Maintenance Manual

SR1018D/SR1218D/SR1323D/ SR1623D

Mobile Elevating work platform

⚠ Warning

Before operation and maintenance, the drivers and service personnel shall always read and thoroughly understand all information in this manual. Failure to do so may result in, fatal accidents or personal injury.

This manual must be kept with this machine at all times.

LINGONG GROUP JINAN HEAVY MACHINERY CO., LTD.

Mobile Elevating Work platform Maintenance Manual

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Thanks for choosing elevating work platforms manufactured by Lingong Group Jinan Heavy Machinery Co., Ltd. This machine is designed according to AS/NZS1418.10:2011+A1:2017. This manual describes the mechanism, driving and operation, maintenance and adjustment, technical parameters and repair/adjustment data of the elevating work platforms.

Maximizing the profits from your elevating work platform is our common goal, which is largely dependent on your familiarity with the platform and careful and thorough maintenance. We sincerely hope that you can read through the manual prior to the first start, operation as well as repair and maintenance of the platform and get full understanding of the operations and maintenances described herein.

All the pictures and descriptions covered herein are correct at time of publication; but the structures and performances of our products are constantly improved and perfected; therefore, please understand that the related design, operation and maintenance instructions are subject to change at any time without prior notice. For the latest information on the elevating work platform or in case of any doubt about this manual, please consult LGMG.

This manual is applicable for elevating work platforms. Users shall be in strict accordance with the time interval in the maintenance schedule to perform maintenance to the platform.

This manual shall always be placed at the specified position so that the driver can read it at any time. This manual is a part of the elevating work platform and thus shall be handed over together when transferring the ownership or the right to use of the platform. If this manual is lost, damaged or hard to be recognized, please replace it in time!

⚠ Warning

- **Only the specially trained staff with corresponding qualifications is allowed to operate, repair and maintain the platform.**
- **Incorrect operation, maintenance and repair are dangerous, and may lead to personal injury.**
- **Before operation or maintenance, the operator shall carefully read this manual. Do not operate, maintain, and repair this platform without reading and understanding this manual.**
- **Loading shall be done in strict accordance with the rated loading capacity, and any consequence due to overloading or unauthorized modification shall be the responsibility of the users.**
- **The operation procedures and precautions referred to herein are only applicable to the stipulated operation of the machine. For any operation out of the specification but not prohibited, always make sure that this operation will not hurt you or other people.**

Safety Attentions

Operators shall understand and follow prevailing national and local safety regulations. In case of no relevant national or local regulation, safety attentions in this manual will be applicable.

Most accidents are caused by failure of following regulations on machine operation and maintenance. To avoid accident, please read, understand and follow all warning requirements and notes in this manual and on the machine before operation and maintenance.

Since it is unable to predict all possible dangers, therefore, safety explanation in the manual and on the machine may not include all safety precautions. If the procedures and operation which are not recommended in this manual are used, it must ensure people's safety and have no damage on machines. If the user cannot confirm the safety of some operations, please ask the Company or the dealer.

The prevention measures on operation and maintenance given in this manual are only applicable to use of the machine as per the regulations. If the machine is used in the scope which is not listed in this manual, the Company will not undertake any safety liability. The safety liabilities of this operation are undertaken by users and operators.

The operation forbidden in this manual cannot be performed in any condition.

The following markers are used for identifying the safety information in this manual:

Danger:

Due to failure to avoid it, the sequence of the danger will cause serious injuries or death. This word also indicates that failure to avoid it may cause serious damages to the machine.

Warning:

Due to failure to avoid it, the sequence of potential danger may cause serious injuries or death. This word also indicates that failure to avoid it may cause serious damages to the machine.

Notice:

Failure to avoid it may cause light or medium injuries. This word also indicates that failure to avoid it may cause damages to the machine or shortening of the service life of the machine.

Chapter 1 Maintenance

1.1 Compliance and obedience

1) The operator is only allowed to perform routine maintenance items as specified in this manual.
2) Carry out periodic maintenance and check by trained maintenance technicians as required by the manufacturer.

Maintenance Symbols

The following symbols are used in this manual to help convey relevant meanings in the instructions. When one or more symbols are shown at the first part of the maintenance program, the meanings expressed are as follows.

It indicates a tool required to carry out this procedure.

It indicates a new part required to carry out this procedure.

It indicates that the engine must be in a cooling state before carrying out this procedure.

1.2 Check for safety manual

It is required to keep the operator in a good state and the safety manual in proper condition for safe operation. The manual shall be stored in a container in the working platform provided by each machine. An unrecognized or lost manual shall be unable to provide necessary safety and operation information for safe operation.

1) Confirm that the storage container is on site and in a good condition.
2) Confirm both the responsibility manual and safety manual are in the storage container within the work platform by the operator.
3) Check each page of the manual to be legible and in a good condition.
4) Put the manual into the file storage box after use.

⚠ If the manual needs to be replaced, please contact the service staff of LGMG.

1.3 Check for labels and signs

It is required to keep all safety and description labels and signs in a good condition for safe operation of the platform. Labels warn operators and staff of many possible hazards in using the platform. They also provide users with operation and maintenance information. Illegible labels cannot warn staff of steps or hazards and may lead to unsafe operating conditions.

Refer to the label section in this operation manual and use the label menu and instructions to check that all labels are in place.

Check the clarity and damage of all the labels and immediately replace any damaged or illegible label.

⚠ If the labels need to be replaced, please contact the service staff of LGMG.

1.4 Check for damaged, loose or missing parts

This step is performed every 8 hours or every day. whichever comes first.

Carrying out daily equipment status check is necessary for ensuring safe equipment operation and maintaining good equipment performance. Incorrect positioning, repairing damaged equipment, and loose or missing parts may result in unsafe operating conditions.

1) Check for damaged parts for the whole platform, and check for incorrect installation or missing parts and components, including:

- Electrical components, wirings and cables
- Hydraulic hoses, connectors, valve blocks

and hydraulic cylinders

- Fuel and hydraulic tanks
- Wear-resistant pads
- Tires and wheels
- Engine and related components
- Limit switch and horn
- Nuts, bolts and other fasteners
- Platform extension components
- Platform entrance door
- Indicators and alarms
- Safety arm
- Scissors arms pin and fastener
- Platform control handle
- Outrigger cover and foot pad

2) Check the entire machine for:

- Cracks in welds or structural components
- Whether the platform, fork frame and chassis are deformed or have cracked weld joints.
- Indentation or damage to the machine
- Ensure that all structural components and other key components are complete and all relevant fasteners and pins are in the correct position and tightened.
- Ensure that the guardrail has been installed, and guardrail bolts have been properly installed and tightened.

⚠ Notice: If the platform must be raised to check the machine, ensure that the safety arm is in the correct position. See the "Operation Instructions" section.

1.5 Check for PCU and GCU

This step is performed every 8 hours or every day, whichever comes first.

The functions of the test equipment and the red emergency shutdown switch are required for safe operation of the platform. If there is an unsafe working condition or any normal operation failure, the red emergency shutdown switch will disable all functions and shut down the engine. Each function shall be enabled for smooth operation without any pause, jitter or abnormal noise.

1) Pull out the red emergency shutdown switches on the GCU and PCU.
2) Turn the key switch to GCU. Start the engine.
3) It is strictly forbidden to press the lift enabling switch and try to turn on each function switch.

Result: Operation of all functions shall be forbidden.

4) Press and hold the lift enabling switch to turn on each function switch.

Result: All functions shall be performed for a full cycle. The buzzer shall sound when the platform falls down.

5) Push the red emergency shutdown switch button on the GCU to the "Off" position.

Result: The engine shall be shut down and all functions shall be disabled.

6) Turn the key switch to the operation platform control unit, and pull out the red emergency shutdown switch to the "On" position on the GCU.
7) Start the engine through the work platform.
8) It is strictly forbidden to press the function enabling switch and try to perform all platform functions.

Result: Operation of all platform functions shall be forbidden.

9) Press and hold the function enabling switch. Try to perform all platform functions.

Result: All platform functions shall be performed for a full cycle.

10) Push the red emergency shutdown switch button on the PCU to the "Off" position.

Result: The engine shall be shut down and all functions shall be disabled.

1.6 Check for wires

This check item shall be conducted every 8 hours or once a day, whichever comes first.

1) Keeping wires in a good condition is critical for safe operation and good performance of the platform. Failure to find and replace wires burned, scratched, corroded or bent will result in unsafe operating conditions or even cause damage to platform parts.

Electric Shock/Explosion Hazards

⚠ Danger: Thermal contact or live

conductors may lead to serious casualty accidents. Do not wear rings, watches or other jewelry.

1) Check if the ground wires under the chassis are missing or damaged.
2) Check the following areas for wires burned, scratched, corroded, bent or loosened:

- Interior of GCU box
- Hydraulic valve group wires
- Battery wires
- Interior of PCU box

3) Turn the key switch to the PCU and pull out the red emergency shutdown switches on the GCU and PCU.
4) Raise the platform to a height which is about 4 m away from the ground.
5) Lift the safety arm and move it to the middle of scissors axle sleeve, revolve it upward until it is vertical.
6) Lower the platform height until the safety arm contacts the axle sleeve completely.

Smashing and Pressing Hazards

⚠ Warning: When the platform is lowered, make sure the operator's hand is in the correct position of the safety arm.

1) Check the chassis and scissors area for wires burned, scratched, corroded, bent or loosened:
2) Check the following areas for wires burned, scratched, corroded, bent or loosened:

- Scissors arm wire
- ECU to platform
- Harness connectors connected to the platform

3) Check the free coating of insulating oil in the following locations:

- Harness connectors connecting the ECU with PCU
- All harness connectors connecting level sensors

4) Ascend the platform and restore the safety arm to the installation position.
5) Shut down the machine after descending the platform to the folding position.

1.7 Check for batteries

A sound battery condition is critical to good engine performance and safe operation. Improper electrolyte levels or damaged cables or wires may cause damage to engine components and bring hazardous conditions.

Keep away from fireworks and remove all rings, watches and other accessories. Wear goggles, protective gloves and protective clothing if necessary. Avoid touching the spilled electrolyte with hands or other parts of the body. Neutralize with baking soda and the spilled electrolyte.

Maintenance-free lead-acid battery inspection:

- Check that the battery locking lever is secure
- Check the wiring of the battery cable. The wiring is firm and free from corrosion.
- Check whether the battery fluid leaks and whether the battery is dry and clean.

Check the status of the electric eye every three months (maintenance free lead-acid battery).

Check the color of the battery hydrometer as shown in the figure:

Battery hydrometer

Hydrometer color	Meaning and treatment
White	Lack of battery fluid. Please shut down the machine and stop using it
Black	Power loss or damage
Green	Measure the voltage of each battery. If the voltage is lower than 11V, it indicates that the battery is damaged; The voltage is between 12.4v-12.7, indicating that the battery is in good

	condition

- If the color of the battery hydrometer is green and the voltage is above 12V, but the starter cannot be driven, please ask the personnel trained and qualified for the maintenance of the machine to further test the battery.

Battery recharge:

- Before charging, disconnect the negative connection of the battery first, and then the positive connection of the battery.
- Before replenishing electricity, clean the end column and remove the oxide scale on the surface.

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

- Do not replenish the battery with white eyes. Replace the battery.
- When wiring after charging, connect the positive wire first and then the negative wire.

Notice: Adding a terminal protector and an anti-corrosion sealant will help remove corrosion caused to battery terminals and cables.

1.8 Check for tires and hubs

This check item is conducted every 200 hours or two month, whichever comes first.

Keeping tires and hubs in a good condition is critical for safe operation and good performance. Failure of the tires and hubs may cause the platform to tilt. If such failure is not found and repaired in time, it will also cause damage to platform parts.

1) Check treads and sides of tires for scratches, cracks, punctures, and other abnormal wear.

2) Check if the hubs are damaged, bent or cracked.

3) Check whether or not the technological screws for tires are detached. Upon the detaching of screws, if there is slight or no leakage of fillers, and no significant deformation is found for the tire body, and users can knock in screws which are slightly larger than the diameter (about 5mm) of the vent hole with a hammer. If leakage of a large quantity of fillers is found, and the tire body deforms significantly, it is necessary to reduce the height of the working platform and replace the tires timely.

4) Check for nut torque of tires：305±25N.m

1.9 Check for exhaust cover of hydraulic oil tank

1) This check item shall be conducted every 250 hours or quarterly, whichever comes first.

2) An unobstructed hydraulic oil tank cap is essential for good mechanical performance and long service life of the platform. A dirty or clogged exhaust cover may result in poor platform performance. Given harsh working environment, more frequent check is required.

① Remove the exhaust cover from the hydraulic oil tank cap.

② Check for ventilation.

Result: Air can pass through the exhaust cover.

Result: If air does not pass through the exhaust cover, clean or replace the exhaust cover. Continue with Step 3.

Notice: Air is supposed to pass freely while checking ventilation of the oil tank cap.

③ Carefully clean the tank exhaust cover with mild solvent and dry it with low pressure compressed air. Repeat Step 2.

3) Install the exhaust cover of the hydraulic oil tank.

1.10 Check for hydraulic oil leakage

Check leakage every 8 hours or once a day.

⚠ Danger of personal injury.

Sputtered hydraulic oil may penetrate and burn the skin.

Check for residues of hydraulic oil, oil droplets or oil in the following areas:

- All hydraulic cylinders.
- Each valve element
- Each oil pipe and connector
- Walking motor
- Reducer
- Filter
- Hydraulic oil tank
- Hydraulic pump
- Under the chassis
- Shaft
- Ground area under the platform.

1.11 Check for the Hydraulic Filter

Check or replace it every 500 hours or half a year.

⚠ If the work environment is dusty,

increase the number of times that perform this step.

It is necessary to replace the hydraulic filter to maintain good machine performance and service life. Dirty or blocked filters may cause a decrease in machine performance and continuous use may result in damage to components. An increase in the number of replacement filters is required for the extremely dirty working condition.

⚠ Danger of personal injury.

Be careful with hot oil, and contact with them will lead to severe burn.

⚠ Perform this step when the engine is turned off.

Replacement of the Return Oil Filter Element of Hydraulic Oil Tank

1) This step shall be performed every 500 hours or half a year, whichever comes first.
2) It is crucial to replace the return oil filter element for the good performance and service life of the machine. Dirty or blocked filters may affect machine performance and continuous use shall result in damage to components. The filter elements should be replaced more frequently under the poor working condition.

Be careful: danger of scald

Watch out for hot oil. Contact with hot oil may cause severe burn.

① Open the cover above the oil tank.

② Remove the filter element flange above the oil tank.

③ Put the filter element out and replace the new filter element.

④ Install flange and cover plate.

⑤ Note down the replacement time and date on the filter element replacement table using a marker.

⑥ Turn the key switch to the GCU, and pull out the red emergency shutdown button on the GCU and PCU.

⑦ Press the lifting function button.

⑧ Check the filter components for oil leakage.

Replacement of High-Pressure Filter Element

1) Place an appropriate container under the filter.
2) Remove the nuts at the bottom of the filter cover with a wrench and remove the filter

cover.

3) Remove the filter element from the filter cover.

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

5) Install the new high-pressure filter element and tighten it.

6) Scrub out any oil droplet that is splashed out during installation.

7) Check the filter cover and the associated elements to ensure no leakage.

1.12 Replacement of the air filter of the hydraulic oil tank

Replace it every 500 hours or half a year, and increase the number of times that perform this step if the work environment is too dusty.

Perform this step when the engine is turned off.

1) Remove the filter element.

2) Scrub out the inside and tail cover of the tank with a piece of damp cloth.

3) Install a new air filter element.

1.13 Check hydraulic oil level

Check it every 8 hours or every day.

It is crucial for the machine to keep the hydraulic oil at a suitable oil level. The hydraulic oil at an inappropriate level will damage the hydraulic components. Through routine inspection, the inspector can determine the change of hydraulic oil level, which can indicate the problems of hydraulic system.

Notice: Perform this procedure when the platform is in a folding state and the engine is closed.

1) Park the vehicle on a flat ground. The platform is in a folding state.

2) Check the oil pointer on the hydraulic oil tank. When the fork frame is in the folding state, the hydraulic oil level should be locked in the 1/2 - 2/3 of the liquid level meter (Short oil level gauge) or “LH” position of the liquid level meter (long oil level gauge), and fill the hydraulic oil if necessary.

Condition	Oil viscosity brand
-25℃＜The lowest temperature	L-HV 32 low temperature hydraulic oil
-40℃＜The lowest temperature≤-25℃	L-HS 32 Ultralow temperature hydraulic oil
The lowest temperature≤-40℃	10# Aviation hydraulic oil

1.14 Inspect or replacement of hydraulic oil

Replace the hydraulic oil every 2000 hours or two years, whichever comes first.

If the hydraulic oil is not replaced during the two-year inspection, check the hydraulic oil quarterly. Replace it when the test is not qualified.

Perform this step when the arm lever is in the folding state.

When removing the hose assembly or couplers, the O-rings or hose ends on the coupler must be replaced and tightened to the specified torque during installation.

Close two ball valves located on the hydraulic oil tank (if the ball valve has been equipped).

Hazard of damage to components.

The engine cannot be started when the ball valve of the hydraulic oil tank is closed, otherwise the components will be damaged. If the ball valve is closed, remove the key from the key switch and hang a warning sign on the equipment.

1) Remove oil drain plug, ring magnet, and oil drain flange from the hydraulic oil tank.

2) Drain the hydraulic oil from the hydraulic oil

tank completely into a suitable container.

3) Disconnect the hose connected to the oil tank and protect the hose coupler to prevent foreign matter from entering.

4) Remove the fixed fasteners from hydraulic oil tank.

5) Remove the hydraulic oil tank from the equipment.

6) Remove the adsorption filter screen from the hydraulic oil tank and clean it with a mild volume.

7) Flush the inside of hydraulic oil tank with mild solvent.

8) Clean the foreign matters adsorbed by ring magnets.

9) Install adsorption filter screen.

10) Install oil drain plug. Ring magnet and oil drain flange.

11) Install the hydraulic oil tank on the equipment.

12) Install hose.

13) Fill the hydraulic oil to the hydraulic oil tank until the liquid level is locked in the 1/2 - 2/3 of the liquid level meter (Short oil level gauge) or “LH” position of the liquid level meter (long oil level gauge), and it is forbidden to overflow.

14) Scrub off the hydraulic oil that may be sprayed out.

15) Open the ball valve on the hydraulic oil tank.

! Danger of damage to components,

after installing the hydraulic oil tank, make sure to open two ball valves of the hydraulic oil tank and fill the pump with oil.

16) Check the functions of all machines through an entire cycle and check for oil leakage.

17) Recheck the tank level after a cycle and refuel to the specified position.

1.15 Check for the oil level in the reducer

Check this step every 250 hours or a quarter.

The incorrect oil level in the reducer shall lead to the reduction of equipment performance and continuous use will result in damage to components.

1) Drive the equipment rotating until a plug is at the highest point, and the other is about 90 degrees from this one.

2) Remove the plug at 90 degrees and check the oil level.

Result: The oil level shall be the same as the bottom of the side plug hole.

3) When required, remove the upper plug and refill oil until the oil level is the same as the bottom of the side plug hole.

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

5) Repeat this step for each reducer.

Condition	Oil viscosity brand
30° C＜The lowest temperature	85W/140
-10° C＜The lowest temperature＜30° C	85W/90
-30° C＜The lowest temperature＜-10° C	80W/90
The lowest temperature＜-30° C	75W

1.16 Replacement of the gear oil of reducer

It is available in the first 50 hours, and it will be replaced every 1000 hours or a year.

It is necessary to replace the gear oil of reducer to maintain good equipment performance and service life. Failure to replace the reducer oil every year may result in reduced equipment performance, and continuous use may result in damage to components.

1) Select the reducer to be maintained, and drive the equipment until one plug is at the lowest point.

2) Remove the two plugs and drain the oil (note to be drained) into the proper container.

3) Drive the equipment rotating until a plug is at the highest point, and the other is 90 degrees from this one.

4) Refill oil from the hole of reducer at the high point until the liquid level is the same as the side hole at the bottom. Install a plug.

5) Repeat this procedure for each reducer to refuel.

1.17 Engine maintenance – Deutz

1.17.1 Check for engine oil level

Do not operate on running engines!

No smoking and open fires!

Be careful when contacting with high temperature engine oil. Danger of scalding!

When operating on the oil system, pay attention to the surface cleaning. Carefully clean all areas involved. Blow wet parts with compressed air.

Please observe the safety regulations for engine oil and relevant local regulations. Dispose of spilled engine oil and filter elements as required. Waste oil cannot penetrate into the ground.

Test run shall be carried out after each operation. At the same time, pay attention to the sealing and lubricating oil pressure, and then check the engine oil level.

Check the engine oil level every 8 hours or every day.

Insufficient or excessive engine oil may cause damage to the engine. The engine oil level can only be checked when the engine is placed horizontally and closed. If the engine is hot, close the engine and check the engine oil level 5 minutes later. Check it immediately if the engine is cooled.

1) Insert the oil measuring rod and clean it with a piece of clean and fiber-free cloth.
2) Insert the oil measuring rod into the bottom.
3) Pull out the oil measuring rod and read the value of engine oil level.
4) The engine oil level shall always be between MIN and MAX!
5) Fill up to the maximum liquid level if necessary.

1.17.2 Replacement of engine oil and filter

Do not operate on running engines!

No smoking and open fires!

Be careful when contacting with high temperature engine oil. Danger of scalding!

When operating on the oil system, pay attention to the surface cleaning. Carefully clean all areas involved.

Blow wet parts with compressed air.

Please observe the safety regulations for engine oil and relevant local regulations. Dispose of spilled engine oil and filter elements as required. Waste oil cannot penetrate into the ground.

Test run shall be carried out after each operation. At the same time, pay attention to the sealing and lubrication oil pressure, and then check the engine oil level.

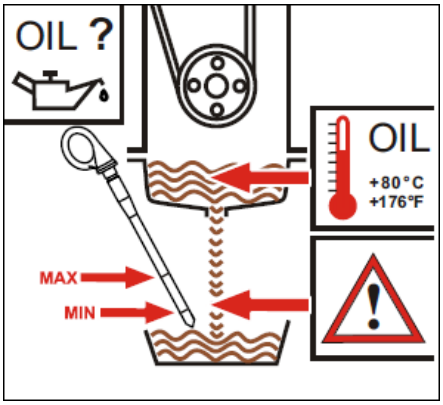
It is available in the first 50 hours, and the engine oil and filter shall be replaced every 500 hours or half a year. (If the ambient temperature continues to be below -10℃. (14 ˚F) or the temperature of engine oil is below 60℃ (84 ˚F), or the sulphur content in the diesel fuel is 0.5 - 1%, the oil change period is reduced by a half; if the engine oil does not reach the replacement

interval period within a year, the oil shall be replaced at least once a year.)

⚠ Danger of burn, be careful of high-temperature engine parts and oil, contacting with high temperature engine oil and/or engine parts will cause severe burns.

⚠ Perform the function after engine warm up to normal operation temperature.

Replacement of engine oil

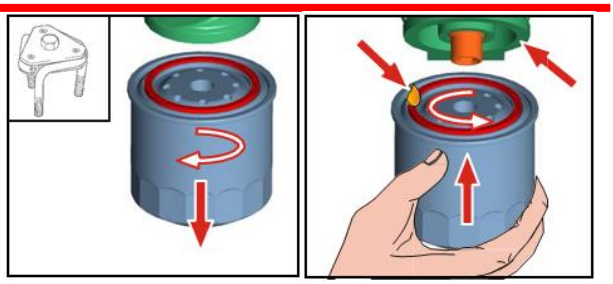


1) Warm up and run the engine .
2) Place the engine horizontally.
3) Shut down the engine.
4) Place the container under the engine oil drain plug.
5) Screw off the engine oil drain plug to drain the old engine oil.
6) Install the new seal ring for the engine oil drain plug and screw in and tighten it.
7) Add engine oil at the engine oil filler.
8) Warm up and run the engine.
9) Place the engine horizontally.
10) Check the engine oil level and fill it if necessary.

Replacement of the engine oil filter

The engine oil filter element must also be replaced every time the engine oil is replaced.

⚠ Never fill the filter in advance. There is risk of contamination.



1) If a torsion stopper is installed, remove the clamping clamp (optional).
2) Release and unscrew the filter element with a wrench.
3) Contain the oil that was drained.
4) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
5) Apply a thin layer of engine oil to the seal ring of the new filter.
6) Screw in a new filter manually until seal fit and tighten it with 10-12 Nm.

   Tighten the torque.
7) Fix the clamping clamp of a torsion stopper (optional).

1.17.3 Check for fuel leakage

⚠ The engine must be shut down!

No smoking and open fires!

Be careful when contacting high temperature fuel!

Please observe the safety regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

Visually check for fuel leakage every 8 hours or every day.

⚠ There is danger of explosion and fire. The fuel of the engine is combustible. Check the position of the machine. When this step is performed, the machine shall be away from the heater, spark, flame, and open and well-ventilated areas with burning tobacco. A qualified fire extinguisher

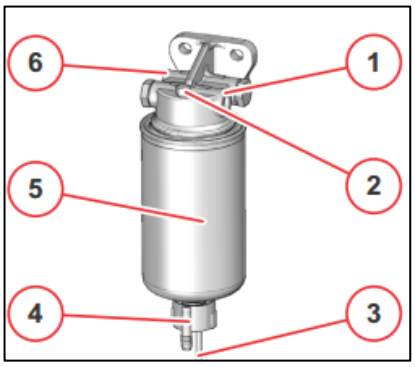
shall be placed in an easily accessible place.

⚠ There is danger of explosion and fire. If fuel leaks, prevent any additional person from entering the area or operating the equipment. Repair the leakage immediately.

1.7.4 Vent Fuel Pre-Filter

⚠ Risk of explosion and fire. Engine fuel is combustible. The position where the equipment is located shall be inspected. When the step is executed, equipment shall be located in an open and well-ventilated area that keeps away from the heater, spark, flame and burning tobacco. A qualified fire extinguisher shall be placed at the location that is easily accessible.

⚠ Perform the step when the engine flames out.



1. Fuel supply flow to the pump
2. Venting screw
3 .Electrical connection for water level sensor
4. Drain plug
5. Filter insert
6. Fuel inlet from the fuel tank

Check and drain the fuel filter every 8 hours or every day.

1) Shut down the engine, and find the fuel filter.
2) Disconnect cable connection.
3) Loosen the drainage plug located at the bottom of the filter cartridge, allowing the water drained to an appropriate container. Once any fuel starts to flow out, screw down the drainage plug immediately.
4) Wipe up any fuel that may be splashed.
5) Start the engine from the ground control and inspect whether or not there is leakage in the fuel filter.

Change the fuel pre-filter insert

1) Switch off the engine.
2) Shut off the fuel supply to the engine (with high-level tank).
3) Place suitable collecting containers underneath.
4) Disconnect cable connections.
5) Loosen drain plug and drain liquid.
6) Disassemble filter insert.
7) Clean any dirt of the opposite side of filter head.
8) Wet the sealing surfaces of the filter cartridge slightly with fuel and screw back on to the filter head, clockwise (17-18 Nm).
9) Mount drain plug.
10) Open the fuel shutoff tap and vent the system, see venting the fuel system.

Vent the fuel system

The fuel system is vented via the electric fuel supply pump.

In order to ensure that no error messages are generated, no attempt should be made to start the system up whilst venting.

This process is carried out as follows:

● Ignition "ON"

The electronic fuel supply pump switches on for

20 seconds in order to vent the fuel system and build up the required fuel pressure.

Wait until the electric fuel supply pump is disconnected from the control unit.

● Ignition "OFF"

Repeat the process at least 2 times until the fuel system is vented

⚠ Risk of explosion and fire. Where there is fuel leakage, prevent any irrelevant personnel from entering the area and strictly prohibit operating the equipment. Repair the leak immediately.

1.17.5 Replacement of the fuel filter element

⚠ The engine must be shut down!

No smoking and open fires!

Be careful when contacting high temperature fuel!

⚠ Do not release the injection pipeline or the high-pressure oil pipeline when the engine is running.

⚠ Carefully clean all areas involved in cleaning. Blow wet parts with compressed air.

⚠ Please observe the safety regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

⚠ After completing the operation on the fuel system, exhaust the system, perform the trial operation and check the seal performance.

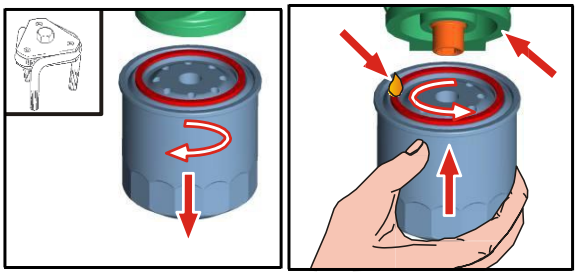
It is available in the first 50 hours, and it will be replaced every 500 hours, or a quarter, but an increase in the number of replacement filters is required for the extremely dirty work environment.

⚠ There is danger of explosion and fire. The fuel of the engine is combustible. Check the position of the machine execution.

When this step is performed, the machine shall be away from the heater, spark, flame, and open and well-ventilated areas with burning tobacco.

A qualified fire extinguisher shall be placed in an easily accessible place.

⚠ Never fill the filter in advance. There is risk of contamination.



1) If a torsion stopper is installed, remove the clamping clamp (optional).
2) Release and unscrew the filter element with a wrench.
3) Contain the diesel fuel drained.
4) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
5) Apply a thin layer of diesel to the seal ring of the new filter.
6) Screw in a new filter manually until seal fit and tighten it with 10-12 Nm.
7) Tighten the torque.
8) Fix the clamping clamp of a torsion stopper (optional).
9) Exhaust the fuel system.

1.17.6 Check for engine air filter

Check the maintenance indicator (If equipped) for the air filter every 8 hours or every day.

Check the maintenance indicator for the air filter

⚠ Perform this step when the engine is turned off.

Check the maintenance indicator (If equipped) of the air filter. When the transparency of the indicator (1) turns red, filter element needs to be maintained and cleaned or replaced.

1.17.7 Cleaning or replacement of air filter

Clean it every 250 hours or quarterly and replaced it for every 1000 hours.

⚠ Do not operate on running engines!

⚠ Be sure to pay attention to the cleanliness of the external surface when operating on the engine suction system, and close the suction inlet when necessary. The old filter elements are handled in an environmentally friendly manner.

Cleaning of air filter

⚠ Do not clean the filter element (4) with gasoline or high temperature liquid.

If the primary element is stained heavily, replace it soon. At this time, replace the secondary element too.

The secondary element should be removed only if it is to be replaced.

To protect the engine, do not remove the secondary element in servicing the primary element.

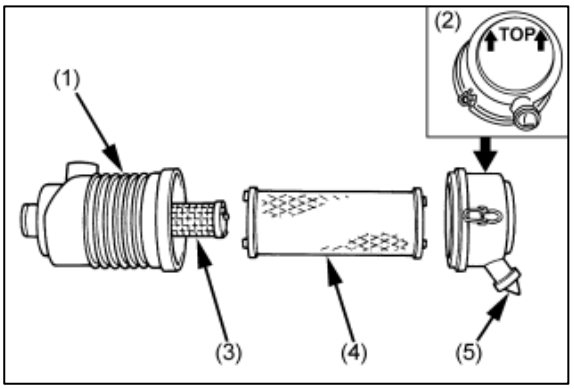


Figure 1-12

1. Air cleaner body
2. Dust cup
3. Secondary element（If equipped）
4. Primary element
5. Evacuator valve

Make sure the hooking clip for the element is tight enough. If it is loose, dust and dirt may be sucked in wearing down the cylinder liner and piston ring earlier and thereby resulting in poor power output.

Do not overservice the air cleaner element. Overservicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.

1) Open the hooking clip.
2) Remove the filter cover (2) and screw off the filter element (4).
3) Filter element (4): For slight contamination, purge with dry compressed air (maximum 205 Kpa) from inside to outside for cleaning (general cleaning times are no more than 5 times);

Replace it in case of serious contamination.

Replacement of the Safety Filter Tube of the Air Filter

⚠ Never clean the safety filter tube (3).

1) Screw off the Primary element (4) and the Secondary element (3).
2) Install the new Secondary element.

Install the filter element (4), place the outer cover (2) and fix it with the hooking clip.

1.17.8 Check for coolant liquid level

Check the coolant liquid level every 8 hours or every day.

⚠ The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Never run the engine without coolant, even if it's a very short time.

1) Carefully open the cover for the cooling system.
2) The coolant liquid level shall always be between min and max! Fill up to the maximum liquid level if necessary.

1.17.9 Filling or Replacement of Engine Coolant

Replace it every 2,000 hours or two years.

⚠ The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Never run the engine without coolant, even if it's a very short time.

Draining of the Cooling System

1) Carefully open the cooler cover.
2) Place the receiving container under the coolant interface.
3) Drain the coolant.
4) Reconnect and tighten the coolant interface.
5) Close the cooler cover.

Filling of the Coolant

1) Carefully open the cover for the cooling system.
2) Loosen the cooler exhaust bolts that may be present.
3) Fill the coolant to max or the filling limit position.
4) Open the possible heater and switch to the maximum gear, to fill the heating circuit and exhaust.
5) Close the cooler cover.
6) Run the engine to the running temperature.
7) Shut down the engine.
8) Check the coolant liquid level when the engine is cooled, and fill it to max if necessary.

⚠ Note: The coolant with different freezing point should be selected according to the local ambient temperature, the principle is that the freezing point of coolant is 10℃-15℃ lower than the local minimum temperature.

1.17.10 Check for engine belt-DeutzD2.9L4

Check it every 8 hours or every day.

⚠ Only when the engine is stationary can the belt drive operation be carried out.

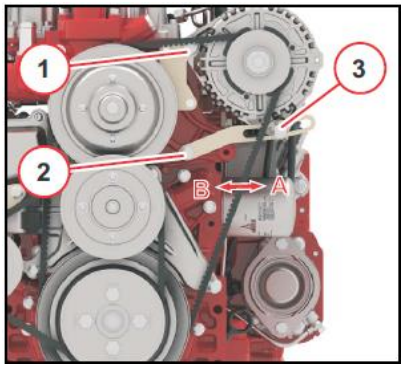
⚠ There is danger of burn. Be cautious of high-temperature engine components. Contact with them may cause serious burn.

Belt Check

1) Visually inspect whether all belt drives for damage.
2) Replace damaged components.
3) Reinstall the protector if necessary.
4) When it is a new belt, check whether the position is correct. After running for 15 minutes, check the tension.

Replacement of Belt

Replace it every 2,000 hours or two years, whichever comes first.



1) Loosen bolts (1,2,3) and nuts.
2) Move the engine in direction B, until the belt is lose.
3) Remove the old belt, and install a mew one.
4) Move the engine in direction A until the correct belt tension is reached.
5) Check the belt tension.
6) Tighten the bolts and nuts.

Tightening torque

Screw 1 42 Nm

Screw 2 30 Nm

Screw 3 M8 30 Nm

Screw 3 M10 42 Nm

1.18 Engine maintenance-Kubota

1.18.1 Check for Engine Oil Level

⚠ Do not operate on running engines!

No smoking and open fires!

Be careful when contacting with high temperature engine oil. Danger of scalding!

⚠ When operating on the oil system, pay attention to the surface cleaning. Carefully clean all areas involved. Blow wet parts with compressed air.

⚠ Please observe the safety regulations for engine oil and relevant local regulations. Dispose of spilled engine oil and filter elements as required. Waste oil cannot penetrate into the ground.

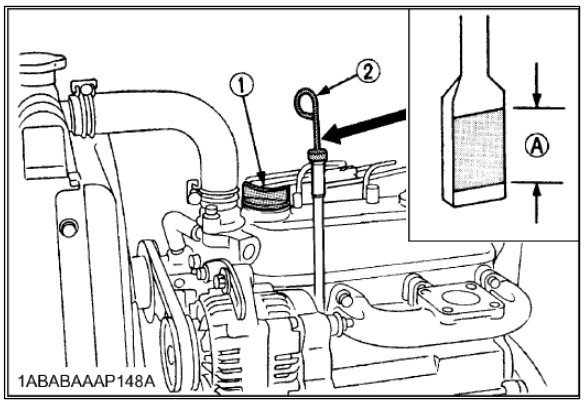
⚠ Test run shall be carried out after each operation. At the same time, pay attention to the sealing and lubricating oil pressure, and then check the engine oil level.

Check the engine oil level every 8 hours or every day.

Insufficient or excessive engine oil may cause damage to the engine. The engine oil level can

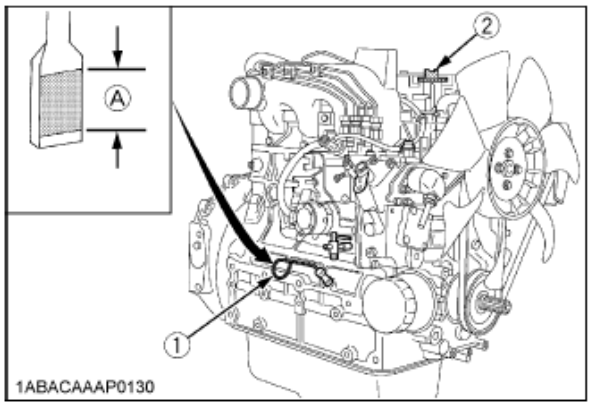
only be checked when the engine is placed horizontally and closed. If the engine is hot, close the engine and check the engine oil level 5 minutes later. Check it immediately if the engine is cooled.

Kubota-D1105:



1. Oil fill plug 2. Oil measuring rod

Kubota-V2403:



1. Oil measuring rod 2. Oil fill plug

1) Insert the oil measuring rod and clean it with a piece of clean and fiber-free cloth.
2) Insert the oil measuring rod into the bottom.
3) Pull out the oil measuring rod and read the value of engine oil level.
4) The engine oil level shall always be between MIN and MAX!

Fill up to the maximum liquid level if necessary.

1.18.2 Replacement of Engine Oil and Filter

⚠ Do not operate on running engines!

No smoking and open fires!

Be careful when contacting with high temperature engine oil. Danger of scalding!

⚠ When operating on the oil system, pay attention to the surface cleaning. Carefully clean all areas involved.

Blow wet parts with compressed air.

⚠ Please observe the safety regulations for engine oil and relevant local regulations. Dispose of spilled engine oil and filter elements as required. Waste oil cannot penetrate into the ground.

⚠ Test run shall be carried out after each operation. At the same time, pay attention to the sealing and lubrication oil pressure, and then check the engine oil level.

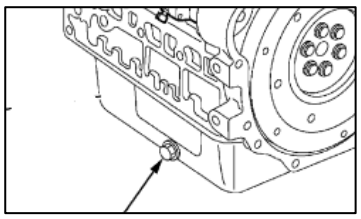
It is available in the first 50 hours, and the engine oil and filter shall be replaced every 400(V2403)/200（D1105）hours or half a year/quarterly. (If the ambient temperature continues to be below -10℃. (14 ˚F) or the temperature of engine oil is below 60℃ (84 ˚F), or the sulphur content in the diesel fuel is 0.5 - 1%, the oil change period is reduced by a half; if the engine oil does not reach the replacement interval period within a year, the oil shall be replaced at least once a year.)

⚠ Danger of burn, be careful of high-temperature engine parts and oil, contacting with high temperature engine oil and/or engine parts will cause severe burns.

⚠ Perform the function after engine

warm up to normal operation temperature.

Replacement of engine oil-Kubota engine

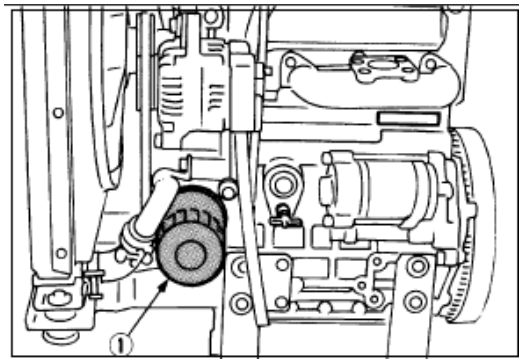


1. Oil drain plug

1) Warm up and run the engine.
2) Place the engine horizontally.
3) Shut down the engine.
4) Place the container under the engine oil drain plug.
5) Screw off the engine oil drain plug to drain the old engine oil.
6) Install the new seal ring for the engine oil drain plug and screw in and tighten it.
7) Add engine oil at the engine oil filler.
8) Warm up and run the engine.
9) Place the engine horizontally.
10) Wait for more than five minutes after filling the oil. Check the engine oil level and fill it if necessary.

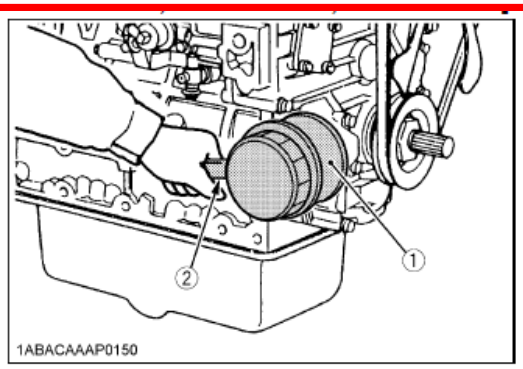
Replacement of the Engine Oil Filter

Kubota-D1105



1. Oil filter

Kubota-V2403



1. Oil filter

The engine oil filter element must also be replaced every time the engine oil is replaced.

⚠ Never fill the filter in advance. There is risk of contamination.

1) If a torsion stopper is installed, remove the clamping clamp (optional).
2) Release and unscrew the filter element with a wrench.
3) Contain the oil that was drained.
4) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
5) Apply a thin layer of engine oil to the seal ring of the new filter.
6) Screw in a new filter manually until seal fit.
7) Fix the clamping clamp of a torsion stopper (optional).

1.18.3 Check for Fuel Leakage

⚠ The engine must be shut down!

No smoking and open fires!

Be careful when contacting high temperature fuel!

Please observe the safety regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

Visually check for fuel leakage every 8 hours or every day.

⚠ There is danger of explosion and fire. The fuel of the engine is combustible. Check the position of the machine. When this step is performed, the machine shall be away from the heater, spark, flame, and open and well-ventilated areas with burning tobacco. A qualified fire extinguisher shall be placed in an easily accessible place.

⚠ There is danger of explosion and fire. If fuel leaks, prevent any additional person from entering the area or operating the equipment. Repair the leakage immediately.

1.18.4 Clean or Replace the Fuel Filter

⚠ The engine must be shut down!

No smoking and open fires!

Be careful when contacting high temperature fuel!

⚠ Do not release the injection pipeline or the high-pressure oil pipeline when the engine is running.

⚠ Carefully clean all areas involved in cleaning. Blow wet parts with compressed air.

⚠ Please observe the safety regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

⚠ After completing the operation on the fuel system, exhaust the system, perform the trial operation and check the seal performance.

It is available in the first 50 hours, and it will be replaced every 400 hours, but an increase in the number of replacement filters is required for the extremely dirty work environment.

⚠ There is danger of explosion and fire. The fuel of the engine is combustible. Check the position of the machine. Execution

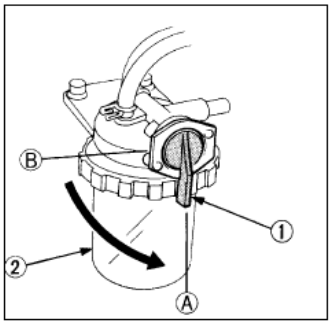
When this step is performed, the machine shall be away from the heater, spark, flame, and open and well-ventilated areas with burning tobacco.

A qualified fire extinguisher shall be placed in an easily accessible place.

⚠ Never fill the filter in advance.

There is risk of contamination.

Clean the Fuel Pre-filter



1. Fuel filter handle 2.Fuel filter pot A:Open state B:Close state

1) Clean the fuel filter every 100 hours operation to prevent dust from entering.

2) Close the fuel filter handle.

3) Remove the top cover and clean the interior with diesel.

4) Take out the filter and clean it with diesel oil or replace a new one.

5) Apply a thin layer of diesel to the seal ring of the new filter.

6) Reinstall the fuel filter.

7) Exhaust the fuel system.

Replacement of fuel filter

1. It will be replaced every 400 hours, but an increase in the number of replacement filters is required for the extremely dirty work environment.

2. Apply a thin layer of diesel to the seal ring of the new filter and tight the filter manually.

3. Exhaust the fuel system.

1.18.5 Check for Engine Air Filter

Check the maintenance indicator (If equipped) for the air filter every 8 hours or every day.

⚠ Perform this step when the engine is turned off.

Check the maintenance indicator of the air filter. When the transparency of the indicator turns red, filter element needs to be maintained and cleaned or replaced.

When the primary filter element is cleaned more than 5 times or the filter element has been damaged, the primary filter element needs to be replaced.

Under ordinary conditions, open the dust discharge valve once a week; When used in dusty places, open it once a day，which can remove large particles of dust and something dirty.

1.18.6 Cleaning or replacement of air filter

Clean it every 250 hours or quarterly and replaced it for every 1000 hours.

⚠ Do not operate on running engines!

⚠ Be sure to pay attention to the cleanliness of the external surface when operating on the engine suction system, and close the suction inlet when necessary. The old filter elements are handled in an environmentally friendly manner.

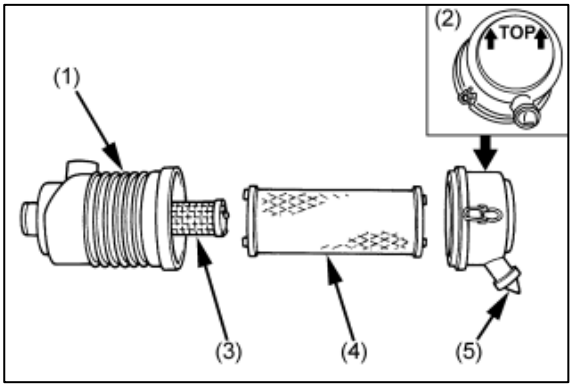
Cleaning of air filter

⚠ Do not clean the filter element (4) with gasoline or high temperature liquid.

If the primary element is stained heavily, replace it soon. At this time, replace the secondary element too.

The secondary element should be removed only if it is to be replaced.

To protect the engine, do not remove the secondary element in servicing the primary element.



1. Air cleaner body

2. Dust cup

3. Secondary element（If equipped）

4. Primary element

5. Evacuator valve

Make sure the hooking clip for the element is tight enough. If it is loose, dust and dirt may be sucked in wearing down the cylinder liner and piston ring earlier and thereby resulting in poor power output.

Do not overservice the air cleaner element. Overservicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.

1) Open the hooking clip.
2) Remove the filter cover (2) and screw off the filter element (4).
3) Filter element (4): For slight contamination, purge with dry compressed air (maximum 205 Kpa) from inside to outside for cleaning (general cleaning times are no more than 5 times);

Replace it in case of serious contamination.

Replacement of the Safety Filter Tube of the Air Filter

⚠ Never clean the safety filter tube (3).

1) Screw off the Primary element (4) and the Secondary element (3).
2) Install the new Secondary element.
3) Install the filter element (4), place the outer cover (2) and fix it with the hooking clip.

1.18.7 Check for coolant liquid level

Check the coolant liquid level every 8 hours or every day.

⚠ The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Never run the engine without coolant, even if it's a very short time.

1) Carefully open the cover for the cooling system.
2) The coolant liquid level shall always be between min and max! Fill up to the maximum liquid level if necessary.

1.18.8 Filling or Replacement of Engine Coolant

Replace it every 2,000 hours or two years.

⚠ The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Never run the engine without coolant, even if it's a very short time.

Draining of the Cooling System

1) Carefully open the cooler cover.
2) Place the receiving container under the coolant interface.
3) Drain the coolant.
4) Reconnect and tighten the coolant interface.
5) Close the cooler cover.

Filling of the Coolant

1) Carefully open the cover for the cooling system.
2) Loosen the cooler exhaust bolts that may be present.
3) Fill the coolant to max or the filling limit position.
4) Open the possible heater and switch to the

maximum gear, to fill the heating circuit and exhaust.

5) Close the cooler cover.

6) Run the engine to the running temperature.

7) Shut down the engine.

8) Check the coolant liquid level when the engine is cooled, and fill it to max if necessary.

⚠ Note: The coolant with different freezing point should be selected according to the local ambient temperature, the principle is that the freezing point of coolant is 10℃-15℃ lower than the local minimum temperature.

1.18.9 Check for Engine Belt

Check it every 8 hours or every. day.

⚠ Only when the engine is stationary can the belt drive operation be carried out.

⚠ There is danger of burn. Be cautious of high-temperature engine components. Contact with them may cause serious burn。

Belt Check

1) Visually inspect whether all belt drives for damage.

2) Replace damaged components.

3) Reinstall the protector if necessary.

4) When it is a new belt, check whether the position is correct. After running for 15 minutes, check the tension.

1.19 Check or replacement of scissors arms slider

This step shall be performed every 1,000 hours or a year, whichever comes first.

1) The quality of the scissors arms wear-resistant block is crucial to the machine's safe operation. Worn wear-resistant sliders may cause damage to the components and unsafe working hazards.

2) Check the wear-resistant pads in the folding state of the platform.

① Measure the height of the wear-resistant pads on the chassis slide rail and platform slide rail.

Result: The measurement result is less than 8 mm. Replace the wear-resistant slider.

② Apply lubricant between the chassis slide rail and wear-resistant slider, the platform slide rail and the wear-resistant slider.

1.20 Regular maintenance

Maintenance items with period of a quarter, a year, and two years must be completed by qualified staff upon training in maintenance of the machine in accordance with procedures in the machine maintenance manual.

For machines that are idle for more than three months, quarterly check must be performed before they can be re-used.

1.21 Engine fault table

DEUTZ

Faults	Cause	Measures
Engine does not start and diagnostic lamp flashes	Not disconnected (if possible)	Check coupling
	Fuel tank empty	Tanks
	Fuel suction pipe blocked	Check
	Below starting limit temperature	Check
	Cold starting device	Check/replace
	Wrong SAE viscosity class of the engine lubricating oil	Change the lubricating oil
	Fuel quality does not comply with operating manual	Change the fuel
	Battery defective or discharged	Check battery
	Cable connection to starter loose or oxidized	Check cable connections
	Starter defective or pinion does not engage	Check starter
	Air filter clogged / turbocharger defective	Check/replace
	Air in fuel system	Vent fuel system
	Compression pressure too low	Check compression pressure
	Exhaust gas backpressure too high	Check
	Injection line leaks	Check injection line
	High-pressure pump defective	Check/replace
Engine does not start and diagnostic lamp flashes	Engine electronics prevents starting	Check error according to error code and eliminate error if necessary
Engine starts, but runs irregularly or fails	Exhaust gas backpressure too high	Check
	Compression pressure too low	Check compression pressure
	Cold starting device	Check/replace
	Air in fuel system	Vent
	Fuel filter contaminated	Clean

	Fuel quality does not comply with operating manual	Change the fuel
	Injector defective	Change
	Injection line leaks	Check injection line
	Engine cable harness defective	Check/replace
Speed changes are possible and diagnostic lamp lights up	Engine electronics has detected a system error and activates an equivalent speed	Check error according to error code and eliminate error if necessary
Engine becomes excessively hot. Temperature warning system activates	Vent line blocked	Clean
	Lube oil cooler defective	Check/replace
	Lube oil filter contaminated on the air or lube oil side	Change
	Lube oil level too high	Check lube oil level, if necessary drain off.
	Lubricating oil level too low	Fill up lube oil
	Injector defective	Change
	Coolant heat exchanger soiled	Clean
	Defective cooling water pump (torn or loose V-belt)	Check whether torn or loose
	Low coolant	Fill up
	Resistance in cooling system is too high / flow volume too low	Check the cooling system
	Fan / viscous coupling defective, V-belt torn or loose	Check/replace/tension
	Charge air line leaking	Check charge air line
	Charge air cooler soiled	Check/clean
	Air filter clogged / turbocharger defective	Check/replace
	Air filter maintenance switch / maintenance indicator defective	Check/replace
	Fan defective/V-rib belt torn or loose	Check fan/V-belt, change if necessary
	Exhaust gas backpressure too high	Check
	Throttle valve defective	Check/replace
	Coolant temperature transmitter	Check/replace
	Coolant thermostat defective	Check/replace
	Coolant cover defective	Check/replace
Engine output is deficient	Lube oil level too high	Check lube oil level, if necessary drain off.
	Fuel suction temperature too high	Check the system
	Fuel quality does not comply with operating manual	Change the fuel
	Air filter clogged / turbocharger defective	Check/replace

	Air filter maintenance switch / maintenance indicator defective	Check/replace
	Fan defective/V-rib belt torn or loose	Check fan/V-belt, change if necessary
	Charge air line leaking	Check charge air line
	Charge air cooler soiled	Clean
	Injection line leaks	Check injection line
	Injector defective	Change
	Throttle valve defective	Check/replace
	Exhaust gas recirculation, actuator defective	Check/replace
	Exhaust gas backpressure too high	Check/clean
	Exhaust gas turbocharger defective	Change
Engine performs poorly and diagnostic lamp lights	Engine electronics reduce performance	Please contact your LGMG partner
Engine does not run on all cylinders	Injection line leaks	Check injection line
	Injector defective	Change
	Compression pressure too low	Check compression pressure
	Engine cable harness defective	Check/replace
Engine lubricating oil pressure is nonexistent or excessively low	Lubricating oil level too low	Fill up lube oil
	Excessive inclination of engine	Check engine mounting / reduce inclination
	Wrong SAE viscosity class of the engine lubricating oil	Change the lubricating oil
	Lubricating oil pressure sensor defective	Check/replace
	Lubricating oil control valve jammed	Check/clean
	Lubricating oil suction pipe blocked	Check/clean
Engine lubricating oil consumption excessive	Lube oil level too high	Check lube oil level, if necessary drain off
	Excessive inclination of engine	Check engine mounting / reduce inclination
	Crankcase breather	Check/replace
Lubricating oil in the exhaust system	Engine operated continuously with too low a load (< 20-30%)	Check load factor
	Valve shaft seals defective	Check/replace
	Exhaust gas turbocharger defective	Check/replace
Engine producing blue smoke	Lube oil level too high	Check lube oil level, if necessary drain off
	Excessive inclination of engine	Check engine mounting / reduce inclination
Engine producing blue smoke	Lube oil level too high	Check lube oil level, if necessary drain off
	Excessive inclination of engine	Check engine mounting / reduce inclination

Engine producing white smoke	Fuel quality does not comply with operating manual	Change the fuel
	Injector defective	Change
	Condensation	Warm up engine so that water residues evaporate
Engine producing black smoke	Air filter clogged / turbocharger defective	Check/replace
	Air filter maintenance switch / maintenance indicator defective	Check/replace
	Charge air line leaking	Check charge air line
	Injector defective	Change
	Air filter clogged / turbocharger defective	Check/replace
	Charge air line leaking	Check charge air line
	Injector defective	Change
	Differential pressure of flow meter defective	Change
	Nox sensor defective	Change
	Differential pressure sensor of diesel particulate filter is issuing an implausible signal	Change
	Differential pressure line added	Clean

1.22 Engine fault code

DEUTZ

KWP-Code	SPN	FMI	Error Identification
45	168	3	Battery voltage: The voltage measured by ECU is out of the target range, system reaction is initiated.
46	168	4	Battery voltage: The voltage measured by ECU is out of the target range, system reaction is initiated.
47	168	2	Battery voltage: The voltage measured by ECU is out of the target range,system reaction is initiated.
84	639	14	CAN bus 0: The ECU is not allowed to send messages because the status "BusOff" is detected.
85	1231	14	CAN-Bus 1: The ECU is not allowed to send messages, because the status "BusOff" is detected. Warning, no diagnostic with SERDIA2010 is possible.
88	102	2	Charge air pressure measured by sensor is above the warning threshold.
89	102	2	Charge air pressure measured by sensor is above shut off threshold.
92	110	0	Coolant temperature sensor: The voltage of the sensor measured by ECU is out of the target range
93	110	1	Coolant temperature sensor: The voltage of the sensor measured by ECU is out of the target range.
96	110	3	Coolant temperature sensor: The voltage of the sensor measured by ECU is out of the target range (Signal range check high).
97	110	4	Coolant temperature sensor: The voltage of the sensor measured by ECU is out of the target range (signal range check low).
98	110	0	Coolant temperature: The coolant temperature calculated by ECU is above the target range; The ECU activates a system reaction.
99	110	0	Coolant temperature: The coolant temperature calculated by ECU is above the target range. The ECU activates a system reaction.
101	111	1	Coolant level: The coolant level calculated by ECU is below the allowed minimum
126	523603	9	Timeout Error of CAN-receive-frame AMB; Ambient temperature sensor
171	523212	9	Timeout error of CAN-Receive-Frame ComEngPrt. Engine Protection.
179	523240	9	Timeout CAN-message FunModCtl. Function Mode Control.
291	523776	9	Timeout error of CAN-Receive-Frame TSC1TE - active
292	523777	9	Passive timeout error of CAN-Receive-Frame TSC1TE. Setpoint
305	898	9	Timeout error of CAN-Receive-Frame TSC1TE. Setpoint
360	523982	0	Powerstage diagnosis disabled. High battery voltage.
361	523982	1	Powerstage diagnosis disabled. Low battery voltage
362	523090	2	When any of the switch inputs is not active for a period of time.
376	630	12	Internal hardware monitoring, the ECU finds an error during the access to its EEPROM memory or works with an alternative value
377	630	12	Internal hardware monitoring: The ECU finds an error during the access to its EEPROM memory or works with an alternative value

378	630	12	Internal hardware monitoring: The ECU finds an error during the access to it's EEPROM memory or works with an alternative value
387	523612	12	Internal hardware monitoring: The CPU of the ECU is set to RESET and the cause is logged internally. No item will be created in error memory
388	190	0	Engine speed: The engine speed calculated by ECU is above the target range.
389	190	0	Engine speed: The engine speed calculated by ECU is above the target range. The ECU activates a system reaction.
390	190	11	Engine speed: The engine speed calculated by ECU is above the target range. The ECU activates a system reaction
391	190	14	Engine speed: The engine speed calculated by ECU is above the target range. The ECU activates a system reaction.
419	190	8	Camshaft speed sensor: The ECU receives no signal and uses the signal from crankshaft speed sensor as alternative to calculate the engine speed.
420	190	12	Camshaft speed sensor: The ECU receives no signal and uses the signal from camshaft speed sensor as alternative to calculate the engine speed.
420	190	2	Offset angle between crank- and camshaft-sensor is too large
422	190	8	Sensor crankshaft detection. Out of range, signal disrupted or no signal
423	190	12	Crankshaft speed sensor: The ECU receives no signal and uses the signal from camshaft speed sensor as alternative to calculate the engine speed
457	975	3	PWM-Signal fan, short-circuit to battery.
464	97	3	Fuel filter water level sensor: The sensor voltage measured by ECU is out of the target range
465	97	4	Fuel filter water level sensor: The voltage of sensor measured by ECU is out of the target range
472	94	3	Low fuel pressure sensor: The voltage of sensor measured by ECU is out of the target range
473	94	4	Low fuel pressure sensor: The voltage of sensor measured by ECU is out of the target range
474	94	1	Low fuel pressure: The low fuel pressure calculated by ECU is underneath the target range. The ECU activates a system reaction
475	94	1	Low fuel pressure, shut off threshold exceeded.
547	729	12	The cold start aid relay is overheated.
559	523895	13	Check of missing injector adjustment value programming (IMA) injector 1.
560	523896	13	Check of missing injector adjustment value programming (IMA) injector 2.
561	523897	13	Check of missing injector adjustment value programming (IMA) injector 3
564	523900	13	Check of missing injector adjustment value programming (IMA) injector 6
565	523350	4	Injector cylinder bank 1: The current drop measured by ECU is above the target range
566	523352	4	Injector cylinder bank 2: The current drop measured by ECU is above the target range.
567	523354	12	Internal hardware monitoring: The ECU detects an error of its injector high current output
568	651	5	Injector cylinder 1: Interruption of electrical connection
569	652	5	Injector cylinder 2: Interruption of electrical connection

570	653	5	Injector cylinder 3: interruption of electrical connection
571	654	5	Injector cylinder 4: Interruption of electrical connection
572	655	5	Injector cylinder 5: interruption of electrical connection
573	656	5	Injector cylinder 6: Interruption of electrical connection.
580	651	3	Injector cylinder 1: The current drop measured by ECU is above the target range
581	652	3	Injector cylinder 2: The current drop measured by ECU is above the target range
582	653	3	Injector cylinder 3: The current drop measured by ECU is above the target range
583	654	3	Injector cylinder 4: The current drop measured by ECU is above the target range
584	655	3	Injector cylinder 5: The current drop measured by ECU is above the target range
585	656	6	Injector cylinder 6: The current drop measured by ECU is above the target range.
592	523615	5	Detecting an open load fault in the metering unit of the fuel system
594	523615	3	Fuel metering unit: The current drain measured by ECU is above the target range
595	523615	4	Fuel metering unit: The current drain measured by ECU is above the target range
596	523615	3	Fuel metering unit: The current drain measured by ECU is above the target range
597	523615	4	Fuel metering unit: The current drain measured by ECU is above the target range
612	523612	12	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
613	523612	12	ECU reported internal software error Internal ECU monitoring detection reported error
614	523612	12	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
619	523612	12	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
625	523612	12	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
637	523612	12	Engine speed: the engine speed calculated by ECU is above the target range; the ECU activates a system reaction
732	100	3	Oil pressure sensor: the voltage of sensor measured by ECU is out of the target range
733	100	4	Oil pressure sensor: the voltage of sensor measured by ECU is out of the target range
734	100	0	High oil pressure; warning threshold exceeded
735	100	0	High oil pressure; shut off threshold exceeded
736	100	1	Oil pressure is below the target range (warning threshold)
737	100	1	Oil pressure is below the target range (shut off threshold)
746	175	0	High oil temperature; shut off threshold exceeded
747	1237	2	Override switch: the ECU receives a permanent signal.
752	107	0	Air filter differential pressure: the pressure difference of the intake air between the filter inlet and outlet calculated by ECU is above the target range and the ECU activates a system reaction
776	102	3	Charge air pressure sensor: the measured voltage of sensor by ECU is out of the target range

777	102	4	Charge air pressure sensor: the measured voltage of sensor by ECU is out of the target range
825	523009	9	The pressure relief valve (PRV) has reached the number of allowed activations.
826	523470	2	Pressure relief valve is forced to open, perform pressure increase
827	523470	2	Pressure Relief Valve (PRV) forced to open. Performed by pressure increase.
828	523470	12	Pressure Relief Valve (PRV) forced to open. Shutoff conditions.
829	523470	12	Pressure Relief Valve (PRV) forced to open. Warning conditions.
830	523470	14	Open Pressure Relief Valve (PRV)
831	523470	11	Rail pressure relief valve can not be opened due to the railpressure.
832	523470	11	Rail pressure out of tolerance range. The PRV can not be opened at this operating point with a pressure shock.
833	523009	10	The pressure relief valve (PRV) has reached the allowed opening time
834	523906	5	ECU detects open load on the electric fuel feed pump output
835	523906	12	ECU detects too high temperature in powerstage of fuel pump circuit.
836	523906	3	ECU detects shortcut to battery in fuel feed pump circuit.
837	523906	4	Electrical fuel pre - supply pump. Short circuit to ground.
856	523613	0	Rail pressure below setpoint, speed-dependent threshold exceeded. The rail pressure is below the target range, which is determined as a function of the engine speed.
857	523613	0	Rail pressure below setpoint, threshold exceeded
858	523613	0	Rail pressure: the fuel pressure in rail calculated by ECU is above the target range which is dependant on the engine speed
859	523613	0	Rail pressure: the fuel pressure in rail calculated by ECU is below the target range which is dependant on the engine speed.
861	523613	1	Rail pressure: the fuel pressure in rail calculated by ECU is below the target range which is dependant on the engine speed
862	523613	0	Rail pressure: the fuel pressure in rail calculated by ECU is above the target range.
864	523613	2	Rail pressure metering unit, Setpoint of metering unit in overrun mode not plausible.
876	523470	7	Rail pressure is out of the expected average range.
877	157	3	Rail pressure sensor: the voltage of sensor measured by ECU is out of the target range
878	157	4	Rail pressure sensor: the voltage of sensor measured by ECU is out of the target range
932	29	3	Analog accelerator pedal 2 (hand pedal): the voltage measured by ECU is out of the target range.
935	91	3	Analog accelerator pedal sensor 1 or double accelerator pedal sensor: the voltage measured by ECU is out of the target range or the calculated pedal position is implausible compared with the position of the second pedal
937	29	4	Handthrottle; short circuit to ground
940	91	4	Sensor error accelerator pedal. Signal is below the range
946	1079	13	Internal hardware monitoring: the ECU detects a deviation of the target range of the power supply voltage of sensor output 1
947	1080	13	Internal hardware monitoring: the ECU detects a deviation of the

			target range of the power supply voltage of sensor output 2
948	523601	13	Internal hardware monitoring: the ECU detects a deviation of the target range of the power supply voltage of sensor output 3
956	677	3	Start relay (high side power stage): the current drop measured by ECU is above the target range.
957	677	4	Start relay (high side power stage): the current drain measured by ECU is above the target range
958	677	5	Start relay (low side power stage): the current drop measured by ECU is above the target range
959	677	12	Start relay (low side power stage): the current drop measured by ECU is above the target range
960	677	3	Start relay (low side power stage): the current drain measured by ECU is above the target range
961	677	4	Starter relay low side short circuit to ground
973	523612	14	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
974	523612	14	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory.
975	523612	14	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
976	91	11	Diagnostic fault check of synchronism of single potentiometer and Low idle switch(LIS).
978	29	2	Plausibility error between sensor and idle switch, Acceleration Pedal Detection. In case of Hand Throttle with Low Idle Switch, it is the plausibility check between hand throttle and idle switch
980	523550	12	Terminal 50 was operated for more than 2 minutes. This may happen due to short to battery or wrong usage of Terminal 50. Starter control is disabled until this error is healed.
994	105	3	Electrical error charged air temperature. Signal range check high.(SRC)
995	105	4	Electrical error charged air temperature. Signal range check low
996	105	0	Charged air cooler temperature. System reaction initiated. High charged air cooler temperature. Warning threshold exceeded.
997	105	0	Charge air temperature downstream calculated by ECU is over the shut off threshold. The ECU activates a system reaction.
1016	51	7	Actuator position for EGR valve is not plausible, internal error, angular misalignement of the flap
1024	51	3	Actuator of the external EGR valve: the ECU detects a short circuit to battery or open load
1025	51	4	Actuator of the external EGR valve: the ECU detects a short circuit to ground
1157	97	12	Water in fuel level prefilter; maximum value exceeded
1170	523612	12	Internal hardware monitoring: the CPU of the ECU is reset and the cause is logged internally; no item will be created in error memory
1180	168	0	Physical range check high for battery voltage
1181	168	1	Physical range check low for battery voltage
1223	51	5	Actuator EGR-Valve: Open load on ECU output is detected
1224	51	6	Actuator EGR-valve: too high curent is going into the actuator. Output is switched off

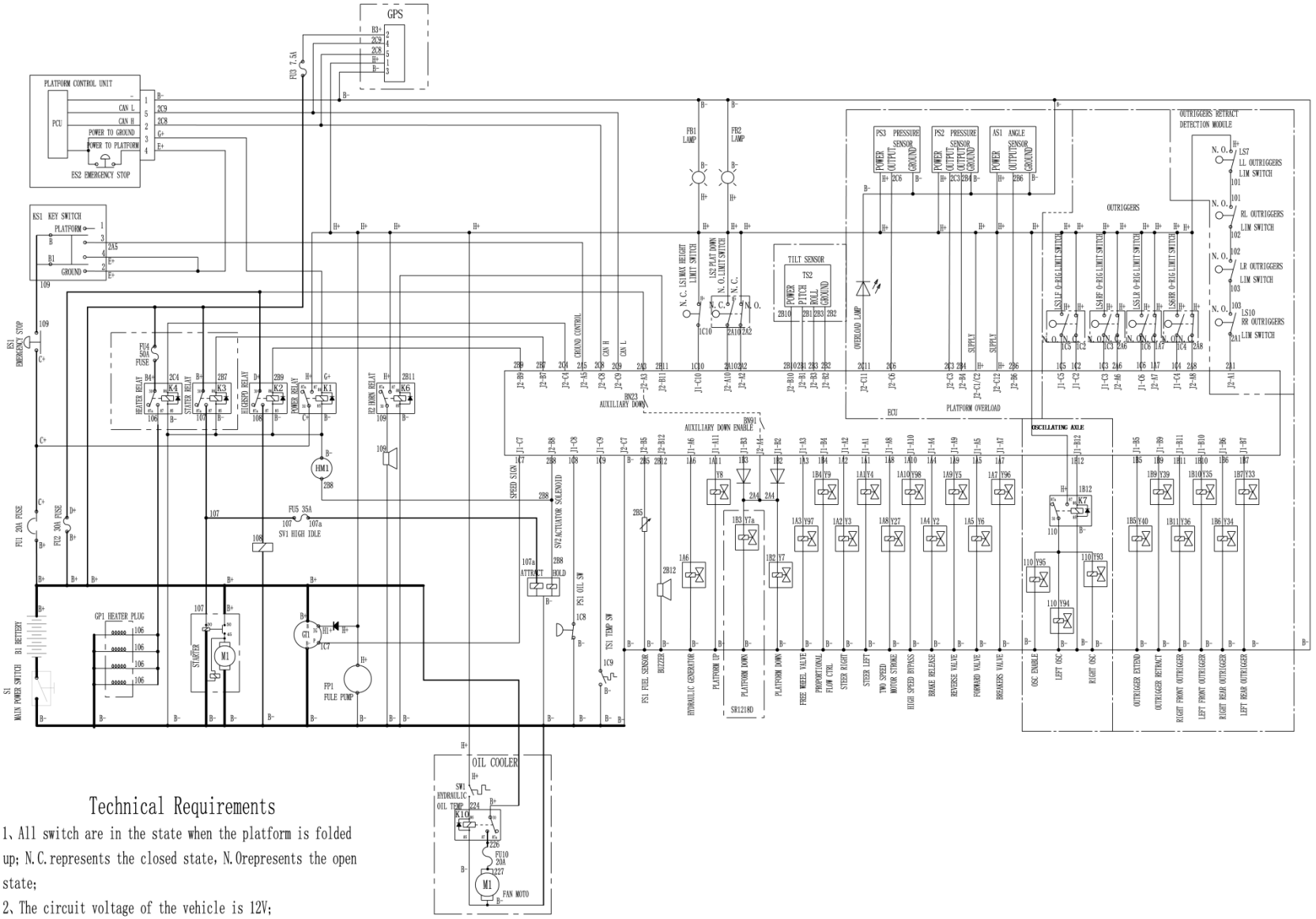
1226	51	3	Actuator EGR-valve: short cut to battery is detected
1227	51	3	Actuator EGR-valve: short cut to battery on ECU pin is detected
1228	51	4	Actuator EGR-valve: short cut to ground on ECU pin is detected
1229	51	4	EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); short circuit to ground
1230	51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); Overload by short-circuit
1231	51	11	Power stage overtemperature due to high current.
1232	51	4	actuator AGR valve (2.9;3.6) throttle valve (4.1;6.1;7.8); Voltage below threshold
1505	524057	2	Fuel low pressure pump; error pressure build up
1668	524105	9	Timeout error of CAN-Transmit-Frame ComEGRMsFlw (EGR Steller)
1669	524108	9	Timeout error of CAN-Transmit-Frame ComEGRTVActr (EGR actuator)
1670	524110	9	Timeout error of CAN-Transmit-Frame ComETVActrTO.
1671	524112	9	Timeout ComIntake Throttle Valve Actr.
1677	524106	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1 (EGR actuator)
1678	524107	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2 (EGR actuator)
1679	524109	9	Timeout error of CAN-Receive-Frame ComRxEGRTVActr (EGR actuator)
1680	524111	9	Timeout error of CAN-Receive-Frame ComRxETVActr
1681	524113	9	Timeout error of CAN-Receive-Frame ComRxITVActr
1683	524121	9	Timeout error of CAN-Receive-Frame ComRxTrbChActr (wastegate actuator)
1687	524125	9	Timeout error of CAN-Receive-Frame ComTxTrbChActr (Wastegate actuator)

KUBOTA

DTC	SPN	FMI	Detection item	DTC set parameter
Accelerator position sensor：high	91	3	Open circuit of sensor/harness, +B short circuit	Voltage of coolant temperature sensor is 4.9V or above
Accelerator position sensor：low	91	4	Open short circuit of sensor/harness,	Voltage of coolant temperature sensor is 0.1V or less
Oil Pressure Error	100	1	Oil pressure switch	Despite rpm，oil pressure switch is on
Engine overheat	110	0	Overheat of engine water temperature	Engine water temperature ≥110 °C
Water temperature sensor: High	110	3	Open circuit of sensor / harness, + B short circuit	Voltage of coolant temperature sensor is 4.9 V or above
Water temperature sensor: Low	110	4	Ground short circuit of sensor / harness	Voltage of coolant temperature sensor is 0.1 V or less
Battery voltage: High	158	3	Open circuit, short circuit, or damage of harness. Failure of battery	ECU recognition of battery voltage is above 18 V.
Engine overrun	190	0	Engine speed exceeds threshold speed	Engine speed >2990 min-1 (rpm)
Sensor supply voltage 1: Low	3509	4	Sensor supply voltage 1	Voltage to sensor is below 4.00 V
Actuator Abnormal	523771	2	Open circuit, short circuit, or damage of harness.	Actuator current >3.0A or < 80mA
Engine Speed Sensor Abnormal	523772	2	Open circuit, short circuit, or damage of harness.	Engine speed = 0 min-1 (rpm) after Starter signal into ECU
Starter error	523736	2	Starter running time exceed threshold time	Starter running time is above 12 sec
Alternator L, terminal Abnormal	523737	2	Open circuit，short circuit, or damage of harness	Alternator L terminal has voltage while engine 0 rpm（after key on）
Charging failure	523738	2	Open circuit，short circuit, or damage of harness	Alternator L terminal is 0V while engine is running
CAN Communication Abnormal	523774	2	CAN bus	CAN bus off
Emergency stop	-	-	Emergency stop switch	Emergency stop CAN signal into ECU

Chapter 2 Schematics

SR1018D/SR1218D Electric schematic

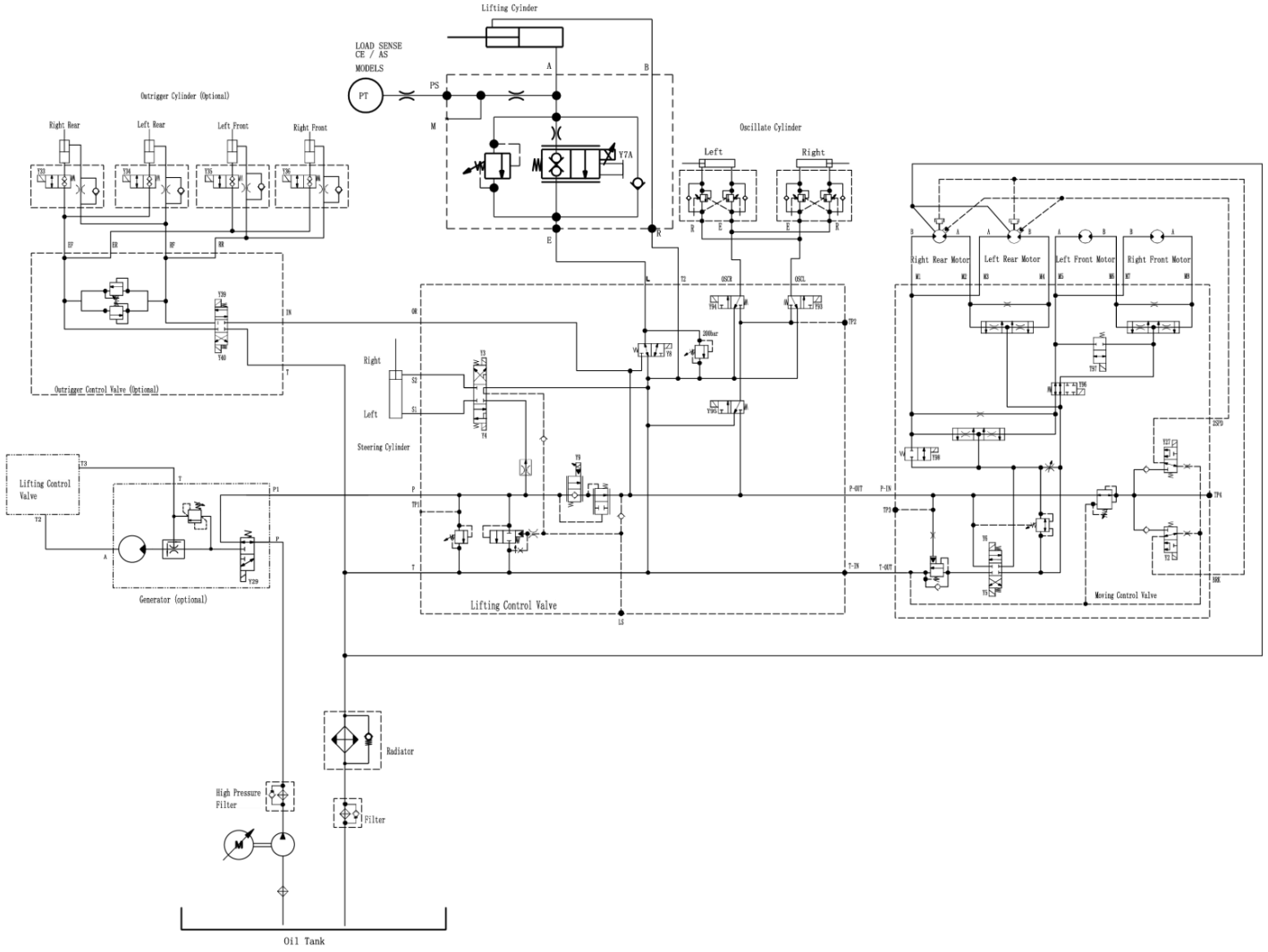


Technical Requirements

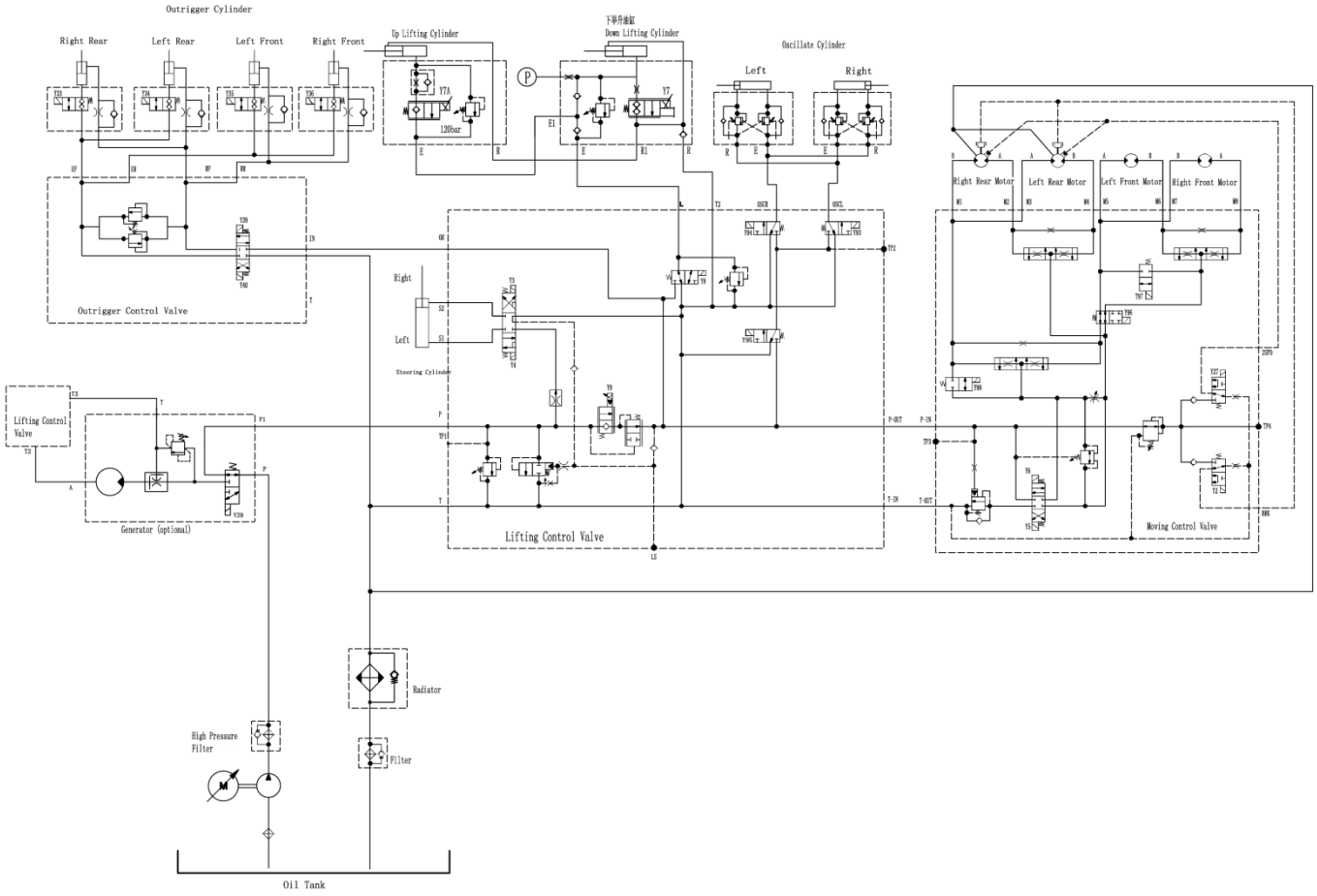
1、All switch are in the state when the platform is folded up; N.C. represents the closed state, N.Orepresents the open state;

2、The circuit voltage of the vehicle is 12V;

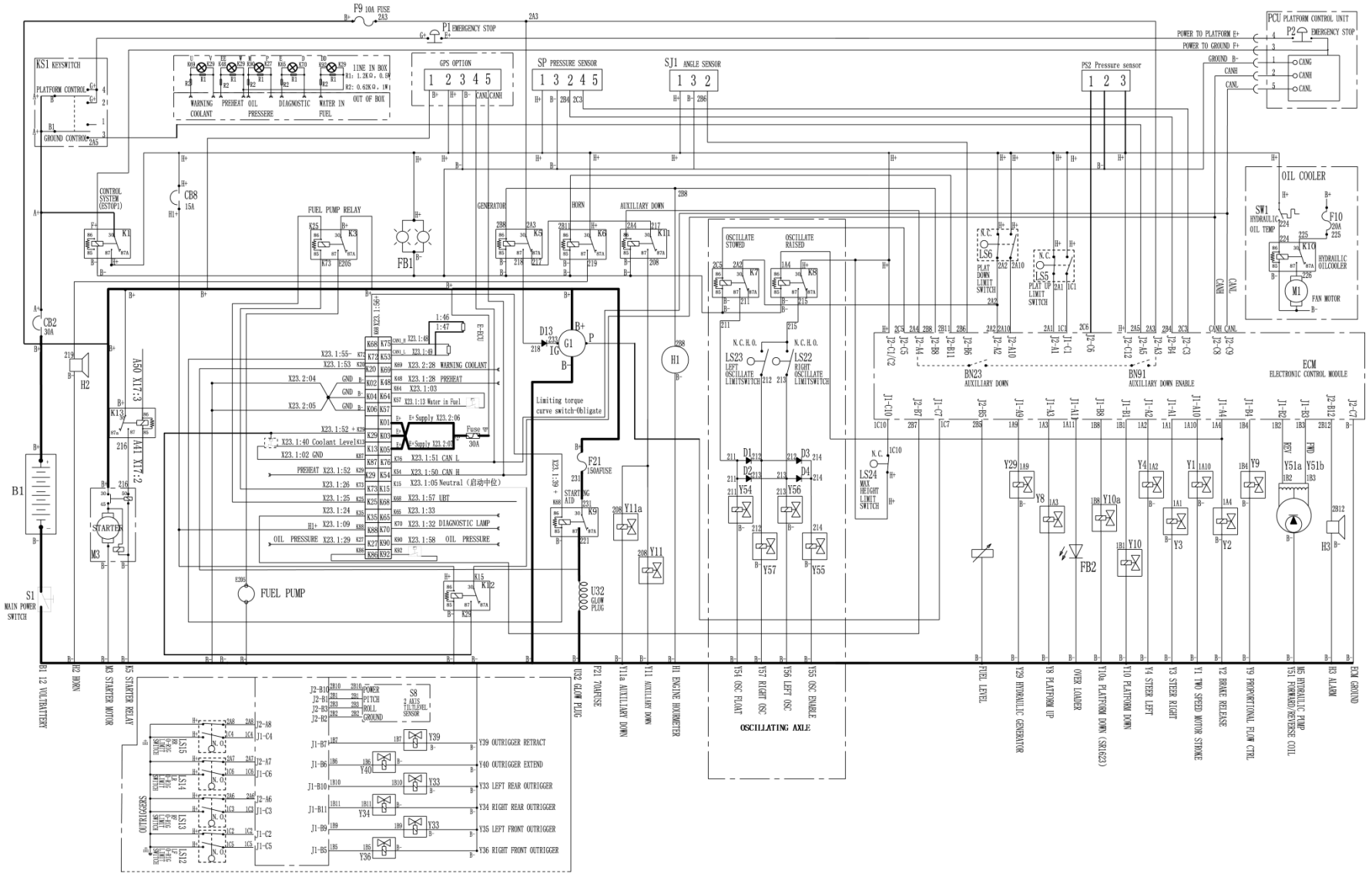
SR1018D Hydraulic schematic



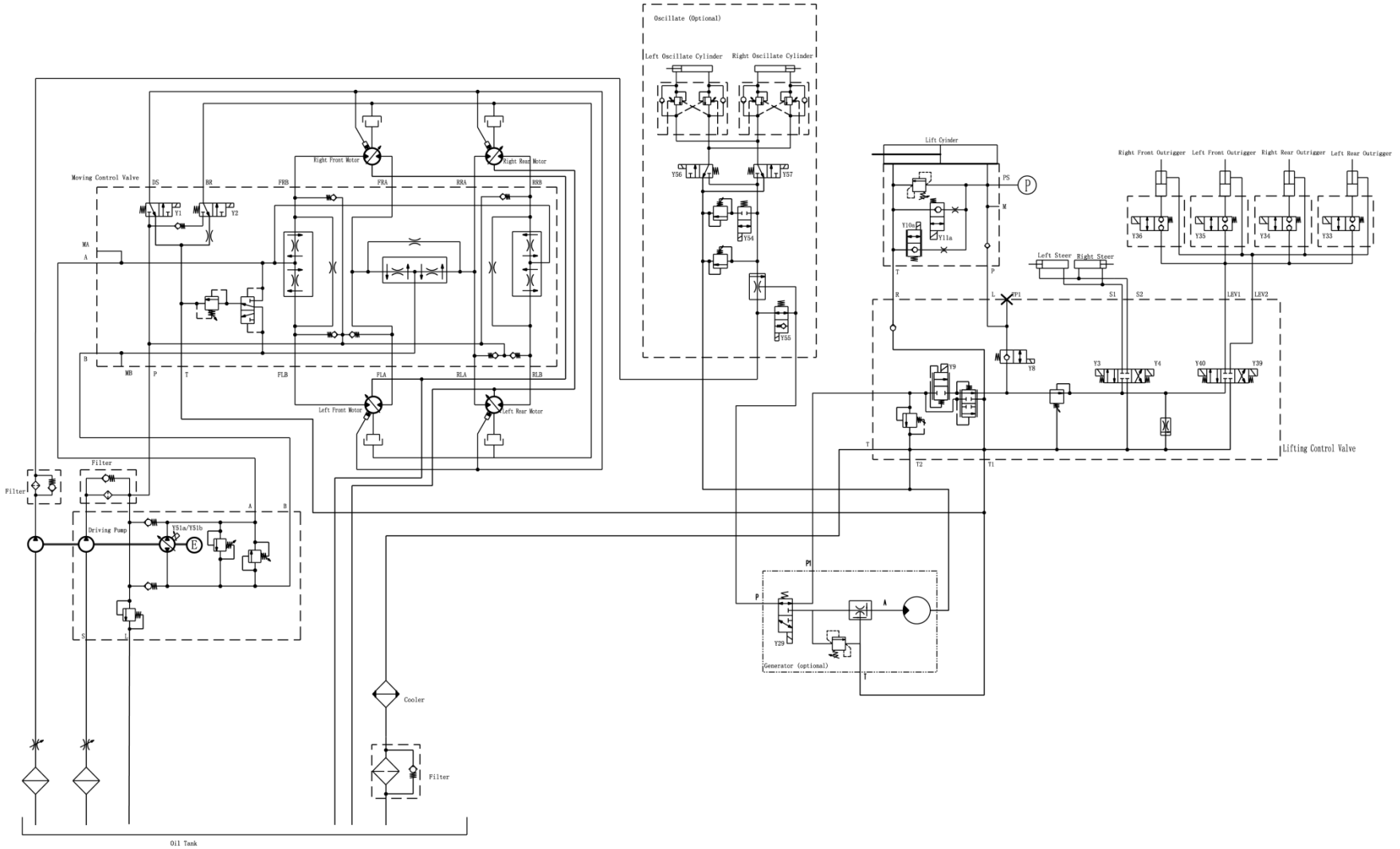
SR1218D Hydraulic schematic



SR1323D/SR1623D Electric schematic



SR1323D Hydraulic schematic



SR1623D Hydraulic schematic