

**DIGGER KING**



**KING 3.5 TON**

**OPERATING MANUAL**

Thank you for your purchase of your new Digger King 3.5 ton Excavator! Our products are compact in design, with matching power, good product stability, and high performance. Digger King excavators can meet the digging and unloading requirements under different working conditions such as plains, hills, and forests. They are also suitable for brick factories, kilns, rivers, dredging, and road construction. Your new excavator can reduce the physical labour of workers and speed up the construction progress.

To enable users to correctly master the use, adjustment, maintenance, and repair knowledge of the machine and have full efficiency from the excavator, please read this operation and maintenance manual carefully and conscientiously implement the regulations described in this manual.

**Operation Section:** A technical reference for the operator to use the machine, during which the operator is guided in the correct procedures for inspecting, starting, operating, and stopping the machine. The operating techniques outlined in the manual are a foundation upon which the operator can improve his or her techniques and skills by gaining knowledge of the machine and its functions.

**Maintenance Section:** User maintenance instructions for the entire machine. Specific maintenance measures for the machine are detailed in the "Excavator Maintenance Catalog". Users should undertake maintenance items according to requirements and machine working hours.

To demonstrate structural features of the machine, some pictures in this manual are set as structural perspective views, so the appearance may be different from the actual product. If the excavator mechanical structure and technical parameters change due to technical improvements, which are not listed in this manual, please consult Digger King for the latest product information on the product.

**Using or repairing the machine:** The relevant instructions must be followed, and if necessary, you can contact our technical team. When purchasing accessories, please indicate the excavator's serial number to ensure you are provided with the correct parts or attachments.

Due to the continuous innovation of our product technology, this manual reserves the right of interpretation and modification.

If the product does not match the pictures in this manual, the product shall prevail.

Warning! This machine must not be used for the following purposes:

- Lifting operations;
- Lifting operations (if used for lifting operations, additional protection should be installed).
- Disassembly (if used as a disassembly machine, protective devices must be installed);
- Areas subject to falling object hazards (no overhead guard or FOPS installed)
- Areas with unhealthy environments, such as polluted areas;
- Lightning weather.

Warning: Unsafe use of this machine may result in serious injury or death. Operators and maintenance personnel must read this manual before operating and maintaining this machine. This manual should be placed near the machine for easy access, and all personnel related to the machine should refer to this manual.

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# Chapter 1 Safety Precautions And Safety Signs

## 1.1 Safety Precautions

### General precautions

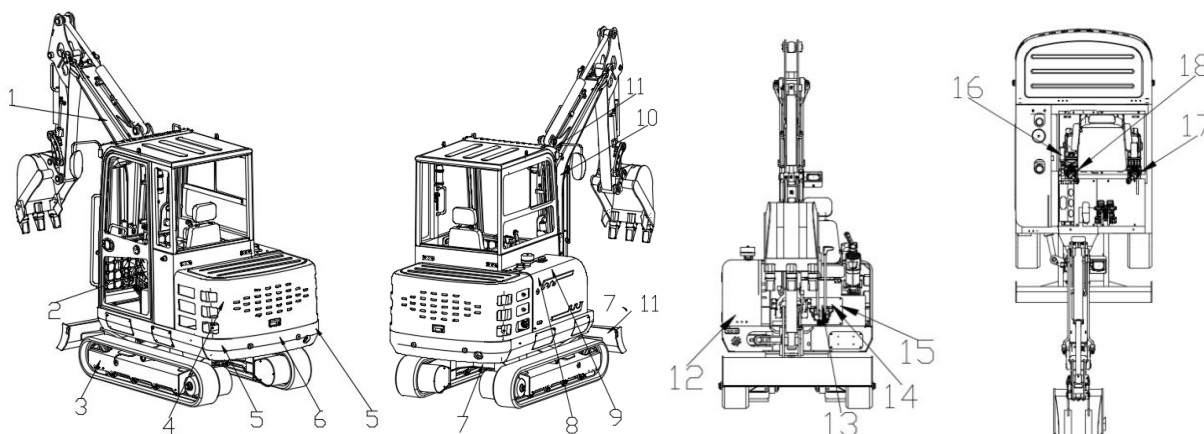
You must comply with the safety regulations and laws of the relevant departments and operate, inspect, and maintain the machine in accordance with the manufacturer's requirements.

## 1.2 Safety Identification Tips

Use the following warning and safety signs.

1. Be sure to fully understand the correct location and content of the logo.
2. To ensure that the logo is clearly visible, please make sure that the logo is positioned correctly and keep it clean. When cleaning the logo, do not use organic solvents or gasoline, otherwise it will peel off.
3. In addition to warning and safety signs, there are other signs that are treated in the same way.
4. If the marking is damaged, missing, or illegible, please replace it. Please refer to this manual or the actual marking for the specific marking part number and send the order to the factory.

## 1.3 Safety Sign Location



(1) Brand and model

(2) After operating the machine, release the operating lock.



△ This mark is the operation lock mechanism. After operating the machine, lower the operation lock lever to prevent the driver from operating it by mistake.

(3) Direction



(4) Inspection qualification mark



(5) It is strictly forbidden to stand within the operating range.



△ It is strictly forbidden to stand within the operating range of the machine.

△ Note the turning radius of the machine.

(6) Brand and model (latter)

(7) Bundling transport point



(8) Hydraulic oil filling port



(9) Fuel filling port



△ Refuel at designated locations.

△ When refueling, the engine should be turned off and all open flames should be kept away.

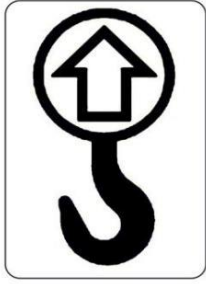
(10) No one is allowed to stand under the working device



△ It is strictly forbidden to stand in the working area of the machine.

△ Do not damage or remove the markings on the machine.

(11) Hoisting position



(12) Note that the machine operating noise is 93dB



△ Warning: Under certain specific operating conditions of the machine, the actual noise value may be different from the value determined using the noise test code.

The measured A-weight transmitted sound power is 92 dB(A).

The guaranteed sound power is 93 dB(A).

The uncertainty of the noise emission value is 3.5 dB.

(13) Notes on operation, inspection and maintenance



△ The instructions should be read before operation, maintenance, disassembly, assembly, and transportation.

△ Be careful not to damage or lose it.

(14) Maintenance Label

## MAINTENANCE PRECAUTIONS

VORSICHTSMAßNAHMEN FÜR DIE WARTUNG



- Pin, buttering is recommended every 10 hours  
Stift, Buttering wird alle 10 Stunden empfohlen
- Track tensioning device, check before use, if the track becomes loose, please add butter immediately  
Kettenspannvorrichtung, vor Gebrauch prüfen, wenn sich die Kette lockert, bitte sofort Butter zugeben

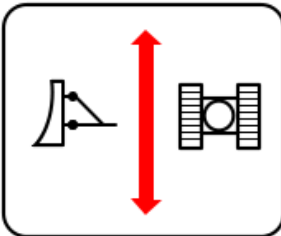
Filter name Filtername	The first time Time Zeit		das erste Mal maintenance mode Wartungsmodus		Normal Time Zeit		normalerweise maintenance mode Wartungsmodus	
	Air filter Luftfilter	50H		cleaning Reinigung		100H		replacement Ersatz
Diesel filter Dieselfilter	50H		replacement Ersatz		200H		replacement Ersatz	
Hydraulic oil filter Hydraulikölfilter	100H		replacement Ersatz		300H		replacement Ersatz	

RPPA service website: [www.rppaservice.com](http://www.rppaservice.com)  
(Website des RPPA-Service)

## (15) Excavator excavation parameters

Lift capacity ratings	
A: Load radius	Conditions of operation
B: Load point height	2012mm Big arm
C: Lift capacity ratings	1110mm ARm
Cf: Rated loads over front	weight: 2578.5kg
Cs: Rated loads over side	Track width: 230mm
(Unit: kg)	Track spacing: 990mm
Load point height (Unit: m)	Load radius A (Static-bulldozer support)
	1.5      2      2.5      Max(5.0)
	Cf   Cs   Cf   Cs   Cf   Cs   Cf   Cs   A(mm)
1.5	1163   293   837   179   797   142   531   342   3848
1	1575   1148   1017   434   1032   530   559   335   3912
0.5	1515   999   1197   689   855   499   581   329   3893
0 (Grade)	1760   1077   1287   766   907   526   798   403   3788
-1	1787   1111   1098   792   958   565   826   450   3788
-1.1	1814   1230   1014   811   989   594   855   478   3272

## (16) Bulldozer operation

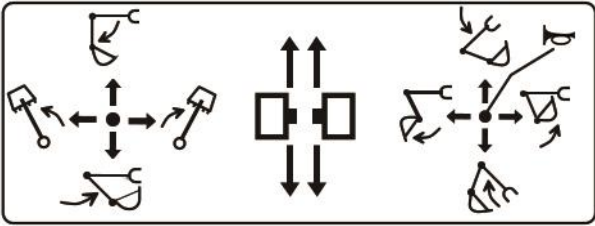


## (17) Wear ear protection when operating an excavator



△ With ear protection warning

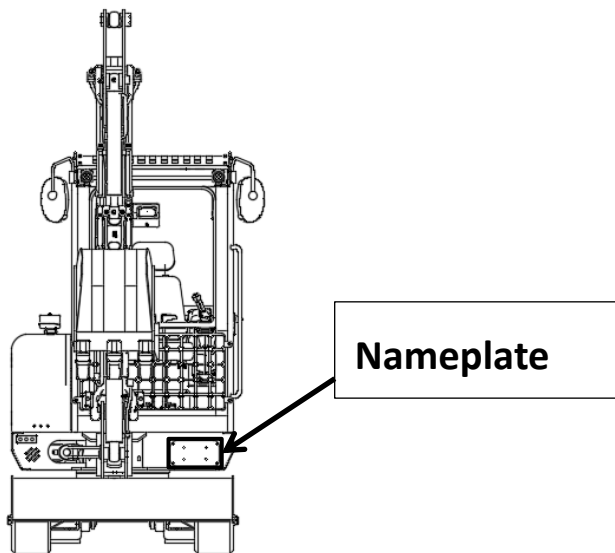
## (18) Schematic diagram of excavator operation



△ Perform basic operations of the excavator according to the above diagram. Operate the excavator strictly according to the markings.

## 1. 4 Nameplate

Nameplate location



## 1. 5 Safety Information

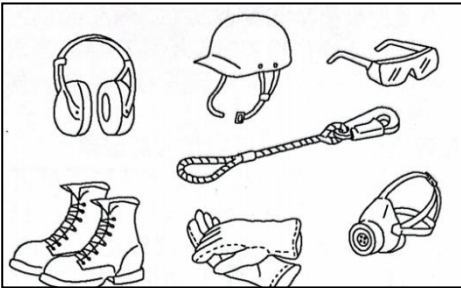
### Safety Rules

Only trained and instructed personnel may operate and maintain the machine. All safety rules, precautions, and instructions should be followed when operating or maintaining the machine.

Being under the influence of alcohol or drugs can severely reduce/impair the ability to safely operate or repair machinery, placing yourself and others at risk. When working with other operators or on-site traffic controllers, ensure that everyone understands all hand signals used.

## Exception handling

If any abnormality is found (sound, vibration, odor, incorrect instrument display, smoke, oil leakage, etc., or abnormal alarm device or monitor display), it should be reported to the supervisor immediately and necessary measures should be taken. Do not operate the machine until the fault is corrected.



## Work clothes and protective equipment for operators

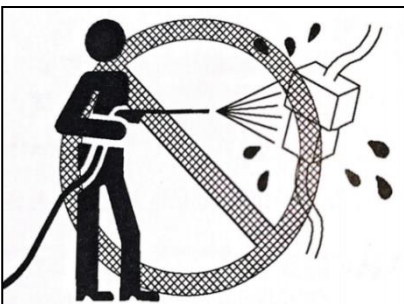
Do not wear loose clothing and accessories. Excavators have hanging joysticks or other protruding parts. If your hair is too long and sticks out of the helmet, there is a risk of it getting entangled in the machine. Tie your hair up and be careful not to let it hang around the machine. Wear a hard hat and safety shoes. When operating or maintaining the machine, wear safety glasses, masks, gloves, earplugs, and safety belts as needed. Before use, check that all protective devices are functioning properly.

## Safety

Make sure all shields are in place. If a shield is damaged, repair it immediately.

Understand how to use safety equipment and use it correctly.

Do not remove any safety devices and keep them in good working condition.



### **Keep the machine clean**

1. If water enters the electrical system, there is a risk of malfunction or failure. Do not flush the electrical system (sensors, connectors) with water or steam.
2. If the machine being inspected or maintained is contaminated with mud or oil, there is a risk of slipping and falling or a risk of dirt getting into the eyes.
3. Always keep the machine clean. Keep the operating position clean while driving and be sure to remove mud and oil from the soles of your shoes.
4. If there is mud or oil on the soles of your shoes, your feet will slip when you operate the pedals, causing serious malfunctions.

### **Lock and leave the operator's seat**

1. Before standing up from the operator's seat (when opening or closing the front window or roof window, or when installing, or adjusting the seat), lower the working device completely to the ground and put the operating lock in the locked position. Then turn off the engine.

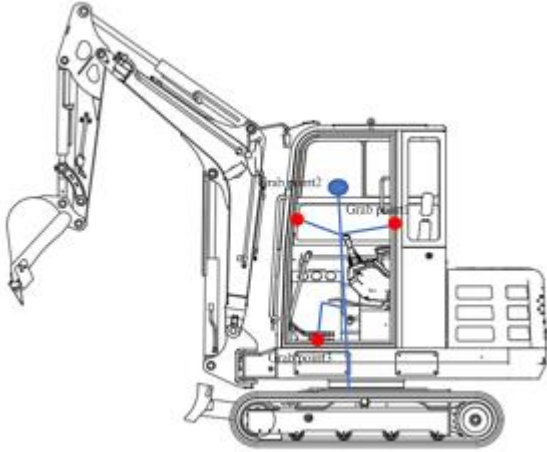
If the lock is accidentally touched, it may cause the machine to move suddenly and cause serious injury or damage to the machine.

2. When leaving the machine, be sure to lower the working device completely to the ground, pull the operating lock firmly to the locked position, and then turn off the engine. Lock all equipment with the key, remove the key and put it in the designated place.

### **Handrails and ladders**

To prevent personal injury from slipping or falling from the machine, follow these requirements.

1. When getting on or off the machine, use the handrails and ladders indicated in the illustration.



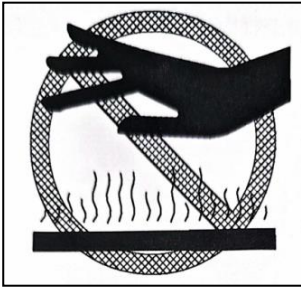
2. To ensure safety, face the machine and support yourself by maintaining three points (two feet, one hand, or two hands and one foot) of contact with the handrails and steps (including the track plate).
3. Do not hold the joysticks when getting on or off the machine.
4. Onto the hood or shield without anti-slip mats.
5. Check the handrails and steps (including the track plate) before getting on or off the machine. If there is oil, grease, or mud on the handrails or steps (including the track plate), wipe them off immediately. Keep these parts clean. If damaged, repair them and tighten any loose bolts.
6. Operate the machine while you are holding the tool in your hands.

### **Getting on and off the machine**

1. Do not jump on or off the machine. Do not get on or off the machine while it is moving.
2. If the machine begins to move without an operator, do not jump on the machine and attempt to stop it.

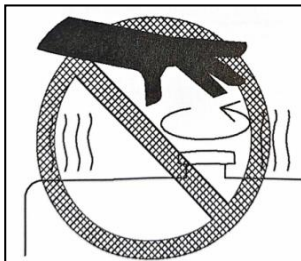
### **Do not sit on the equipment**

Do not allow anyone to sit on the bucket, log grab, or other attachments as there is a risk of falling or serious injury.



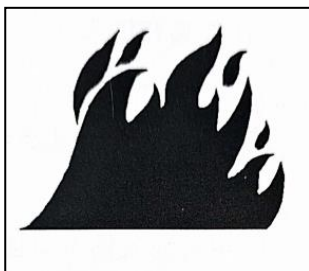
### **Coolant**

To prevent heat injuries from hot water or steam jets when checking or draining the coolant, wait until the water cools down, use the radiator cap to test you can safely touch at a comfortable temperature before starting the operation. Even if the coolant has cooled, loosen the radiator cap slowly to release the internal pressure of the radiator before removing it.



### **Hot oil**

When checking or draining the oil, to prevent the oil from being sprayed out or causing burns due to contact, please wait until the oil cools down before touching the cap or plug to relieve the internal pressure before removing the oil cap.



## **Fire and explosion-proof**

### **Fires caused by fuel or oil**



Fuel, motor oil, antifreeze, and window cleaner are extremely flammable and dangerous. To prevent fires, the following must be observed:

1. Do not smoke or use an open flame near fuel or oil.
2. Turn off the engine before refueling.
3. Do not leave the machine unattended while adding fuel and oil. Keep fuel and machine oil tank caps tight.
4. Do not spill fuel on hot surfaces or components of the electrical system.
5. Refuel or store oil in a well-ventilated area.
6. Engine oil or fuel oil should be stored in designated areas, with unauthorized access not permitted.
7. After adding fuel or oil, wipe off any spilled fuel or oil. When grinding or welding on the lower body, move flammable materials to a safe place before starting.
8. When cleaning parts with engine oil, only non-flammable engine oil should be used. Diesel and gasoline are easy to ignite; do NOT use them.
9. Place oily rags or other flammable items in a safe container to ensure the safety of the scene.
10. It is strictly forbidden to weld or cut pipes containing flammable liquids.

### **Preventing fire caused by the accumulation of flammable materials**

Remove dry leaves, wood chips, paper, dust, or other flammable material that has accumulated in or around the engine, exhaust pipe, muffler, battery, or hood.

### **Preventing fire caused by a short circuit in the electrical system**

1. Keep the wire contacts clean and securely fastened.

2. Check the wires for looseness or damage daily. Tighten loose connectors or wire clamps, and repair or replace damaged wires.

### **Preventing fire caused by hydraulic lines**

Check that all hoses and clamps, guards, and bumpers are securely in place.

If it is loose, it will vibrate and rub against other parts during operation, causing damage to the hose and high-pressure oil spray, creating a fire hazard or serious injury.

### **Preventing explosions caused by lighting equipment**

1. When checking fuel, engine oil, battery electrolyte, window cleaner, or coolant, use an explosion-proof light. Failure to use this lighting equipment may result in an explosion that could cause serious injury.

2. When the power supply of the machine is used for lighting, please follow the regulations of this manual.

### **Actions to take in case of fire**

If a fire occurs, follow the instructions below and leave the machine quickly.

Turn the start switch to OFF to shut down the engine.

Use handrails and steps to exit the machine immediately.



### **Prevent dropping, spilling, and intrusion**

The unit must not be used in hazardous locations where there is a risk of falling objects unless the Falling Object Protective System (FOPS) or top guard is installed.

### **Accessory Installation**

When installing the selected attachments or accessories, please contact our service staff in advance.

Digger King is not responsible for any injuries, accidents, or product failures caused by the use of unapproved attachments or parts.

When installing and using selected accessories, please read the accessory instruction manual and the general instructions about the accessories in this manual.

### **Combination of accessories**

Depending on the type or combination of working devices, there is a risk that the working device may hit the cab or other parts of the machine. When used by unfamiliar workers, check for the risk of impact and operate with caution.

### **Unauthorized modifications**

Any modification not approved by Digger King is dangerous and strictly forbidden. Please contact our service staff regarding any modifications.

Digger King will not be held responsible for accident or warranty claims should unauthorized modifications be made.

Before commencing operation, the work area should be thoroughly inspected for unusual and hazardous conditions.

1. There is a risk of fire when operating near combustible materials such as thatched roofs, dry leaves, or hay, so operate with caution.
2. Check the topography and conditions of the ground at the job site to determine the safest operating procedures. Do not work where there is a risk of landslides or falling rocks.
3. If there are water pipes, conduits, or high-voltage wires buried beneath the work site, contact the various utilities and mark their locations, taking care not to break or damage any lines.
4. Take necessary measures to prevent any unauthorized persons from entering the work area.
5. When working on highways, signal personnel should be arranged, and fences should be installed to ensure the safety of traffic and pedestrians.
6. When walking or working in shallow water or soft land, check the type and condition of the rock formation and the depth and flow rate of the water before working.

## **Working on soft ground**

1. Avoid walking or operating the machine near cliff edges, embankments, and deep canals. In these areas, the ground is soft and there is a risk of falling or tipping over if the ground gives way under the weight or vibration of the machine. Remember that these places can change after heavy rain, blasting, or earthquakes.
2. When working near embankments or trenches, there is a risk of loosening the soil due to the weight and vibration of the machine. Take measures to stabilize the ground to prevent the machine from tipping or falling.

## **Ensure good visibility**

To ensure safe operation or walking, check whether there are people or obstacles around the machine and check the conditions at the work site. Follow the steps below:

1. When working in a dark place, turn on the work light and headlight mounted on the machine, and set up auxiliary lighting in the work area if necessary.
2. If visibility is poor, or if there is fog, snow, rain, or dust, cease operation.



## **Ventilation of enclosed areas**

Engine exhaust can be deadly.

If the engine must be started in an enclosed area, or when handling fuel, cleaning oil, or paint, doors and windows should be opened to prevent gas poisoning to ensure adequate ventilation.

## **Asbestos**

Asbestos dust in the air can cause lung cancer if inhaled. There is a risk of inhaling asbestos when doing demolition work or handling industrial waste in the workplace. One of the following rules must be followed.

1. When cleaning, spray water to reduce dust, and do not use compressed air.
2. If there is a possibility of asbestos dust in the air, the machine must be placed in a conspicuous

location and all personnel should use approved dust masks.

3. During operation, other personnel are not allowed to approach.

4. Comply with job site regulations and environmental standards.

### **Signalman's signals and gestures**

1. Set up signs on the embankment or soft ground. If visibility is poor, arrange signalmen if necessary. Operators should pay special attention to these signs and follow the instructions of the signalmen.

2. Before starting work, make sure all workers know all signals, hand signals, and cab emergency exits.

# Chapter 2 Preparation Before Work

Before operation, you should fully understand the vehicle's condition and operating area to ensure safety.

## 2.1 Fuel quantity check

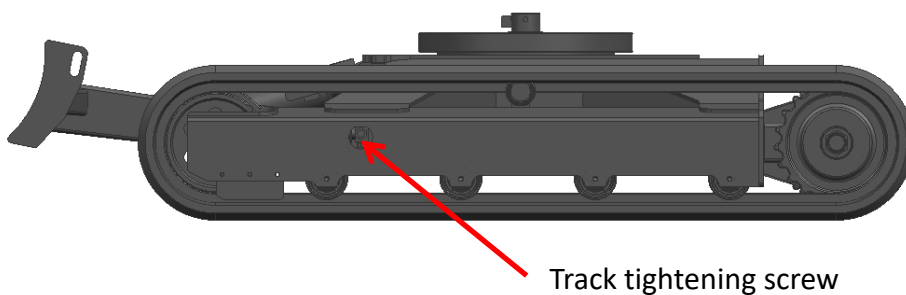
### Fuel quantity inspection

Before operation, the fuel capacity of the vehicle should be checked. When the fuel is insufficient, the fuel should be replenished in time to avoid the exhaustion of fuel and the air entering the machine, and the machine may not be able to ignite after refueling.

Due to the different climates, areas with lower winter temperatures must choose diesel suitable for the local temperature. For example, if the minimum temperature is -20 degrees, the diesel needs to be -30# diesel, otherwise the diesel will freeze, making it difficult/ impossible to start the machine.

## 2.2 Track tension check

Before operation, check the track tension. If the track is too loose, inject a proper amount of grease to tighten the track (as shown in the figure below). The adjustment ports of different models are slightly different in form, but the positions are roughly the same. Please refer to the actual product.



If the crawler track is too loose, it is easy to fall off when turning, turning around, or walking on one side. Once the crawler track falls off, it can be difficult to reinstall it.

## 2.3 Check the hydraulic oil and oil level

Before operation, check whether the hydraulic oil is level. If the oil level in the hydraulic oil tank

is too low or the machine is tilted, the oil pump will not be able to suck oil and the vehicle will not move (the movement will be stagnant, the oil pump and hydraulic pump will be severely worn or even damaged). It is necessary to add hydraulic oil or level the vehicle. If there is no hydraulic oil or the machine cannot be leveled, you can try to operate the joystick to lift the boom to the height of the vehicle and then start the machine. If there is any movement, first adjust the vehicle to a level, and then add hydraulic oil.

### **Hydraulic oil inspection**

This excavator uses 46 (specific gravity 0.8/viscosity index 47) anti-wear hydraulic oil.

Different climates vary greatly. Too low or too high a temperature will affect the viscosity of the hydraulic oil, resulting in unstable system pressure.

Insufficient or abnormal oil flow may even accelerate the wear of the oil pump. Special climate areas (too cold or too hot) should be combined with local climate

Choose hydraulic oil suitable for local temperature according to the conditions. In order to deal with the environment, hydraulic oil may cause the excavator to lose performance.

As for safety issues, the following is a reference for selecting hydraulic oil under special ambient temperatures:

- ① When the working environment temperature is lower than  $-18^{\circ}\text{C}$ , it is recommended to replace the low-temperature or ultra-low-temperature anti-wear hydraulic oil.
- ② When the working environment temperature is  $-5\sim-18^{\circ}\text{C}$ , it is recommended to replace 32 # anti-wear hydraulic oil.
- ③ When the working environment temperature is higher than  $-5^{\circ}\text{C}$ , customers do not need to replace the hydraulic oil separately unless there are special circumstances.

Warning: Waste hydraulic oil should be disposed of in accordance with local regulations and should not be dumped.

Note: When the machine is cold and started, bubbles are likely to appear due to the low temperature of the hydraulic oil and the viscosity of the hydraulic oil. This is a normal phenomenon. After the vehicle is started, the bubbles will gradually dissipate as the temperature of

the hydraulic system rises.

### **Oil and oil level check**

Check the engine oil before the operation to see if it is sufficient (because the machine may work in various situations such as climbing, descending, and tilting, the oil should be close to the dipstick limit to prevent the pump from draining oil). If it is insufficient, refill it immediately (because the engine works slowly, it is necessary to check the oil level regularly). Otherwise, it will cause excessive wear or cylinder scuffing of the engine. Cylinder scuffing, lack of oil, or other problems will not be covered by warranty.

## **2.4 Check lubrication points**

Before operating the excavator, check all lubrication points. Generally, add grease to each lubrication point every 4 to 8 hours of operation. The amount of grease should be sufficient, and the frequency of grease should be increased when the working conditions are poor.

## **2.5 Check the tightness of the fixing bolts of important components**

Important parts include the rotating bracket, rotating motor, and engine. Before operation, check whether the fixing bolts of these parts are loose. If the bolts are loose, they must be tightened immediately. If necessary, consult the manufacturer. Failure to check or tighten the loose bolts may cause serious problems such as interruption of the rotating bracket and rotating motor gears, engine shedding, and damage to the fan and water tank.

## **2.6 Oil leakage inspection**

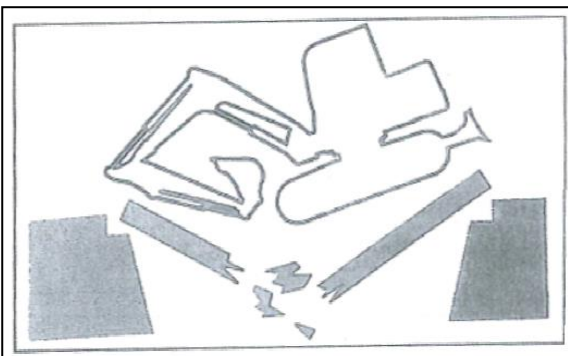
Before the operation, you should observe the surroundings of the vehicle and check whether there is oil leakage on the excavator chassis. If there is, it should be fixed or repaired in time.

## 2.7 Check the operating area



1. Check terrain and ground conditions in the area of operation.
2. Check the building structure and take safety measures if necessary.
3. Avoid walking in places such as ditches, underground pipes, trees, cliffs and shelves.
4. Avoid power lines or hazardous areas such as rock falls or landslides.
5. Check the location of buried gas pipes, water pipes, and power lines.
6. Follow safety measures as necessary.
7. When working on roads, always consider the safety of pedestrians and vehicles, and use signalmen or signals. Isolate the operating area and prohibit access by unauthorized personnel.
8. When working in water or crossing shallow streams, check the water depth, firmness of the ground, and speed of the water flow in advance.

## 2.8 Check the strength of the bridge



When working on a bridge or building, if the strength is insufficient, the bridge or building should be reinforced prior to works.

## 2.9 Always keep the machine clean



1. Wipe off oil, grease, dirt, snow, or ice to prevent accidents.
2. Clear all loose objects and unnecessary equipment from the machine.
3. Remove dust, oil, or grease from engine parts to prevent them from catching fire.
4. Clean the operating valve seats and remove any unnecessary debris in the machine.

## 2.10 Daily inspection and maintenance

Abnormal conditions or damage to the machine that is not identified and repaired will result in malfunction. Before operation, immediately carry out inspection and repair as required.

If an accident or engine failure occurs, stop the machine immediately until the failure is resolved.

## 2.11 Use of bucket

The bucket capacity used is 0.08 cubic meters.

**WARNING:** Please note the mass and volume rating of the bucket; the density of the material should be considered.

# Chapter 3 Safe Operation Of The Machine

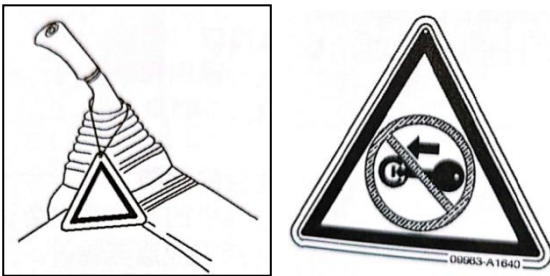
## 3.1 Starting the engine

If there is a warning sign on the joystick, do not start the engine or touch the joystick.

NOTE:

Personnel must receive the necessary training, be familiar with potential hazards, and have the skills to solve problems.

Only trained and authorized personnel can operate and maintain the machine. Operators should receive training and operate and maintain the machine strictly in accordance with this manual.



## 3.2 Preparation before startup

Before starting the engine, turn on the main power switch, turn the start switch, press the decompression switch after the engine speed reaches a certain level, release the start button immediately after the engine ignites, and confirm whether the start button bounces back.

It is strictly forbidden to turn the key after the engine is started. This operation will damage the starter motor and the engine flywheel gear and potentially destroy the starter housing and burn the starter coil. In addition, excessive turning of the fire key will cause the key to not rebound. After the engine is started, the starter gear cannot be separated from the engine. When the engine is running at high speed, the current in the starter will rise rapidly, causing the coil to burn.

The starting key has built-in dust removal, which can effectively prevent dust, water, and other substances from entering the key. Once impurities such as water enter the key, it will cause the lock

cylinder to get stuck or an internal short circuit, damaging the starter motor. Therefore, avoid leaving the key out in the rain or in humid or dusty environments. If you need to leave the key, you must take protective measures and store in a cool dry place.

Special attention: If the diesel engine still cannot start after 10 seconds, please wait for 15 seconds before starting it (starting the power supply continuously for a long time will cause a large amount of battery power consumption and the starter may burn out). This may cause damage to the starter.

Winter start method: The model has a preheating function. When the weather is too cold, the key switch must be turned in the opposite direction and held for 8 to 10 seconds (it cannot be used for a long time, otherwise the battery will lose power), and then the engine can be started normally.

After turning on the machine, the main power switch and the 1st gear key are turned on, otherwise the battery cannot be charged.

After starting the engine, the following operations and inspections should be performed in an area without people or obstacles. If a fault is found, the engine should be shut down and the fault should be reported according to the procedure.

1. Preheat the engine and hydraulic oil for 5-10 minutes.
2. Check whether the instruments and alarm devices are normal.
3. Check for any noise.
4. Test the engine speed.
5. Do not use starting fluid on the engine. Starting fluid can cause explosions and serious injury or death.
6. Preheat the engine and hydraulic oil. If you operate the control levers without preheating, the machine will not react or move quickly or accurately, causing an accident.

### **3.3 Operation**

#### **Check after starting the engine**

When checking, move the machine to a wide, unobstructed area and operate it slowly. No one is allowed to approach the machine.

Always wear your seat belt.

Check that the machine motion is consistent with that shown on the control mode card.

If not, use the correct control immediately.

Check the operation of instruments and equipment, and check the operation of the bucket, dipper arm, boom, traveling system, swing system, and steering system.

Check for sounds, vibrations, heating, smells, or gauges for oil or fuel leaks.

### **3.4 Workstation Setup**

#### **Get on board**

1. Entering the vehicle from the left side, the operator pulls the operating lock upwards.
2. Move the operating lock upward to the end position.
3. Place your hands on the designated handles and push down the steps to get on the cab.
4. Swivel and sit in the seat operating position.

#### **Adjusting the driver's seat**

The driver's seat should be adjusted to a fatigue-free, comfortable working position. All control elements must be operated safely. Longitudinal seat adjustment (seat spacing).

Pull up the longitudinal adjustment lever of the seat, push the seat back, loosen the adjustment lever, and adjust the seat position. Note: Make sure the valve seat is fixed.

#### **Spring preload adjustment**

(Excavators with air seats) The seat weight can be adjusted by rotating the knob on the front of the seat.

1. Increase spring tension to accommodate the weight of heavy operators by turning the adjusting valve clockwise.
2. Reduce spring tension to accommodate the weight of a light operator by turning the adjusting valve counterclockwise. Adjust the seat using the method above for good suspension comfort.

#### **Backrest adjustment**

Gently move the backrest away and lift the joystick on the left side of the seat. Release the joystick

by leaning forward or backward to adjust the desired sitting position. The backrest should be adjusted in such a way that the joystick can be safely operated with the operator's back fully resting on the backrest.

Note: The maximum RMS value of whole-body vibration is 0.5 m/s<sup>2</sup>. The uncertainty of whole-body vibration measurement is 0.1 m/s<sup>2</sup>.

### **Seat belt**

1. Fasten your seat belt.
2. Make sure the seat belt is secure.

Note: It is strictly forbidden to operate the excavator without wearing a safety belt.

### **3.5 Check rearview mirror**

Check the rearview mirror settings to see if the sight line reaches the best observation position. If not, you can adjust the rearview mirror up and down by moving the rearview mirror housing until the best viewing position is ensured.

Clean the rearview mirror: Use a damp or dry cotton cloth to wipe the rearview mirror and frame from left to right and from top to bottom until the rearview mirror is clear. Clean and adjust the rearview mirror to the appropriate position.

### **3.6 Description of display and operating units**

The switches of the display and operating unit are multifunctional and can also be used to navigate the menus in the display. Each function is described in detail in its own chapter.

#### **1. The Oil supply indicator**

The fuel supply indicator shows the relative amount of fuel in the tank.

#### **2. Charging indicator**

When the charging circuit voltage is insufficient, the charging indicator light comes on.

#### **3. Oil pressure indicator**

When the oil pressure is lower than the set value, the oil pressure indicator light comes on.

### 3.7 Other equipment on the driver's seat

The cab is described below.

#### Command Box

The command box is located directly in front of the console.

#### Gauge adjustment button

If the excavator is equipped with a track gauge adjustment device, the excavator's crawler track telescopic range is 990 mm ~ 1300 mm.

Put the warp switch in the expanded position, then step on the dozer pedal and take a step forward to extend the track and a step back to shorten the track.

#### Oil level indicator

By observing the pointer on the oil level indicator, unscrew the oil level gauge, take out the oil level gauge, prevent the oil sump from coming out, and then fill it.

#### Battery disconnect switch

Using the battery disconnect switch, the main circuit can be disconnected.

#### Horn switch

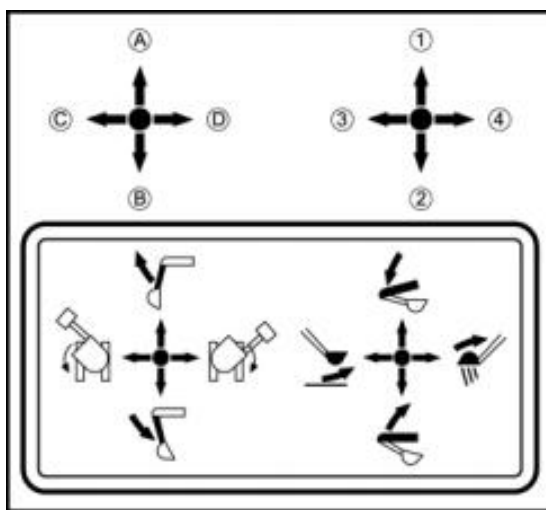
The horn switch is used to control the horn on and off and to sound the horn as a warning. The horn switch is located at the center button of the right operating handle.

### 3.8 Joystick Function Overview (Default Settings)

The figure and table show the functions of the left and right joysticks.

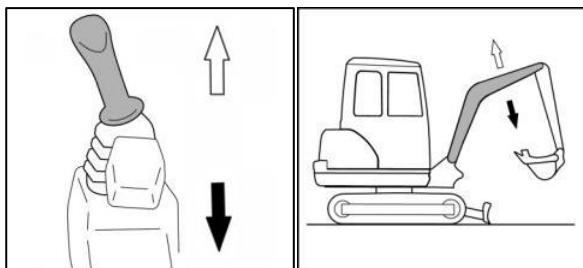
Joystick		Action
Right joystick	1	Lower the boom
	2	Raise the boom

	3	Put away the bucket
	4	Open bucket
Left joystick	A	Lower the stick
	B	Raise the arm
	C	Rotate the cab left
	D	Rotate the cab right



### Boom Operation

When the excavator encounters an overload condition, always lower the boom until the load reaches the ground. To raise the boom, pull back using the right joystick. To lower the main boom, push forward using the right joystick.



Note:

Boom vibration is 2.5 m/s<sup>2</sup>.

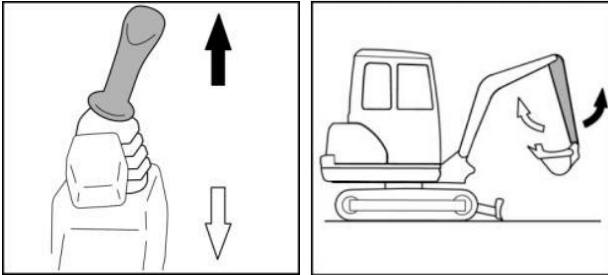
The uncertainty of boom vibration measurement is 0.5/s<sup>2</sup>.

Take note while lowering to ensure that there are no personnel or cargo under the boom.

### Stick Operation

To raise the stick, push the left joystick forward; to retract the stick, pull the left joystick backward.

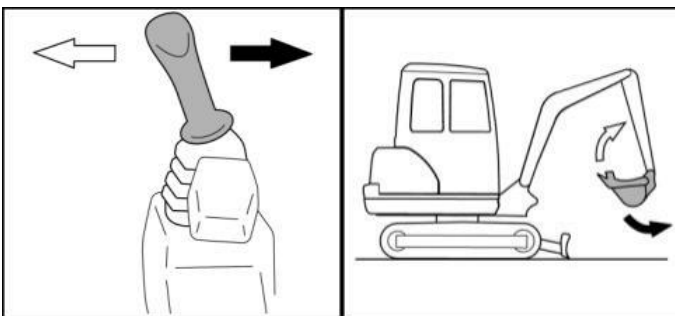
The joystick moves as shown.



To raise the bucket, use the right joystick to pull to the left. To empty the bucket, use the right joystick to push to the right.

When loading into the bucket, make sure the bucket teeth do not hit the front plate of the dozer.

The bucket moves as shown.



### 3.9 Cab

The cab protects passengers from injury or death in an accident, especially in the event of a rollover.

The top of the cab is an anti-pressure device. If the device is deformed, welded, twisted, etc. during daily use, please contact Digger King immediately for advice.

Disassembly process

1. Fix the rope to the lashing point on the top of the cab and put the lifting equipment in the lifting

state.

2. Remove the fixing screws around the cab.
3. Operate the equipment and slowly raise the cab.
4. Move the cab to the left /right and slowly place it to complete the disassembly work.

#### Installation Steps

1. Secure the ropes to the lashing points on top of the cab.
2. Slowly lift the device, slowly raise the roof, and move it to the installation location.
3. Use bolts to secure the cab's mounting holes, making sure the roof does not tilt or wobble on the machine.
4. Loosen the lashing points of the lifting device to complete the installation.

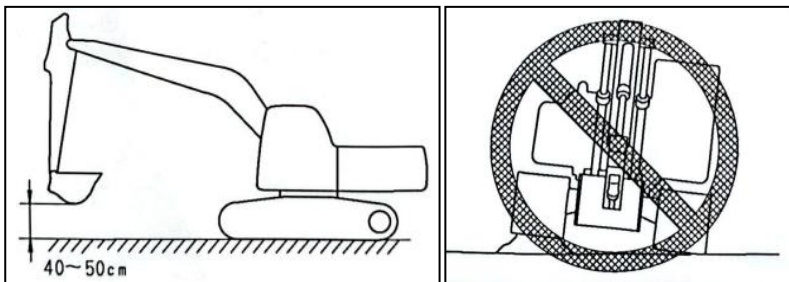
### **3.10 Safety precautions for rotation**



1. Before driving, position the machine so that the dozer blade is in front of the operator's seat. If the dozer blade is behind the cab, operate the machine in the opposite direction (walking inverted forward and backward, turning inverted left and right). Pay special attention when operating the machine in this situation.
2. Before walking, please check whether there is anyone around and whether there are any obstacles.
3. Before walking, honk the horn to alert people around you.
4. The machine can only be operated while sitting in a seat.
5. No one except the operator may ride this machine.
6. Check whether the walking alarm device is working properly.

7. When the machine is running or rotating, be especially careful not to hit other machines or people.
8. Even if the machine is equipped with a rearview mirror, the above precautions must be followed.

### 3.11 Travel safety precautions

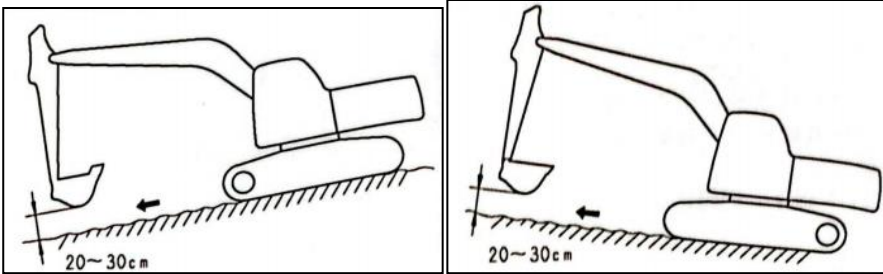


1. When walking on level ground, the working device should be 40~50cm (16~20 inches) off the ground.
2. When traveling on rough and uneven ground, travel at a low speed and do not suddenly operate the steering to avoid the danger of the machine overturning. The working device may hit the ground, causing the machine to lose balance and damage the machine or structure.
3. When traveling on rough ground or steep slopes, if the machine is equipped with an automatic deceleration device, turn off the automatic speed reduction switch. If the automatic speed reduction switch is turned on, the engine speed will increase and the travel speed will increase suddenly.
4. Try to avoid moving over obstacles. If the machine must move over obstacles, make sure the working device is close to the ground and move at a low speed.

Walk fast on the road.

5. When walking, or operating, always keep a safe distance from people, buildings, or other machines and avoid contact with them.
6. When crossing a bridge or building, first check that the structure is strong enough to support the weight of the machine.
7. When traveling on the highway, first check with the relevant authorities and follow their instructions.
8. When operating in tunnels, under bridges, under power lines, or other places with limited height, operate slowly and take special care not to let the working device touch anything.

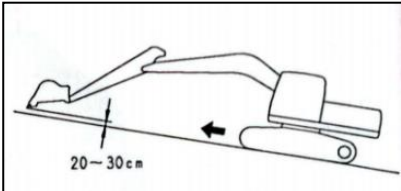
### 3.12 Walking on a slope



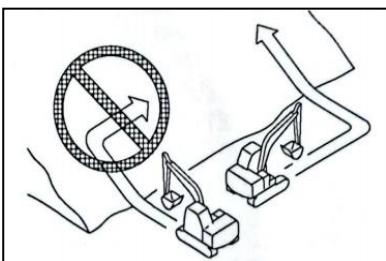
To prevent the machine from tipping over or sliding, follow these requirements. When walking on a slope, keep the working device 20 to 30 cm (8 to 12 inches) off the ground. In an emergency, the working device can be quickly lowered to the ground to stop the machine from working.

When traveling uphill, turn the cab uphill, and when traveling downhill, turn the cab downhill.

When traveling, check the hardness of the ground in front of the machine. When climbing a steep slope, extend the working device forward to increase balance, keep the working device 20 to 30 cm (8 to 12 inches) off the ground, and travel at a low speed.



On the current slope, reduce the engine speed, move the joystick close to the "middle" position, and walk at a low speed. It is dangerous to walk up and down the slope in a straight line, turn on the slope, or cross the slope.



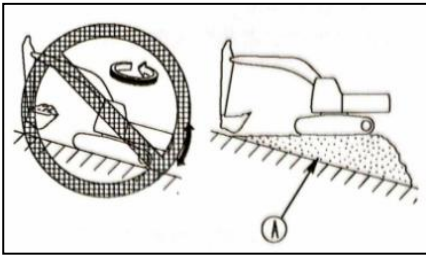
Do not turn on or through a slope. Always go down to a flat area, change the position of the machine, and then go up the slope. Go at a low speed on grass, fallen leaves, or wet steel plates, because even on a slight slope, at 130 degrees, there is a risk of the machine slipping.

If the engine stalls while the machine is traveling on a slope, immediately move the joystick to the "neutral" position to restart the engine.

### 3.13 Operating on a slope

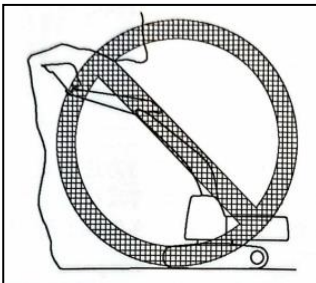
When working on a slope, the machine will lose balance and tip over when operating the rotating or working device. This may cause serious personal injury or equipment damage. Follow the following principles:

1. When performing these operations, a flat area should be provided, and the operation should be carried out with caution.
2. When the bucket is full, do not turn the working device from the uphill side back to the downhill side. This operation is very dangerous and will cause the machine to overturn.
3. If the machine must be used on a slope, build up as many platforms as possible (A).

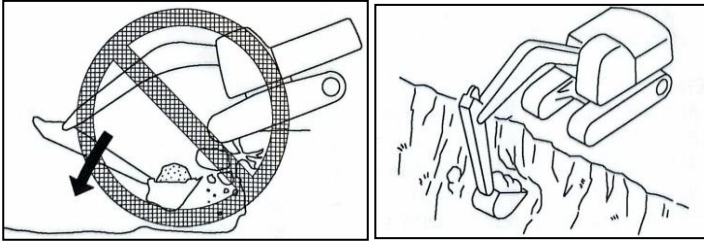


### 3.14 Prohibited Operations

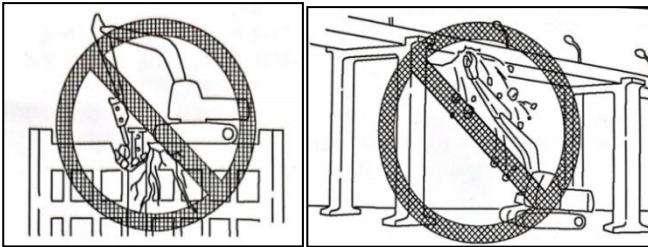
1. Do not dig the work surface below the overhanging part, as there is a risk of falling rocks or hitting the machine.



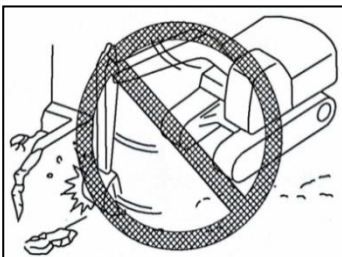
2. Do not dig too deep at the front and bottom of the machine. Otherwise, the ground under the machine may collapse and cause the machine to fall.



3. When digging, adjust the crawler tracks to a right angle with the shoulder or cliff. The sprocket is at the rear, making it easy to withdraw the machine in any situation.
4. Do not perform disassembly operations under the machine as this will make the machine unstable and there is a risk of it tipping over.
5. If working in a building or other structure, check the strength of the structure before starting work to avoid the risk of the building collapsing and causing serious injury or damage.



6. When disassembling, do not remove the pins. This creates a risk of broken parts falling or the building collapsing, causing serious injury or damage.



7. Do not use the impact force of the attachment to break objects, as there is a risk of material breaking and causing personal injury or damage to the attachment.
8. Generally speaking, a rollover is more likely to occur when the working device is on the side than when it is at the front or rear.
9. When using a hammer or other heavy working device, there is a risk of losing balance and tipping over. When operating on flat ground and slopes: Do not suddenly drop, turn around, or stop the working device. Do not suddenly extend or retract the boom. This can easily cause the machine to tip over due to the impact force.
10. Do not pass the bucket over the heads of other workers or over the operator's seat of dump trucks and other transport equipment. The load is likely to fall, and the bucket could hit the dump

truck, causing serious injury or damage.

### **3.15 Snow Day Operation**

1. Snow-covered or icy roads are slippery. When walking or operating the machine, be especially careful not to operate the joystick suddenly. Even a small slope can cause the machine to slip, so be especially careful when working on a slope.
2. For frozen ground, when the temperature rises, the ground will become soft, causing the machine to roll over.
3. If the machine enters deep snow, there is a risk of rolling over or being buried in the snow. Be careful not to leave the shoulder of the road or roll over in the snow.
4. When clearing snow, there may be objects on the road shoulder and near the road that are buried in the snow and cannot be seen. There is a danger that the machine may hit the buried objects and overturn, so it must be operated with caution.

### **3.16 Parking**

1. Place the machine on a firm and level surface away from risk of rockfall or landslides, or where there is no risk of flooding.
2. Lower the working equipment to the ground.
3. When leaving the machine, pull the operating lock to the locked position and turn off the engine.
4. To prevent unauthorized persons from moving the machine, close the cab door and lock all equipment with the key. Remove the key, take it with you, and place it in the designated place.
5. If the machine must be parked on a slope, follow the instructions below.
6. Adjust the bucket to the downhill side and insert the bucket into the ground.
7. Place pads under the tracks to prevent the machine from moving.

### **3.17 Transportation**

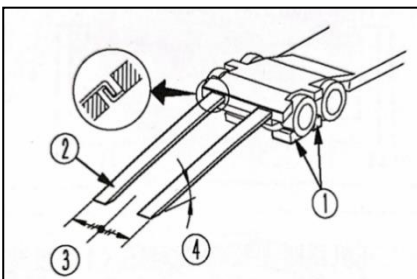
For easy transportation, the machine can be divided into several parts. Therefore, when transporting the machine, please contact the factory for advice.

### **3.18 Machine installation and uninstallation**

When loading and unloading the machine, incorrect operation may cause the machine to frequently tip over or fall, so you must be especially careful. Be sure to do the following:

1. Only install and unload on hard, level ground. Keep a safe distance from roadsides or cliff edges.
2. Do not install or uninstall the machine together with working equipment. There is a risk of the machine falling or tipping over.
3. Use a springboard of sufficient strength and ensure the width, length, and thickness of the springboard to provide a safe carrying slope.
4. Make sure the ramp surface is clean and free of grease, oil, ice, and loose materials. Remove dirt from the machine tracks. Be extra careful especially on rainy days because the ramp surface is slippery.
5. Turn off the automatic deceleration switch. Start the engine at a low speed and drive slowly. When on the ramp, do not operate any control lever except the travel lever.
6. Do not correct the direction on the ramp. If necessary, drive off the ramp in the correct direction, and then drive back onto the ramp. Where the ramp connects to the track or trailer, the machine's center of gravity changes suddenly, putting the machine at risk of losing balance. Move slowly across the connection.
7. When loading and unloading on the roadbed or platform, ensure that the roadbed or platform has appropriate width, strength, and slope. When rotating the trailer structure, the trailer is unstable, causing the working device to withdraw and rotate slowly.
8. For machines with a cab, load the machine and lock the door. If this is not done, the cab door may open unexpectedly during transport.

### 3.19 Transporting machines



(1) Pad (2) Springboard (3) Centerline of trailer (4) Angle of setting springboard

When transporting the machine on a trailer, do the following.

1. The weight, transport height, and overall length of the machine will vary depending on the working attachment, so you will need to confirm the dimensions.
2. When passing a bridge or building on private land, first check whether its structure is sufficient

to support the weight of the machine. When traveling on a highway, the relevant management agency should first check and follow its instructions.

Machine Recovery: If the excavator is trapped, use a crane to lift the entire excavator for recovery, following the lifting procedures and taking care to use the correct lifting points.

### **3.20 Bucket lifting operation**

It is generally prohibited to use standard-specification machines for lifting operations.

Bucket lifting.

Lifting operations are generally prohibited. However, lifting with a bucket is permitted if the operation meets specified conditions and only specified conditions.

Safety rules for lifting objects.

1. Lifting operations on slopes, soft ground, or other places where the machine is unstable.
2. Use wire ropes that meet the standards. Do not exceed the specified lifting load.
3. This is extremely dangerous if the load hits people or buildings. Before turning the machine a quarter turn, check that the surrounding area is safe.
4. Do not start, rotate, or stop the machine suddenly, causing the added load to sway.
5. Do not pull the load to one side or toward the machine.
6. Do not raise the operator's seat when lifting a load.

The lifting load of this machine is shown in the figure below.

Stability calculation table, with horizontal columns representing lever arm and bending moment, and vertical columns representing length (track bracket), vertical extension (backhoe), and horizontal bar.

The load lifting table is divided into two tables, the first table is for static working conditions, and the second table is for dynamic working conditions. The vertical axis is the load height, the horizontal axis is the distance of each section, CF is the bucket lowering angle, and CS is the bucket lifting angle.

### Lift capacity ratings



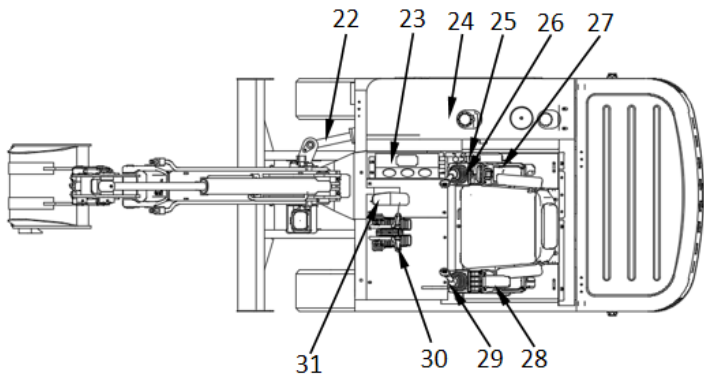
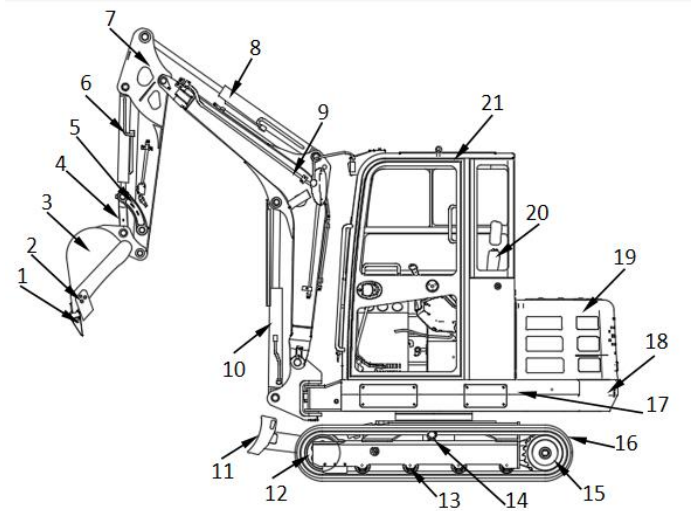
A: Load radius	Conditions of operation
B: Load point height	2012mm Big arm
C: Lift capacity ratings	1110mm ARm
Cf: Rated loads over front	weight: 2578.5kg
Cs: Rated loads over side	Track width: 230mm
(Unit: kg)	Track spacing: 990mm

Load point height (Unit: m)	Load radius A (Static-bulldozer support)								
	1.5		2		2.5		Max(5.0)		A(mm)
	Cf	Cs	Cf	Cs	Cf	Cs	Cf	Cs	
1.5	1163	293	837	179	797	142	531	342	3848
1	1575	1148	1017	434	1032	530	559	335	3912
0.5	1515	999	1197	689	855	499	581	329	3893
0 (Grade)	1760	1077	1287	766	907	526	798	403	3788
-1	1787	1111	1098	792	958	565	826	450	3788
-1.1	1814	1230	1014	811	989	594	855	478	3272

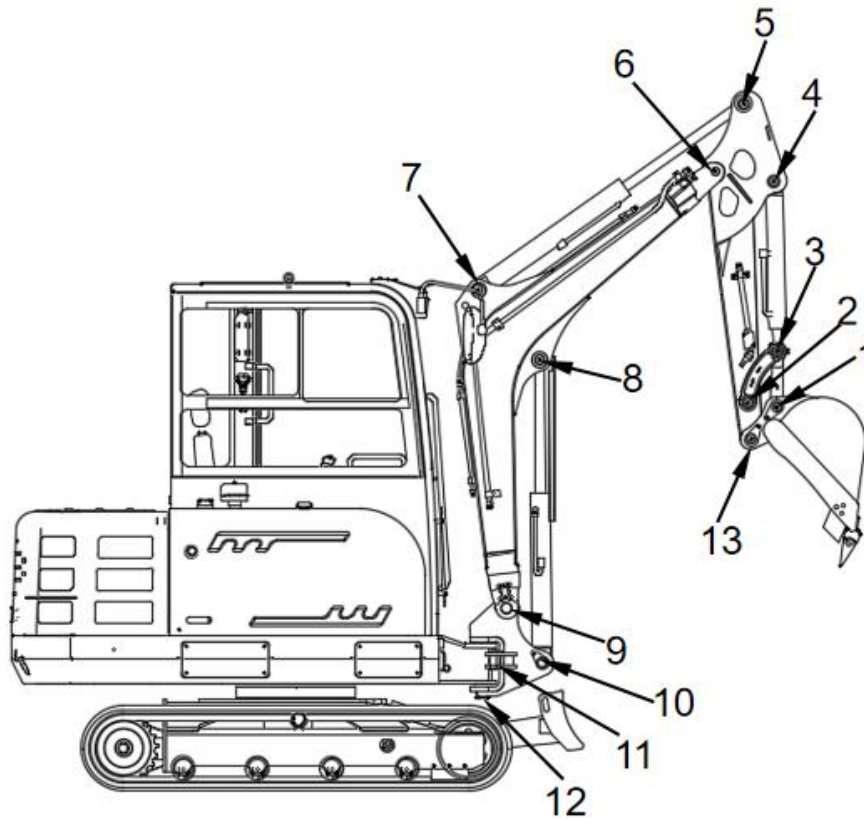
# Chapter 4 Basic Parameters Of Excavators

## 4.1 Basic parameters

Serial No.	Name
1	Main Tooth
2	Side Teeth
3	Bucket
4	Link
5	Joystick
6	Bucket Cylinder
7	Stick
8	Stick Cylinder
9	Boom
10	Boom Cylinder
11	Bulldozer
12	Drive Sprocket
13	Track Roller
14	Sprocket
15	Travel Motor
16	Rubber Tracks
17	Upper Plate
18	Counterweight
19	Shield
20	Seats
21	Cab
22	Side Swing Cylinder
23	Air Conditioner Indoor Unit
24	Side Guard
25	Bulldozer Handle
26	Right Pilot Handle
27	Right Armrest Box
28	Left Armrest Box
29	Left Pilot Handle
30	Walking Foot Valve
31	Broken foot valve



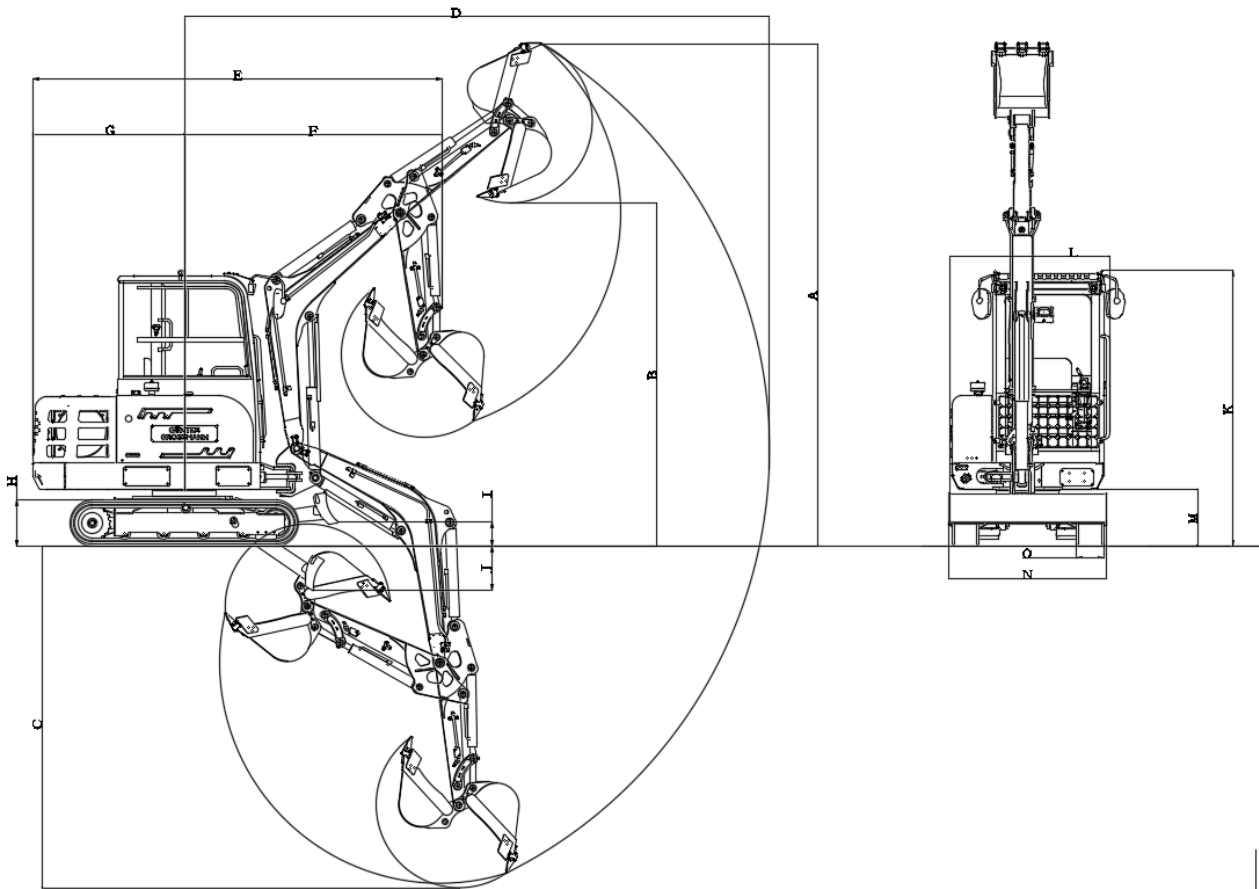
## 4.2 Hinge pins for machine working devices



Machine pin position indicator (King 3.5 ton)

Serial No.	Pin Connection
1	Bucket and connecting rod connecting pin
2	Connecting pin between rocker and arm
3	Connecting pins between rocker, connecting rod and bucket cylinder
4	Bucket cylinder and bucket arm connecting pin
5	Connecting pin between bucket cylinder and bucket
6	Connecting pin between arm and boom
7	Connecting pin between bucket cylinder and boom
8	Connecting pin between boom cylinder and boom
9	Connecting pin between boom and boom bracket
10	Connecting pin between boom cylinder and boom bracket
1 1	Connecting pin between side swing cylinder and boom bracket
1 2	Connecting pin between boom support and upper plate
1 3	Bucket and arm connecting pin

### 4.3 Main dimensions and specifications



Main digging range direction of the excavator King 3.5 ton

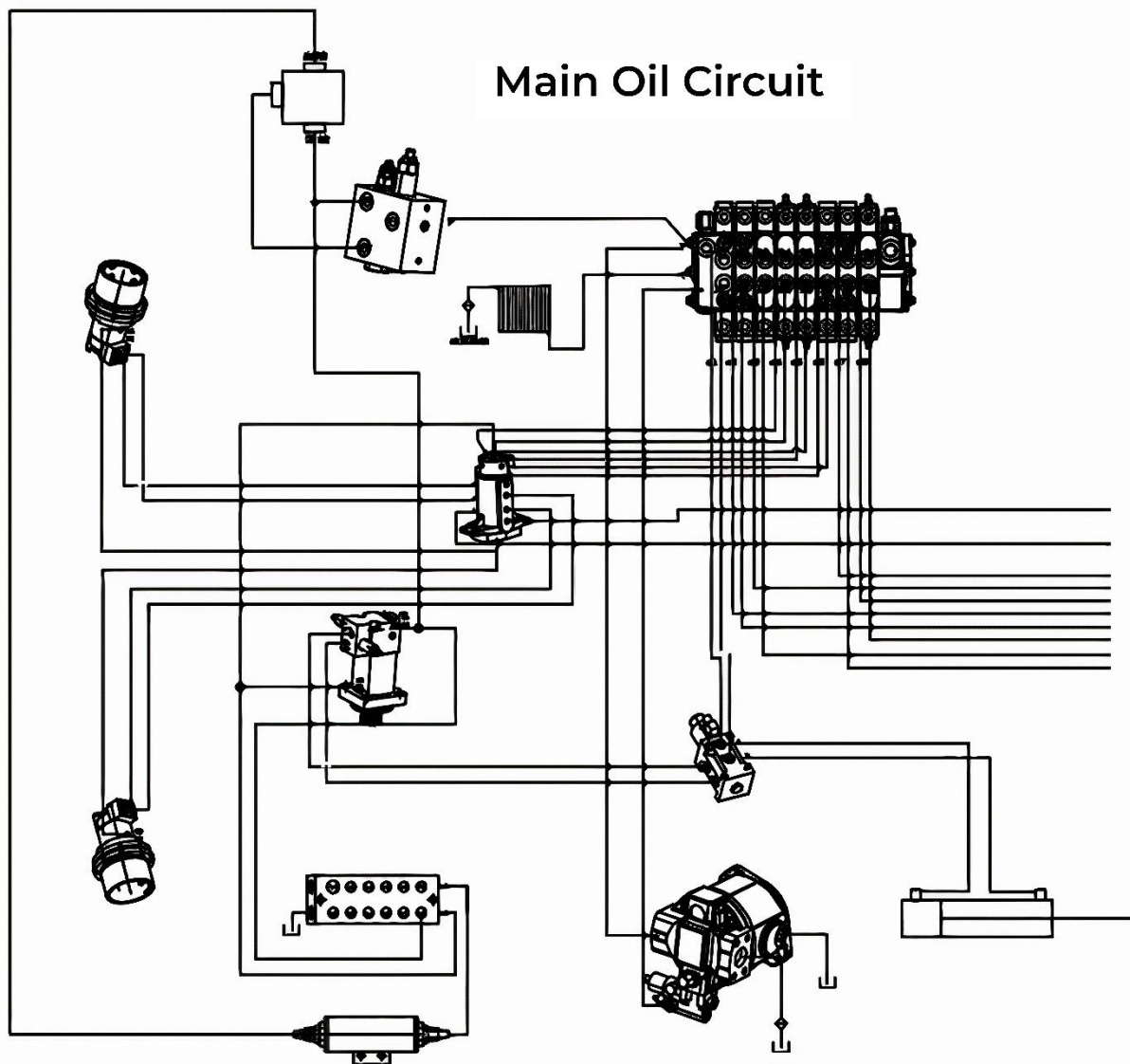
Working scope		Unit: mm
		King 3.5 ton
A	Maximum ground excavation height	4295
B	Maximum unloading height	2932
C	Maximum digging depth	2927
D	Maximum range of ground activities	5007
E	Transport length	3503
F	Turning radius	2179
G	Minimum tail turning radius	1324
H	Track height	391
I	Maximum lifting height	202

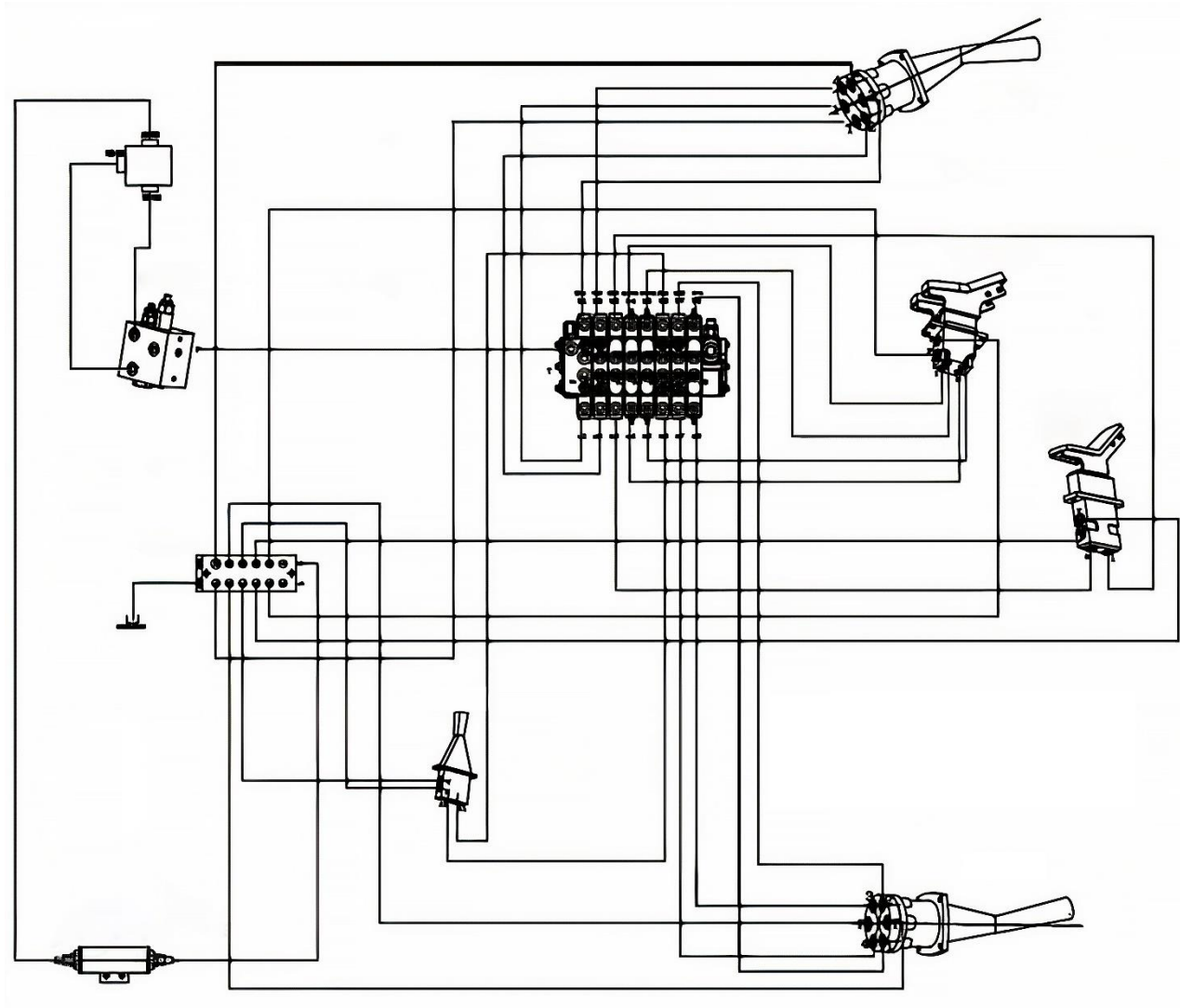
J	Maximum sinking height of bucket teeth	381
K	Overall height	2357
L	Overall width	1350
M	Height of vehicle body	486
N	Width of push shovel	1300
O	Track width	230

#### **4.4 Hydraulic schematic diagram and detailed information**

As an important part of hydraulic system design, the hydraulic schematic diagram clearly shows the working principle, structure, and control method of the hydraulic system. According to the hydraulic circuit of the machine based on the hydraulic schematic diagram, the problem of the hydraulic pipeline can be better solved.

# Main Oil Circuit

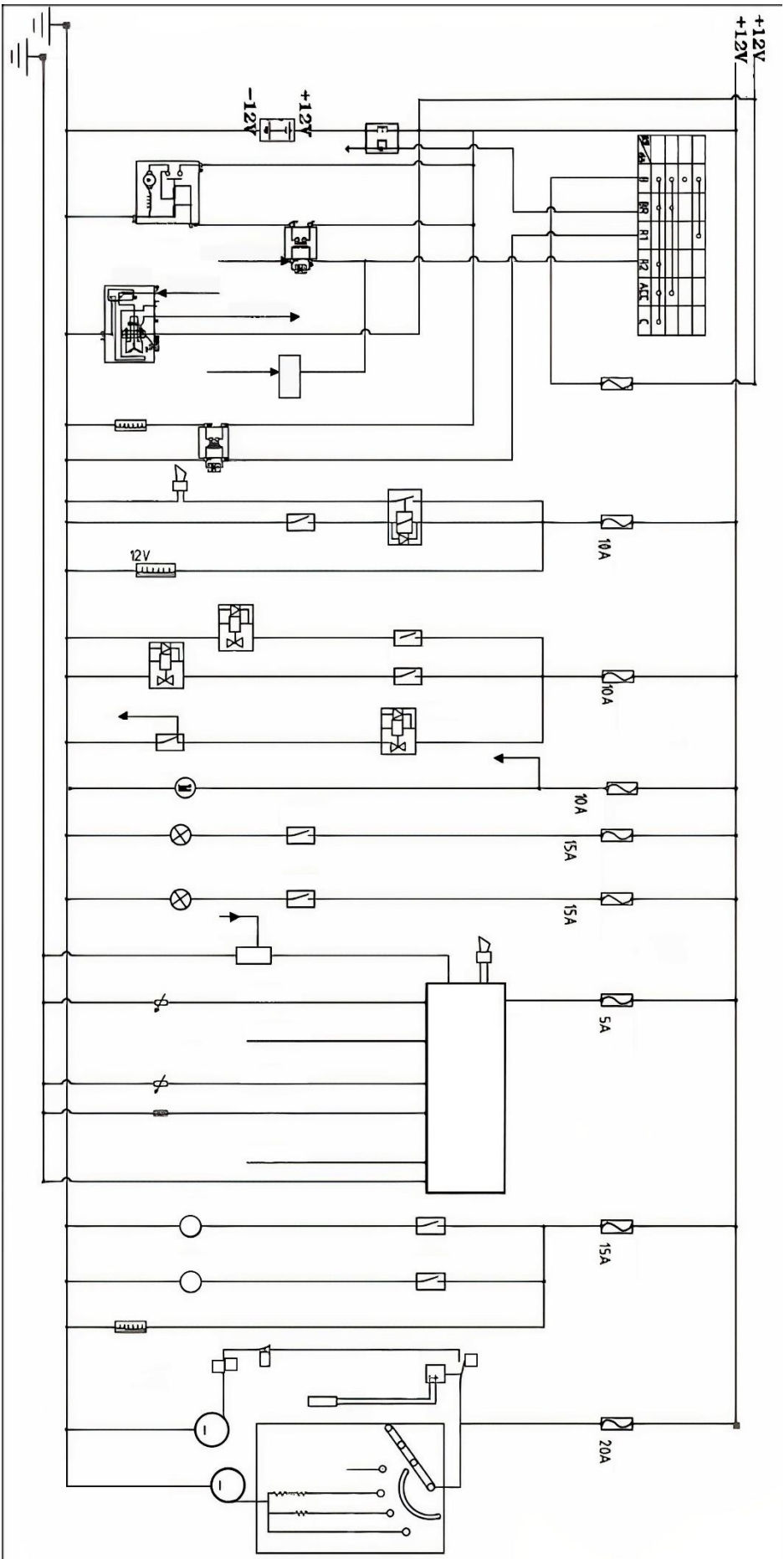




### 4.5 Electrical schematics and details

#### Electrical Schematic

As an important part of circuit design, electrical schematics are used to clearly show the working principle, structure, and control method of the circuit. Based on electrical schematics, we can have a comprehensive understanding of the electrical layout of the machine and can also be used to troubleshoot electrical problems.



## 4.6 Excavator parameter table

Model information configuration status ● Standard ○ Optional			King 3.5 ton			
Basic performance parameters	Machine working weight (kg)	2578.5	Engine	Engine Model	Kubota V1505	
	Bucket capacity (m <sup>3</sup> )	0.08		Maximum horsepower (hp)	25	
	Walking speed low/high (km/h)	0-1.5		Maximum power (Kw)	18.5	
	Climbing ability (%)	30%		Maximum speed (rpm)	2 300	
	Ground pressure (Kpa)	36.4		Displacement (L)	1.5	
	Maximum bucket digging force (kN)	22.5		Number of cylinders	4	
	Maximum digging radius (mm)	5007		Cooling method	Water Cooling	
	Maximum digging depth (mm)	2927		Engine oil change amount (L)	6	
	Maximum digging height (mm)	4295		Fuel form	diesel fuel	
	Maximum unloading height (mm)	2932		Fuel grade	0 / -10	
	Maximum deflection angle (°)	102		Theoretical fuel consumption (L/h)	1.3-1.5	
	Track extension range (mm)	-		Body	Transport length (mm)	3503
	/	/			Transport width (mm)	1350
Configuration	Cab	●	Transport height (mm)		2357	
	armrest	-	Counterweight ground clearance (mm)		486	
	Quick Change	○	Bucket width (mm)		400	
	Hydraulic quick change	○	Boom length (mm)		2220	
	Rake	○	Arm length (mm)		1620	
	Wood Grabber	○	Bulldozer blade width (mm)	1 350		
	Scarifier	○	tank	Fuel tank (L)	60	
	Breaker	○ φ45		Hydraulic oil tank (L)	52	
	Counterweight	●	track	0 -Rubber	230 * 48 *	

	Tension form	Grease tightening		(bandwidth*pitch*number of sections)	88
	air conditioner	•		0 -Steel (bandwidth*pitch*number of sections)	230 * 90 * 46
<b>Hydraulic system</b>	Main pump type/model	Piston pump / TFA10VS028DFLR -31R-PSA12N00		Rubber block (piece)	92
	Main pump brand	Taifeng Hydraulics			
	Main pump maximum flow (L/min)	64.4			
	Multi-way valve	8-way hydraulic control valve			
	Multi-way valve brand	Taifeng Hydraulics			
	Rated setting pressure (Mpa)	18			
	Maximum set pressure (Mpa)	20			
	Travel hydraulic motor type	BWV-1000WCD Modification			
	Travel motor brand	Zhenjiang Dali			
	Motor displacement	990			
	Swing hydraulic motor type	Pi 1 2.5 K			
	Displacement	245			

# Chapter 5 Common Faults And Solutions

## 5.1 Common faults of excavators and their solutions

Common faults	Cause	Solution
The machine has weak power and moves slowly	The overflow valve is clogged or too loose	Dismantle the cleaning device or tighten the relief valve
	Pump damage	Replace the hydraulic pump
	Oil pump intake pipe is blocked	Clean or replace the oil inlet pipe
	Engine failure	Contact Digger King to repair the engine
The machine does not work	Pump damage	Replace the hydraulic pump
	Connector spline damage	Replace the coupling spline
	The machine body tilts so that The hydraulic oil deflects to one side	Add hydraulic oil or adjust the machine to level
The machine cannot turn	The rotary motor gear falls off	Install the swing gear into place
	Rotating motor damage	Replacement of rotating motor
The engine emits faint blue smoke	Overfilling	Adjust the oil level according to the upper and lower limits of the oil gauge
	Engine failure	Contact Digger King
The engine emits faint black smoke	Air filter clogged	Clean or replace the air filter
	Engine failure	Contact Digger King
White smoke coming out of the engine	Mixing water and diesel	Drain the oil and rinse once with oil
The engine will not turn over	Relief valve stuck	Remove the relief valve, install gasoline, and add gasoline

	The relief valve is too tight	Adjust the loose relief valve
Engine misfire	Battery voltage loss	Rechargeable or with an external battery
	Diesel cannot be output to the pipeline because there is air in the pipeline	Unplug the diesel engine pipe on the engine, exhaust the air, and install or press the oil pump to exhaust
	Diesel Freeze	Choose the right diesel grade according to the local temperature
	Engine failure	Contact Digger King
	Nozzle clogged	Replace the nozzle
	Air filter plug	Replace the air filter
	The high-pressure oil pump damaged	Replace the high-pressure oil pump
	Fuse broken	Check and replace the fuse
	Electronic oil pump failure	Replace the electronic oil pump
	High pressure oil pump damaged	Replace the high-pressure oil pump
	Low temperature causes engine oil to be too thick	Use appropriate engine oil
The engine throttle can be large or small	The diesel fuel pipe is folded, causing the fuel supply to be unsmooth	Check the diesel fuel pipe and adjust the direction to ensure smooth fuel supply
Continue to increase the throttle	Engine throttle retainer locked	Loosen the engine throttle bracket
Can't increase the throttle	The throttle valve cable loose	Tighten the throttle valve cable
The headlight does not light up,	Line plug falls off	Check if the line plug is detached or loose

and the computer or display does not work	Damaged parts	Replacement parts
Battery not charging	Generator disconnection	Check engine wiring and reconnect
	Fuse failure	Replace the fuse
	Regulator damage	Replace the regulator
	Battery damage	Replacement battery
Tracks fall off	Mechanical tension relaxation	Support the machine, put the track into the tension wheel, start the machine, and use the rotation force of the drive wheel to adjust the mechanical tensioner until the track rises.
High engine temperature	Lack of antifreeze	Add antifreeze
	Cooling slot is blocked	Cleaning the cooling holes of the water tank
	Damaged thermostat	Replace the thermostat
	Impact of plateau climate	Replace the high-pressure water tank cap
	Engine failure	Contact the manufacturer to repair the engine
Oil pressure alarm	Lack of oil	Add oil
	Engine overheating	Check the coolant
	Sensor damage	Replace the sensor
	Line fault	Check the wiring
The excavator cylinder cannot move	Break the lever ball shaft or base	Replace the ball shaft or base if necessary
The operating lever cannot be	The fixing screws of the return spring of the multi-way valve	Reinstall the return spring or tighten the return spring fixing screw

returned or	stem are loose or fallen off	
pushed back	Valve core stuck	Remove the valve core and reinstall it

## **5.2 Clean the overflow valve (safety valve) and adjust the system pressure**

As one of the core components of the hydraulic system, the overflow valve plays a decisive role in the system pressure. If the overflow valve is too loose or stuck, the machine will be powerless, and move slowly, and the breaker will not move when walking, turning, or climbing. After adjustment, the excavator will run very fast when working and the oil temperature will rise too quickly.

## **5.3 Installing a single track**

First start the machine, lift the side of the machine body where the track has fallen off , remove the rubber track, then put the track into the guide wheel (be careful not to put the track in the wrong direction), pull the other end of the track, start the machine and the joystick at the same time to slowly turn the drive wheel, and use the driving force of the machine and the assistance of the pry bar until the track is fully loaded. Then, tighten the track by adjusting the tensioning device. Pay attention to safety during this series of operations. Improper operation can lead to serious safety accidents (such as getting caught in the track, the crowbar swinging or flying out, etc.). In case of uncertainty, please contact the manufacturer for guidance.

## **5.4 Engine won't fire when diesel runs out**

Once the fuel is exhausted and cannot ignite, first refill the fuel, and then use the fuel pump to inject a certain amount of fuel into the engine fuel supply pipe.

# Chapter 6 Maintenance And Care

## 6.1 Maintenance precautions

### Engine maintenance

As the main power system of the excavator, the engine needs to be maintained in accordance with the "Engine Operation Manual" carried on the vehicle. Strict maintenance in accordance with the provisions of the engine operation manual can effectively increase the service life of the engine and reduce the occurrence of failures.

The main maintenance contents include the following parts:

1. Engine running-in care.
2. Oil change cycle and refill (the oil will be slowly consumed as the machine is used, so it is necessary to check the oil level regularly, not just refill it once and wait until the next change. When the oil is low, it needs to be refilled in time, otherwise, it will cause serious consequences such as cylinder scuffing. Digger King will not provide a warranty for engine damage caused by insufficient oil).
3. Replacement cycle of oil filter and diesel filter.
4. Air filter replacement cycle. When inspecting or maintaining the machine, mark the "Do Not Operate" warning message to prevent unauthorized persons from starting the engine or touching the control handle. Before servicing, turn off the engine, remove the key, and take it with you. Mark the "Do Not Operate" warning message in a conspicuous location such as the start switch or control lever.

### Use the Right Tools

Do not use damaged or inferior tools or tools designed for other purposes. Use the right tool for the job.

## Regular replacement of safety-critical components

1. To ensure the long-term safe use of the machine, refuel and inspect and maintain it regularly. To improve safety, please regularly replace safety-critical components such as hoses and seat belts.
2. "Safety-critical parts that are replaced regularly" are parts that age, wear, and degrade after repeated use, and whose performance changes over time. These characteristics of such parts can cause serious mechanical damage or personal injury, and it is difficult to judge the remaining service life by visual inspection or operating feel alone.
3. If there is any visual appearance of damage, replace the "regularly replaced safety-critical parts" even if the specified replacement interval has not been reached.
4. Replace fuel hoses regularly. Fuel hoses wear out over time, even if there are no symptoms of wear.
5. Replace any component with signs of wear, regardless of the replacement schedule.
6. For safe use of the machine, please inspect and maintain the machine regularly. The following safety-critical parts must be replaced regularly to improve safety. Damage to these parts can result in serious personal injury or fire.

### Safety Critical Components List

Main Body	Safety-critical components that need to be replaced regularly		Replacement time
Fuel System	Fuel pipe		Every two years
	Filler on fuel tank cap		
Hydraulic System	Main pump	Hydraulic pipe (pump outlet)	Every two years
		Hydraulic pipe (pump suction)	
		Hydraulic pipe (swing motor)	
		Hydraulic pipe (travel motor)	
	Working equipment	Hydraulic pipe (arm cylinder pipe)	
		Hydraulic pipe (rod cylinder pipe)	
		Hydraulic pipe (bucket cylinder pipe)	
		Hydraulic pipeline (yaw cylinder pipeline)	

		Hydraulic pipe (bulldozer cylinder pipe)	
		Hydraulic pipe (pilot valve)	
		Hydraulic pipe (auxiliary pipe)	

## 6.2 Fuel Recommendation

Diesel fuel should meet the following standards. This table lists several fuel specifications currently used in the world.

Diesel Specifications	area	Diesel Specifications	area
GB252	China	BS2869-A1 or A2	U.K.
ASTM D975 Number: 1-D, S15	USA Canada	ISO 8217DMX	Internationally
Biodiesel Biodiesel blend B5 ASTM D6751, D7467			
EN590:96	European Union	Grade JIS K2204 2	Japan
Biodiesel blends (fuel sulfur content not exceeding 10ppm)			

1. To maintain engine performance and service life, always use clean, high-quality fuel. To prevent freezing in cold weather, choose a diesel fuel that is suitable for use when the temperature is at least 2°C lower than the lowest expected outdoor temperature.
2. Please use diesel with a cetane number of 45 or above. When using in cold or high-altitude areas, you need to use fuel with a higher cetane number.
3. Please use fuel with a sulfur content of less than 0.05~0.10 15% by volume (ultra-low sulfur fuel should be used in the United States or Canada). High-sulfur fuel may cause sulfuric acid corrosion in the engine cylinder.
4. The use of kerosene is prohibited. Do not mix kerosene, used engine oil or residual fuel with diesel.
5. Poor quality fuel can reduce engine performance or cause engine damage. Fuel additives are not recommended. Some fuel additives can reduce engine performance.
6. Metal content, such as zinc, sodium, silicon and aluminum, must be limited to 1 part per million

by mass (1 mass ppm) or less.

7. Use compliant biodiesel, the engine warranty is void for non-compliant machines or spoiled biodiesel.

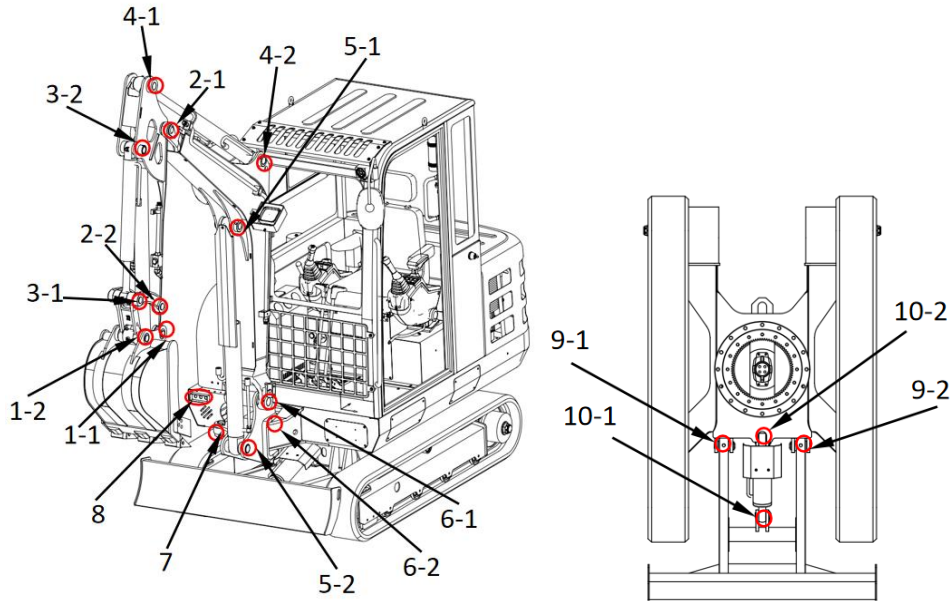
### 6.3 Description of machine lubrication parts

Lubrication area diagram

The details of the 20 fuel filler ports for the King 3.5 ton model are as follows:

Grease fitting position	quantity
(1) Bucket, rocker and arm connection	2
(2) Connection between the arm, boom, and connecting rod	2
(3) Bucket cylinder and bucket arm, the connection between the bucket cylinder and connecting rod and rocker arm	2
(4) The arm cylinder is connected to the boom, and the arm cylinder is connected to the arm	2
(5) Connection between boom cylinder, boom and boom bracket	2
(6) Connection between boom support bracket, boom, and upper plate	2
(7) Sway cylinder and boom support	1
(8) Lubrication of the gears of the rotary motor, lubrication of the inner ball of the rotary support, connection between the yaw cylinder and the upper plate	3
(9) Connection between bulldozer cylinder and lower plate, connection between bulldozer cylinder and bulldozer blade	2
(10) Connect the left and right legs of the dozer to the lower plate.	2

The total number of locations of the 20 fuel filler ports on the King 3.5 ton model:



The user must add sufficient grease to the above refueling point every 4 to 8 hours of work. ※

## 6.4 Maintaining the Directory

### Excavator maintenance catalog:

Excavator Repair Catalog						
Filter Name	First		Conventional		Model	Remark
	Cycle	Maintenance Methods	Cycle	Maintenance Methods		
Oil Filter	50 Hours	Replace	200 Hours	Replace	/	
Air Filter	50 Hours	Cleaning	200 Hours	Replace	/	For severe working conditions, the cleaning and replacement cycle will be shortened (air blowing, no washing)
Diesel Filter	50 Hours	Replace	200 Hours	Replace	/	
Air Filter	500 Hours	Replace	1000 Hours	Replace	/	
Hydraulic Suction Filter	300 Hours	Replace	600 Hours	Replace	/	

Hydraulic Return Filter	300 Hours	Replace	300 Hours	Replace	/	
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**Oil maintenance schedule:**

Name	First		Conventional		Model	Remark
	Cycle	Maintenance Methods	Cycle	Maintenance Methods		
Engine Oil	50 Hours	Replace	200 Hours	Replace	Cd 15w-40 (Pc10 Model)	Choose The Right Oil Type According To The Local Temperature
Antifreeze	Every Day	Examine / Replenish	One Year	Replace	Cf-4 15w-40 ( Other Models)	Cannot Be Mixed With Water Or Replaced With Water (Use Appropriate Anti-Freeze Type According To Local Temperature)
Diesel Fuel	Every Day	Examine / Replenish	/	/	/	Use Diesel Fuel From Regular Gas Stations. Poor Quality Diesel Can Damage Fuel Pumps, Injectors, And Other Components (Select The Appropriate Diesel Grade According To Local Temperature)
Hydraulic Oil	300 Hours	Replace	600 Hours	Replace	46#Anti-Wear Hydraulic Oil	
Travel Motor Gear Oil	50 Hours	Replace	500 Hours	Replace	L-CKD 220	
Grease	New Machine	Add To	8 Hours	Add To	/	
Water Tank Radiator	50 Hours	Cleaning	50 Hours	Cleaning	/	Air-Blowing Or High-Pressure Water-Washing
Hydraulic Oil	50 Hours	Cleaning	50 Hours	Cleaning	/	Air-Blowing Or High-Pressure

Radiator						Water-Washing
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**Important parts inspection list:**

Important Inspection Parts	Cycle	Maintenance Methods	Cycle	Maintenance Methods	Remark
Rotate The Motor Fixing Screw	30 Hours	Examine	30 Hours	Examine	If Loose, Tighten Immediately
Slewing Bearing Fixing Screw	30 Hours	Examine	30 Hours	Examine	If Loose, Tighten Immediately
Engine Fixing Screws	30 Hours	Examine	30 Hours	Examine	If Loose, Tighten Immediately
Track Tensioner	Before Work	Examine	Before Work	Examine	If The Track Is Loose, Add Grease Immediately

Note:

1. Please follow the maintenance cycle and perform regular maintenance. The manufacturer will not provide three warranties for equipment failures caused by untimely or no maintenance.
2. Use genuine parts when repairing. Inferior quality parts or oils may cause rapid wear or serious failure of the equipment.
3. Failure to regularly check the fixing screws of the rotary motor, slewing bearing, and the engine may cause accidents such as gear failure of the rotary motor, damage to the flange, gear failure of the slewing bearing, damage to the engine air ring, and water tank leakage. The manufacturer does not provide the three guarantees.

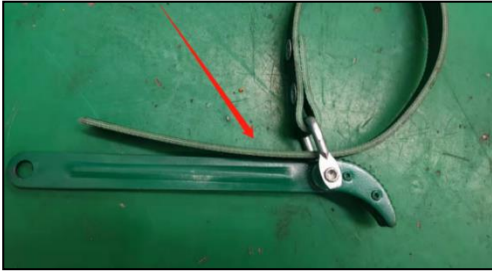
**6. 5 Changing the engine oil**

Oil change precautions

1. Oil change must be carried out when the engine is hot.
2. Do not start the engine during an oil change and before adding new oil.
3. Fill oil close to the upper limit of the dipstick but do not exceed the upper limit. The oil filter must be replaced when changing the engine oil.

King 3.5 ton model oil change method:

As shown in the figure below, unscrew the oil outlet screw, drain the oil, and collect it in a container. Unscrew the oil filler cap, add new oil to the engine, and tighten the oil filler cap after adding oil.



## 6. 6 How to replace the filter element

Below, to replace the filter element of the Kubota engine, you need to open the rear cover of the excavator first, and then you can see all the filter elements. First, use a wrench to remove the protective cover on the filter element, and then remove the filter element for replacement.

