) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “7” and confirming the setting, the program will implement the restrictions of EAC standard, and the icon of EAC standard (EAC) will be displayed in the upper right corner of the Home interface.
   - After changing the value to “8” and confirming the setting, the program will implement the restrictions of UKC standard, and the icon of UKC standard (UKC) will be displayed in the upper right corner of the Home interface.
3. **Overload limit setting:** On the STANDARDIZATION interface, select Overload Limit option by pressing , and press and hold for 3s to confirm the setting. There will be the icon before the selected option after successful setting, and the KG icon (KG) will be displayed in the upper right corner of the main interface.
4. **Drive Limit (operating position) setting:** On the STANDARDIZATION interface, select Driving Restriction (WCS) option by pressing , and press and hold for 3s to confirm the setting. There will be the icon before the selected option after successful setting, and the DR icon (DR) will be displayed in the upper right corner of the main interface.
5. **Interlock remove (drive/boom) setting:** On the STANDARDIZATION interface, select Interlock Remove (Drive/Boom) option by pressing , and press and hold for 3s to confirm the setting. There will be the icon before the selected option after successful setting, and the D/B icon (D/B) will be displayed in the upper right corner of the main interface.
6. To re-select the test option, press to return to the ADVANCED SETTING interface, re-enter the STANDARDIZATION interface, and repeat the above steps to select the desired option.
7. Press successively to return to the main interface, and power off the machine as required.

- In KG mode, when the platform is overloaded, a series of actions of the machine in operating position will be restricted. The difference between KG mode and non-KG mode can be found in the ***Functions and Controls*** section in the maintenance procedures of this Manual.
- In DR mode, the driving function of the machine in operating position will be restricted.

- In D/B mode, driving function and boom actions can be performed at the same time.

Proportional Configuration

1. On the ADVANCED SETTING interface, press or until Proportional Configuration is displayed, and press to enter PROPOR. CONFIG 1 interface.

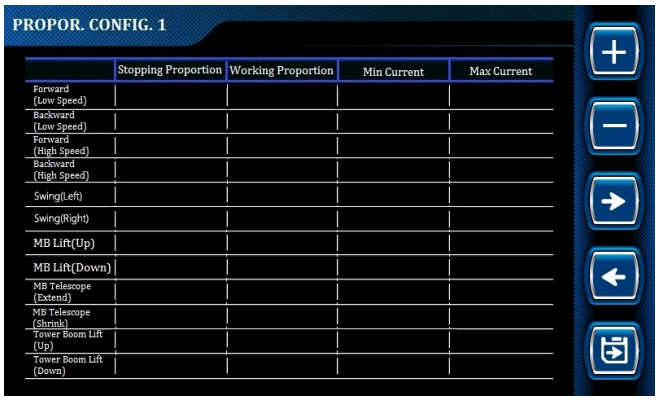

Fig. 15 PROPOR. CONFIG 1 interface

2. On the PROPOR. CONFIG 1 interface, press or to select the parameter to be adjusted (the selected option will be flashing), change the selected parameter value by pressing or , press and hold for 3s to save the parameters on the current page and jump to PROPOR. CONFIG 2 interface (there will be the icon in the top middle of the interface after successful saving), or press to jump to PROPOR. CONFIG 2 interface without saving the parameters on the current page.

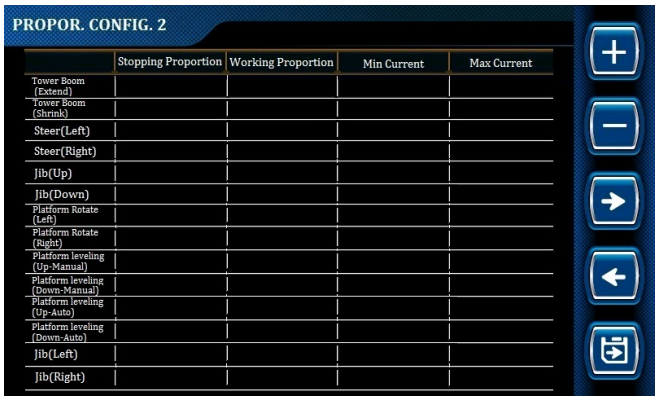

Fig. 16 PROPOR. CONFIG 2 interface

3. Similarly, on the PROPOR. CONFIG 2 interface, follow the above operations to change the parameters requiring adjustment, and jump to the PROPOR. CONFIG 3 interface.

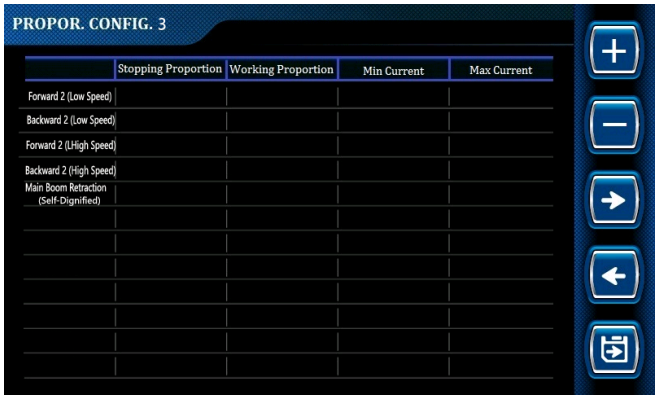

Fig. 17 PROPOR. CONFIG 3 interface

4. Similarly, on the PROPOR. CONFIG 3 interface, follow the above operations to change the parameters requiring adjustment, and jump to the PROPOR. CONFIG 4 interface.

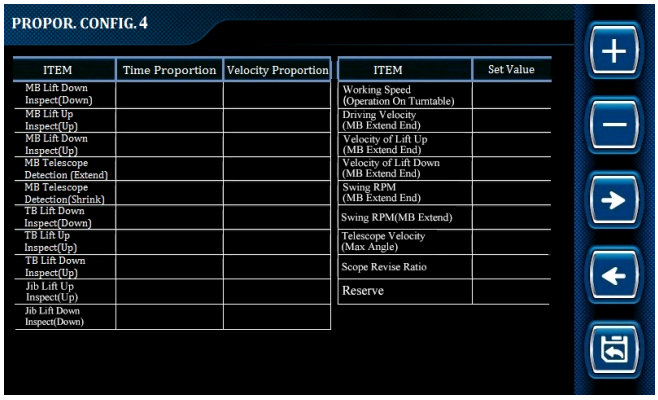

Fig. 18 PROPOR. CONFIG 4 interface

5. On the PROPOR. CONFIG 4 interface, follow the above operations to change the parameters requiring adjustment. Press and hold for 3s to save the parameters on the current page and return to the previous ADVANCED SETTING interface, or press to return to the previous ADVANCED SETTING interface without saving the parameters on the current page.

6. Press successively to return to the main interface, and power off the machine as required.

Note:

The maximum current, minimum current, working proportion, and stopping proportion are only valid for actions controlled by proportional valves. For actions not controlled by proportional valves, please adjust the working proportion and stopping proportion to within 10, or the action response will be delayed.

- Minimum current: refers to the starting current of actions, which affects the starting of actions and micromotion performance. The minimum current should

be set to a value that allows the action to just get started, and it can be identified through the debug mode.

- Maximum current: refers to the maximum current of actions. If it is too low, the speed of actions will be affected, and if it is too high (exceeding the full-open current of the proportional valve), the buffering performance of actions will be affected.
- Working proportion: refers to the starting buffer slope of actions. The smaller the proportion value, the bigger the starting buffer slope and the shorter the time required; the larger the proportion value, the smaller the starting buffer slope and the longer the required time. This parameter can be used to improve the starting hysteresis and starting impact performance of actions.
- Stopping proportion: refers to the stopping buffer slope of actions. The smaller the proportion value, the bigger the stopping buffer slope and the shorter the time required; the larger the proportion value, the smaller the stopping buffer slope and the longer the time required. This parameter can be used to improve the stopping hysteresis and stopping impact performance of actions.
- Time proportion: omitted.
- Speed proportion: used to adjust the target current of action buffering. The smaller the proportion value, the lower the target current and the slower the action; the larger the proportion value, the higher the target current and the faster the action. This parameter can be used to adjust the action speed in the buffer zone.

Table 11-2 Description of items on PROPOR. CONFIG 4 interface

No.	Item	Description	Applicable models
1	MB Lift Down Inspect (Down)	To set the time and speed proportion of main boom when fully lowered during luffing-down. Condition of fully lowering: down limit switch is triggered or the main boom is positioned at an angle smaller than the set value.	TB, AB
2	MB Lift Up Inspect (Up)	To set the time and speed proportion of main boom when fully raised during luffing-up. Condition of fully raising: up limit switch is triggered or the main boom is positioned at an angle bigger than the set value.	TB, AB
3	MB Lift Down Inspect (Up)	To set the time and speed proportion of main boom when fully raised during luffing-down. Condition of fully raising: up limit switch is triggered or the main boom is positioned at an angle bigger than the set value.	TB, AB
4	MB Telescope Detection (Extend)	To set the time and speed proportion of main boom when fully extended. Condition of fully extending: the extended length is bigger than the set value.	TB
5	MB Telescope Detection (Shrink)	To set the time and speed proportion of main boom when fully retracted. Condition of fully retracting: the retracting limit switch is triggered or the extended length is smaller than the set value.	TB, AB
6	TB Lift Down Inspect (Down)	To set the time and speed proportion of articulated boom when fully lowered during luffing-down. Condition of fully lowering: down limit switch is triggered or the articulated boom is positioned at an angle smaller than the set value.	AB
7	TB Lift Up Inspect (Up)	To set the time and speed proportion of articulated boom when fully raised during luffing-up. Condition of fully raising: up limit switch is triggered or the articulated boom is positioned at an angle bigger than the set value.	AB
8	TB Lift Down Inspect (Up)	To set the time and speed proportion of main boom when fully raised during luffing-down.	AB

Table 11-2 Description of items on PROPOR. CONFIG 4 interface (continued)

		Condition of fully raising: up limit switch is triggered or the articulated boom is positioned at an angle bigger than the set value.	
9	Jib Lift Up Inspect (Up)	To set the time and speed proportion of jib boom when fully raised during luffing-up. Condition of fully raising: up limit switch is triggered or the jib boom is positioned at an angle bigger than the set value.	TB, AB
10	Jib Lift Down Inspect (Up)	To set the time and speed proportion of jib boom when fully lowered during luffing-down. Condition of fully lowering: down limit switch is triggered or the jib boom is positioned at an angle smaller than the set value.	TB, AB
11	Working Speed (Operation on Turntable)	To set the speed of turntable rotation.	TB, AB
12	Driving Velocity (MB Extend End)	To set the travel speed with the main boom fully extended.	TB
13	Velocity of Lift Up (MB Extend End)	To set the luffing-up speed with the main boom fully extended (maximum angle).	TB
14	Velocity of Lift Down (MB Extend End)	To set the luffing-down speed with the main boom fully extended (maximum angle).	TB
15	Swing RPM (MB Extend End)	To set the rotation speed with the main boom fully extended (maximum angle).	TB
16	Swing RPM (MB Extend)	To set the rotation speed with the main boom extended. Condition: the retracting limit switch disengages or the main boom is longer than 1.2m.	AB
17	Telescope Velocity (maximum angle)	To set the extending/retracting speed with the main boom at the max angle.	TB
18	Scope Revise Ratio	To slightly adjust the operating range of telescopic boom (not used yet).	TB
Notes: All parameters can be adjusted within 0-100.			

Parameter Restore/Save

1. On the ADVANCED SETTING interface, press or until Parameter Restore/Save is displayed, and press to enter PARAMETER RESTORE/SAVE interface.

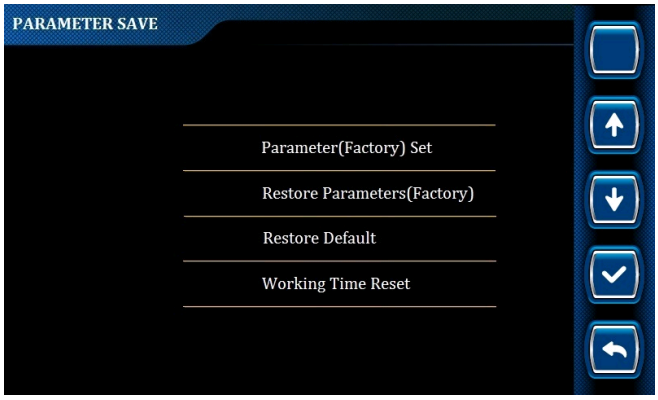

Fig. 19 PARAMETER RESTORE/SAVE interface

2. On the PARAMETER SAVE interface, press or until the desired function is displayed (there will be the icon before the selected option), press and hold for 3s to confirm the selection (there will be the icon before the selected option after confirmation).

3. Press successively to return to the main interface, and power off the machine as required.

Note:

- Parameter (factory) set: used to save the current parameters as factory parameters and the original factory parameters will be overwritten. Please use this function with caution.
- Restore parameters (factory): used to restore the current parameters to the factory parameters and the current parameters will be overwritten. Please use this function with caution.
- Restore default: used to restore the current parameters to the default parameters and the current parameters will be restored. This function shall be used with caution and generally only used in the initial installation and debugging (requiring a password to restore the default parameters).
- Working time reset: used to clear the total working time (after clearing, the total working time is about 36.5h). Please use this function with caution.

11.7 SYSTEM INFORMATION

On the main interface, press to enter SYSTEM INFO interface.

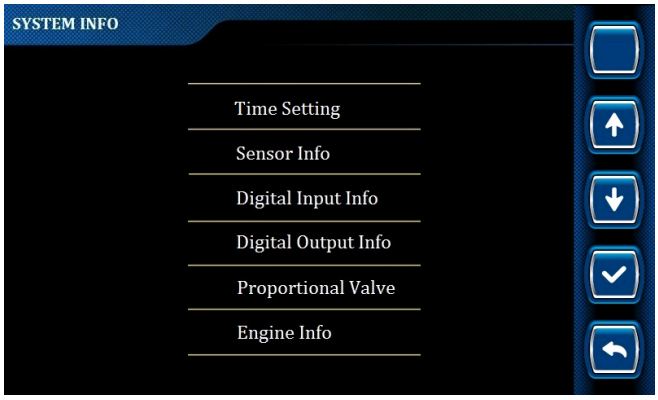

Fig. 20 SYSTEM INFO interface

Time Setting

1. On the SYSTEM INFO interface, press or until Time Setting is displayed, and press to enter TIME SETTING interface.

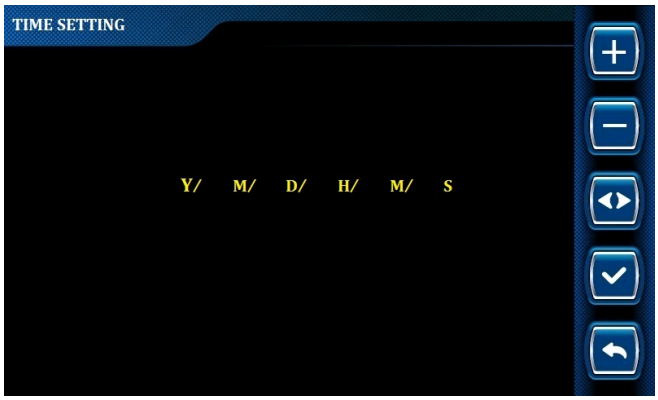

Fig. 21 TIME SETTING interface

2. On the TIME SETTING interface, select the desired setting option (the selected option will be flashing) by pressing , change the value by pressing or , and press to confirm the changing (there will be the icon at the top of the interface).

3. Press successively to return to the main interface, and power off the machine as required.

Sensor Information

- The sensor information option is mainly used to query the actual value of the sensor configured on the machine, thus determining whether each sensor is working normally.
- The configuration of switches is subject to the actual machine configurations.

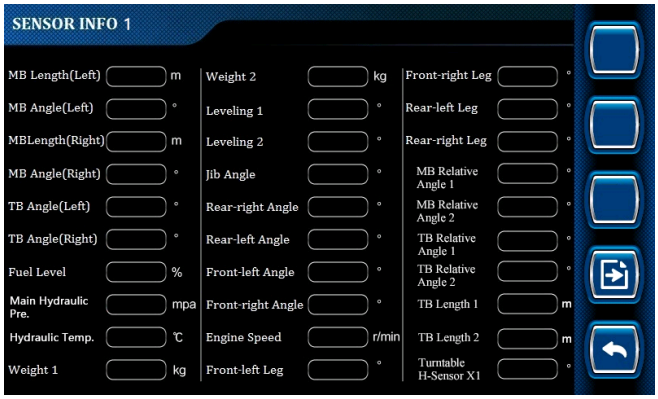

Fig. 22 SENSOR INFO 1

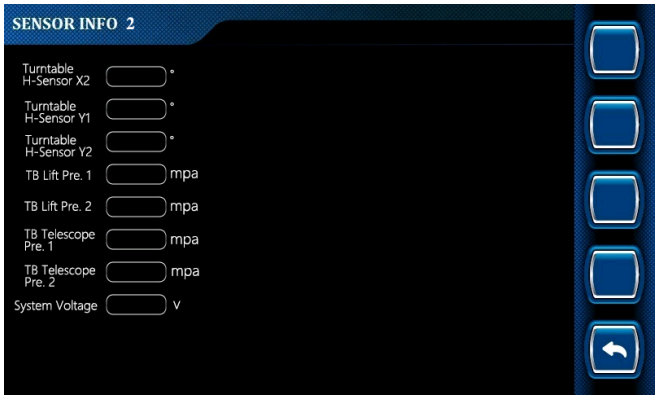

Fig. 23 SENSOR INFO 2

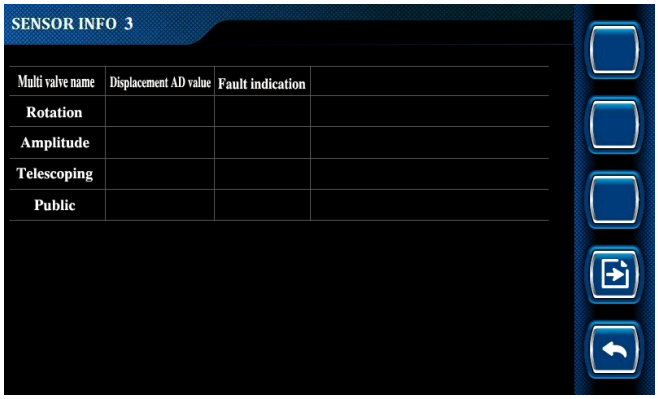

Fig. 24 SENSOR INFO 3

Digital Input Information

- The digital input information option is mainly used to query the signal detection status of detection switches (such as travel switches and proximity switches) configured on the machine (the icon before the option indicates that the switch has detected a signal, and the icon before the option indicates that the switch has not detected a signal), thus determining whether the detection switches are working normally and whether the working state of the machine meets the requirements.
- The configuration of switches is subject to the actual machine configurations.

Fig. 25 Input Info interface

Digital Output Information

- The digital output information option is mainly used to query the output status of the relays, switching valves and other output points configured on the machine (the icon before the option indicates that an output is detected, and the icon before the option indicates that no output is detected), thus assisting in determining the trouble causes.
- The configuration of output points is subject to the actual machine configuration.

Fig. 26 OUTPUT INFO 1 interface

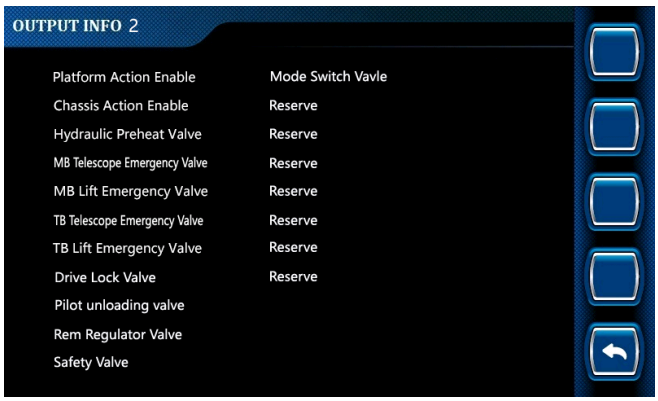

Fig. 27 OUTPUT INFO 2 interface

Proportional Information

- The proportional information option is mainly used to query the output status of the proportional valve output points configured on the machine, thus assisting in determining the trouble causes.
- The configuration of proportional valves is subject to the actual machine configuration.

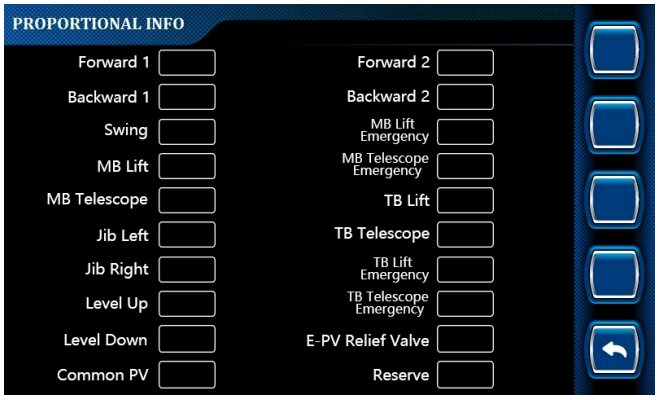

Fig. 28 PROPORTIONAL INFO interface

Engine Information

This section is applicable to models equipped with an engine.

- The machine information option is mainly used to query the status and fault information of the engine configured on the machine, so as to determine whether the engine is working normally.
- The configuration of engine is subject to the actual machine configuration.

1. On the SYSTEM INFO interface, press or until Engine Info is displayed, and press to enter ENGINE INFO interface.

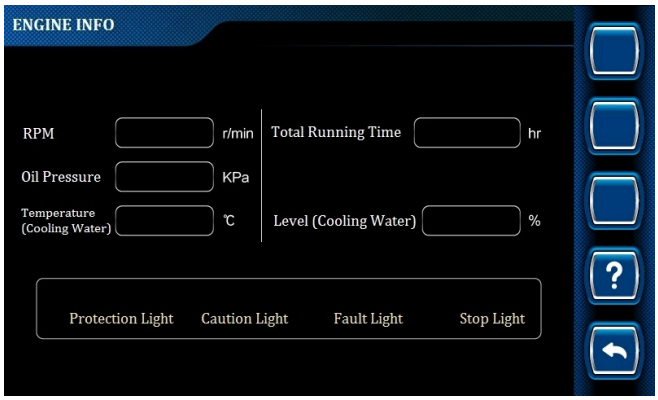

Fig. 29 ENGINE INFO interface

2. On the ENGINE INFO interface, users can query the engine RPM, oil pressure, temperature (cooling water), total running time, level (cooling water), protection light, caution light, fault light and stop light.
3. On the ENGINE INFO interface, press EAT to enter EAT INFO interface.
   1) If the machine does not need EAT, the status indicator will be off.

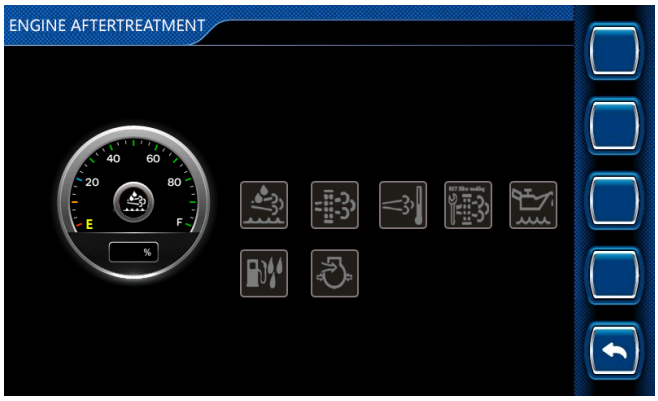

Fig. 30 EAT INFO interface (without requiring EAT)-Equipped with Deutz engine

   2) For machines requiring EAT, if a yellow warning appears on the EAT INFO interface, and the status indicator light flashes, please perform EAT as indicated by the flashing indicator light as soon as possible.

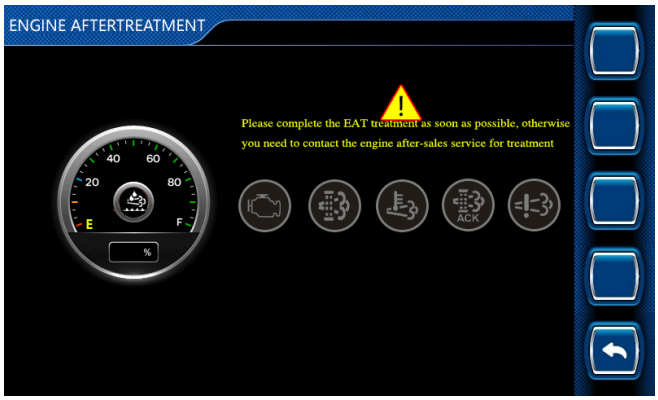

Fig. 31 EAT INFO interface (with EAT not started)-Equipped with Yuchai or Yanmar engine

   3) If EAT is not completed within the specified time, a red warning will appear on the EAT INFO interface, and the status indicator light will be on. At this time, it is necessary to contact the engine manufacturer for EAT.

Fig. 32 EAT INFO interface (with EAT started)-Equipped with Deutz engine

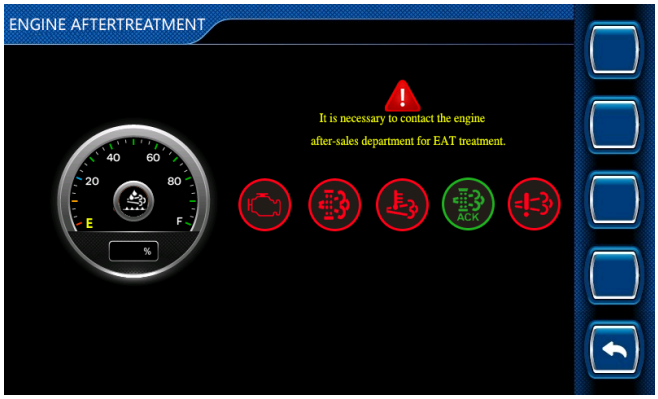

Fig. 33 EAT INFO interface (with EAT started)-Equipped with Yuchai or Yanmar engine

Table 11-3 Description of indicator lights for Deutz engine

No.	Indicator light	Status	Description	Symbol
1	SCR fault warning indicator light	Off	SCR system is working normally	
		Solid on	SCR system is faulted	
2	DEF level indicator light	Off	DEF level is normal	
		Solid on	DEF level is too low	
3	Standstill regeneration indicator light	Off	Standstill regeneration is not performed or requested	
		Solid on	Standstill regeneration is being performed	
		Slow flashing	Standstill regeneration is requested	
		Fast flashing	Standstill regeneration is requested, but since the operator has ignored the request for a long time, the standstill regeneration can only be completed through the DEUTZ diagnostic tool.	
4	Standstill regeneration/high temperature indicator light	Off	Exhaust system temperature is normal	
		Solid on	Exhaust system temperature is abnormal	

Table 11-3 Description of indicator lights for Deutz engine (continued)

5	DPF replacing required due to excessive ash content	Off	Ash content is normal	
		Solid on	Ash content is excessive	
6	Oil replacing required due to cumulative regeneration time being too long	Off	Cumulative regeneration time is within the normal range	
		Solid on	Oil replacing is required due to cumulative regeneration time being too long	

Table 11-4 Description of indicator lights for Yuchai & Yanmar engines

No.	Indicator light	Status	Description	Symbol
1	Engine malfunction indicator light	Off	Engine works normally	
		Solid on	Engine malfunctions	
2	Regeneration request indicator light (Yanmar)	Off	Regeneration is not requested and need not to be performed	
		Solid on	Regeneration is requested, with a reminder that regeneration must be performed	
	DPF regeneration reminder indicator light (Yuchai)	Off	Regeneration is not performed or requested	
		Solid on	The carbon content in DPF is too high, so it is recommended to perform parked regeneration	
		Slow flashing	Since the carbon content in DPF is too high, perform parked regeneration or service regeneration immediately	
		Fast flashing	Since DPF is heavily clogged, perform service regeneration immediately	
3	High exhaust temperature indicator light	Off	Exhaust system is at normal temperature	
		Solid on	Exhaust system temperature exceeds the set limit	
4	Regeneration execution indicator light	Off	Regeneration execution is inactive	
		Solid on	Regeneration function is being executed	
5	NCD indicator light (Yanmar only)	Off	NCD is not working	
		Solid on	NCD is working	
6	Regeneration prohibiting indicator light (Yuchai only)	Off	Conditions prohibiting active regeneration do not exist	
		Solid on	ECU receives the set status of regeneration prohibiting switch, and active regeneration can't be performed	

Note:

- When regeneration request indicator light flashes, a yellow warning will appear on the EAT INFO interface.
- When regeneration request indicator light is solid on, a red warning will appear on the EAT INFO interface.

- When regeneration execution indicator light (green) is solid on, it indicates that regeneration is being performed at this time.

4. On the ENGINE INFO interface, press to enter ENGINE FAULT DIAGNOSES interface.

Fig. 34 ENGINE FAULT DIAGNOSES interface

5. Press to query the detailed description of the main fault codes. For detailed fault descriptions, please refer to the ***Fault Codes Description*** in the Maintenance Manual or the engine maintenance manual provided with the machine.

6. Press successively to return to the main interface, and power off the machine as required.

11.8 TURNTABLE PANEL INFORMATION

- The turntable panel information option is mainly used to query the input status of switches on the turntable control panel, so as to check whether the circuit from the switches to the controller, input signal, etc. are normal, thus assisting in determining the trouble causes.
- The configuration of switches on the turntable panel is subject to the actual machine configuration.

On the main interface, press to enter the TURNTABLE PANEL INFO interface (the icon before the option indicates that the switch has input, and the icon before the option indicates that the switch has no input).

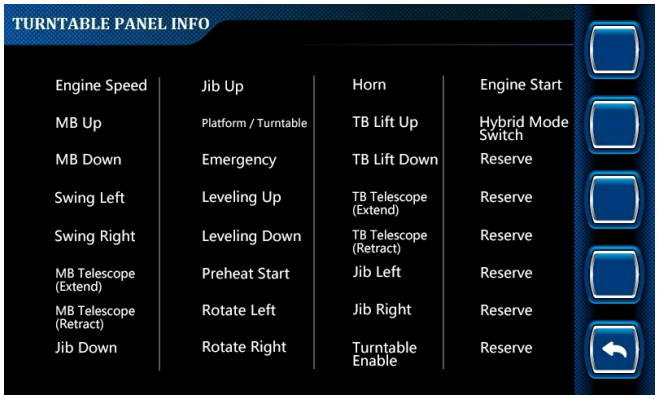

Fig. 35 TURNTABLE PANEL INFO interface

11.9 PLATFORM INFORMATION

- The platform information option is mainly used to query the input and output status of switches on the platform control panel and the status of joystick at the platform controls, so as to check whether the circuit from the switches to the controller, input signal, etc. are normal, thus assisting in determining the trouble causes.
- The configuration of switches and joystick on the platform panel is subject to the actual machine configuration.

1. On the main interface, press to enter the PLATFORM PANEL INFO interface to check the input status of switches on the platform control panel (the icon before the option indicates that the switch has input, and the icon before the option indicates that the switch has no input). Press to check the output status of switches on the platform control panel (the icon before the option indicates that the switch has output, and the icon before the option indicates that the switch has no output).

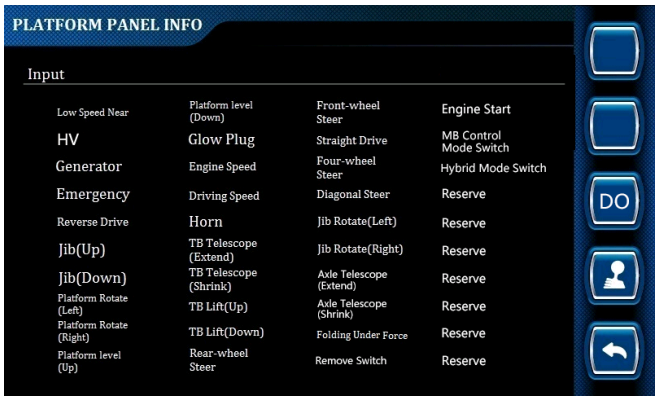

Fig. 36 PLATFORM PANEL INFO interface-input

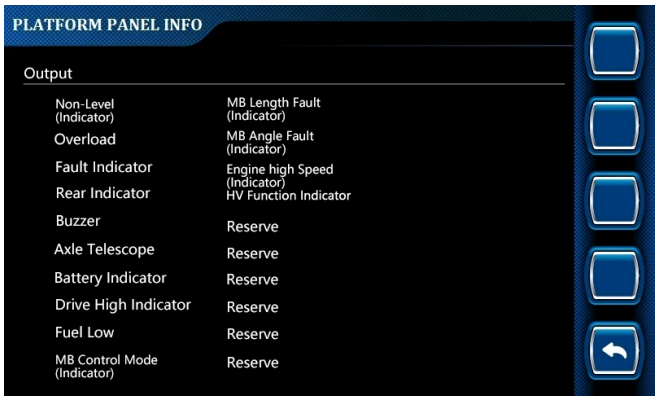

Fig. 37 PLATFORM PANEL INFO interface-output

2. On the PLATFORM PANEL INFO interface, press to enter the JOYSTICK INFO interface to query the actual value of joystick/potentiometer, so as to check whether the position status of joystick/potentiometer is normal.

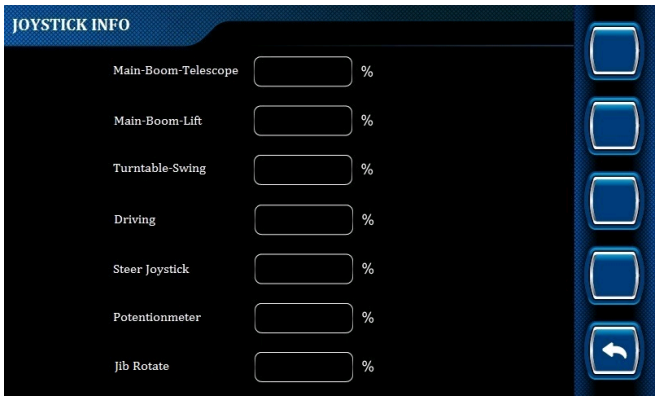

Fig. 38 JOYSTICK INFO interface

3. Press successively to return to the main interface, and power off the machine as required.

11.10 ALARM INFORMATION

The alarm information option is mainly used to query the alarm or fault status of the control system, so as to determine the cause of fault and facilitate troubleshooting.

1. On the main interface, press to enter the ALARM INFO interface. (indicates that the CAN communication is normal, indicates the CAN communication alarm, and indicate other alarms, and indicate no input).

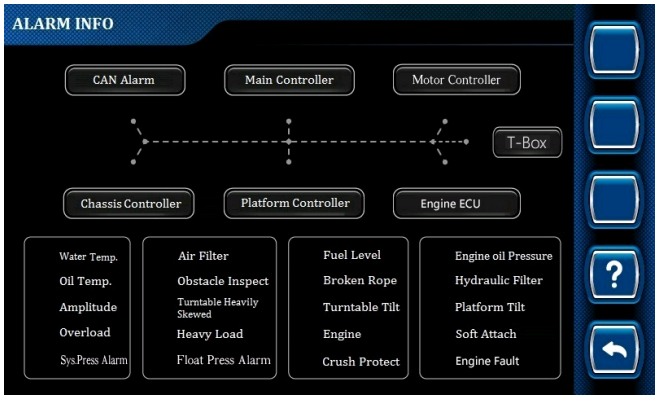

Fig. 39 ALARM INFO interface

2. On the ALARM INFO interface, press to enter FAULT INFO interface.

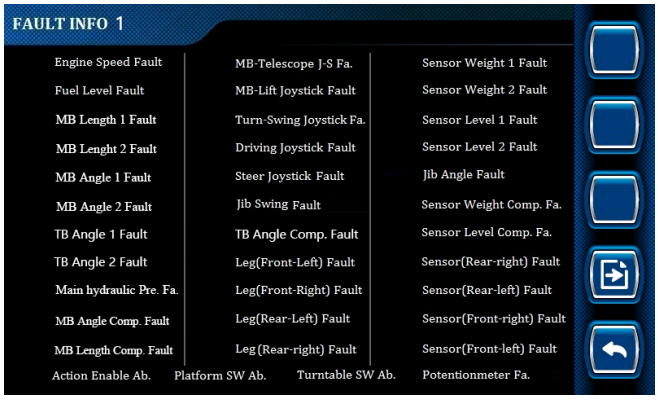

Fig. 40 FAULT INFO interface 1

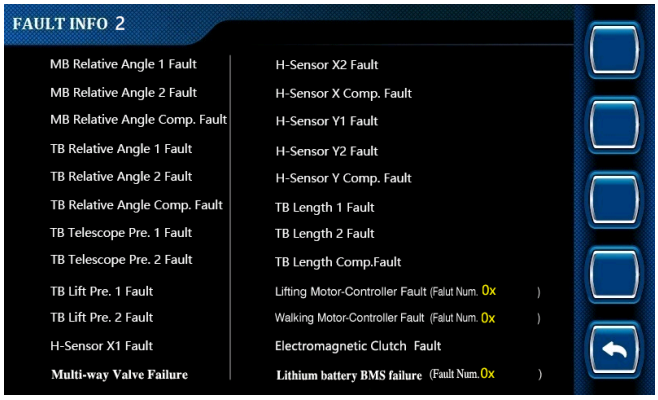

Fig. 41 FAULT INFO interface 2

3. For the detailed description of faults codes of the lifting motor and travel motor controllers, please refer to the ***Motor Controller Fault Codes*** in the Maintenance Manual (if equipped with a motor controller).

4. Lithium battery BMS fault Info: Press to enter Lithium Battery BMS Fault Info interface to check the description of lithium battery BMS fault codes. For the detailed fault description, please see

Lithium Battery BMS Fault Codes section in the Maintenance Manual (if the machine is equipped with any lithium battery).

5. Press  successively to return to the main interface, and power off the machine as required.

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12 APPENDIX

12.1 MAJOR MODIFICATION AND REPAIR RECORD

Major Modification and Repair Record			
Model			
Serial No.			
Date	**Modified/Repaired Item**	**Machine Status after Change**	**Repairman**

Major Modification and Repair Record			

Note:

1. A major modification/repair is a modification/repair made to the entire machine or its parts that affects the stability, strength or performance of the machine.
2. A major modification/repair to the machine should be documented with the form below. Keep the record properly until the machine is taken out of service, or as required by the machine owner/company.
3. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the Inspection and Preventative Maintenance Schedule. After all the inspection and verification results are good, the machine can be put back into service.

12.2 INSPECTION AND PREVENTIVE MAINTENANCE SCHEDULE

Perform inspection and preventive maintenance for the items in the table below at the specified intervals. Maintenance and inspection intervals are calculated based on the months of service or the “accumulated operating hours” displayed on the turntable controls (whichever comes first).

Inspection intervals are based on the use of the machine under normal operating conditions. The intervals should be shortened accordingly when operating in harsh environmental conditions.

Table 12-1 Inspection and Preventive Maintenance Schedule

Item	Interval		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Chassis assembly			
Chassis	2	2	2
Tires	1, 2	1, 2	1, 2
Wheel nuts	1[50]	1[50]	1[50]
Drive motor	1, 6	1, 6	1, 6
Drive reducer	1, 2, 6	1, 2, 6	1, 2, 6, 11
Steering components	1, 2	1, 2	1, 2
Axles/extending axles (if equipped)	1, 2, 3	1, 2, 3	1, 2, 3
Bearings	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Turntable assembly			
Turntable	2	2	2
Slewing bearing or slewing reducer	1[50], 2, 6, 12	1[50], 2, 6, 12	1[50], 2, 6, 8, 12
Slewing reducer (if equipped)	1, 2, 6	1, 2, 6	1, 2, 6, 11
Central rotary joint	6	6	6
Slewing motor	1, 6	1, 6	1, 6
Turntable slewing pin (if equipped)	1, 2, 3	1, 2, 3	1, 2, 3

Table 12-1 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1] or quarterly[2]	Semiannually[3]	Annually[4]
Turntable cover assembly	1, 2, 3	1, 2, 3	1, 2, 3
Hydraulic generator (if equipped)	1, 3, 6, 10[NO.1]	1, 3, 6, 10[NO.1]	1, 3, 6, 10[NO.1]
Boom assembly			
Boom weldment	1, 2	1, 2	1, 2
Hose, wire rope bracket	1, 2	1, 2	1, 2
Pulley and wear pad assembly	1, 2	1, 2	1, 2
Bearings	1, 2, 5, 12	1, 2, 5, 12	1, 2, 5, 12
Cover or protective guard (if equipped)	1, 2	1, 2	1, 2
Drag chain or wire rope system (if equipped)	1, 2, 3, 5	1, 2, 3, 5	1, 2, 3, 5
Pivot pins and retaining rings	1, 2	1, 2	1, 2
Platform assembly			
Guardrails	2	2	2
Access gate	1, 2, 3	1, 2, 3	1, 2, 3
Floor	2	2	2
Swing Cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Safety belt anchorage point	1, 2, 7	1, 2, 7	1, 2, 7
Power system			
Refer to the machine's maintenance manual for inspection and preventive maintenance schedule, and the engine manual provided with the machine for detailed instructions.			
Hydraulic system			
Hydraulic Pump	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic cylinder	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Bleeding the oscillating cylinder (if equipped)	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic valves	1, 2, 5, 6	1, 2, 5, 6	1, 2, 5, 6
Counterbalance valve, check of the locking function (if equipped)	10[NO.1]	10[NO.1]	10[NO.1]
Hydraulic hoses, pipes and fitting	1, 2, 6	1, 2, 6	1, 2, 6
Hydraulic tank, cap and vent	1, 2, 3, 5, 6	1, 2, 3, 5, 6	1, 2, 3, 5, 6
Hydraulic tank suction filter	1, 5, 6	1, 5, 6	1, 5, 6, 11
Hydraulic tank return filter	1, 5, 6, 11[50]	1, 5, 6, 11[50]	1, 5, 6, 11[50]
Hydraulic tank air filter	1, 5, 6	1, 5, 6, 11	1, 5, 6, 11

Table 12-1 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
Hydraulic oil high-pressure filter	1, 5, 6, 11	1, 5, 6, 11	1, 5, 6, 11
Hydraulic oil	5, 6	5, 6	5, 6, 11
Electrical system			
Electrical wiring, connector	1, 2	1, 2	1, 2
Battery	1, 2, 6, 9, 12	1, 2, 6, 9, 12	1, 2, 6, 9, 12
Electrolyte	6	6	6
Charging function	3	3	3
Instruments, gauges, switches, lamps, horn	1, 3	1, 3	1, 3
Functions and controls			
Platform Controls	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Turntable controls	1, 3, 4, 7, 10	1, 3, 4, 7, 10	1, 3, 4, 7, 10
Function control lock, secondary guarding device and brake	1, 3, 10	1, 3, 10	1, 3, 10
Foot switch	1, 3, 10	1, 3, 10	1, 3, 10
Emergency stop button (ground and platform)	1, 3, 10	1, 3, 10	1, 3, 10
Limit switches and power switch	1, 3, 10	1, 3, 10	1, 3, 10
Pothole protection device (if equipped)	1, 3, 10	1, 3, 10	1, 3, 10
Overload limit system	1, 3, 10	1, 3, 10	1, 3, 10
Tilt alarm	1, 3, 10	1, 3, 10	1, 3, 10
Drive brake	1, 3, 10	1, 3, 10	1, 3, 10
Slewing brake	1, 3, 10	1, 3, 10	1, 3, 10
Other inspection items			
Operation Manual in the manuals compartment	10	10	10
All decals/labels complete, clear and secure	10	10	10
Annual inspection date of the machine	/	/	10
No unapproved changes or additions	10	10	10
All safety publications taken into account	10	10	10
General structural components and weldments	2	2	2

Table 12-1 Inspection and Preventive Maintenance Schedule (continued)

Item	Interval		
	Before each delivery[1]or quarterly[2]	Semiannually[3]	Annually[4]
All fasteners, pins, protective guards and covers	1, 2	1, 2	1, 2
Greasing and lubricating according to specifications	10	10	10
Functional test of all systems	10	10	10
Paint and appearance	5	5	5
Inspection date stamped on the chassis	/	/	10
Notify Sinoboom of machine ownership (change)	/	/	10

Note:

[1] Before each sale, lease or shipment delivery;

[2] In service for 3 months or 250 hours; or out of service for more than 3 months;

[3] In service for 6 months or 500 hours;

[4] Once a year and no later than 13 months from the date of the previous annual machine inspection;

[50] The first inspection shall be performed once the machine reaches 50 hours in service for the first time. This occurs only once in the service life of the machine.

[250] The first inspection shall be performed once the machine reaches 250 hours in service for the first time. This occurs only once in the service life of the machine.

[NO. 1] Before the machine is put into service for the first time, or before the first use after the oscillating cylinder or counterbalance valve has been replaced.

Performance code:

1. Check for correct installation (accurate position, firmly installed, tightened to the specified torque)
2. Visual inspection for damage (cracks, cracked welds, deformation, wear, corrosion, excessive wear, gouges, abrasions and exposed threads)
3. Check for normal function
4. Return to neutral position or “off” position normally (the self-reset switch can return to neutral position or “off” position after released)
5. Clean and free of foreign objects
6. Check for correct level, sealing and leaks
7. Labels complete, clear and secure
8. Check for appropriate tolerances
9. Fully charged
10. Verify/perform
11. Replace the oil or filter element
12. Correctly lubricated

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