ACHILLES

⚠ WARNING
Before operation and maintenance, the drivers and maintenance personnel shall always read and get understanding of the manual. Otherwise, fatal accident may occur. This manual shall be kept properly for future reference by the personnel concerned.

A60S HYDRAULIC EXCAVATOR
OPERATION & MAINTENANCE MANUAL

2025-6 VERSION 1

Preface

Welcome to use hydraulic excavator produced by Shandong Lingong.

The manual can instruct you to correctly use and maintain the machine, which will be placed in the cab to be read by all relevant personnel at any time. If the manual cannot be read due to loss or damage, you will immediately contact our company or distributor to ask for a new manual.

When selecting working machine and tool, you will dismantle, install, replace and use them as per operation manuals of working machine and tool.

In addition, you shall carefully read technical documents related to operation, use, repair and maintenance of diesel and other functional parts installed on the machine.

The company has been dedicated to enhancement and improvement of our products so that our products will be more advanced and reliable. We will reserve the right for making these changes, but we don't promise that these changes will also be brought to delivered products. We also reserve the right for changing data and machine and instructions for maintenance and repair. Design change and change about instructions for repair and maintenance will be conducted without notification. As for latest information of machine or questions about the manual, you can consult our company.

If you discover any defect when using our products, please timely feed the information back to us so that we can constantly enhance product quality and better comply with your demands.

The copyright of the manual is owned by Shandong Lingong Construction Machinery Co., Ltd. The manual cannot be copied or reprinted without written consent of Shandong Lingong.

⚠ Warning

Only personnel with corresponding qualification through professional training can operate, repair and maintain the machine.

Operators shall carefully read the manual before operating or maintaining the machine. Don't operate, maintain and repair the machine before reading and understanding the manual.

Operation instructions and prevention specified in the manual are only applicable to usage designated for the machine. If it is used in operations beyond the provision that are not prohibited, you must guarantee that this operation will not cause injury to you or others.

Operation and behavior that have been prohibited in the manual cannot be conducted under any circumstance.

Safety Matters

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

Most of accidents are caused as failing to abide by provisions on operation and maintenance of the machine. To avoid occurrence of accident, operators will read, understand and abide by all warning requirements and instructions in the manual and on the machine before operating and maintaining the machine.

As it is impossible to foresee all possible dangers, safety instructions in the manual and on the machine don't include all safety preventive measures. If steps and operations that are not recommended in the manual have been used, you must guarantee safety of you and others and will not damage the machine. If you cannot confirm safety of some operations, you can consult our company or distributor.

Preventive measures about operation and maintenance specified in the manual are just applicable to usage as per provision. If the machine is used in the scope that has not been listed in the manual, our company will not undertake any safety liability, safety liability in these operations will be undertaken by the user and operators.

Operations prohibited in the manual cannot be conducted under any circumstance.

The following markers are used to identify safety information in the manual:

⚠Danger—if it is not avoided, the dangerous consequence will cause serious injury or death. This word is also applicable that serious damage will be caused to the machine if the danger is not avoided.

⚠Warning—if it is not avoided, consequence of potential danger may cause serious injury or death. This word is also applicable that serious damage may be caused to the machine if the danger is not avoided.

⚠Attention—if it is not avoided, it may cause slight or intermediate injury. This word is also applicable that machine damage may be caused or lifetime of the machine may be shortened if the danger is not avoided.

CE labels and European Community (CE) directives

CE label

(Declaration of compliance with relevant decrees)

(Only applicable to machines launched in markets within the European Community/European Economic Community)

The machine is provided with CE marks. This indicates that the machine meets the “basic health and safety requirements” of the applicable EU regulations on safety of machine operation EU Machinery Safety Directive 2006/42/EC during delivery.

Anyone is also responsible for the safety when performing modifications that affect the safety of the machine.

The EU announcement on compliance with relevant decrees (EU Declaration of Conformity) issued by the Company for each vehicle will be attached to the machine during delivery as proof of compliance with the requirements. The notice also includes other auxiliary devices manufactured by the Company. The document shall be properly kept for at least ten years after consideration of its great importance and value. The document shall also be delivered when the machine is resold to others.

The safety shall be ensured at any time and in any case if the machine is used for other purposes or if additional equipment other than that introduced in the Manual is used. The personnel performing such operation are also responsible for this. However, such operation also requires a new CE mark in some cases and issuance of a new “EU announcement on compliance with relevant decrees”.

European Union (EU) and European Community (CE) regulations

The electronic equipment of the machine may interfere with other electronic equipment in some cases or be interfered by external electromagnetism, possibly causing safety problems.

The part of “EMC” (2014/30/EU) the European Union (EU) and European Community (CE) directives provides a general description about what requirements are formulated from the perspective of machine safety, how permissible restrictions are determined and proposed in accordance with international standards.

A machine or device meeting the requirements shall be provided with CE marks. Our machines have been specially tested for electromagnetic interference. The CE marks and declaration of conformity of the machine also include EMC regulations.

If the vehicle is equipped with other electronic equipment, the equipment must be provided with CE marks and tested on the machine for electromagnetic interference.

CE Statement

Mechanical instructions, EMC declarations

The Company makes a declaration: The mechanical directive of the machine meets the requirements of 2006/42/EC, and the EMC meets the requirements of 2014/30/EU (EN ISO 13766-1 and EN ISO 13766-2), all of which meet the European Union (EU) and European Community (CE) directives.

The information of EU representatives of the Company is as follows:

Person responsible for compiling the technical files established within the EU

Name, Surname	:	Zhang cinan ARAX Speditions-, Handels-, Beratungs-Agentur GmbH
Address	:	Leunaer Str. 7, 12681 Berlin, F.R. Germany

Declaration of noise directive

is herewith confirmed to comply with the requirements set out in the Council Directive on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors(2000/14/EC with amendment 2005/88/EC)

- Conformity Assessment Procedure: 2000/14/EC, amended by 2005/88/EC- Annex VII
- The notified body: TÜV Rheinland LGA Products GmbH (NB 0197)

  Tillystraße 2Đ - 90431 Nürnberg
- Rated power (Pel): 35.5 kW
- Representative sound pressure: 96 dB(A)
- Guaranteed sound pressure: 97 dB(A)

Responsible for marking this declaration is the

Manufacturer's Name	:	SHANDONG LINGONG CONSTRUCTION MACHINERY CO.,LTD.
Manufacturer's Address	:	Lingong Industry Park, Economic &Technological Development Area, Linyi, Shandong 276023,P.R.China

Person responsible for making this declaration

Name, Surname	:	Yang, Jiuhu
Position/Title	:	Manager

European safety regulations

Noise limit

Noise level at the driver's position (L_{PA}): 72.8 ± 1.5 dB (A), external radiation noise level LWA: 96 dB (A), in accordance with ISO 6395: 2008.

Vibration limitation

The vibration value of the cab seat meets the provisions of ISO 7096:2000, and the vibration value is: 0.976 m/s² for light machine operators; 0.522 m/s² for heavy machine operators.

EMC

The EMC of the machine meets the relevant requirements of ISO 13766-1 and ISO 13766-2. The machine can still work normally in an environment under certain electromagnetic effects, and the electromagnetism generated during working will not cause damage to the surrounding environment.

Warning in No. 65 Proposal of State of California

The State of California considers that the exhaust of diesel engine and some of its components can cause cancer, birth defects and other reproductive harm.

Warning

The product may expose you to chemicals, including ethylene glycol. The State of California has known that these chemicals will cause birth defects or other reproductive harm. Go to: www.P65Warnings.ca.gov for more information. Do not ingest the chemical. Wash your hands after processing, to avoid accidental ingestion.

Warning

The product may expose you to chemicals, including lead and lead compounds. The State of California has known that these chemicals will cause cancer, birth defects or other reproductive harm. Go to: www.P65Warnings.ca.gov for more information. Wash your hands after processing of compounds that may contain lead.

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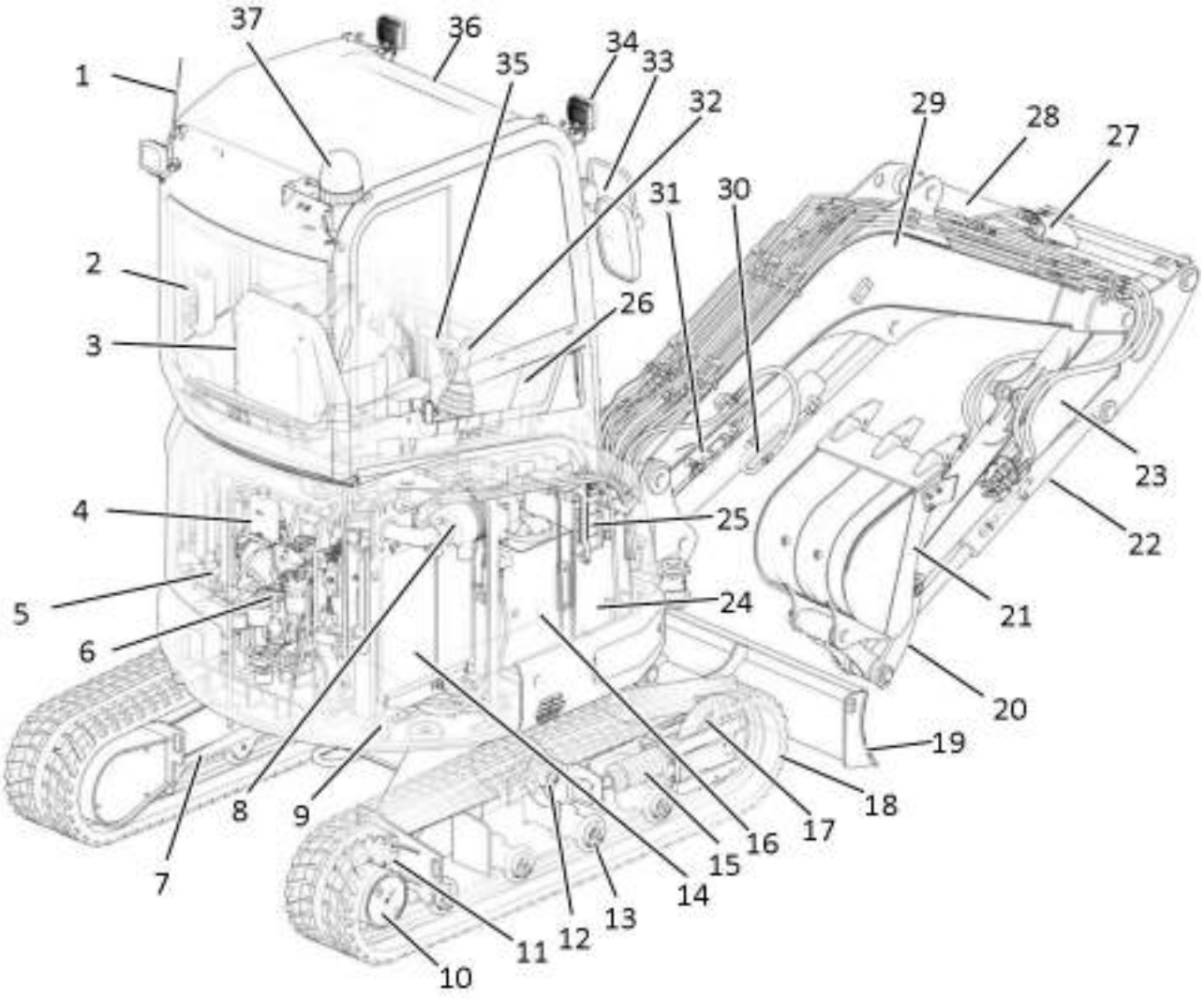
Chapter I Product Introduction

1 Appearance and names of components

This figure shows the appearance of the machine and the names of its main components. In this Manual, front, rear, left and right refer to the traveling directions viewed from the cab when the cab is facing forward and the traveling motor is at the rear of the machine.



1. Antenna 2. Sprinkling can 3. Seat 4. Auxiliary radiator 5. Main pump 6. Engine

7. Lower frame 8. Air filter 9. Upper frame 10. Traveling motor 11. Sprocket 12. Carrier roller 13. Track roller 14. Radiator 15. Tensioner 16. Hydraulic oil tank 17. Guide wheel 18. Track 19. Dozer blade 20. Connecting rod assembly 21. Bucket 22. Bucket cylinder

23. Arm 24. Fuel tank 25. Battery 26. IECU 27. Explosion-proof valve

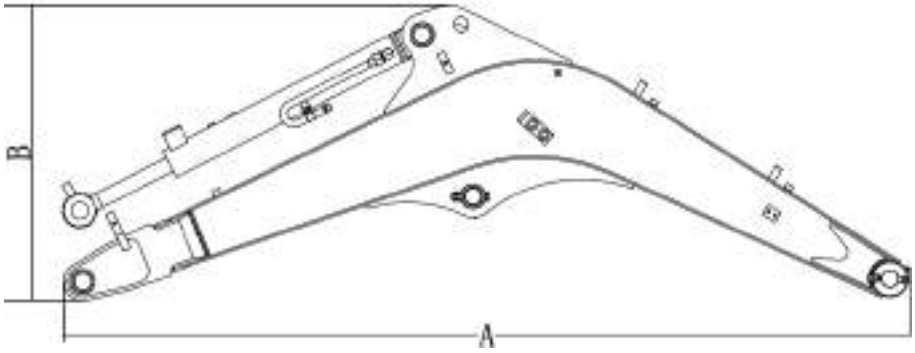
28. Arm cylinder 29. Boom 30. Boom cylinder 31. Explosion-proof valve 32. Control handle 33. Rearview mirror 34. Cab light 35. Traveling control handle 36. Cab

37. Warning light

2 Components, specifications, machine and operation dimensional drawings

2.1 Components and specifications

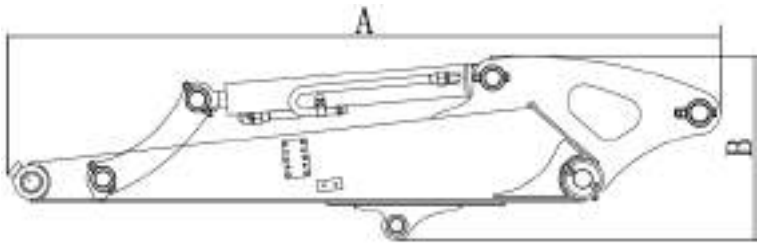
Boom



Description		ER655H
		2.8m (110.3 inch)
Length (A)	mm (inch)	2917 (114.9)
Height (B)		984 (38.8)
Width		362 (14.3)
Weight*	kg (lb)	324 (714.4)

* Including cylinders, piping and pins

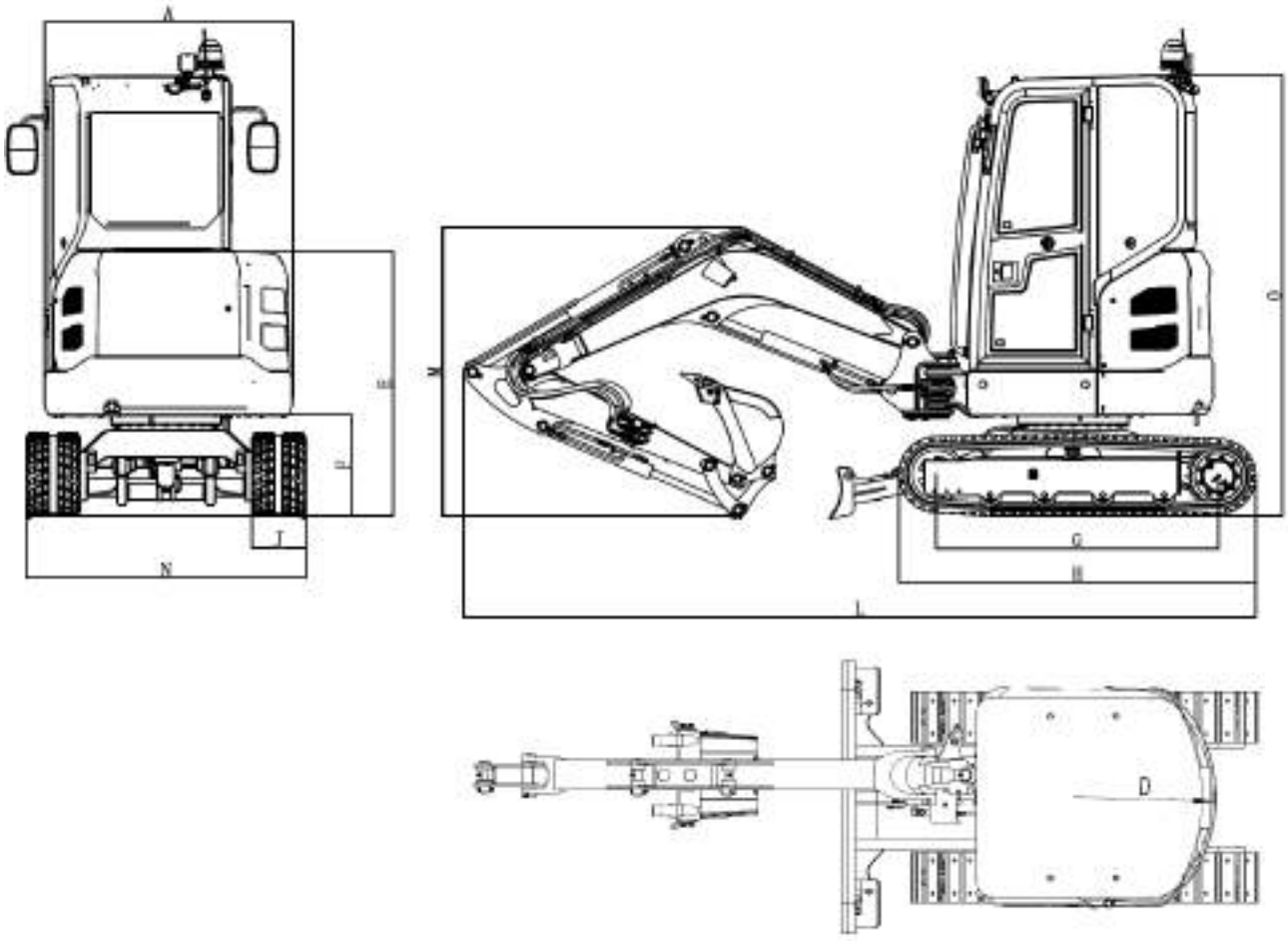
Arm



Description	ER655H
	1.54m (60.7 inch)
Length (A) (mm)(inch)	2008 (79.1)
Height (B) (mm) (inch)	577 (22.7)
Width (mm) (inch)	300 (11.8)
Weight*(kg) (lb)	227(500.5)

* Including cylinders, couplings and pins

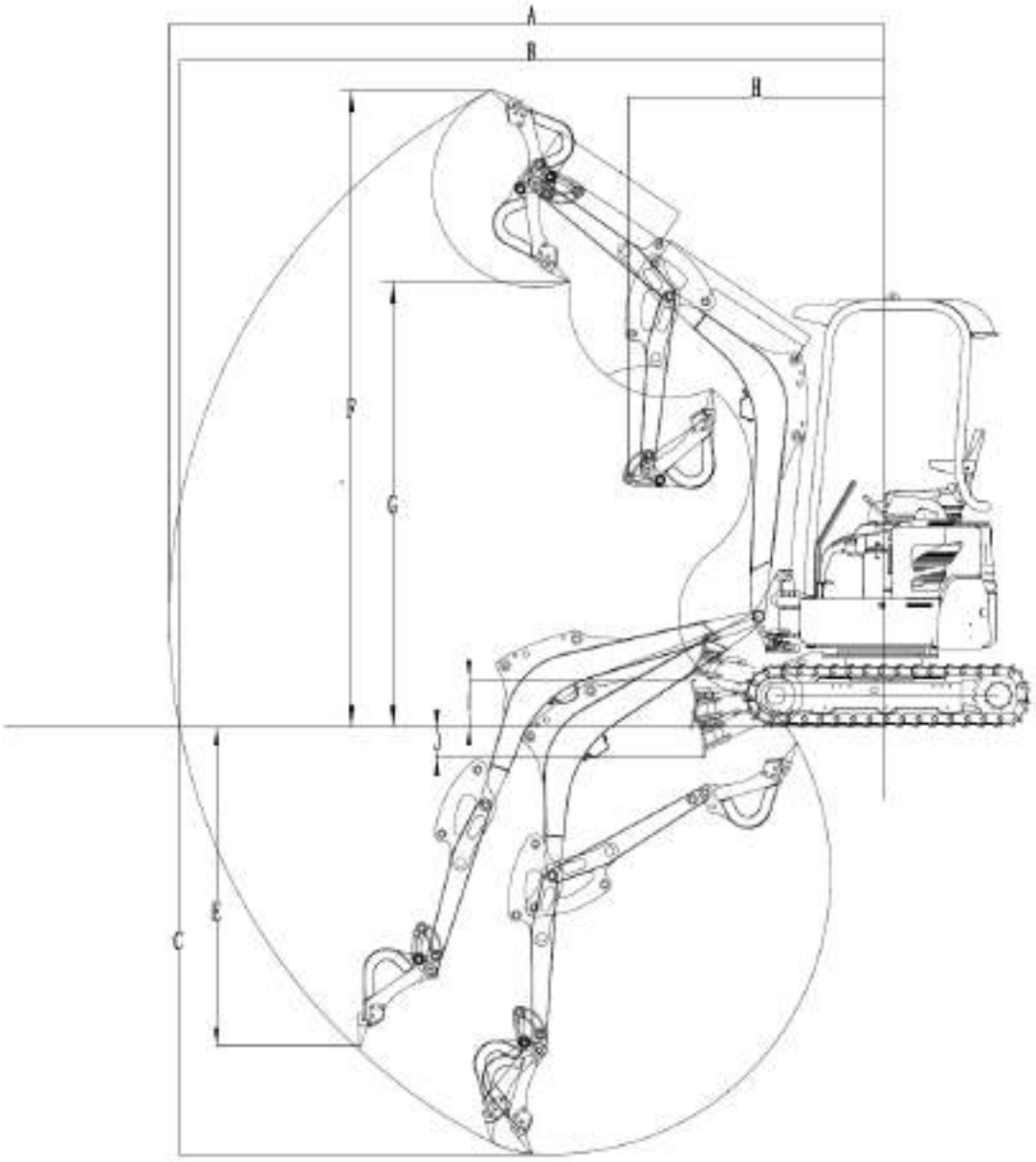
2.2 Overall dimensional drawing



2.8 m (110.3 inch) boom; 1.54 m (60.7 inch) arm; 0.18 m³ (6087.6 fl oz) bucket

Item		Unit	Value
L	Total length	mm (inch)	5485 (216.1)
N	Overall width		1980 (78.0)
O	Total height		2692 (160.1)
A	Upper assembly width		1850 (72.9)
J	Track shoe width		400 (15.8)
D	Tail turning radius		1090 (42.9)
G	Track wheelbase		1985 (78.2)
H	Track length		2500 (98.5)
F	Upper assembly ground clearance		625 (24.6)
E	Total height to hood top		1575 (62.1)
M	Total height of boom		–

2.3 Operation dimensional drawing



2.8 m (110.3 inch) boom; 1.54 m (60.7 inch) arm; 0.18 m³ (6087.6 fl oz) bucket

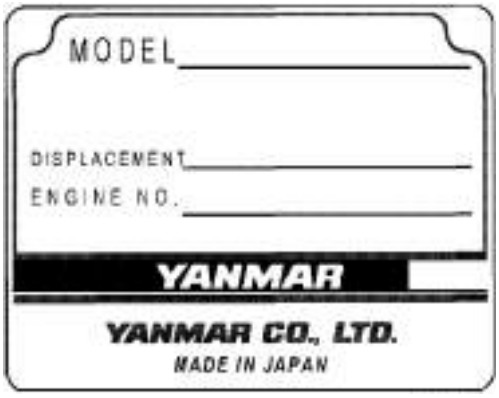
Item		Unit	Value
A	Maximum excavation radius	mm	6043 (238.1)
B	Maximum ground excavation range		5910 (232.9)
C	Maximum excavation depth		3492 (137.6)
E	Maximum vertical excavation depth		2633 (103.7)
F	Maximum excavation height		5608 (221.0)
G	Maximum unloading height		3876 (152.7)
H	Minimum front turning radius		2637 (103.9)
J	Maximum excavation depth at bottom Length of 2.5		3090 (121.7)

3 Labels

3.1 Product label

The machine label is fixed on the front end of upper frame, indicating the machine model, manufacturing year, product identification code and manufacturer, etc. (The PIN code is also printed below the product label)

3.2 Engine label



This label shows the engine type tab, displacement and serial number.

3.3 Bucket

This label is installed on the top of the bucket and indicates the bucket model, serial number, bucket part number, etc.

3.4 Cab

This machine is equipped with an anti-rollover cab, and the anti-rollover sign is shown in the left figure.

4 Applicable working conditions

This machine is a professional crawler-type hydraulic excavator. It is widely used in small-scale building construction, highway maintenance, farmland transformation, underground construction of subway tunnel, hydropower trench foundation pit excavation, municipal engineering, sanitation, landscaping and oil pipeline projects. Optional quick-change device is optional for quickly replacing various auxiliary work equipment under various working conditions. Optional auxiliary work equipment include various buckets, breaker, ground drill and extension bar, hydraulic shears, hydraulic grabs, etc., and the machine has wide adaptability. When working in an environment where objects are likely to fall, the cab with a guard net can be optionally installed to protect the driver's safety. Please consult SDLG or its designated dealers for details.

The suitable working environment temperature of this machine is -20℃～45℃ (-4°F～113°F) and the altitude is below 2000 m (78800.0 inch). If you need to work beyond this range, please contact our company in advance to obtain relevant technical guidance and permission, otherwise our company will not be responsible for the consequences.

5 Features

- It is equipped with a powerful and highly reliable engine, which ensures the excellent working performance of the whole machine. It has the advantages of low emissions and low noise, and is particularly suitable for operations in noise-sensitive areas and at night.
- The load-sensitive hydraulic system and pilot control are adopted for simple and convenient operation. The high-voltage traveling motor makes the machine have high traction force and traveling speed.
- The super-strong structure design is optimized by computer and analyzed by 3D finite element, and high-strength steel plates are used in key parts to improve the ability of the machine to adapt to harsh working conditions.
- It is equipped with luxurious seats, which provide a comfortable driving environment.
- The streamlined design presents simple, smooth and beautiful appearance. The open engine hood is easy for maintenance.
- It is equipped with dozer blades. It has the function of boom deflection.

6 Technical performance parameters

6.1 Machine performance parameters

Item	Unit	Value
Machine weight	kg (lb)	5900 (13009.5)
Standard bucket capacity	m^3 (fl oz)	0.18 (6087.6)
Bucket capacity range	m^3 (fl oz)	0.1～0.24 (3382.0～8116.8)
Travel speed (low/high)	km/h (inch/h)	2.2/4.4 (86680.0/4.4)
Maximum slewing speed	r/min	10
Engine model	4TNV86CT-PLG	
Engine power	kW	35.5
Rated engine speed	r/min	2400
Hydraulic system working pressure	MPa	26.3
Maximum gradeability	°	30
System voltage	V	12
Average ground specific pressure	kPa	33.4

6.2 Product standard

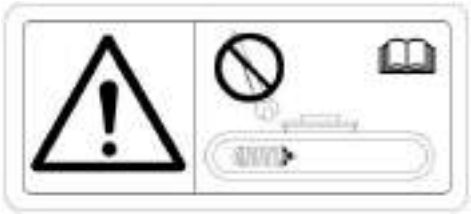
Applicable standard: Hydraulic Excavator (Q/371300 LGJ 003).

7 Location and content of safety signs

7.1 Safety signs and their locations

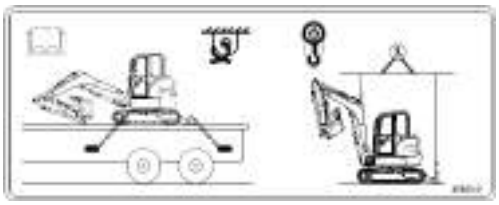
The location of the safety sign of the machine is shown in the table below. Carefully read and follow the instructions of all safety signs on the machine. Keep the safety signs properly. If a safety sign is lost, damaged or the text is unclear, please make up or repair it in time. If it is necessary to replace parts with safety marks, ensure that the new parts have the corresponding safety marks.

When scrubbing the safety signs, use cloth, soapy water, etc., instead of detergent, gasoline, etc.



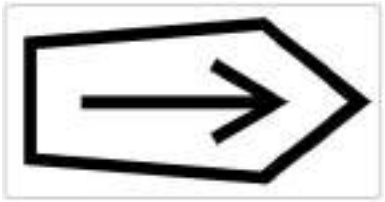
1. Sign of no counter pivoting or recoiling of the spring

It is located on the outer shield of the tension adjusting spring of the left and right tracks



2. Schematic diagram of lifting

It is located on the right side wall of the machine



3. Driving direction sign

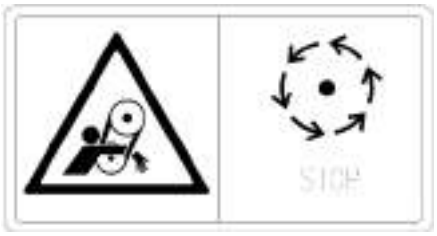
It is located outside the guide wheel shields on both sides

4. Signs for paying attention to the work equipment

They are located at both sides of the arm.

5. Sign for no entry to the turning area

It is located on both sides of the rear surface of the counterweight



6. Warning sign for touching the machine

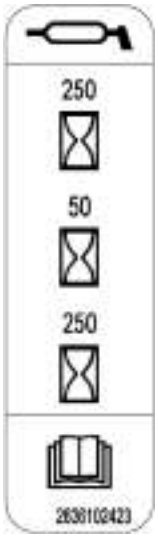
It is located on the rear surface of the counterweight

7. Lug sign

It is used to fix the machine during transportation and avoid towing.

8. Battery disconnect sign

It is located near the master power switch on the right shield outside the cab

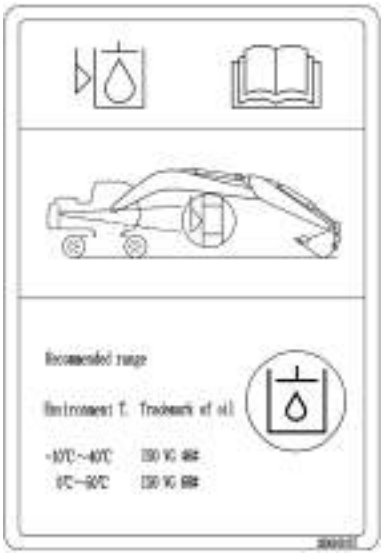


9. Lubrication adding sign

It is located near the grease filler of the slewing gear ring of the upper frame

10. Fire extinguisher installation location sign

It is located on the left rear pillar of the cab

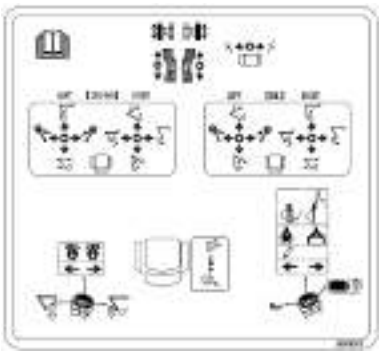


11. Signs for paying attention to the hydraulic oil tank and oil filling

Opening the right hood, it is located near the level gauge on the hydraulic oil tank

12. Hydraulic oil level sign

Opening the right hood, it is located near the level gauge on the hydraulic oil tank



13. Sign for paying attention to operation modes

It is located on the right side glass in the cab.

14. Fuel tank - no open flame sign

It is located near the fuel tank filler on the right side of the machine

15. High temperature liquid warning sign

It is located near the antifreeze filling port.

16. Antifreeze filling sign

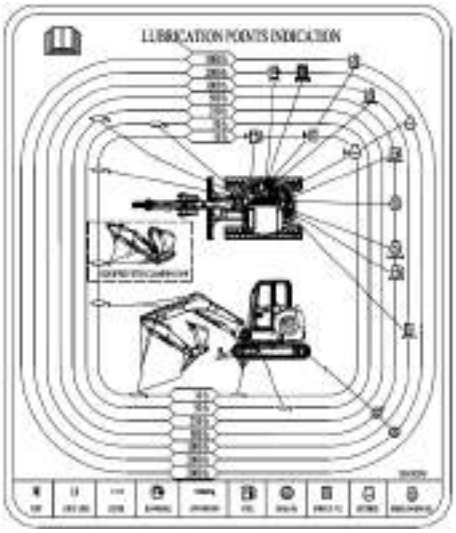
It is located near the antifreeze filling port.

17. Sign for prompting to avoid high temperature burning

It is located near high-temperature components

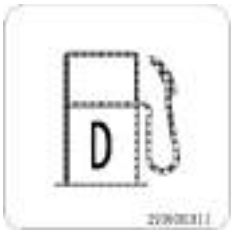
18. Sign for avoiding injury from fan

It is located near the fan



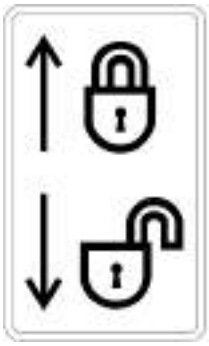
19. Lubrication diagram

It is located on the inside of the cab door



20. Fuel tank sign

It is located on the right shield outside the cab



21. Safety lock warning sign

It is located on the outside of the left control box

22. Sign for forbidding to open the control lockout lever when leaving the machine.

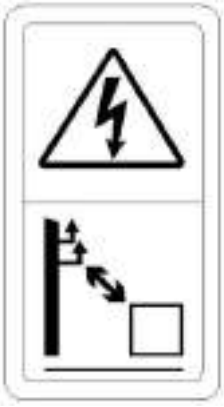
It is located on the outside of the left control box

23. Sign for precautions when leaving the machine

It is located on the right side glass in the cab.

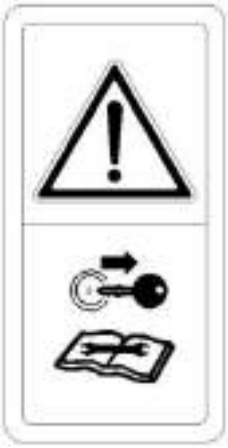
24. Seat belt warning sign

It is located on the right side glass in the cab.



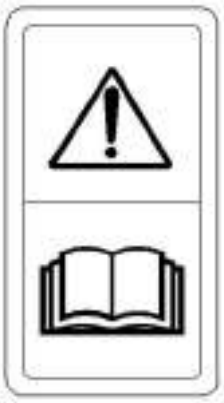
25. Sign for keeping a safe distance from power lines

It is located on the right side glass in the cab.



26. Sign for prompting to turn off the engine before maintenance or repair

It is located on the right side glass in the cab.



27. Sign for prompting to read the instructions

It is located on the right side glass in the cab.

28. Fire prevention warning sign

It is located on the right side glass in the cab.

29. Explosion warning sign

It is located on the accumulator

30. Sign for pinching warning

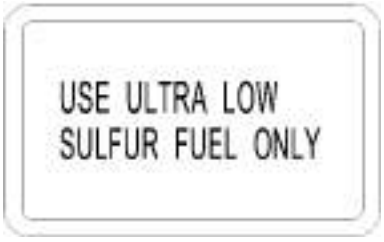
It is located on the cover plate under the seat

31. Sign for fuse box location

It is located near the fuse box on the cover plate under the seat

32. Sign for lifting position

It is located at the lifting point

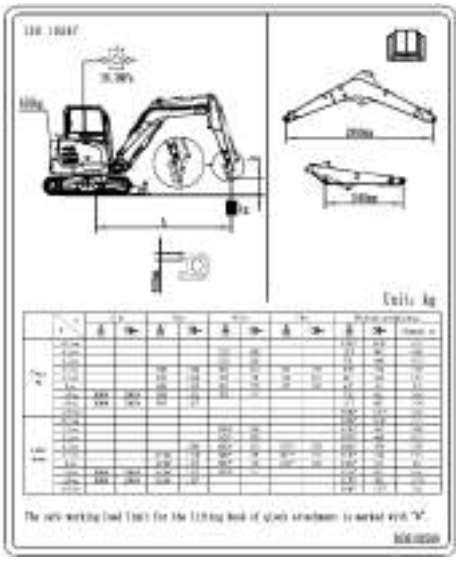


33. Sign for refueling

It is located near the fuel tank filler on the right side of the machine

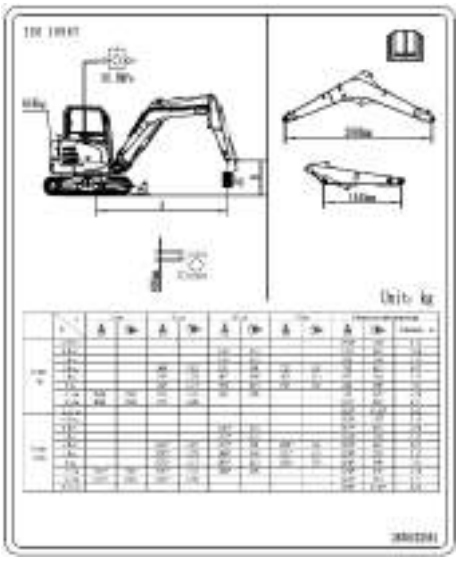
34. Noise sign

It is located near the machine label on the left front of the upper frame



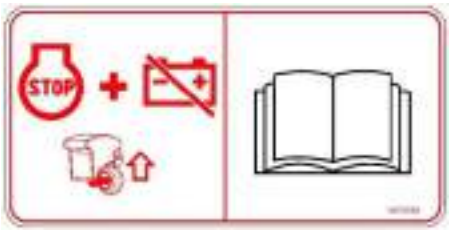
35. Lifting capacity sign （with quick attachment）

It is located on the inside of the cab door



36. Lifting capacity sign（no quick attachment）

It is located on the inside of the cab door



36 Emergency stop sign

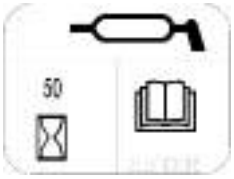
It is located near the emergency stop switch

37. Hydraulic oil tank sign

It is located on the top of the hydraulic oil tank

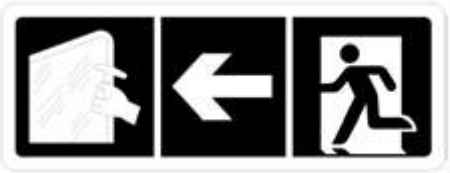
38. Articulated steering sign

It is located on both sides of the boom



39. Lubrication adding sign

It is located near the grease filler of the deflection cylinder



40. Emergency exit sign

It is located on the rear glass in the cab.

41. Sign for window closing notice

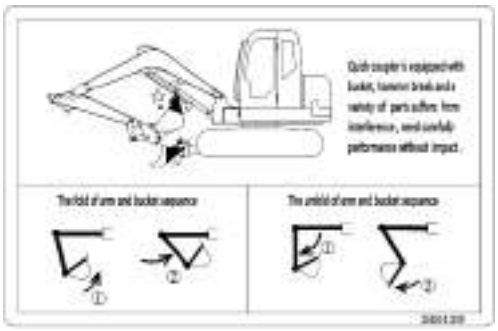
It is located on the left side of the front windshield in the cab.

42. Cab door caution sign

It is located outside the cab door

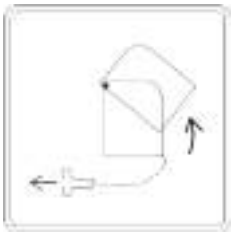
43. Collision prevention sign

It is located on the right side glass in the cab.



44. Sign of quick change device

It is located on the inside of the cab door

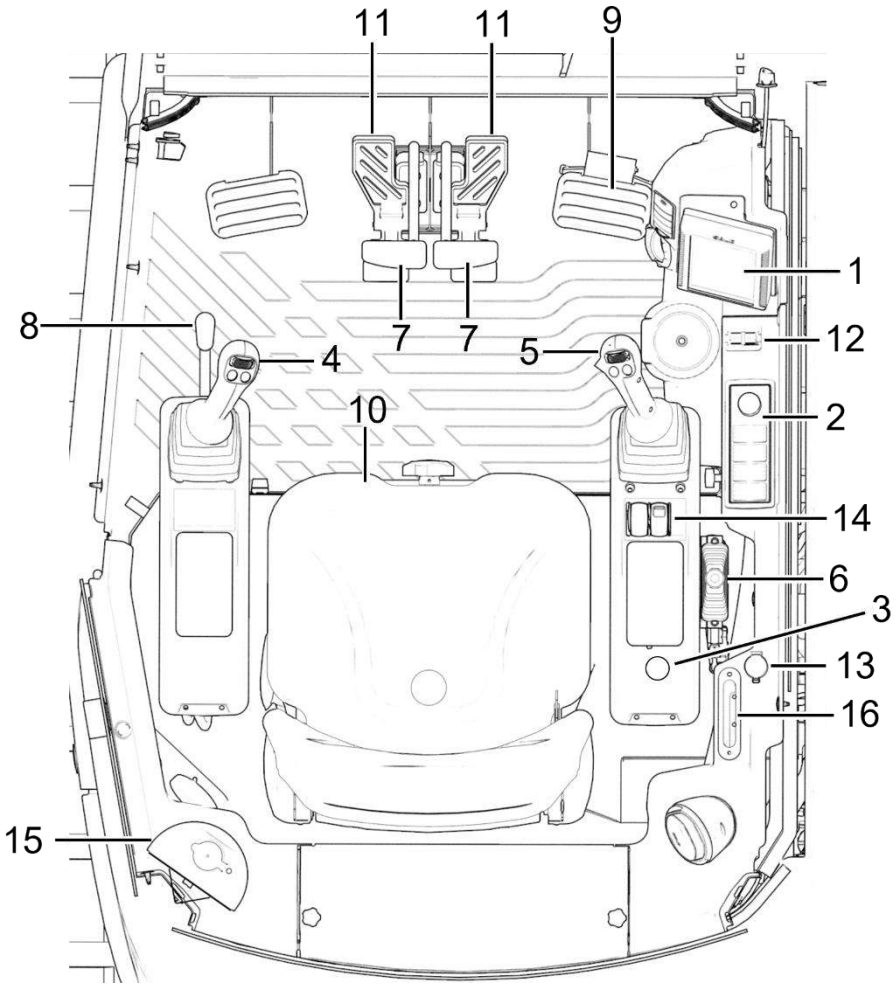


45. Side cover opening sign

It is located on the rear side of the right cover

Chapter II IECU and Controller

⚠ Warnings
Do not operate this machine until you are familiar with the location and function of the instruments and controllers and how to use them. Always check instruments and controllers, pay attention to unusual readings, and take necessary actions to prevent serious damage to the machine.



1 IECU 2 Keypad 3 Start switch 4 Left pilot lever 5 Right pilot lever 6 Dozer blade control handle 7 Travel control lever

8 Control lockout lever 9 Work equipment deflectionpedal

10 Seat

11 Travel pedal 12 USB/AUX port 13 Standby power supply

14 Rocker switch 15 Sprinkling can 16 Mobile phone box

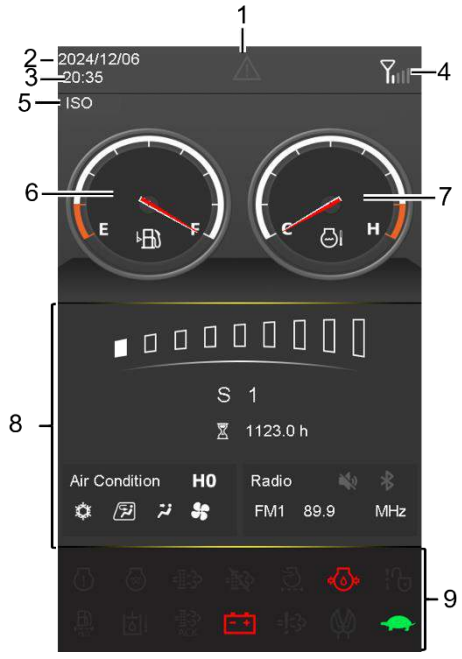
1 Front instrument (IECU)

★ Notice

Take appropriate measures to prevent damage to the machine. Read and understand the instructions in this section carefully to familiarize yourself with the front dashboard before attempting to operate the machine.

★ Notice

Multiple language modes are available on the front dashboard. For details on how to set the language, refer to the relevant section.



SN	Name	SN	Name
1	Central alarm indicator light	6	Fuel level gauge
2	Date display	7	Engine water temperature gauge
3	Time display	8	Main display
4	GPS signal quality	9	Indicator light group
5	Handle operation mode display	10	

1) Central alarm indicator light (red)

The light flashes red when alarming.

The warning light will start to alarm at a frequency of 0.5Hz when any of the following conditions is met: when the machine fails, the light will flash and the buzzer will alarm at the same time.

- The engine speed is ≥ 700 rpm, and the engine oil pressure switch is grounded for 3 seconds.
- Engine speed is ≥ 700 rpm, and system voltage is ≤ 11 V for 3 seconds.

- Engine speed is ≥ 700 rpm, and system voltage is ≥ 15 V for 3 seconds.
- Engine water temperature is ≥ 110 ℃ (230 °F).
- Engine is faulty, GPS alarms, and oil level is low.

2) Date display

Display the current date in the format " xx/xx/xxxx" (MM/DD/YY); For instructions on how to set the current date in the main screen, refer to the relevant sections.

3) Time display

It displays the current time in the format of "xx:xx"; For instructions on how to set the current time in the main screen, refer to the relevant sections.

4) GPS signal quality

5) Handle operation mode display area

Display the currently selected handle operation mode in "ISO" or "BHL"; For instructions on how to set the current handle operation mode in the main screen, refer to the relevant section.

6) Fuel level gauge

This gauge shows the level of the fuel in the fuel tank. If the pointer falls into the red area, the machine should be refueled.

7) Engine water temperature gauge

The gauge shows the temperature of the engine coolant. There is a red mark area on the top of the gauge. When the pointer is in this area, it indicates "engine overheating". The machine can work normally if there is no alarm.

★ Notice

When the engine is overheated, the red central warning light will flash. Stop the work and find out the cause.

8) Main display

After the main display is powered on, it will be initialized, the Lingong LOGO interface will be displayed, and the main interface will be displayed after initialization.

Homepage of the display:

As shown in the left figure, it can display: engine speed, working time, etc.

- Engine tachometer: including LED graphic display and digital display. The display shows the gear corresponding to the engine speed. The engine speed can be viewed on the menu page.
- Hour meter: the display form is 00000.0h, and the maximum value is 99999.9h. Updated every 6 minutes.

Click the main menu button on the Keypad to enter the main menu interface.

Main menu interface

In the main menu interface, different secondary interfaces can be selected by receiving the operation command of Keypad, and the instrument will display the information of the machine on the secondary interface; For example, information on the engine, hydraulic system, electrical system, machine information, service, settings, A/C, radio and GPS can be displayed.

Engine

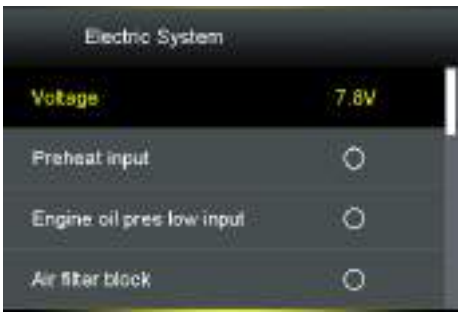
- Display the engine speed, required engine speed, coolant temperature, load rate, friction torque, atmospheric pressure, air intake, DPF differential pressure, set EGR opening, actual EGR opening, fuel flow, engine working time, time since last active regeneration of DPF, and DPF soot level.

- DPF soot level: Show soot percent and ash percent.

Hydraulics

- Display the hydraulic oil temperature, LS pressure and main pump current.

Electrical system



- Display the voltage electrical system and other information.

Machine information

- Total fuel consumption: The fuel consumption in the total working time is displayed in the format of "x.x L".
- Average fuel consumption: The average fuel consumption in the total working time is displayed in the format of "x.x L/h".

- Running time: Display the current total working time of the machine. Use this display to determine the servicing interval calculated in working hours.
  - Total working time: display the total working time of the machine.

- Phase working time: It is displayed in the format of "xh xmin" (x hours x minutes), which can be reset to 0, indicating the working time after reset.

- Alarm information: If an abnormal condition is detected, the exact error/fault will be displayed. Operate the OK button on the Keypad to view the current fault code and fault description. If necessary, contact the dealer service department of Shandong Lingong Construction Machinery Co., Ltd. for suggestions. The fault information interface is shown in the left figure, which displays the fault code and fault description. Multiple-fault information can be switched by the Page Up button of the Keypad.

Service

In the secondary interface of "Service", you can directly contact the dealer service department of Shandong Lingong Construction Machinery Co., Ltd. through "One-click Repair-Servicing" and "One-click Repair-Repair" to obtain the corresponding service. Taking the "Engine Oil/Oil Filter" interface as an example, in the tertiary interface of "Service - Servicing" as shown in the left figure, the operation instruction of the roller knob on the Keypad can be received, the maintenance interval can be set, and the remaining time can be reset.

★ Notice

After each servicing, the remaining servicing time of the corresponding maintenance parts needs to be reset, otherwise the time may be 0.

Setting

In the setting interface, you can receive the operation commands from Keypad to realize the settings of mute, handle operation mode, automatic idling, shear-hammer switching, hoisting mode, language, time/date, unit, display brightness, keypad backlight and regeneration enabling/disabling.

- Mute: turn off the reversing buzzer.

- Handle setting: It can be selected between ISO and BHL to adapt to the operating habits of different users. For detailed description of the two operating modes, please refer to "Control handle of work equipment ".

- Automatic idling time interface: In the tertiary interface of "Settings" - "Automatic Idling", as shown in the left figure, you can receive the operation instructions of the roller knob on the Keypad, set the automatic idle time and turn on or off the automatic idling function, and the setting will take effect after pressing the OK key.

- Switching between shear and hammer mode: In the tertiary interface of "Settings" - "Switching between shear and hammer mode", as shown in the left figure, the operation instructions of the Page Up button on the Keypad can be received to select the hydraulic shear mode or the breaker mode.

★Notice

For detailed operation methods of the left and right work equipment control handle in hydraulic shear selection or breaker selection mode, please refer to "4.2 Multi-function control handle ".

When you need to operate the thumbscrew, please select the hydraulic shear mode.

- Hoisting mode: In the tertiary interface of "Settings" - "Hoisting mode", as shown in the left figure, the operation command of the OK key on the Keypad can be received to select the hoisting mode. When the hoisting mode is selected, and the boom pressure value exceeds the threshold, the text prompt of "Hoisting Overloaded" will appear on the display.

★Notice

When using the hoisting mode, make sure that the machine is in a state that complies with local regulations.

★ Warning

When it is necessary to lift objects, select the hoisting mode. Otherwise, serious machine damage or casualties may be caused.

- Language interface: In the tertiary interface of "Setting" - "Language", as shown in the left figure, the operation commands of relevant buttons on Keypad1 can be received, and the language display on IECU can be set. After pressing the OK key, the setting takes effect.

- Time and date interface: In the tertiary interface of "Setting" - "Time/Date", as shown in the left figure, the operation command of Page Up button on the Keypad can be received, the date and time can be set, and the setting will take effect after pressing the OK button.

- Unit setting: in the tertiary interface of "Setting" - "Unit", as shown in the left figure, the operation command of the roller knob on the Keypad can be received to set the unit of measurement to metric or American system.

- Display brightness interface: in the tertiary interface of "Settings" - "Display Brightness", as shown in the left figure, you can receive the operation instructions of the roller knob on the Keypad to select the "Auto Adjust" or "Manual Adjust" brightness adjustment mode. In addition, the daytime brightness and nighttime brightness can be adjusted respectively on the next level interface of "Manual adjustment".

- Keypad backlight interface: In the tertiary interface of "Settings" - "Keypad backlight", as shown in the left figure, the operation command of the Page Up button on the Keypad can be received to set the brightness of the keypad backlight.

- Regeneration enabling/disabling selection

In the tertiary interface of "Settings" - "Regeneration Enabling/Disabling Selection", as shown in the left figure, the operation instructions of the roller knob on the Keypad can be received to set the interruption of parking regeneration (passive regeneration) and driving regeneration (active regeneration) or the trigger of parking regeneration (passive

regeneration).

The operation steps of parking regeneration are as follows:

- After power-on, the DPF regeneration request light on the IECU is always on in yellow ;
- Move the machine to a safe area, warm up the machine for 15 minutes or until the engine coolant temperature is higher than 60 ℃ (140°F), set the throttle to the lowest idling position, let the engine idle, and lower the control lockout lever.
- Enter the DPF regeneration operation page through Menu-Setting-Regeneration Enabling/Disabling Selection. First, select "Regeneration Interlock Switch" to be on through the Keypad, keep "Disable Regeneration" in the off state, and then select "Enable Regeneration". At this time, the DPF regeneration confirmation light is on, and after about 1 the DPF regeneration request light is on, the DPF regeneration confirmation light flashes, and then select "Enable Regeneration". At this time, the DPF regeneration confirmation light is always on, and the engine automatically starts DPF regeneration after about 3s. At this time, the exhaust temperature indicator light of the engine is on.

Note: The engine speed automatically increases during the regeneration process, and the temperature of the after-treatment device is higher than the normal operating temperature. In non-emergency situations, it is

forbidden to turn off the DPF regeneration function, turn off the engine, operate the throttle knob, or conduct operation, otherwise the DPF regeneration will fail.

- After the DPF regeneration is completed, the DPF regeneration request light and the engine exhaust temperature indicator light are off, the regeneration is completed, the engine speed returns to idling, and the machine can resume operation.

Note: When the machine needs to be parked for regeneration, please stop the operation, park the machine to a safe area, keep it away from flammable materials, and start the DPF regeneration function. The whole process takes about 30 minutes.

A/C interface

Select "A/C" in the "Menu Interface" or directly press the "Heating and A/C button" on the Keypad to enter the "A/C" interface, as shown in the figure. In the A/C interface, you can operate the A/C function.

Note: When the engine is not started after power-on, the A/C shall not be used for more than 30 minutes to ensure that the battery is sufficient.

① Turn on/off the A/C

② Compressor ON/OFF

The refrigerating system can only be operated when the air volume selection is enabled.

③ Temperature display

Display the currently set cab temperature. The cab temperature can be adjusted step by step among 9

levels, namely, C4-C3-C2-C1-H0-H1-H2-H3-H4 . Adjustment is carried out by moving the knob of the roller left and right; Toggle it to the left to reduce the temperature by 1 level; Toggle it to the right to increase the temperature by 1 level.

④ Temperature setting (decrease)

Operate the roller knob on the Keypad, move the cursor to the icon, and press the OK button. Each time you press the button, the set cab temperature will be reduced by one level.

⑤ Temperature setting (increase)

Operate the roller knob on the Keypad, move the cursor to the icon, and press the OK button. Each time you press it, the set cab temperature will increase by one level.

⑥ Adjust air volume

Display the currently set air volume. The air volume can be adjusted between the following 5 levels: OFF (O) - Level 1 - Level 2 - Level 3 - Level 4.

⑦ Decrease air volume

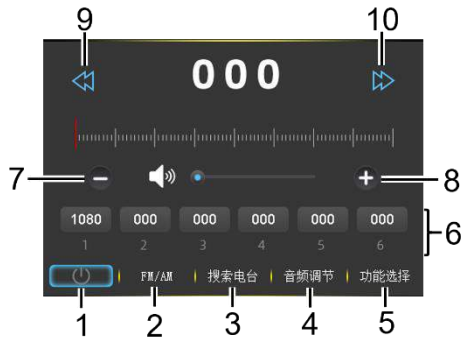
Operate the roller knob on the Keypad, move the cursor to the places of the icon, and press the OK button. Each time you press it, the air volume will be reduced by 1 level.

⑧ Increase air volume

Operate the roller knob on the Keypad, move the cursor to the places of the icon, and press the OK button. Each time you press it, the air volume will

increase by 1 level.

Audio interface (radio)



Select "Radio" under the "Main Interface" or directly press the "Audio Shortcut Button" on the Keypad to enter the "Radio" interface.

Note: When the engine is not started after power-on, the radio function shall not be used for more than 30 minutes to ensure that the battery is sufficient.

① Power supply control

Operate the roller knob on the Keypad. When the power control key is on, press the OK button to turn on the power of the radio. If you need to turn off the radio, press the OK button again.

② Band selection

Operate the roller knob on the Keypad. When "FM/AM" is on, press OK to switch the radio band. The radio band will be switched in the cycle of FM1/FM2/FM3/AM1/AM2/FM1.

③ Automatic radio station search

④ Audio adjustment

⑤ Function selection

The following four audio modes can be switched: Bluetooth music, USB music, AUX connection, and radio. The priority of the above four audio modes is USB music, radio, Bluetooth music, and AUX connection from top to bottom.

⑥ Radio station presetting (1~6)

After the station is searched manually/automatically, operate the roller knob to any of the reset stations 1~6, press the OK button for more than 2 seconds, and the current playing

frequency will be saved in the corresponding position; up to 6 stations can be saved for each band, and a total of 30 stations can be saved.

Press the OK button (less than 2 seconds) to directly listen to the corresponding preset radio station.

⑦ Volume control (decrease)

Operate the roller knob on the Keypad. When the "-" is on, press OK to decrease the volume gradually. When the volume is adjusted to the appropriate level, release the OK button immediately; You can also press the OK button one by one until the volume is appropriate.

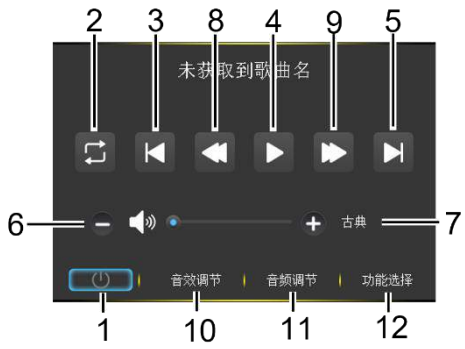
⑧ Volume control (increase)

Operate the roller knob on the Keypad. When the "+" is on, press OK to increase the volume gradually. When the volume is adjusted to the appropriate level, release the OK button immediately; You can also press the OK button one by one until the volume is appropriate.

⑨ Manual station selection key (frequency increase key ◀◀, frequency decrease key ▶▶)

Operate the scroll knob on the Keypad. when "◀◀ / ▶▶ " is on, press OK shortly and operate the manual station selection button ◀◀ / ▶▶ to manually search for radio stations in step-by-step frequency upward/downward.

Press OK and operate the manual radio selection button ◀◀ / ▶▶ for more than 0.5 seconds to automatically search for radio stations step-by-step frequency upward/downward until a radio station is detected, and then stay at this station for listening to it.



a) Audio interface (USB music)

Select "Radio" in the "Main Interface" or directly press the "Audio Shortcut Button" on the Keypad to enter the "Radio" interface. At this time, if you connect the USB port, you will enter the "USB Music" interface. If you want to continue listening to the radio or Bluetooth music, you can click "Function Selection" at the bottom of the "USB Music" interface.

Note: When the engine is not started after power-on, the audio function shall not be used for more than 30 minutes to ensure that the battery is sufficient.

① Power supply control

② Play mode switching

The modes include List, Random and Single cycle.

③ Previous song

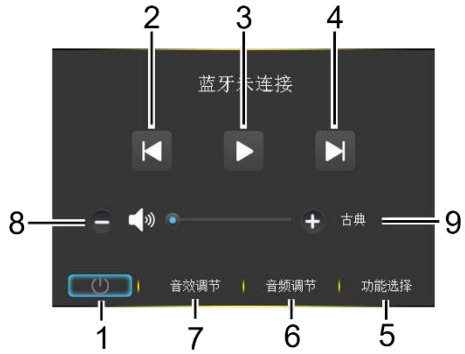
④ Play/Pause

⑤ Next song

⑥ Volume control (decrease)

⑦ Volume control (increase)

b) Audio interface (Bluetooth music)



Select "Radio" in the "Main Interface" or directly press the "Audio Shortcut Button" on the Keypad to enter the "Radio" interface. If Bluetooth is connected, Bluetooth music can be played through "Function Selection" at the bottom of the "Radio" interface.

Note: When the engine is not started after power-on, the audio function shall not be used for more than 30 minutes to ensure that the battery is sufficient.

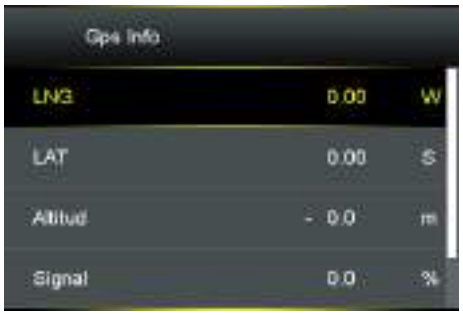
① Power supply control

② Previous song

③ Play/Pause

④ Next song

GPS



The GPS information interface can display the LNG, LAT, Altitud and signal quality of the current machine location.

9) Indicator light group

- Message indicator light (white)

This light will be on when the machine is faulty.

If this happens, check the specific fault through the message indicator light button at the bottom of IECU or "machine information-fault information" under the IECU menu interface, and contact the company or authorized dealer to eliminate the fault.

- Engine coolant temperature warning indicator light (red)

If the engine coolant temperature is too high, this light will be on, the central alarm indicator light will flash and the buzzer will sound.

If this happens, stop the machine immediately, find the cause, and continue to use the machine after the fault is eliminated.

- Preheating indicator light (yellow)

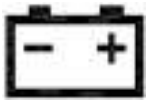
In cold weather, the start switch is in the "I" position; when the engine water temperature is lower than 15 ℃(59 °F), the preheating is enabled; When preheating, this indicator light will be on in yellow; If preheating is complete, the indicator light goes out.

- Air filter blockage alarm indicator light (red)

During the operation of the engine, when the air filter is blocked, this indicator light will be and alarm in red. At this time, the air filter must be replaced or cleaned.

- Oil pressure alarm indicator light (red)

When the oil pressure switch is grounded, the oil pressure alarm indicator light is on in red.



- Charging indicator light (red)

When the engine is running, and this indicator light is not on, it indicates that the battery is being charged. If the indicator light is on when the engine is running, it indicates that the charging system is faulty.

If the ignition key is turned to the "I" position before the engine is started, this indicator light will be on. If the charging indicator light meets any of the following conditions, it will start to alarm in red.

- Engine speed < 700 rpm.
- Engine speed is ≥ 700 rpm, and system voltage is ≤ 11 V for 3 seconds.
- Engine speed is ≥ 700 rpm, and system voltage is ≥ 15 V for 3 seconds.

- Mute indicator light (yellow)

When some faults occur, there will be an audible alarm; Press the Mute button on the bottom of the instrument panel or on the keypad, the audible alarm will stop and the indicator light will be on.

- Safety lock/unlock indicator light (red)

This light is on when the control lockout lever is in the unlocked position. For the operation of the control lockout lever, refer to "4.9 Control lockout lever".

- High-speed traveling indicator light (green)

When the high-speed mode is selected by pressing the high and low speed switch on the Keypad or the dozer blade control handle, this indicator light is on in green.

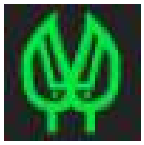
- Low-speed traveling indicator light (green)

When the low-speed mode is selected by pressing the high and low speed switch on the Keypad or the dozer blade control handle, this indicator light is on in green.

- Select the hydraulic hammer indicator light

When the breaker is selected through the IECU menu "Settings-Shear and Breaker Switching" and the safety lock of the wave wheel on the right control handle is unlocked, this light will be on.

Note: For the operation and unlocking method of the safety lock of the right control handle, refer to "4.2 Multi-function control handle".



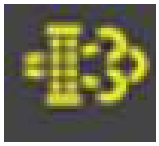
- Select hydraulic shear indicator light

When the hydraulic shear function is selected through the IECU menu "Settings-Shear and Hammer Switching" and the safety lock of the wave wheel on the right control handle is in the unlocked state, this light will be on.

Note: For the operation and unlocking method of the safety lock of the right control handle, refer to "4.2 Multi-function control handle".

- Forward and backhand switching

When the ISO operation mode is selected through the IECU menu "Setting-ISO/BHL", "ISO" will be displayed in the upper left corner of the IECU; When the BHL operation mode is selected through the IECU menu "Machine Setting - ISO/BHL", "BHL" is displayed in the upper left corner of the IECU.



- DPF regeneration request light-yellow

It is always on in yellow - The machine can be parked for regeneration currently. Please stop the operation while ensuring safety, park the machine to a safe area, keep it away from flammables, and start the DPF regeneration function. The whole process takes about 30 minutes.

It flashes in yellow - The machine can be parked for regeneration currently. Turn off the Disable Regeneration switch in time, and regenerate according to the operating specifications while ensuring safety.

Both the DPF regeneration request light and the fault light are on (in steady yellow) - indicating that the DPF regeneration of the machine is faulty. Please stop the

operation immediately and call 400 for service according to the fault prompt.

- DPF regeneration prohibition light-yellow

Yellow - indicating that the regeneration function of the machine is disabled. Release this state in time under safe working conditions.

- Driver alarm indicator light - yellow

Steady on in yellow - There is an emission-related fault. According to the requirements of national regulations, the power of the machine will be limited after 36 h or 64 h. Rectify the fault in time.

- Engine exhaust temperature indicator light - yellow

Steady on in yellow -The machine is currently subjected to regeneration, and the temperature of the after-treatment device is higher than the normal operating temperature. In the case of non-parking regeneration, the machine can operate normally, and the regeneration disabling switch is prohibited under safe conditions.

- DPF regeneration confirmation light-green

Steady on in green – the DPF regeneration confirmation light is always on when regeneration is enabled.

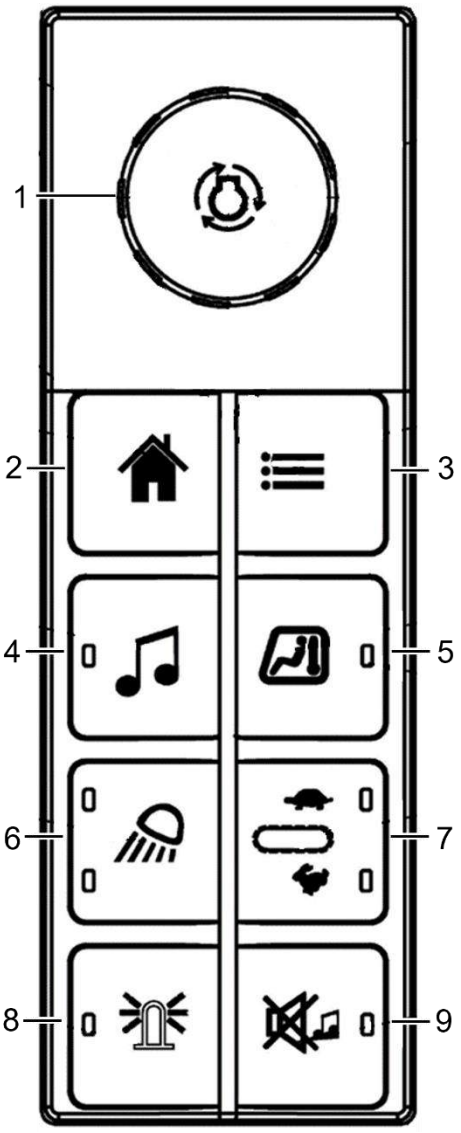
Flash in green - DPF regeneration confirmation light flashes, indicating that the engine has entered the regeneration waiting state. Follow the parking regeneration specification for operation.

- Driver alarm system indicator light - yellow

Steady on in yellow - There is an emission-related fault. According to the requirements of national regulations, the

power of the machine will be limited after 36 h or 64 h. Rectify the fault in time.

2 Keypad



1	Roller knob
2	Return button
3	Menu/Confirm button
4	Audio shortcut button
5	Heating and A/C button
6	Work light switch
7	Travel speed selector switch
8	Warning light switch
9	Alarm mute

1) Roller knob

Rotation-adjust the throttle gear of the engine;

Front, rear, left, right - line feed, page turning.

Throttle gear knob - This machine is equipped with an electronic throttle knob, which controls the engine speed by rotating the roller knob on the keypad. The knob can be rotated 360°. The knob has several gears. When the excavator is powered on, the default gear is the lowest gear, namely, gear 1; rotate it clockwise once to increase 1 gear (which cannot be higher than the highest gear), and rotate it counterclockwise once to decrease 1 gear (which cannot be lower than gear 1). Each time it is rotated, 1 gear is increased (or decreased), and

the corresponding indicator light will also be on (or off) in turn. When it is rotated to the highest gear, all lights are on. When it is rotated to any gear, the corresponding LED light on the display will be on and show the current gear.

2) Return button

Press this button to exit the current interface and return to the previous interface.

Press and hold this button to return to the home page directly.

When the IECU shows alarm information, press this button to temporarily cancel the display of alarm information on the IECU.

3) Menu/Confirm button

Press this button to directly enter the main menu interface. Press this button to confirm the current selection on the IECU interface.

4) Audio shortcut button

Press this button to access the audio menu directly. Use the roller knob to perform input selection.

5) Heating and A/C button

Press this button to directly enter the heating and A/C interface.

6) Work light switch

This switch is a 3-position switch. Press this switch, the work light will switch between the following 3 positions, and the indicator light of the selected position will be on.

Position 0 The light is off (OFF).

Position 1 The cab light is on.

Position 2 The boom work light and the cab light are on at the same time.

7) Travel speed selector switch

This switch is a two-position switch. When this switch is pressed, the traveling speed will be switched between two positions, and the corresponding indicator light of the selected traveling speed will go on.

Position 0 Traveling at low speed only.

Position 1 It is automatically switched in accordance with the traveling conditions during low-speed or high-speed traveling.

★ Notice

Make sure to stop the machine before changing the traveling mode.

Travel at low speed on ramps, soft ground or restricted sites.

Use low speed when loading the machine onto the trailer.

8) Warning light switch

When this switch is pressed, the warning light is turned on, and the indicator light goes on; When it is pressed again, the warning light is turned off, and the indicator light goes out.

9) Alarm muting switch

When this button is pressed, the radio and vehicle alarm is muted; When it is pressed again, the alarm is restored.

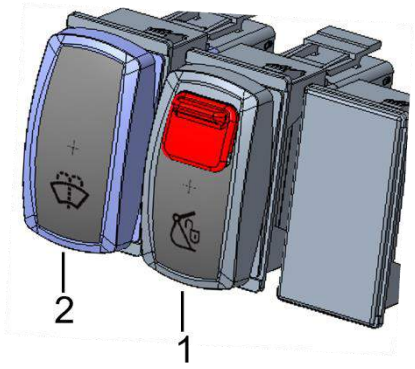
When this button is pressed when the radio is on, the instrument and radio are muted. When this button is

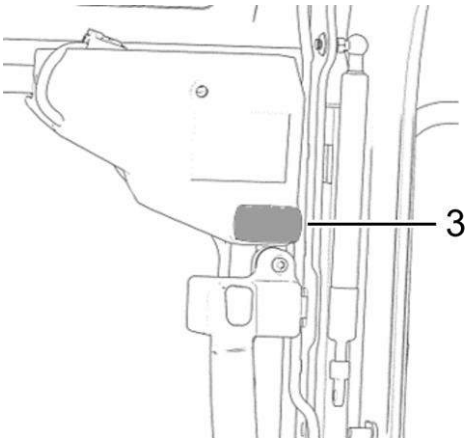
pressed again, the radio is unmuted; when it is pressed again, the instrument is unmuted.

When this button is pressed when the radio is off, the instrument is muted; when it is pressed again, the instrument is unmuted.

3 Switch

- Rocker switch

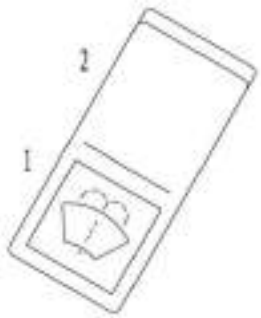




1) Quick-change power switch

Position 1 The quick-change power supply is on, the two quick-change button switches on the left control handle are in working condition, and the safety locking/unlocking indicator light goes on.

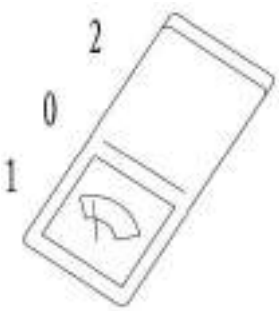
Position 2 The quick-change power supply is off, the two quick-change button switches on the left control handle are in non-working condition, and the safety locking/unlocking indicator light goes out.



2) Water spray switch

Position 1 The water sprayer sprays water

Position 2 The water sprayer stops spraying water



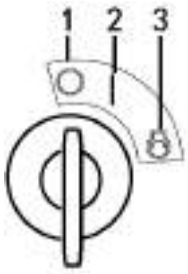
3) Wiper switch (this switch is located on the right front of the cab roof)

Position 1 The wiper operates continuously

Position 0 The wiper operates intermittently

Position 2 The wiper stops operating.

Notice: The wiper switch is located at the upper right corner of the front windshield.



1 Stop position
2 Power-on (preheating) position
3 Startup position

- Start switch

This switch is located at the rear of the right control box and is used to turn on or off the machine's electrical system and start engine.

Position O

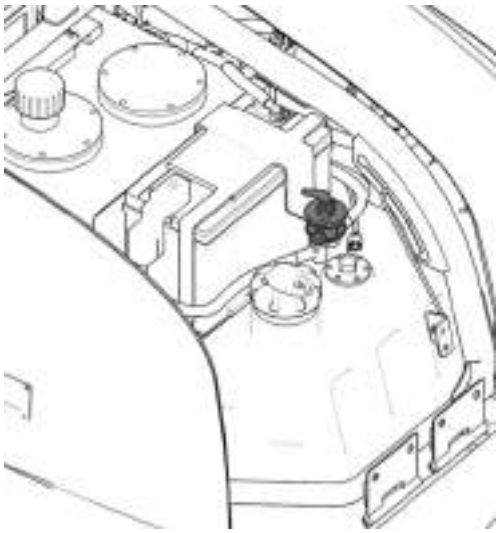
The key can be inserted or removed in this position, and when the key is rotated to this position, the starting circuit is closed.

Position I

This position is used to turn on the electrical system of the vehicle, please keep the key in this position when the engine is running.

Position

This position is the position where the engine is started. Keep the key in this position during starting. Release the key immediately after the engine is started, and it will automatically return to the position I.



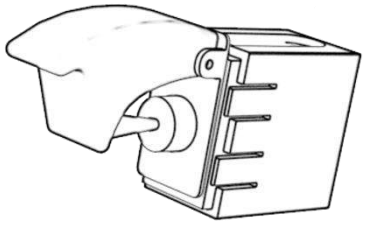
- Master power switch

The master power switch is installed in the cover on the right front of the machine.

Position "I": the master power switch is on.

Position "O": the master power switch is off.

IMPORTANT!! The engine can only be started when the master power switch is at the "I" position. When checking electrical system or parking, please make sure the master power switch is at the "O" position to prevent the battery from leakage. Never turn the master power switch to the "O" position while the machine is running.



- Emergency stop switch

This switch is located at the lower left of the left control box of the seat.

Open the red protective cover and toggle the switch upward to stop the engine.

When this switch is in the downward condition, the machine can be used normally, and the red protective cover can be closed normally.

This switch should be used when the engine does not stop even if the ignition key is turned to the stop position.

- USB/AUX interface

Plug in USB/SD and automatically enter MP3/WMA playback function.

- Standby power supply

This socket is used for common electronic equipment, e.g. mobile phone charger, etc.

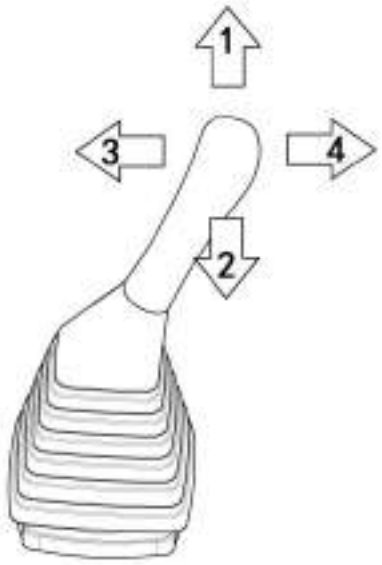
Voltage: 12V

4 Other controls

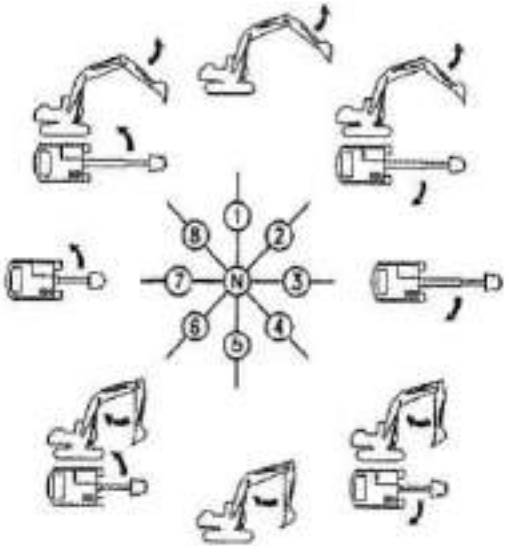
4.1 Work equipment control handle

- Left control handle (ISO)

When the ISO operation mode is selected through the IECU-Settings sub-interface, this handle is used to rotate and operate the arm.



1 Arm extended (unloading)
2 Arm retracted (excavating)
3 Left swing
4 Right swing



N - Neutral position (upper frame and arm remain stationary)

1 - Arm extension

2 - Arm extension and right swing

3 - Right swing

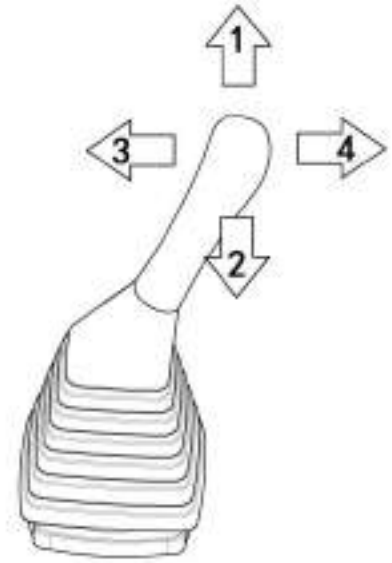
4 - Arm retraction and right swing

5 - Arm retraction

6 - Arm retraction and left swing

7 - Left swing

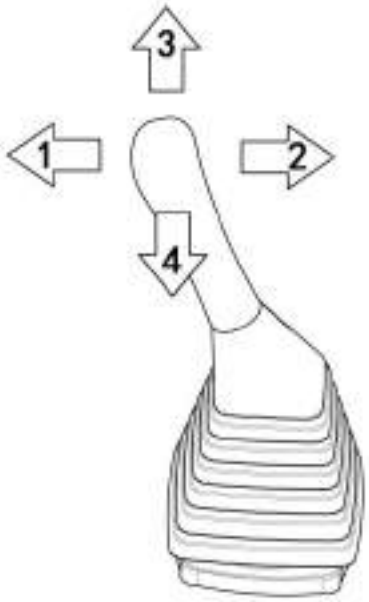
8 - Arm extension and left swing



1 BOOM lower
2 BOOM RAISE
3 Left swing
4 Right swing

- Left control handle (BHL)

When the BHL operation mode is selected through the IECU-Settings sub-interface, this handle is used to rotate and operate the boom.



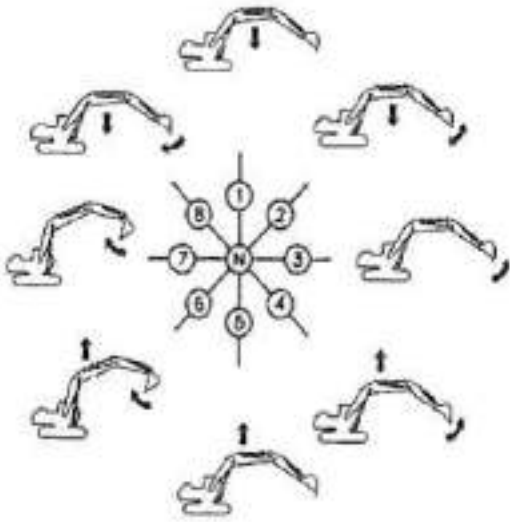
1 Bucket in (digging)
2 Bucket out (unloading)
3 BOOM lower
4 BOOM RAISE

- Right control handle (ISO)

When the ISO operation mode is selected through the IECU-Settings sub-interface, this handle is used to operate the boom and bucket.

Right work equipment control handle

This handle controls the boom and bucket



N - Neutral position (boom and bucket remain stationary)

1 - BOOM lower

2 - BOOM lower and bucket out

3 - Bucket out

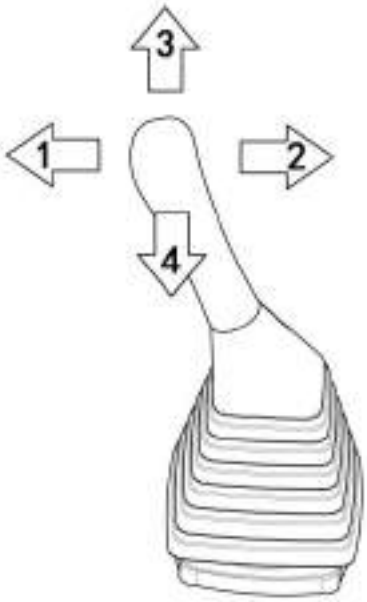
4 - BOOM RAISE and bucket out

5 - BOOM RAISE

6 - BOOM RAISE and bucket in

7 - Bucket in

8 - BOOM lower and bucket in

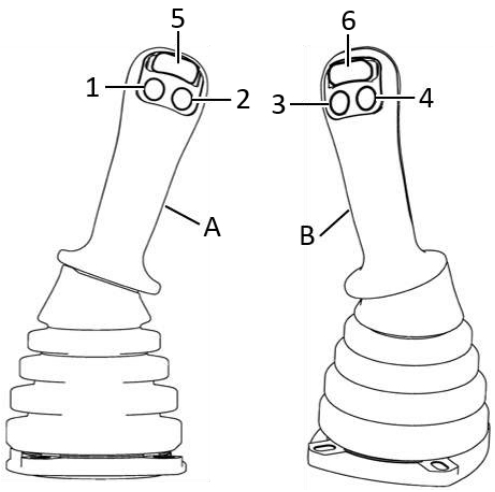


1 Bucket in (digging)
2 Bucket out (unloading)
3 Arm extension (unloading)
4 Arm retraction (digging)

- Right control handle (BHL)

When the BHL operation mode is selected through the IECU-Settings sub-interface, this handle is used to operate the arm and bucket.

4.2 Multi-function control handle



A Left control lever

B Right control lever

1 Quick-change cylinder extension

2 Quick-change cylinder retraction

3 Horn

4 Thumbwheel safety locking

5 Hydraulic shear rotation - roll the thumbwheel to the left, and the hydraulic shear rotates counterclockwise; Roll the thumbwheel to the right, and the hydraulic shear rotates clockwise.

6 Hydraulic shear opening and closing - roll the thumbwheel to the left, the hydraulic shear clamps/the breaker

vibrates; Roll the thumbwheel to the right, and the hydraulic shear opens.

Thumbscrew opening and closing - roll the thumbwheel to the left, the thumbscrew clamps/the breaker vibrates; Roll the thumbwheel to the right, and the thumbscrew opens. (with thumbscrew)

4.3 Optional pedal (right)

This pedal is used to operate the swing cylinder of the work equipment.

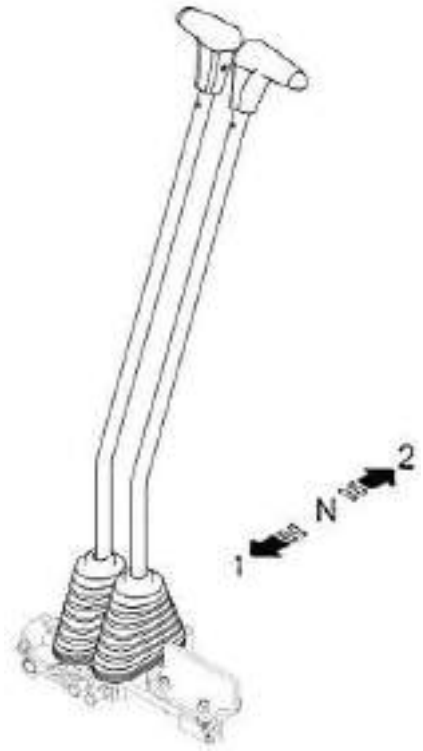
When operating the swing cylinder of the work equipment, first turn up the cover plate, and then step on the left end of the pedal to make the work equipment swing counterclockwise; Step on the right end of the pedal to make the work equipment swing clockwise.

★ Notice

When the machine is not operated with this pedal, make sure that the upper cover plate of the pedal is lowered to lock the pedal, so as to prevent accidental operation.

4.4 Traveling control lever

IMPORTANT!! Before operating the traveling control lever, check the direction of the track. When the traveling motor is in the front, the sequence of traveling operation is reversed.



This control lever is used to move and stop the machine.

Position N: Neutral position (stop the machine)

Position 1: Forward

When the traveling motor is at the rear, push the control lever forward (or step on the pedal forward) to move the machine forward.

Position 2: Reverse

When the traveling motor is at the rear, pull the control lever backward (or step on the pedal backward) to reverse the machine.

4.5 Dozer blade control handle

This control handle is located on the right control box.

Position 1: backward - dozer blade lifting

Position 2: forward - dozer blade lowering

Position N: middle (neutral)

The traveling speed selector switch is integrated at the top of this control handle. When this switch is pressed, the traveling speed will be switched between high speed and low speed, and the corresponding indicator light of the selected traveling speed will go on.

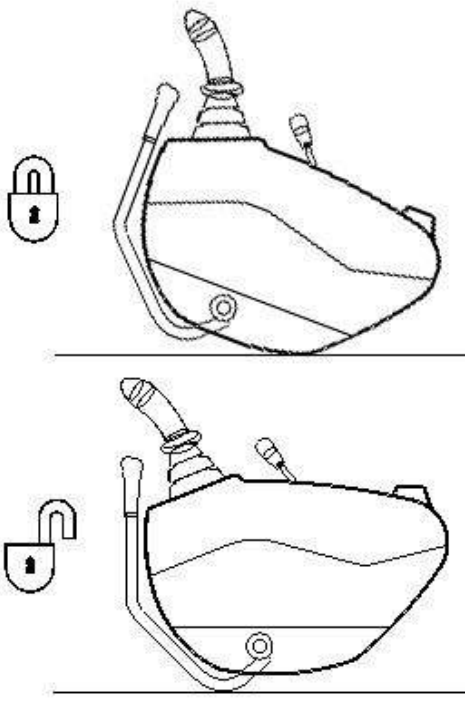
★ Notice

Make sure to stop the machine before changing the traveling mode.

Travel at low speed on ramps, soft ground or restricted sites.

Use low speed when loading the machine onto the trailer.

4.6 Control lockout lever



⚠ Warning
If the control lockout lever is not firmly placed in the Lock position, the control lever may be moved, resulting in serious accidents or injuries.

The engine can only be started when the control lockout lever is in the "Locked" position. After starting, the work equipment, rotation and travel can be operated at the "Unlock" position.

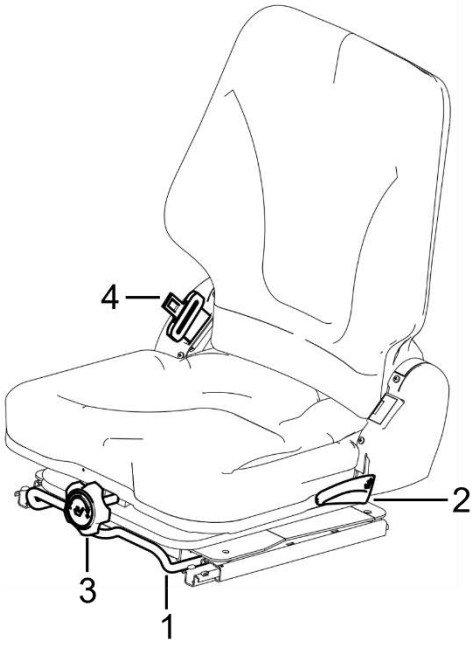
IMPORTANT!! When leaving the cab, pull the control lockout lever firmly to the Lock position to lock the system. If the safety lockout control lever is not in the Lock position and

the work equipment control handle is accidentally touched, serious personal injury can be caused.

Notice! When pulling up or pushing down the control lockout lever, do not touch the control handle of the work equipment.

4.7 Seat adjustment

⚠ Warning
When adjusting the seat, park the vehicle in a safe places and shut down the engine. Before changing the driver or starting to operate the machine, adjust the driver seat to the most comfortable seating position. Do not adjust the seat when the machine is being operated.



- Forward and backward adjustment

Adjust the lever 1 up and down to move the seat forward and backward. Adjust the seat to a suitable position and then release the lever 1.

- Seat back adjustment

The operator sits on the driver seat, pulls the lever 2 backward, adjusts the backrest to a proper position, and releases the lever 2.

- Load-bearing adjustment

The operator sits on the driver's seat, rotates the load-bearing adjustment knob 3, adjusts to a comfortable weight, and then releases the adjustment knob.

- Safety belt

IMPORTANT!! If the safety belt is worn or damaged, replace it immediately.

It is not allowed to modify the safety belt or its mounting parts without permission.

The safety belt can only be used by one adult.

The safety belt must be replaced every three years.

4.9 Fire extinguisher

The mounting holes for the fire extinguisher bracket have been reserved in the right rear of the cab of this machine. Please install a fire extinguisher that meets the national laws and local requirements.

Warning! Be sure to prepare a fire extinguisher and read the instructions on the fire extinguisher before operating the machine. Be sure to know how to use the fire extinguisher.

Check regularly to ensure that the fire extinguisher is within the warranty period.

If the fire extinguisher has expired, it must be replaced in time.

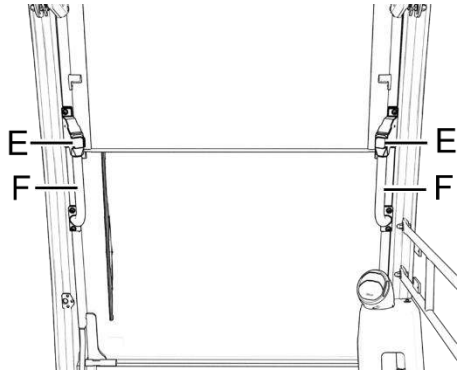
Install the fire extinguisher as follows:

Remove the two bolts installed at the right rear of the cab, and then install the fire extinguisher.

The fire extinguisher is installed on the right side of the seat in the cab. For the use method and precautions of the fire extinguisher, please refer to the text instructions on the fire extinguisher.

The fire extinguisher shall be inspected and maintained frequently.

4.10 Opening of front window



1 Lower the accessory equipment to the ground to shut down the engine.

2 Place the control lockout lever firmly in the Lock position.

3 Hold the left and right handles F of the front window with both hands, press the unlocking button E, and then open it by applying force upward until the front upper window is pushed

into the lock pin at the rear side of the cab top, and confirm that it is locked.

★ Warning

If the window is not locked in the Open position, machine movement may cause it to drop.

★ Warning

When opening or closing the front upper window, front lower window or door, place the control lockout lever in the Lock position. If the control lever is not locked and accidentally touched, it will cause serious accidents.

⚠ Warning
When the roller is worn or there is a crack on the buffer block, the windshield may become loose and fall off. Therefore, please replace the damaged parts immediately.

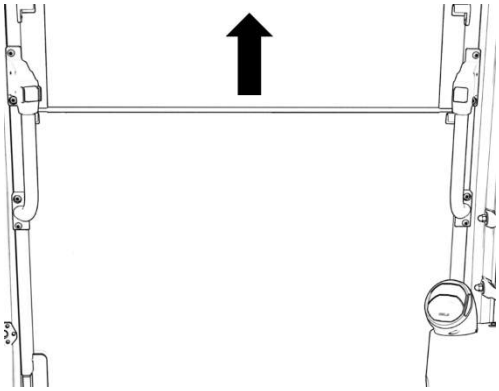
4.11 Closing of front window

1 Lower the accessory equipment to the ground to shut down the engine.

2 Place the control lockout lever firmly in the Lock position.

3 Hold the left and right handles F of the front window with both hands, press the unlocking button E, and pull down for unlocking. Then pull the handle forward with force and slowly lower the front window until the front window is pushed into the window lock on the front side of the cab top, and make sure it is locked.

4.12 Removal of front lower window



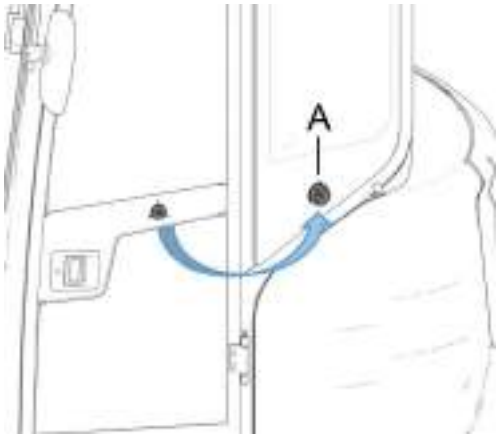
1 Open the front window.

2 Pinch the upper edge of the lower window with both hands, and pull it up.

3 Store the removed window in the cab.

Notice! Ensure that the lower window is properly placed to prevent it from being damaged.

4.13 Door lock

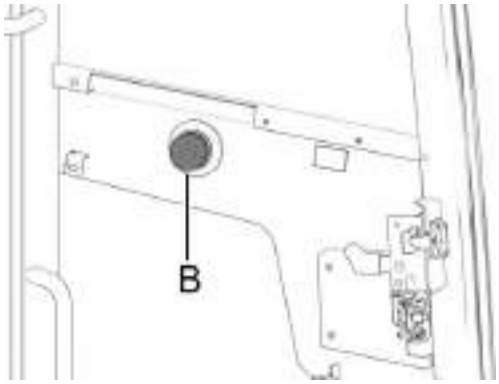


It is used to ensure the safety of the cab door in the Open position.

1 Push the door towards the outside of the cab.

2 Make sure that it is securely fixed on the lock (A).

Rotate the knob (B) in the cab door counterclockwise to release the door.



4.14 Emergency exit

If the doors and windows of the cab cannot be opened, the rear window can be broken with a safety hammer as an emergency escape exit. The safety hammer is located on the left pillar in the cab.

Notice! Only use the safety hammer in an emergency to break the rear window as an escape exit, and do not use it at any other time.

4.15 Lid/cover with lock

The fuel tank filler cap, engine hood, toolbox and other parts of this machine are equipped with locks. These lockable parts shall be opened and closed with the self-contained keys of the machine.

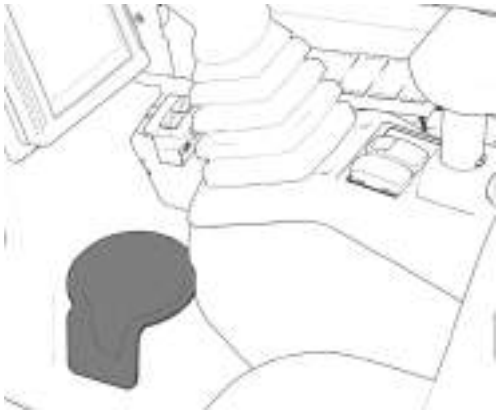
Notice! Insert the key to the bottom and turn the key. If the key is turned before it is fully inserted, the key may be broken.

4.16 Placement of the Operation and Servicing Manual

There is a storage bag behind the driver's seat, in which the Operation and Servicing Manual shall be placed for use when necessary.

★ Notice

Do not place tools or heavy objects in the storage bag, which may damage the storage bag.



4.17 Cup holder

The cup holder is located in the front right of the cab and is used to hold soft drink cans, etc.

4.18 Coat hook

The coat hook is located in the right rear of the cab.

★ Notice

Do not hang any objects that affect the operator's vision.

4.19 A/C heater

Please refer to relevant sections

4.10 Radio

Please refer to relevant sections

Chapter III Operation Instructions

1 Introduction

This chapter contains regulations on operation and safety. In ensure the correct and safe operation/operation of the machine, you must comply with these regulations, and also fulfill the responsibilities and obligations of national, provincial and municipal laws and regulations on transportation safety, traffic safety, industrial safety and labor welfare.

2 New machine running-in

IMPORTANT!! Check the oil level frequently.

The machine has been thoroughly adjusted and tested before delivery. However, when a new machine is used, operating it under harsh conditions will adversely affect the performance of the machine and shorten the service life of the machine. In the first 100 hours (indicated by hour), be sure to run-in the machine, which will improve the hardness and smoothness of all bearing surfaces, thus greatly prolonging the service life. Observe the following regulations during running-in:

- After the engine is started, run it at idle speed for 5 minutes.
- Avoid heavy load or running at high speed.
- Avoid sudden start, sudden acceleration, sudden turn and sudden stop except in emergencies.

3 Safety rules during operation

3.1 Obligations of operators

Warning
When operating the machine, the operators and the management department have the right to let the unauthorized personnel leave the site. The operators shall carefully observe the surroundings of the machine to ensure safety.

- Operators must abide by the rules and recommendations of the Operation and Servicing Manual, and pay attention to the special requirements and hazards specified by laws, regulations or work sites.
- The operator must take sufficient rest, keep in good mental and physical condition, and never operate the machine after drinking or taking drugs and other narcotics.
- The operator must fully understand the working site of the machine. It is forbidden for anyone to pass or stand under the lifted excavating gear, which is essential to avoid serious personal and property losses and possible fatal accidents.
- Prevent anyone from entering or staying in a hazardous area within 7m (275.8 inch) of the machine. If there is a person, the operator must be extremely careful and can only operate the machine when he or she can be seen or know where he or she is.
- If any abnormality (noise, vibration, odor, incorrect instrument display, smoke, oil leakage, etc., or any

abnormal display on the alarm device or monitor) is found during operation or servicing, report it to the supervisor and take necessary measures. Do not operate the machine until the fault is rectified.

3.2 Safety regulations

- Before start-up, faults or defects affecting safety must be eliminated.
- Wear clothing suitable for safe operation and a rigid hat to enhance head protection.
- Do not use communication equipment when the machine is traveling. Its signal may interfere with important electronic devices of the electrical system in the machine.
- Always sit on the seat when starting the engine.
- Avoid hand or finger pinching and keep your hands away from areas with pinching risks (covers, doors, windows, etc).
- Sit on the seat and fasten the safety belt.
- When entering and leaving the machine, you should face the machine and use steps and handrail. Do not grasp any control handle (or control lever). Keep at least three points of contact, that is, two hands and one foot or one hand and two feet. Do not jump.
- The cab door must be closed tightly during operation.
- Vibration (shaking) during operation may cause injury to the operator.
- Methods of reducing vibration are as follows:
- Adjust the seat and fasten the safety belt.

- Select the smoothest operating surface (level the surface if necessary).
- Adjust the machine speed.
- When traveling on uneven ground, the machine shall not tilt to one side by more than 10°.
- There are two escape routes in the cab: the door and rear window. In case of danger, break the window glass with an emergency hammer to escape. Refer to "Emergency exit" of Chapter II.
- When climbing on the top of the machine, only use the inspection channel equipped with anti-slip mats. Do not climb on engine hood or covers without anti-slip mats.
- Check the handrail and steps (including the track shoe) before getting on and off the machine. If there is oil, grease or mud on the handrails or steps (including the track shoe), wipe them off immediately. Keep these areas clean. If damaged, repair it and tighten the loose bolts.

4 Working in hazardous areas

Notice: The machine is not suitable for environments that are harmful to human body, such as toxic gas, dust, etc.

4.1 Working in areas close to overhead high-voltage power lines

- If the machine is close to a high-voltage wire, personnel may be subjected to electric shock, although that does not necessarily occur via direct contact, but the current can be conducted down from the wire.
- If you work near high-voltage lines, prohibit any one else from approaching the machine.
- Before working near overhead power lines, the power company should be contacted to determine the cable voltage.

- For the sake of safety, the minimum distance between the machine and the high-voltage line shall be as follows:

Voltage	Minimum safe distance from wires
0 to 1 kV	2 m (7 ft)
1 to 55 kV	4 m (13 ft)
55 to 500 kV	6 m (20 ft)

- If the work equipment comes into contact with the wires, the operator must stay in the cab. If the machine is still working, try to move the work equipment away from the high-voltage line to disconnect the circuit.

4.2 Working in areas where overhead cables for electric trains are used

- Before loading or unloading the machine, contact the railway authority to obtain the operation permit.
- After the operation is interrupted, the railway authority must be contacted again before continuing the operation.

4.3 Working in areas with cables and pipelines buried underground

- Before operating the machine, contact the department responsible for underground cables and pipelines and follow their instructions.

- When the position of the cable or pipeline is complex and difficult to be handled, or the operator cannot see the actual operation point at the operation place, a signalman shall be appointed. For hand signals, please refer to "8 Hand signals" of Chapter IV.

4.4 Working in confined areas

- Before operation, check whether the space is sufficient.
- The operation shall be slow.

4.5 Working in areas with insufficient lighting conditions

- When working in buildings and tunnels, turn on the frame light and boom light.
- Do not operate the machine when visibility is poor, such as in dense fog, snow or heavy rain.

4.6 Working in other hazardous areas

- Turn on the warning light on the top of the cab when the machine poses obstruction and danger to traffic and the width of the machine-connected device exceeds its own width (wires are reserved and can be optionally installed by the user as needed).
- Take care when moving the machine with suspended load, and assign a signalman if necessary. For hand signals, refer to "8 Hand signals" of Chapter IV.
- Use road markings when working on or next to roads.
- Be careful when operating the machine in places marked as hazardous areas.
- Do not operate near the edge of facilities such as wharves and skew bridges.

4.7 Avoidance of environmental damage

Care shall be taken to protect the environment during maintenance and servicing. The discharge of oil harmful to the environment will pollute the environment. Oil degrades very slowly in water and sediment. 1 litre of oil can contaminate millions of litres of drinking water.

⚠ Notice

For the following points, all waste must be sent to an officially recognized waste management company for disposal.

- During draining, the oil must be collected in a suitable container, and overflow prevention measures must be taken.
- Before waste disposal with the used filter, all working fluids must be drained from it. If the machine is working in an environment containing asbestos or other dusts harmful to health, place the used filter of the machine in the sealed bag attached to the new filter.
- The battery contains substances that are harmful to personal health and the environment. Used battery must be disposed of as environmentally hazardous waste.
- Used rags, gloves, bottles and other consumables may also be contaminated with oils that are harmful to the environment. These consumables must also be disposed of as environmentally hazardous waste.
- When the product needs to be scrapped, scrap it according to local laws and regulations and

environmental protection policies.

5 Starting the machine

5.1 Inspection before starting the engine

IMPORTANT!! Always walk around the machine before starting to make sure there is no one in the place nearest to the machine.

- Place the machine in the repair position. Refer to "1 Repair position" of Chapter V.
- For daily maintenance, refer to "15 Regular maintenance" of Chapter VI.
- Adjust the seat so that the controller and pedal can be operated comfortably and safely. Refer to "Seat adjustment" of Chapter II.
- Check the IECU, turn the start switch to the "I" position, all lights go on immediately. If any light does not go on, it means that this light or the electrical system is faulty. After the engine is running, all lights go out.
- Check whether the frame light, boom light, rearview mirror, etc. are in serviceable condition.
- Check and confirm that there is no leakage.
- Check and confirm that there are no defective or loose parts, which could cause damage.
- Check and confirm that there is fuel in the fuel tank. If the fuel tank runs out or air enters the system for some reason, the air must be vented before the engine is started. Refer to "Fuel system exhaust" of Chapter VI.
- Check and confirm that the engine hood and guard

plate are closed.

5.2 Operation before starting the engine

- Window cleaning or defrosting
- When starting the engine, always sit on the operator seat. Refer to "5.3 Starting engine" of this chapter.
- Fasten the seat belt before all operations.
- Check and confirm that the IECU, all controllers and switches are working properly.
- Before starting the machine, check and confirm that no one is near the machine.
- Sound the horn.
- Put down the control lockout lever (refer to "Control lockout lever" of Chapter II) and start the engine.

5.3 Starting the engine

⚠ Warnings
After checking whether there are people and obstacles around the machine, start the engine and sound the horn at the same time. Do not operate any control handle (or control lever) and key switch during startup.

IMPORTANT!! Do not hold the key in the starting position for more than 20 seconds, which will seriously damage the starting system. After 2 minutes, try to start the engine again.

IMPORTANT!! If there is abnormal sound, excessive vibration or abnormal operation, please immediately turn the start switch to the "O" position and shut down the engine.

Notice! Make sure the control lockout lever is in the locked

state, otherwise the engine cannot be started. See "3.6 Control lockout lever of Chapter II".

- Turn the engine speed control lever to the low throttle position. Refer to "3.5 Engine speed control lever" of Chapter II.
- Release the key immediately after the engine is started.
- If the engine does not start, wait until the engine stops completely, turn the key back to the "O" stop position, and then try to restart.

Notice: When it is very cold (below -15℃ = +5℉), the engine cannot be used for high-intensity work immediately after starting. Let the engine idle for 10 to 15 minutes.

5.4 Operation and inspection after starting the engine

IMPORTANT!! If there is abnormal sound, excessive vibration or abnormal situation, immediately turn the key to the "O" (stop) position and shut down the engine.

- Do not operate the work equipment immediately after starting the engine. Make sure that each system has reached sufficient working temperature.
- Turn the engine speed control lever to the neutral position, and let the engine run at idle speed for 5 minutes.

IMPORTANT!! Never run the engine at high speed or low idle speed for more than 20 minutes.

IMPORTANT!! If the idling time is long, please run the engine at medium speed.

- Pull the control lockout lever to the "Unlock" position.

Refer to "3.6 Control lockout lever" of Chapter II, and lift the bucket from the ground.

- Operate the control lever slowly, move the bucket and arm cylinders to their stroke ends for 30 seconds and 5 minutes respectively in turn to rise the hydraulic oil temperature.

IMPORTANT!! If the hydraulic oil temperature is low, do not operate, and run it at low speed and light load until the oil in the engine and hydraulic system becomes hot and flows more easily.

- After warming up, check whether the IECU is in the following states.
- The engine coolant temperature gauge is within the range of 30°C - 110°C (86°F - 230°F)
- Fuel level gauge, trending to H
- The central warning light (red) is off
- The charging indicator light (red) is off
- The air filter clogging warning indicator light (red) is off
- The engine water temperature warning indicator light (red) is off
- The hydraulic oil temperature alarm indicator light (red) is off
- The hydraulic oil filter clogging warning indicator light (red) is off
- The preheating indicator light (yellow) is off
- Check for abnormal exhaust color, noise or vibration. If any abnormality is found, repair it.

- Place the control lockout lever in the Lock position and confirm that the slewing and work equipment cannot be operated with the left and right work equipment control levers.

6 Operating the machine

6.1 Operating the work equipment

For the operation method of the work equipment, please refer to "4.1 Work equipment control handle" and "4.2 Multi-function control handle".

6.2 Dozer blade control handle

For the operation method of the dozer blade, please refer to "4.5 Dozer blade control handle".

6.3 Traveling direction control

IMPORTANT!! Before operating the traveling control lever or the traveling pedal, check the direction of the track. If the traveling motor is at the front of the machine, the traveling control lever or pedal must be operated in the opposite direction.

IMPORTANT!! Be sure to operate the traveling control lever smoothly to avoid sudden start and stop. Do not change the traveling direction quickly.

If the machine is to travel continuously, please follow the following operating conditions:

Ground conditions	Operation
Flat, normal or soft soil	Do not travel continuously for more than 2 hours. If it is to travel at high speed for more than 2 hours, stop it for at least 20 minutes, and the traveling must be in the forward direction. Otherwise, the track roller and the idler may be overheated, resulting in oil leakage.
Uneven or rough soil (mixed with gravel, crushed stone, boulders, or on slopes)	Do not travel the machine at low speed for more than 1 hour. If it is to travel at high speed for more than 1 hour, stop it for at least 20 minutes, and the traveling must be in the forward direction. Otherwise, the track roller and the idler may be overheated, resulting in oil leakage.

Forward traveling

- Place the engine speed control lever in the high throttle position to increase the engine speed.
- When the traveling motor is at the rear of the machine, slowly push the traveling control lever forward, or slowly step on the front part of the pedal;
- When the traveling motor is at the front of the machine, slowly pull the traveling control lever backward, or slowly step on the rear part of the pedal.

Backward traveling

- Place the engine speed control lever in the high throttle position to increase the engine speed.
- When the traveling motor is at the rear of the machine,

slowly pull the traveling control lever backward, or slowly step on the rear part of the pedal;

- When the traveling motor is at the front of the machine, slowly push the traveling control lever forward, or slowly step on the front part of the pedal.

Left turning

- When the traveling motor is at the rear of the machine, push the right traveling control lever forward to realize forward left turning; Pull the left traveling control lever backward to realize backward left turning.
- When the traveling motor is at the front of the machine, operate the traveling control lever in the opposite direction to the above.

Right turning

- When the traveling motor is at the rear of the machine, push the left traveling control lever forward to realize forward right turning; Pull the right traveling control lever backward to realize backward right turning.
- When the traveling motor is at the front of the machine, operate the traveling control lever in the opposite direction to the above.

Direction switching, reverse rotation

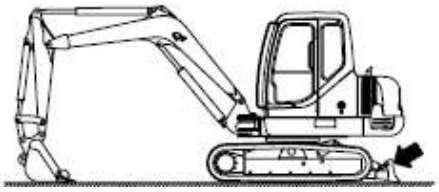
- When the traveling motor is at the rear of the machine, pull the left traveling control lever backward and push the right traveling control lever forward at the same time to make the machine switch direction quickly to the left; Pull the right traveling control lever backward and push the left traveling control lever forward at the

same time to make the machine switch direction quickly to the right;

- When the traveling motor is at the front of the machine, operate the traveling control lever in the opposite direction to the above.

7 After operation

7.1 Steps for parking the machine



⚠ Warning
When entering or leaving the cab, always face the machine and use the pedal or handrail to prevent slipping. Always use three-point contact when getting on and off the machine, that is, two hands and one foot or two feet and one hand. Do not jump off the machine.

IMPORTANT!! Select a flat ground to park the machine, and avoid dangerous places. If the machine must be parked on a slope, place a cushion block under the track shoe. Insert the bucket into the ground as an additional safety measure.

- Place the left and right traveling control levers in the neutral position.
- Place the engine speed control lever to the low throttle position.
- Lower the bucket and dozer blade to the ground so that the bottom of the bucket is parallel to the ground.
- Place the control lockout lever in the Lock position. Refer to "4.7 Control lockout lever".
- Run the engine at low speed for about 5 minutes to cool it down gradually.
- Turn the key switch to the O position to shut down the engine.
- Remove the start switch key.

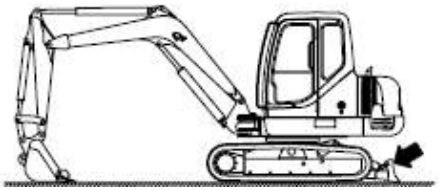
IMPORTANT!! Avoid stopping the machine suddenly. If the machine is to remain in operation for a period of time (no matter how long), the master power switch should be placed in the "O"

position (the Off position).

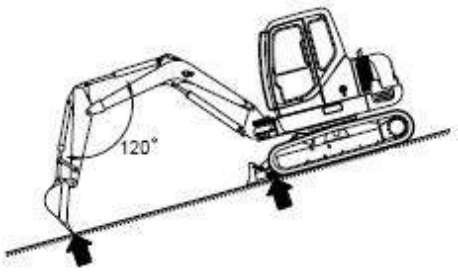
7.2 Operation and inspection after shutting down engine

- Conduct walkaround inspection on the work equipment, the exterior of the machine and the chassis, and check for water or oil leakage. If any abnormality is found, repair it.
- Fill up the fuel tank with fuel.
- Check the engine compartment for paper scraps and debris. Remove paper scraps and debris to avoid fire.
- Remove the sludge, rock debris and rubble attached to the track shoe and chassis.
- In icy weather, clean the track and park the machine on a wooden board.

8 Parking the machine



IMPORTANT!! Park the machine on level ground. Place the bucket and dozer blade flat on the ground. If it must be parked on a slope, place cushion blocks under the track to prevent the machine from moving, adjust the bucket to the downhill side, and insert the bucket teeth into the ground.



- Choose a place where there is no danger of falling stones, collapse and submergence to park the machine.
- Pay attention to the weather conditions and take appropriate measures to prevent the machine from freezing on the ground, sinking or suffering any other adverse consequences.
- When the vehicle is stopped due to failure, place fences, signals, flags or warning lights, and place other necessary signals to ensure that passing vehicles can see the machine clearly. Make the machine, fences and flags not obstruct traffic.
- When leaving the machine after shutting down the engine, turn the control lockout lever to the Lock position. Refer to "4.7 Control lockout lever" of Chapter II.
- Close the window, lock the cab and all the covers, remove the key, take it with you and put it in the specified place.
- Turn off the master power switch. Refer to "3 Switch" of Chapter II.

IMPORTANT!! If the engine is stopped without cooling, it

may shorten the service life. Do not shut down the engine immediately unless there is an emergency. In case of engine overheating, cool the engine at low speed, and then shut down the engine.

If the machine is to be parked for a long time, the following points must also be observed:

- Check the machine for oil or water leakage, and check whether the work equipment and track are faulty.
- Remove the dirt and debris attached to the track and roller.
- Conduct anti-rust treatment of exposed parts and thorough lubrication of the machine.
- Fill the fuel and hydraulic tanks to the maximum capacity mark.

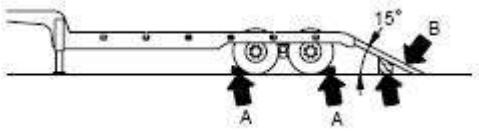
When the excavator is to be stored for a long time, the following operations shall be carried out:

- Wipe off the grease on the piston rod of the hydraulic cylinder.
- Add grease to all parts that require lubrication.

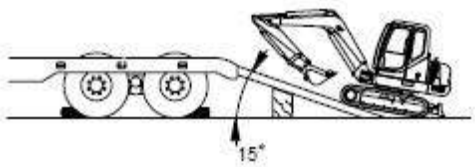
9 Transportation of the machine

⚠ Warning
➢ Observe the regulations on weight, height, length and load safety when transporting the machine. ➢ Pay special attention to the loading and unloading of the machine. ➢ Run the engine at low speed, and set the running speed of the vehicle at low speed. ➢ Select a solid and flat ground and keep a sufficient distance from the road shoulder. ➢ Ensure that the firmness, width, length and thickness of the wooden board for loading and unloading the machine meet the safety standards. If the board is excessively bent, it shall be supported by wooden pads. ➢ Remove grease, oil, dirt, ice, etc. from the wooden board and underbody of the truck to avoid sideslip. ➢ Do not change the driving route on the wooden board. Otherwise, first lower the vehicle from the wooden board, and then change the direction. ➢ Operate slowly when swinging on the truck due to the instability of the base. ➢ After loading, plug each track and fix it with a rope of sufficient strength so that the vehicle cannot move. ➢ Lock the cab door.

9.1 Loading



- Brake the trailer properly, and place the cushion block A under the tire to ensure that the trailer does not move.
- Install the loading platform B between the trailer and the machine, and fix it firmly:
- Ensure that the firmness, width, length and thickness



of the loading platform are safe for loading.

- Ensure that the angle of the loading platform is 15° or less.
- Ensure that the distance between the loading platforms matches the center of the track.
- Separately check whether the height of the left and right loading platforms is the same.
- Set the traveling speed at low speed.
- Operate the engine at low speed.
- Determine the direction, and drive slowly to the loading platform.
- When loading the machine, do not make the piston rod of the bucket touch the trailer.

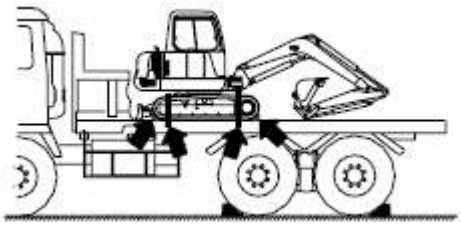
- When the machine is on the loading platform, do not operate any control lever (or control handle) other than the traveling control lever (or traveling pedal).
- Load the machine onto the trailer correctly, and ensure that the machine is fixed firmly.

9.2 Securing the machine

- Lower the bucket.
- Extend the bucket and arm cylinders fully, and then slowly lower the boom.
- Lower the control lockout lever to lock the system securely. See "4.7 Safety locking control lever" of of Chapter II.
- Shut down the engine and remove the key from the ignition switch.
- Turn off the master power switch (set to "O" position).

Refer to the section of master power switch of "3 Switch" of Chapter II.

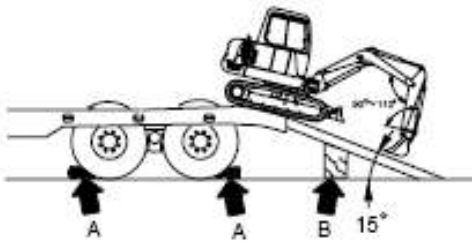
- Lock the driver door and all covers and hoods with locks. Refer to "4.11 Covers/hoods with lock" of Chapter II.
- Cover the exhaust pipe to prevent damage to the turbocharger.



- Place cushion blocks under both ends of the track, and fix the machine with tethers with appropriate load capacity to prevent it from moving.

Notice! When the machine is loaded with work equipment, even if the boom is closed, the pressure on the hydraulic cylinder of the boom due to the self-weight of the machine is still large. Therefore, insert a support between the arm and the boom during loading.

9.3 Unloading



- Brake the trailer properly, and place the cushion block A under the tire to ensure that the trailer does not move.
- Install the loading platform B between the trailer and the machine, and fix it firmly
- Ensure that the strength, width, length and thickness of the loading platform B are safe for loading.
- Ensure that the angle of the loading platform B is 15° or less.
- Ensure that the distance between the loading platforms B matches the center of the track.
- Separately check whether the height of the left and

right loading platforms is the same.

- Remove the chains or wire ropes that fasten the machine.
- Start the engine for warm-up.
- Place the control lockout lever in the "Unlock" position. Refer to "3.6 Control lockout lever" of Chapter II.
- Place the speed control lever of the engine in the low-speed position.
- Raise the work equipment and move the machine slowly. Stop moving when the machine is level with the upper edge of the rear wheel of the trailer.
- Adjust the angle between the arm and the boom to 90°~110°, lower the bucket to the ground, and slowly move the machine from the rear of the trailer to the unloading platform.
- When the machine is moved off the unloading platform, slowly operate the boom and arm to lower the machine carefully until the machine is completely off the platform.

Notice! Make the work equipment as low as possible without touching the ground or other objects. When it is on a slope, do not operate any other control lever (or control handle) other than the traveling control lever.

9.4 Lifting the machine

⚠ Warning!

If there is a person in the cab or on the machine, do not lift the machine.

Proper steel ropes, chains and hooks with sufficient load capacity shall be used.

Always lift the machine as shown in the figure below. Improper lifting will cause the load to deflect, resulting in personal injury or machine damage.

During lifting, do not allow pedestrians or vehicles to enter under the lifted machine.

Lift the machine on a flat, solid and level ground.

- Start the engine and install the work equipment as shown in the figure.
- Turn the control lockout lever upward to lock the system. Refer to "4.7 Control lockout lever" of Chapter II.
- Shut down the engine, check the machine for safety, and then firmly close and lock the operator cab door, front window and engine hood.

- As shown in the figure, properly connect and firmly lock the lifting cable or chain with sufficient strength relative to the weight of the machine at the lifting position.
- After installing all lifting equipment, adjust the lifting angle of the sling rope to 30°~40°, and lift the machine slightly to check the balance. If it is ok, lift the machine slowly and evenly.

Notice:

The lifting steps are applicable to machines with standard technical specifications.

Depending on the accessories and options actually installed, the lifting method will vary. In this case, please contact the dealer of the company for consultation.

When the transportation height is limited, the original cab can be disassembled as shown in the figure to reduce the transportation height. The cab has a protective function and cannot be dismantled during work. We will not be responsible for the dangerous situations caused by disassembling the cab during work.

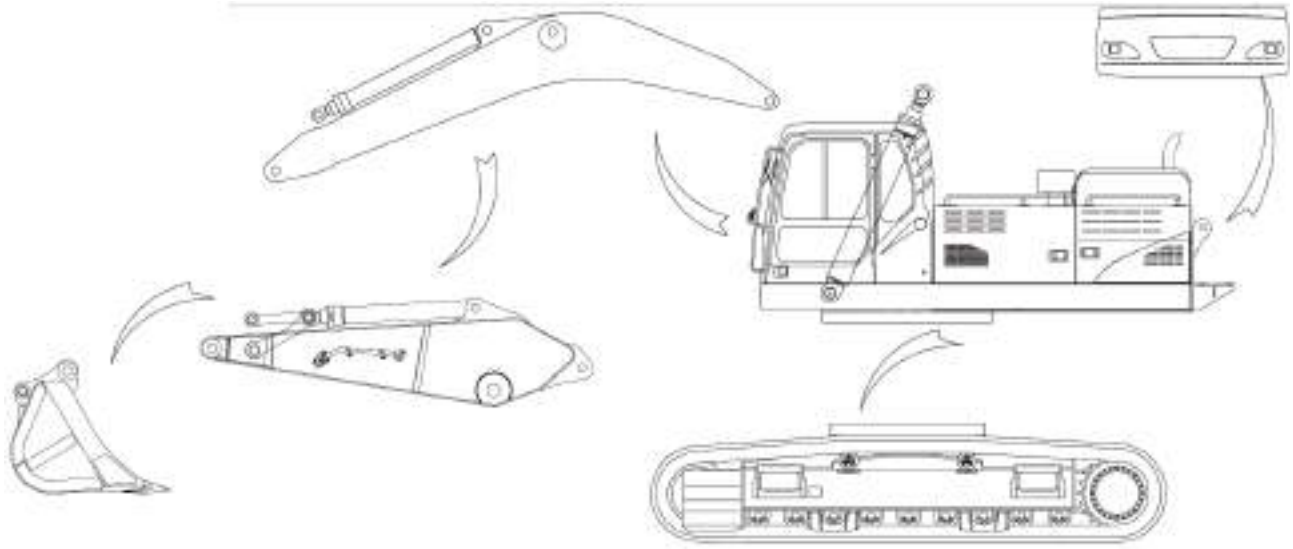
9.5 Disassembly during transportation

★ Notice

In case of transportation, the local, provincial and national regulations on the weight, width, height and length of the machine shall be observed. In case of selection of the transportation route, the clearance of the passageway, the width limit, height limit and load limit of the bridge and road, as well as the passing time shall be considered.

Dimensions and specifications of the machine, boom and arm. Please refer to relevant sections. For the specifications of other components, please contact Shandong Lingong Construction Machinery Co., Ltd. and its authorized dealers.

In case of transportation weight and size, the following components can be removed during transportation.



For the assembly/disassembly of the above detachable components, please refer to the repair manual of the machine and contact your dealer for the corresponding information.

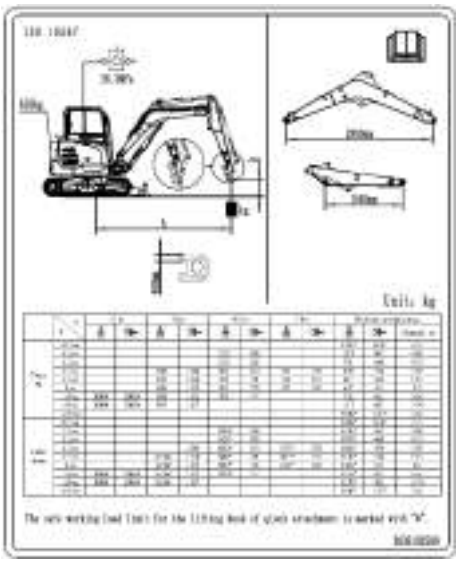
Removal of warning light

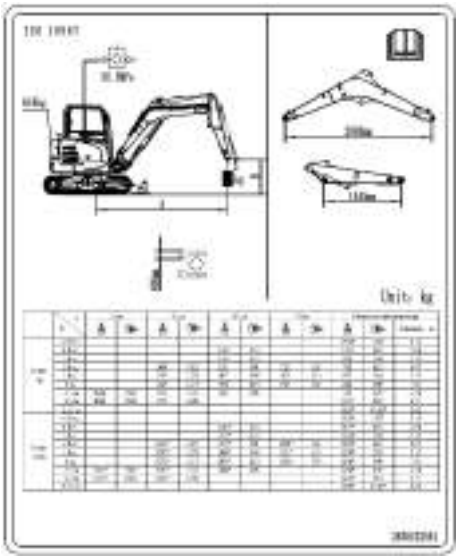
★ Notice

The warning light shall be removed before machine

transportation to avoid damage due to overheight.

9.6 Lifting items (optional)





If the machine is used to lift items, the following safety work equipment must be provided:

- A load hook.
- The explosion-proof valve on the boom or the explosion-proof valve on the boom and arm in some countries shall be evaluated in accordance with the risk.
- Overload warning equipment.

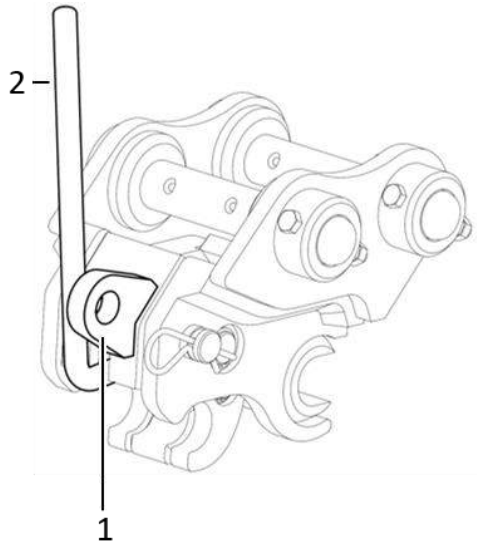
Notice:

It is the responsibility of the operator to be familiar with and follow all national, government, and city regulations regulating this type of work.

For more information, please contact our dealers for consultation.

To ensure optimum control and safety during lifting, remember the following:

- It shall be operated on a flat, solid and level ground.
- If the ground conditions are unstable, e.g. loose gravel, sand or water, do not work at a load close to the maximum rated load given in the machine's lifting capacity table.
- Do not slew the excavator abruptly with a suspended load, the effect of centrifugal force will destroy the stability of the machine.
- Do not pull up the load through slewing or arm retraction.
- Do not operate the machine above personnel.



Load hook

The hook 1 on the quick-change device cannot withstand the lateral load force. The load force must be applied longitudinally to this hook.

The following items shall be strictly observed in case of lifting with quick-change device:

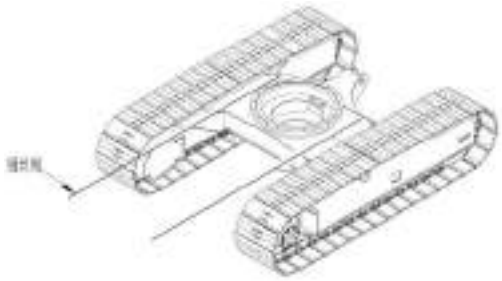
- The quick-change device shall be checked before lifting, and lifting is prohibited if the structure of the quick-change device is abnormal (including but not limited to the following situations):
  - The body of the quick-change device is damaged, such as weld crack, structural member fracture and other defects;
  - The shaking at the connection between the quick-change device and the arm and connecting rod is too large;
  - The pin shaft at the connection between the quick-change device and the arm and the connecting rod is not axially fixed or the pin shaft is damaged too much.
- In case of lifting with the quick-change device, the bucket shall be removed, and the weight of the lifted object shall not exceed the rated lifting capacity of the quick-change device.
- The quick-change crowbar (2) shall be only used in case of bucket assembly/disassembly. It is strictly prohibited to install the crowbar (2) on the quick-change device during lifting of items.

10 Traction of the machine

10.1 Precautions

- Use a cable with sufficient strength to tow the machine, and do not use a towing rope with broken strands, reduced diameter or twisting.
- Do not tow the machine on a slope.
- During the towing process, no one is allowed to stand near the towing rope, and do not cross or approach the towing rope.
- When connecting the machine to be towed, do not allow anyone to enter between the tractor and the machine to be towed.
- Do not pull the rope suddenly, but slowly. The slack rope is likely to be broken when pulled suddenly.
- Keep the rope horizontal, straight and parallel to the track.
- Select the low-speed traveling mode. Slowly start the machine during towing.

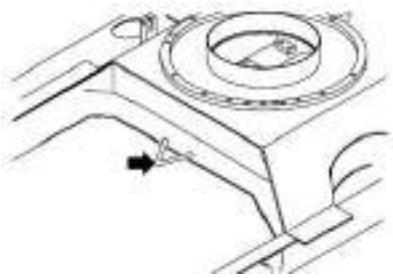
10.2 Heavy load traction



- If the machine is stuck in the mud and cannot be driven out by its own power or the machine is used to tow heavy objects, the wire rope shall be used as shown in the figure.
- Place a wooden block between the towing rope and the machine to protect the machine and avoid damage to the rope.

10.3 Light load traction

- To tow light objects, use the shackles on the lower frame.



11 Explosion-proof valve (optional)

Warning
Do not remove the explosion-proof valve by yourself. When the pressure valve is disassembled, the internal components will pop out with great force under the action of spring tension, causing injuries. If there is a problem with the explosion-proof valve, please contact the authorized dealers of Shandong Lingong Construction Machinery Co., Ltd. High-temperature hydraulic oil under high pressure may splash on the skin after being sprayed out, causing serious injuries. If you are injured by the sprayed hydraulic oil, please seek medical treatment immediately.

The explosion-proof valve is installed at the large chamber end of the boom cylinder and the small chamber end of the arm cylinder.

Boom and arm lowering during explosion-proof valve pipeline shut-off

★ Notice

Do not stand under the lifted boom or arm.

There are three cases for boom and arm lowering.

1 The engine is running

Lower the boom and arm by using the work equipment control handle in the usual way. Collect the oil in the explosion-proof valve hose into a suitable container.

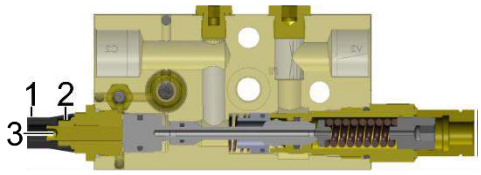
2 The engine has stopped

The hydraulic pressure of the servo system can be maintained by an accumulator for several minutes, which

allows the operator to lower the boom and arm in the usual way. It takes a long time to lower the boom and arm, and the control pressure will be released. Collect the oil in the explosion-proof valve hose into a suitable container.

3 The engine has stopped, and there is no servo pressure

When the engine stops working and there is no servo pressure for the explosion-proof valve to pilot, the emergency lowering of the boom and arm can be realized by adjusting the adjusting screw on the explosion-proof valve. The cross-sectional diagram of the safety valve is shown in the left figure.



★Notice

Before turning the adjusting screw, mark its position for future assembly.

- Open the black plastic sheath 1, Loosen the locking nut 2 with a 13 mm (0.5 inch) wrench with a torque of about 13 N.m (115.1 in.-lb), and then slowly turn the adjusting screw A clockwise with a 4 mm (0.2inch) Allen wrench until the boom and arm begin lowering slowly.
- Return the adjusting screw 3 to the original position marked.
- Fix the adjusting screw 3 with a 4 mm Allen wrench, and then tighten the locking nut 2 with a 13 mm (0.5 inch) wrench with a torque of 13 N.m(115.1 in.-lb), install black plastic sheath 1.
- Contact the authorized dealer of Shandong Lingong Construction Machinery Co., Ltd.

Chapter 4 Operation techniques

This chapter provides instructions and suggestions on the operation of machine, including the operation method of the most common working devices, so that operators can operate the machine safely and effectively.

1 Excavation rules

1.1 Precautions

⚠ WARNING
During excavation, the operator must sit in the driver's seat. During the operation of the machine, no one is allowed to be on the outside of upper structure, on the tracks, or at the door of the machine.

First, read "**3 Safety rules during operation**" in Chapter 3.

- Before operation, carefully study the workplace drawings and local rules, know about the conditions of the ground and dangerous areas of the workplace, cut off the gas, power and water if necessary, and mark the locations of underground cables and pipes.
- Put fences and “No Entry” signs around the machine if there is a risk of unauthorized approach. Pay special attention to the rotating machine.
- Do not allow the bucket to pass over the heads of other workers or over the driver's seat of dump trucks and other transportation equipment, as the loaded

material may fall, and the bucket may hit the dump truck, causing serious injury or damage.

- Never use a bucket for cutting and chiseling.
- Never use dozer blade as a support.
- Never use this machine as a crane for lifting.
- Release the pedal and control lever and shut down the engine promptly in case of loss of control of the machine.
- Shut down the engine promptly and find out the cause if the red warning lamp goes on and the buzzer sounds.
- Do not equip the machine with a bucket larger than the specification or other working devices.
- In the event of a fire, turn off the main power switch (set it to position “0”) when possible.
- Do not excavate the working surface below the suspended part, as the machine is in the risk of damage by falling rocks or collapse of suspended part.
- Do not dig too deep under the front of the machine. Otherwise, the ground beneath the machine may collapse and cause the machine to fall.
- When performing excavation, adjust the tracks to be at right angle to the shoulder or cliff, and place the travel motor at the rear, so that the machine can be easily driven away in any situation.
- Do not carry out removal under the machine, as this will make the machine unstable and roll over thereafter.

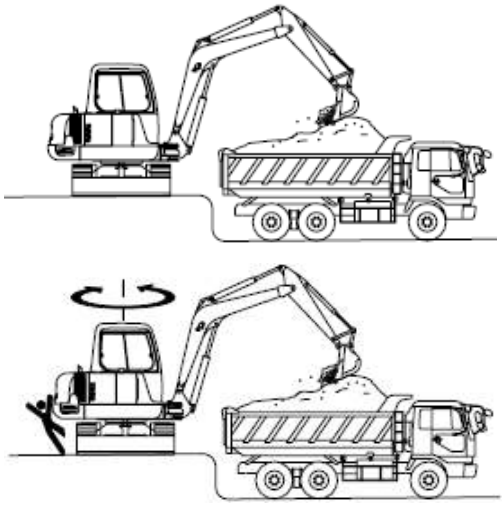
- When working on the top of building or other structure, check the strength of the structure at first, as such operation poses a risk of buildings collapse, causing serious injury or damage thereafter.
- Do not perform demolition to structures above the head, as this poses a risk of debris falling or building collapse, causing serious injury or damage thereafter.
- Do not use the impact force of the working device for breaking, as this poses a risk of personnel injury or damage to the working device caused by flying broken materials.
- Generally speaking, the risk of rollover with the working device on the side is higher that with the working device on the front or rear.
- When a breaking device or other heavy working device is used, there is a risk of balance loss and roll-over. When operating on a flat surface or slope, do not suddenly drop, rotate, or stop the working device, and do not suddenly extend or retract the boom cylinder, as these operations pose a risk of machine roll-over due to the impact force.
- For construction in places with height restrictions, such as tunnels, bridges, cables, or garages, take special care not to damage the working device.
- When the working device is on the same side as the dozer blade, operate with prudent if the working device is close to the dozer blade to avoid contact between them; when the working device is used for

digging, place the dozer blade on the ground and do not lift it, so as to avoid contact with the boom cylinder.

- Always ensure that the machine is stable enough for excavation. For operation on a level ground, always place the dozer blade flatly on the ground; for operation on a slope, always place the dozer blade on the ground at the lower side of the slope.

1.2 Precautions for loading materials

⚠ WARNING
When loading materials, check that there are no other people standing near it, as stones may fall out during loading.



- If possible, locate the excavator at a position higher than the truck.
- Place the truck in an appropriate position to avoid unnecessary rotation or lifting of the excavator.
- Confirm that the driver of the truck is outside the working area of the machine, and never rotate the bucket above the cab of the truck.
- Load the materials to the truck stably and well control the loading height to avoid unnecessary scattering.

1.3 Precautions during slewing or reversing

- Appoint a signaler for working in areas with dangers or low visibility. Refer to "8 Gesture signals” in this chapter.
- Confirm that no unrelated personnel enters the slewing radius or operating radius.

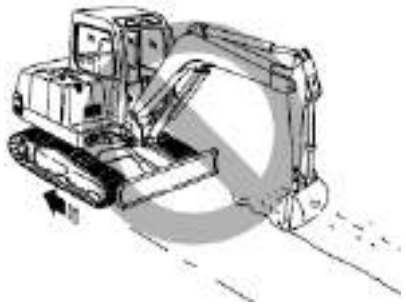
- Before starting the machine, activate the horn or signal to warn all personnel to leave the machine.
- Check that there is no one in the blind corner at the rear of the machine during reversing.

1.4 Prohibited operations

- Operation using swing force

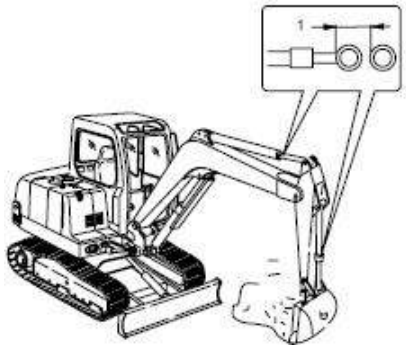
Do not use swing force to rake soil on the ground, demolish buildings, or push bucket teeth into the ground, as such operations may cause damage to the machine and working devices.

- Operation using travel force



Do not use travel force to excavate and push the bucket teeth into the ground, as such operations will cause overload at the rear of the machine and damage the travel drive mechanism.

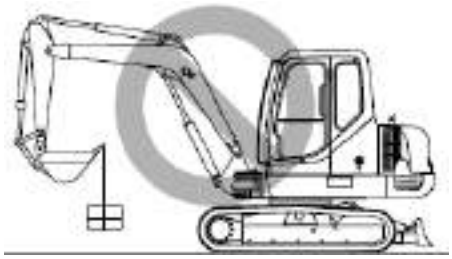
- Operation with hydraulic cylinder extended to the end of the stroke



Do not extend the cylinder to the end of its stroke, as this will overload the limiter inside the cylinder and shorten the service life of the machine. During operation, the interval 1 should be as large as possible as shown in the figure on the right.

- Operation using bucket lowering force

Do not use the lowering force of the machine for digging or the lowering force of the bucket as a pick, breaking hammer or pile driver. Hammer digging or continuous hammering may overload the rear of the machine or damage the working device. This will significantly shorten the life of the machine.



- Lifting operations

The machine shall never be used for lifting in principle. But if lifting is allowed, please use push type hooks of correct rating and certified lifting sling/shackle clips.

- Operation using machine lowering pressure

Do not operate by the lowering pressure of machine. For digging road surface with hard rocks, it is best to rocks them with other methods before digging, as this not only can reduce damage to the machine but also is more economical.

- Rock excavation operations

Use a break hammer to break rock and then perform excavation to prevent machine damage and improve work efficiency.

2 Machine vibration

Vibration on construction machinery is influenced by many factors, such as working mode, ground conditions, speed, etc., and the operator can also affect the actual vibration level to a large extent.

2.1 Guiding principles for reducing machine vibration levels

- Use the machine of the appropriate type and size according to the use, and equip it with appropriate options and working devices.
- Maintain the site and transportation roads in good condition.
- Remove all large stones or obstacles.
- Fill in all ditches and holes.
- Provide equipment and make a schedule to maintain site condition.
- Adjust the machine speed and travel path to minimize vibration levels.
- Avoid obstacles and uneven tablelands.
- Reduce speed when driving over uneven ground.
- Maintain the machine according to the manufacturer's recommendations.
- Check the braking system and steering system.
- Check the controllers, hydraulic system and their connections.
- Regularly maintain and adjust seats.
- Adjust the seat and suspension according to the weight and body size of the operator.

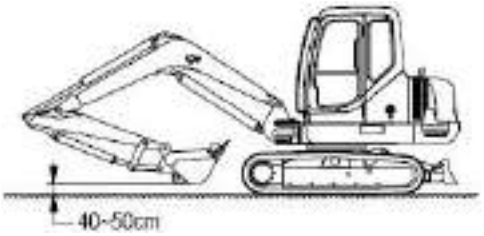
- Check and maintain the seat suspension and adjust the device of machine.
- Fasten the seat belt and adjust it correctly.
- Perform steering, braking, acceleration, gearshifting and movement of working device steadily.
- Minimize vibrations caused by long work cycle or long-distance travel.
- If possible, use the suspension system.
- If there is no suspension system available, reduce the speed to prevent vibration.
- When the construction sites are far apart, transport the machine.

2.2 Guiding principles for effectively minimizing back pain

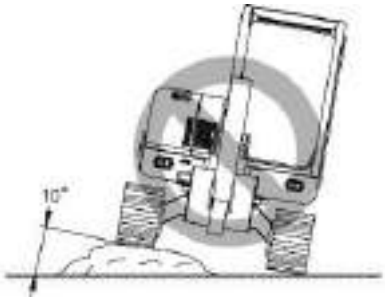
- Adjust the seat and controls to achieve the best operating posture.
- Take a break and reduce prolonged sitting posture.
- Avoid jumping off the cab or access system.
- Reduce repetitive handling and lifting of heavy weights.
- Maintain a suitable weight and good physical condition.

3 Operation under special working conditions

3.1 Travel



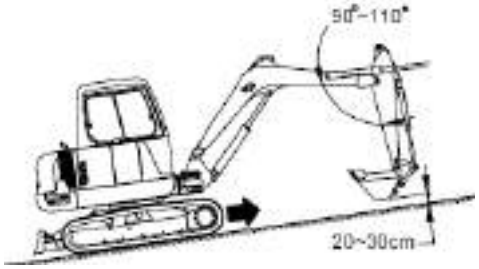
- The working device must be retracted and lifted so that it is 40cm (15.8 inch) to 50cm (19.7 inch) above the flat ground.



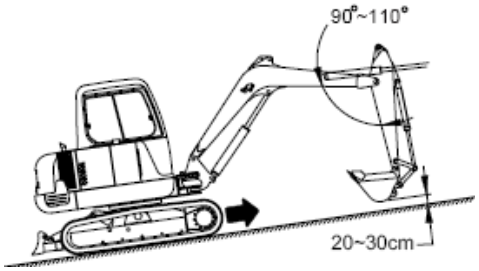
- Prevent the machine from tilting for more than 10° on the uneven ground.

- Drive thee machine at a low speed on uneven roadbeds, such as stone roadbeds or on uneven roads with large boulders. The drive wheels should be set forward for traveling at high speed.

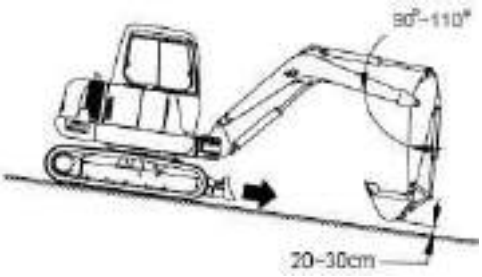
3.2 Travel on slopes



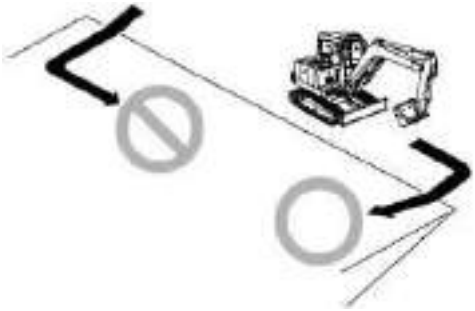
- For travel on a slope, keep the angle between the boom and the stick within 90° ~110°, and lift bucket 20cm ~ 30cm (7.9 inch ~ 11.8inch) above the ground.
- Be careful when opening or closing the door on a slope. As the pushing/pulling force of the door may change rapidly, please keep the door closed and securely locked.
- Do not travel on slopes of 25° or above, as this poses a risk of roll-over.



- For travel upwards a slope of 15° or above, keep the posture of the machine as shown in the figure. If the track shoes slip on slopes, insert the bucket into the ground and pull the stick move the machine up with the power of the working device.



- For travel downwards a slope of 15° or above, keep the posture of the machine as shown in the figure and maintain a low speed.



- Neither reverse down a slope nor turn on the slope or drive across the slope, and instead, please turn on the flat ground, or drive downhill to the flat road and then bypass the slope.
- If the machine slips, immediately lower the bucket to the ground to stop the machine.
- Do not perform slewing action or operation of working device on the slope, otherwise the machine will lose its balance and tip over. Especially when the bucket is loaded with goods, no slewing action is allowed.

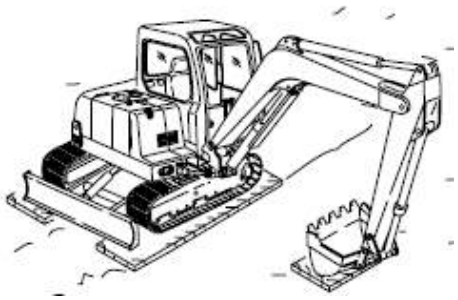
- When this is unavoidable, stack soil on the slope to level the ground, make the machine level and stable and operate with care.

- If the engine is suddenly shut down during travel on a slope, please place the travel control lever in "N" and lower the bucket to the ground, then restart the engine.
- If the engine is shut down on a slope, turn the ignition switch to the "I" position and operate the control lever to have the upper structure of the machine slew under its own weight. Therefore, do not operate the slewing function.

3.3 Moving out of muddy ground

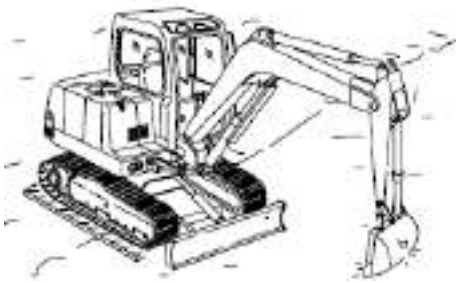
Be very careful when working on muddy ground.

⚠ WARNING
When the boom or stick is used to support the machine, be sure to use the bottom of the bucket (instead of the bucket teeth). Keep the angle between the boom and the stick within 90°~110°. After working in water or moving out of muddy ground, apply grease to the pin shaft of the working device. Check the lubricating oil in the driving wheels, rollers and track drive box. If the lubricating oil is contaminated, replace it.



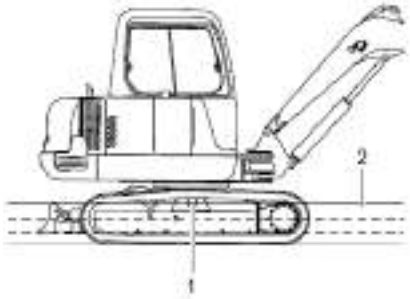
- When tracks on one side are entrapped in the mud

If tracks on one side are entrapped in the mud, support the entrapped track with the bucket, and place a wooden board under the track. If necessary, place a wooden board under the bucket.



- When tracks on both sides are entrapped in the mud

If tracks on both sides are entrapped in mud, place wooden boards under tracks on both sides. Push the bucket teeth into the ground, pull the stick in the same way as that for excavation, and push the travel control lever to the F position to drive the machine out of the swamp.



1. Upper track roller
2. Water surface

3.4 Travel in water

IMPORTANT! When the machine is driven out of the water, and the angle of the machine exceeds 15°, the rear of the upper structure body will enter the water, and the water will be kicked up by the radiator fan, which will cause damage to the radiator fan, so take special care in this case.

- The allowable water depth can reach the center of the upper track roller, and the upper track roller can not be completely submerged.
- After leaving the water area, ensure that all affected areas, such as pin shaft of bucket, are refilled with grease.
- Always clear the used grease, no matter whether the maintenance interval is reached or not.
- In addition, check if the oil in the travel drive mechanism is contaminated, and if necessary, replace the oil.

3.5 Operation in cold weather

⚠ WARNING
Avoid direct contact of unprotected skin with very cold metal parts because the skin may be frozen on the metal parts. The hydraulic system of the machine will respond very slowly at an extremely low temperature, therefore, be very careful before the normal operating temperature of the system is reached, so as to avoid accidents.

Please refer to "5 Machine startup" in Chapter 3 for

suggestions on startup.

- Remove ice and snow on the window before operation.
- The snow-covered or frozen surface is very slippery. Therefore, when driving or operating the machine on such a surface, be extremely careful, and do not operate the control lever suddenly. Even a small slope can cause the machine to slip. Therefore, pay special attention when working on a slope.
- The frozen ground will become soft when the temperature rises, which will cause roll-over of the machine.
- If the machine is driven through deep snow, it may be turned upside down or covered by snow. Be careful not to drive the machine away from the road shoulder or get stuck in snow.

3.6 Working on sites with debris

For operation on sites that are polluted or harmful to health, always equip the machine with devices suitable for such sites, and shorten the maintenance interval of machine appropriately.

3.7 Operation under poor visibility condition

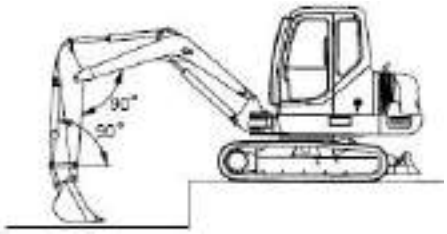
⚠ WARNING
Check whether the machine can be operated safely when the visibility becomes poor. If the visibility is below the safety limit, stop the operation immediately and park the machine in a safe place after the visibility gets better.

work lights and reflectors.

- Be more careful during excavation at night, as it is more difficult to determine distance and height in the dark.
- Set up a road warning sign or turn on the top warning lamp (optional) in case of operation on roads.

4 Recommended operations

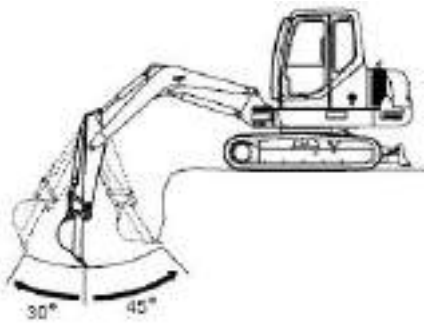
Excavator is a multi-functional machine that can be installed with various professional working devices to complete various types of operations. The following are some simple operations allowed by the excavator.



- Backhoe

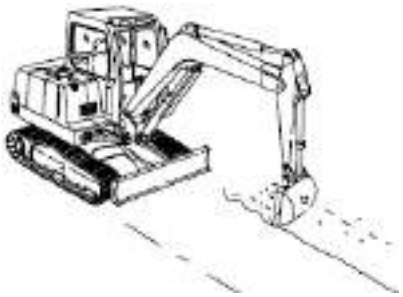
Backhoe is suitable for excavation in a position lower than the machine.

When the angle between the bucket cylinder and the connecting rod, as well as the angle between the stick cylinder and the stick are set at 90°, the work efficiency of the cylinders is the highest. Therefore, for the purpose of excavation, it is recommended to make use of such angles to improve work efficiency. The operating range of stick is 30° forward to 45° backward measured from the stick angle. From the perspective of digging depth, the difference may be small. When the cylinder is to be used, do not extend it to the end of its stroke.



- Face shovel

Face shovel is suitable for excavation at a position higher than the machine. Face shovel can be carried out by installing a bucket in the opposite direction.



- Trenching

Install a suitable bucket and adjust the track in the direction of trenching (track parallel to the ditch) so that the machine can work effectively.

To make a wide trench, first excavate the two sides of the trench, and then excavate the central area.

- Loading

When parking the dump truck, minimize the slewing radius and ensure a good visibility for the operator to improve the work efficiency.

In addition, perform loading at the rear of the dump truck instead of on the side, which makes the operator's work easier and improves work efficiency.

5. Track

Track shoe	Application	Safety precautions
A	Stony ground, general soil	Be sure to drive the machine slowly on the ground with pits or many obstructions.
B	Soft ground	High-speed traveling is only possible on flat ground. If it is inevitable to cross obstacles during traveling, reduce the travel speed to about half of the low speed. CAUTION! Do not drive the machine on uneven ground with large obstructions such as boulders and fallen tree trunks.
C	Extremely soft ground (muddy ground)	Only on grounds where category "A" and "B" track shoes are not possible to be used. High-speed traveling is only possible on flat ground. If it is inevitable to cross obstacles during traveling, reduce the travel speed to about half of the low speed. CAUTION! Do not drive the machine on uneven ground with large obstructions such as boulders and fallen tree trunks.
D	Pavement	Only on pavement CAUTION! They can not be used on uneven or extremely hard surfaces

Spec.	Category
350mm (13.8 inch), 380mm (15.0 inch) steel track shoes	A
400mm (15.8 inch) steel tracks & rubber block track shoes	D

6 Optional multi-functional working devices

IMPORTANT! Select other working devices, if required, that are suitable for the machine.

6.1 Precautions for selecting working devices

When installing and using optional work devices, please read the operation manual for the relevant working devices and the relevant information in this manual.

Do not use working devices not approved by Shandong Lingong Construction Machinery Co., Ltd. or its designated dealers, as this may cause safety problems, affect the normal operation of the machine, and shorten its service life.

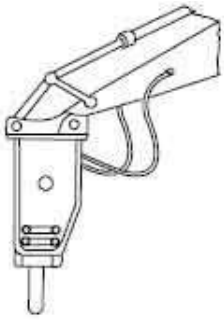
Shandong Lingong Construction Machinery Co., Ltd. will not be responsible for any damage, accidents, or machine damage caused by the use of unauthorized working devices.

When optionally installing a breaker or hydraulic shear, please contact SDLG or dealers. For some models, it is necessary to install a specified number of solenoid valves in the pipeline and re-flash the program. To ensure the safety of your machine and personnel, and achieve higher work efficiency.

When installing devices such as thumb clips to grab logs, the machine must be equipped with OPG.

6.2 Hydraulic hammer

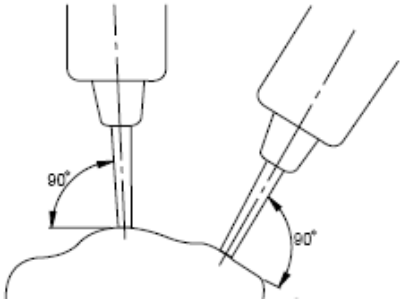
CAUTION: Do not install or use a hydraulic breaking hammer when the protective net is not installed



Main applications

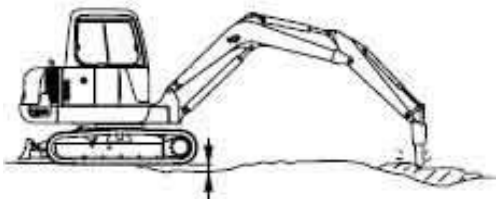
- Stone breaking
- Blasting
- Road repair

Hydraulic hammer is widely applicable for building demolition, road surface breaking, tunnel excavation, slag crushing, and stone breaking and cutting.

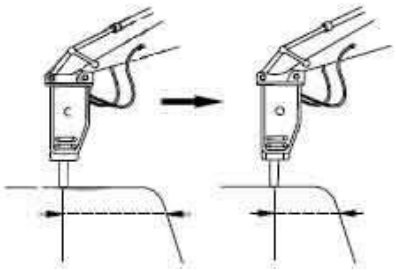


Install a protective equipment when a hydraulic hammer is installed for use.

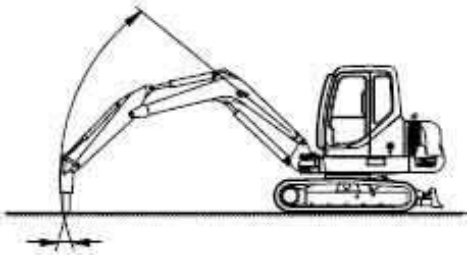
Press the hammer head at right angle on the working surface, as shown in the figure.



During striking, press the hammer against the working surface and lift the frame by approximately 5 cm (2 inch). Do not lift the vehicle too high.



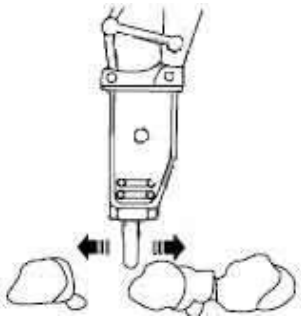
If the working surface is repeatedly struck several times but does not break within 1 min, move the hammer head to the nearby working surface and perform striking again.



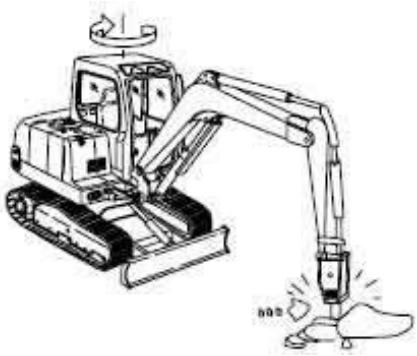
There is a slight deviation between the striking direction of the hammer head and the direction of the breaking hammer body. Therefore, it is necessary to adjust the direction of the bucket cylinder so that the direction of the hammer head and the breaking hammer body are always the same.

Press the hammer head against the working surface to avoid empty striking.

Precautions for operating hydraulic hammer

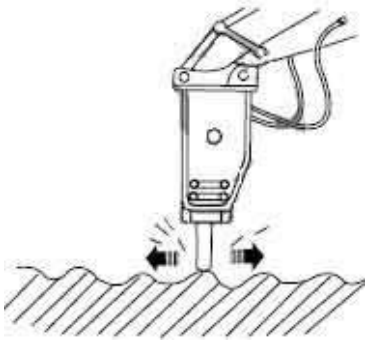


Do not extend the hydraulic cylinder to the end of its stroke, and instead, leave a clearance of approximately 5 cm (2 inch).

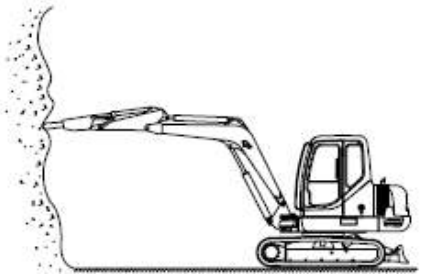


Do not throw the breaking hammer towards the rock or concrete.

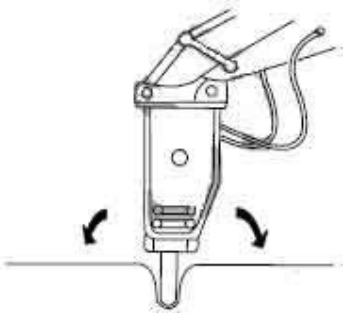
Do not move the hammer head during striking.



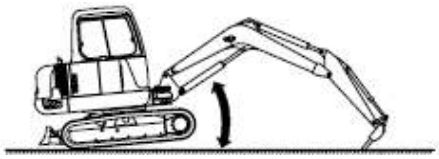
Do not strike horizontally or upwards.



Do not twist the hammer head when drilling holes on the ground.



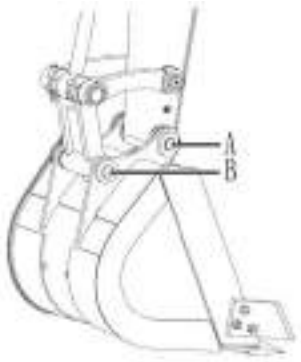
Do not use the hammer as a hoe.



When lifting the machine, do not extend the bucket cylinder to its maximum position.

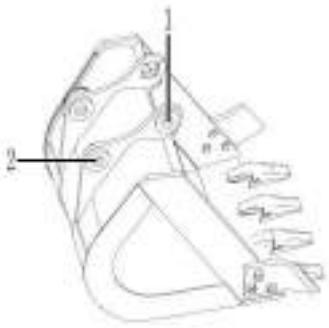
7 Replacement of bucket

⚠ WARNING
When knocking the pin shaft with a hammer, metal shavings may fly into the eyes and cause serious injury. Therefore, always wear goggles, safety helmets, gloves, and other PPEs during this operation. When removing the bucket, place the bucket securely. If the pin shaft is knocked with force, it may fly out and harm personnel in the surrounding area. Therefore, check whether the surrounding area is safe. When removing the pin shaft, do not stand under the bucket, and do not stretch feet or any part of your body under the bucket. When removing or installing the pin shaft, be careful not to get your hands injured. When aligning the holes, do not insert your fingers into the pin holes.



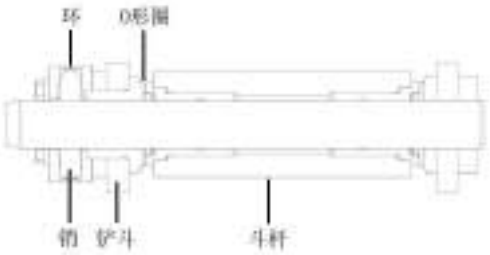
- Gently place the bucket on a flat surface.
- Remove the retainer ring and stop pin, pull out the pin shafts (A) and (B), and remove the bucket.

CAUTION! After removing the pin shaft, ensure that the pin shaft is not contaminated by soil. Be careful not to damage the dust seals installed at two ends of the shaft sleeve.

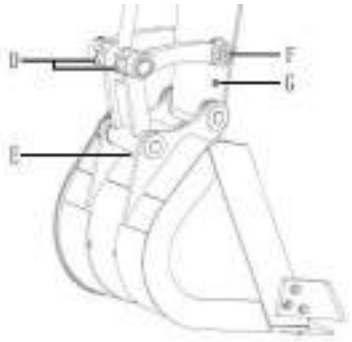


- Align the stick with the hole (1) and the connecting rod with the hole (2), and then install the lubricated pin shafts (A) and (B).

CAUTION! When installing the bucket, the O-ring is easily to be damaged, so the O-ring should be installed on the boss at the end of the stick. When knocking the pin shaft, move the O-ring down into the standard groove.



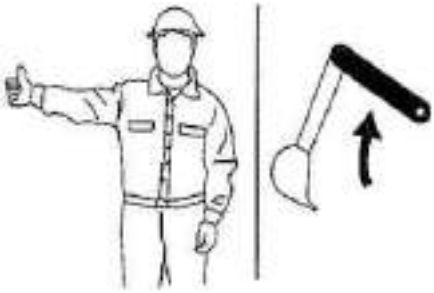
- Install the retainer ring and pin onto each pin shaft.



- Add grease through the grease nipples (D), (E), (F), and (G) (5 in total) on the bucket linkage.

8 Gesture signals

Gesture signals are suitable for machine travel commanding during ground operations (including excavation and leveling) and when obstacles affect the operator's field of vision. If rapid lowering, lifting, or movement is required, the arm movements must be more vivid.

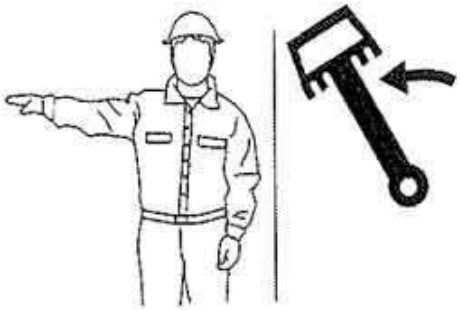


- BOOM RAISE

As shown in the figure, stretch one of the arms horizontally, clench the fist and extend the thumb, with the fingertip facing upwards.

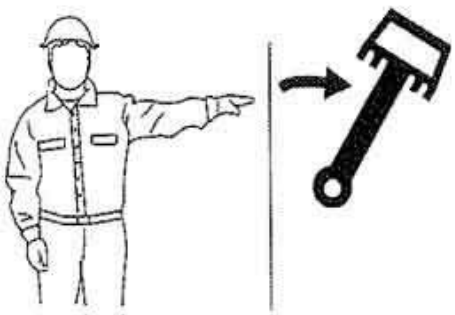
- BOOM lower

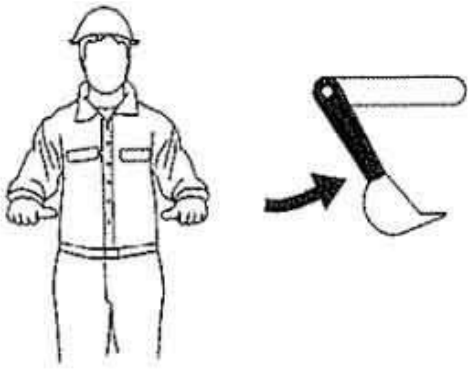
As shown in the figure, stretch one of the arms horizontally, clench the fist and extend the thumb, with the fingertip facing downwards.



- Slewing

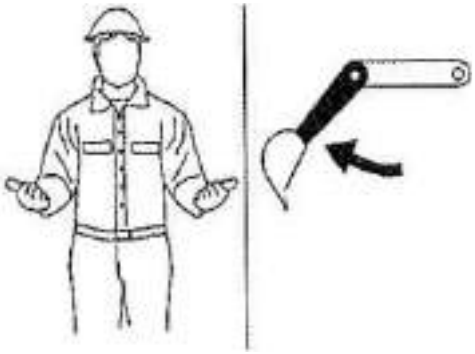
As shown in the figure, stretch one of the arms horizontally, clench the fist and extend the index finger to indicate the slewing direction.





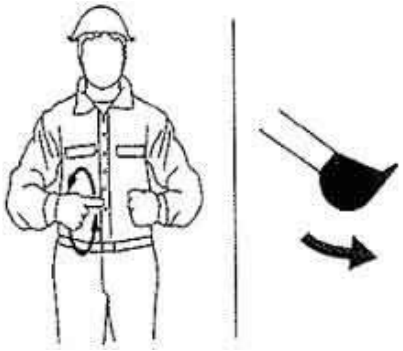
- Dipper Arm in

As shown in the figure, clench the fists of both hands, and extend the thumbs with fingertips inward.



- Dipper Arm out

As shown in the figure, clench the fists of both hands, and extend the thumbs with fingertips outward.

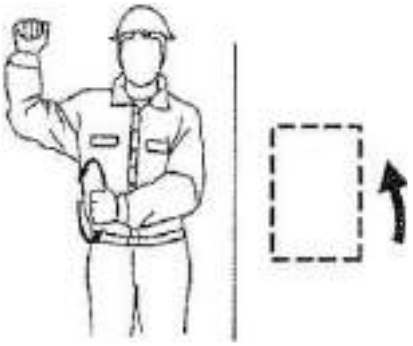


- Bucket in

As shown in the figure, clench the fist of one hand and keep stationary, clench the fist of the other hand and extend the index finger towards the clenched hand horizontally and draw a small circle on the vertical plane.

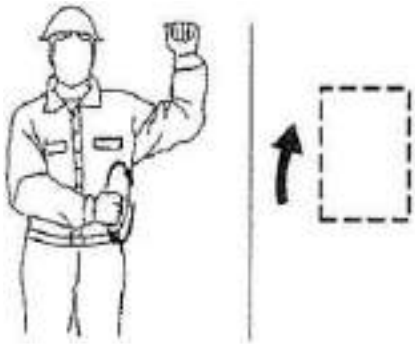
- Bucket out

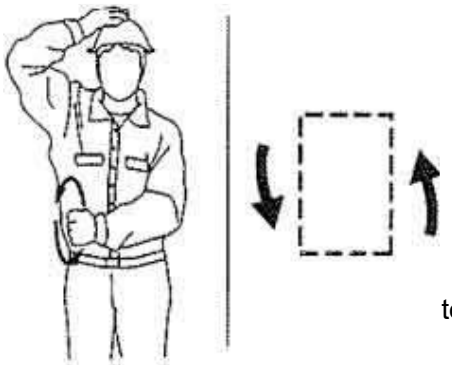
As shown in the figure, stretch one hand and keep stationary, clench the fist of the other hand and extend the index finger towards the stationary hand horizontally and draw a small circle on the vertical plane.



- Steering

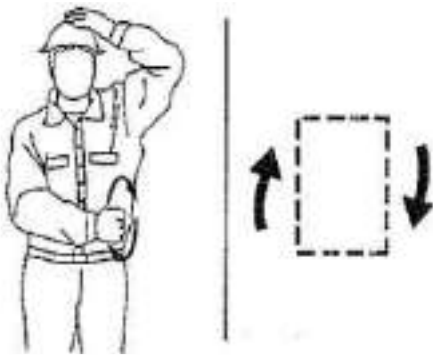
As shown in the figure, raise one arm and clench the fist to indicate the inner side of steering, and clench the fist of the other hand and draw a circle on the vertical plane to indicate the steering direction of track or wheel.

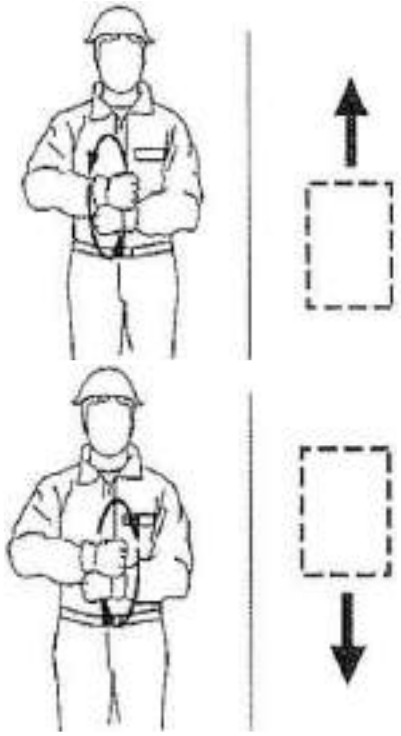




- In-situ steering

As shown in the figure, place your hand on top of the head to indicate the rotation of the track or wheel on the side or rear, while clench the fist of the other hand and draw a circle on the vertical plane to indicate forward rotation of the track or wheel on the other side.



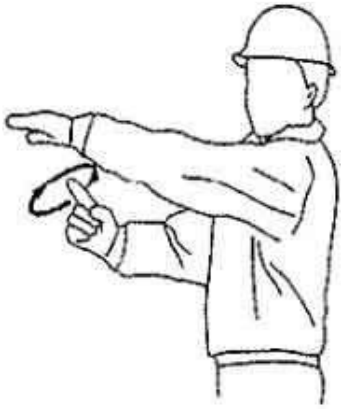


- Movement

As shown in the figure, clench the fists of both hands and raise them, and draw a circle on the vertical plane according to the rotation direction of the track or wheel.

- Moving distance

As shown in the figure, raise both hands and move them horizontally with the palms facing inward to indicate the moving distance.



- Slow movement

As shown in the figure, keep one hand stationary and place it in front of the hand that emits the movement signal to indicate slow performance of action.

- Stop

As shown in the figure, stretch one of the arms horizontally with the palm facing downwards, and then move the arm back and forth.

- Emergency stop

As shown in the figure, stretch both arms horizontally with the palms facing downwards, and then move the arm back and forth.

- Engine shutdown

As shown in the figure, move the thumb or index finger across the front of the throat.

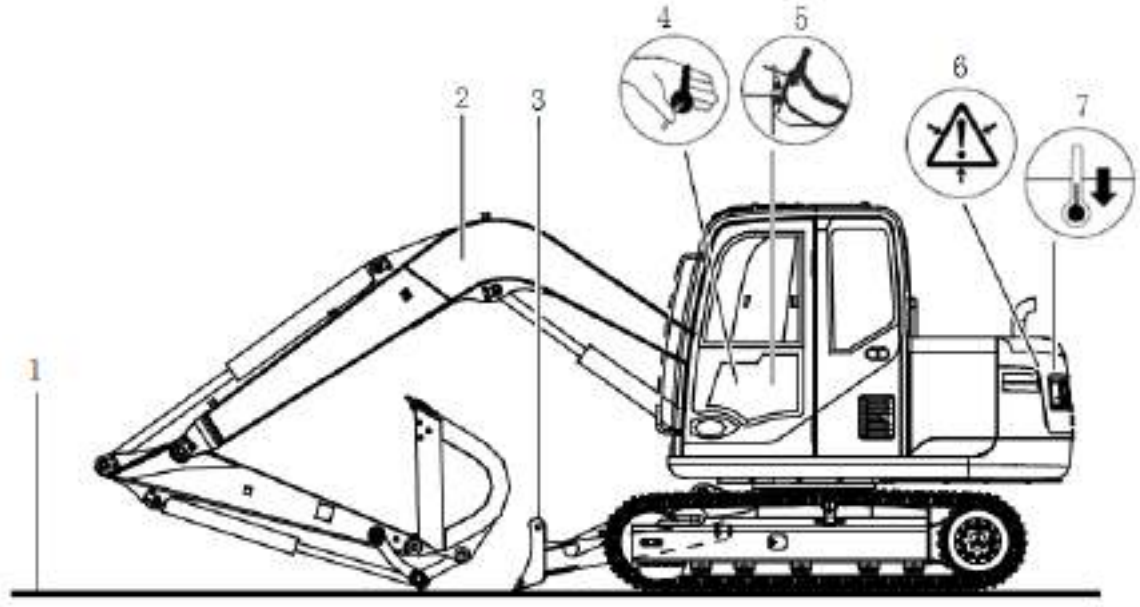
Chapter 5 Safety during maintenance

⚠ WARNING
If maintenance is required before cooling of the machine, be extremely careful, so as not to get burned by hot liquids and parts.

The general safety provisions are covered in this chapter and shall be followed during inspection and maintenance of the machine. The safety provisions and warnings for operation of the machine are described in different chapters.

1 Maintenance location

Before maintenance, park the machine on a flat ground, and make preparations for maintenance as follows:

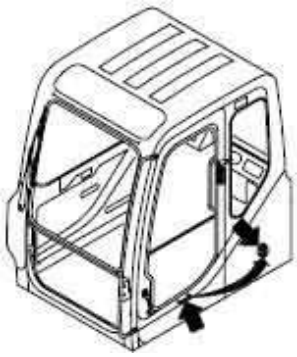


- Place the machine on a flat and solid ground.
- Lower the working device to the ground.

- Lower the dozer blade on the ground.
- Shut down the engine and remove the ignition key.
- Place the control lockout lever in the “locked” position, refer to "3.5 Control lockout lever” in Chapter 2.
- Release the pressure in the pipe and container gradually to avoid dangers.
- Wait for the machine to fully cool down.

2 Access or climbing of machine

⚠ WARNING
Always take care.



- Check the handrails or steps before getting on or off the machine. If there is oil, lubricant or mud, remove it promptly to avoid slipping when you get on or off the machine.
- Do not grip any control levers when getting on or off the machine.
- Never jump on or off the machine. Do not get on/off the machine when it is moving.
- When getting on or off the machine, use the steps and handrails to support your body, and contact with the machine on at least three points (i.e. use two hands and one foot or one hand and two feet) to ensure that your body doesn’t shake.
- Always face towards the machine.
- Do not use the outer handle A of the cab as a handrail for getting on or off the machine because it is intended for closing of the cab door.

3 Safety regulations

3.1 Prevention of personnel injury

- It is very dangerous to adopt incorrect maintenance methods. Make sure that you have sufficient knowledge, correct information and suitable tools and equipment for maintenance of the machine.
- Read all labels, signs and marks on the machine and the Operation and Maintenance Manual before maintenance of the machine. Important information about machine maintenance is contained in the instructions.
- Before maintenance, paste “No Operation” sign or other similar warning sign on ignition switch and instrument panel, Prevent others from starting the engine or operating the control lever. Otherwise, the operator may incur injury or even death.
- When working on the machine, do not wear loose clothes such as headscarf or jewelry which may be caught by moving parts, otherwise personal injury will be caused.
- Be sure to wear safety hat, goggles, gloves, protective shoes and other required PPE during repair.
- Ensure that enough ventilation equipment is provided when starting the engine indoors.
- Do not stay in front of or behind the machine when the engine is running.
- Shut down the engine and make sure that the tools or other articles which may cause damage are not left in

the machine before opening the engine hood, radiator housing, etc.

- Open all pressure vessels carefully, and release any residual pressure. Residual pressure is still accumulated in the system after the engine is shut down. In case of opening before release of the pressure, the fluid will be ejected under a high pressure. Similarly, the tightness of leaky connections and joints can be checked only after the pressure is released from the system completely.
- Check for leakage with paper or wood chips rather than by hand directly.
- Make sure that the surfaces to be stepped on, handrails and non-slip surfaces are free of oil, diesel, dust, ice, etc. Do not step on the machine surfaces that are not allowed for this purpose.
- When maintaining the machine, be sure to shut down the engine, unless otherwise stated on the label or in this manual.
- If the machine uses a wood grabbing device that complies with regulations, OPG (FRONT GUARD + TOP GUARD) must be installed.
- Any unauthorized modification may lead to dangers. Before modification of the machine, be sure to consult us or our designated dealers. Otherwise, we will not bear responsibility for any damage caused therefrom.

If one of the following conditions was satisfied, the modification will be formally permitted:

1. Auxiliary devices, accessories, assemblies, accessories or software are produced, distributed or licensed by Shandong Lingong Construction Machinery Co., Ltd.
2. The modification shall be made with the written permission of SDLG's technique department.

Maintenance safety with engine running

To prevent personal injury, do not perform maintenance with engine running, and if such maintenance is necessary, follow precautions below:

- Assign an operator to sit in the driver' seat, and maintain a smooth communication with all maintenance personnel, and ask the operator to be ready to shut down the engine at any time.
- Do not touch the exhaust tailpipe, muffler or other hot parts, so as to avoid scalding.
- Be more careful if the operation point is near a rotating part, as there is risk of catching by such rotating part.
- Do not touch any control lever. If it is necessary to operate a control lever, send a signal to other personnel concerned and warn them to walk to a safe place.
- Prevent any tool or any body part from contacting fan blade or fan belt. Otherwise, serious injury may occur.
- Do not adjust an unfamiliar part without investigation.

3.2 Prevention of machine damage

- It is very dangerous to adopt incorrect maintenance methods. Make sure that you have sufficient knowledge, correct information and suitable tools and equipment for maintenance of the machine.
- Hoist or support the machine or its parts using the equipment with a sufficient lifting or supporting capacity.
- All lifting devices must comply with the corresponding national regulations. We will not bear responsibility for any failure to use the lifting devices, tools or working methods specified in this manual.
- Release the pressure from the hydraulic system before working.
- If the machine is used in contaminated areas (in contaminated environments and/or unsanitary areas), maintain it as per special methods. Additionally, always observe special safety regulations when maintaining the machine.
- In case of repair or replacement, use the parts designated by us; in case of maintenance, use the oil and grease designated by us, and select the oil and grease with proper viscosity according to the ambient temperature.
- Never use oil of different brands together. If only one type of oil is provided and it is different from the oil being used, change the current oil completely.
- When pouring/draining oil or fuel, avoid spillover. In

case that the fluid cannot be drained into the container directly, use a pump or connect a hose to drain fluid safely. Oil spilled onto the ground will pollute the environment and cause a fire. Any used oil and other fluids shall always be disposed of by an authorized waste disposal agency.

- Make sure that all covers on the machine are closed before starting the engine.
- For measures related to electric welding, refer to "11.2 Precautions during welding" in Chapter 6.
- This machine is used in a driver's cabin and is prohibited from being used in extremely harsh environments.
- If the cab/canopy is damaged and needs to be repaired or replaced, it is necessary to contact Shandong Lingong Construction Machinery Co., Ltd. or its designated dealer for consultation on repair methods. Unauthorized repair is absolutely not allowed.

3.3 Preventing environmental pollution

- In case of maintenance of the machine, take into account the possibility of environmental pollution. Oil and other fluids harmful to the environment cannot be drained directly.

CAUTION: All waste shall be handed over to a qualified waste disposal agency.

- When draining oil and other fluids, collect them in a suitable container, take splash-proof measures, and

hand them over to a waste disposal agency.

- Do not discard the used battery, because it contains substances harmful to the environment and health. Hand it over to a waste disposal agency.
- Do not discard the rags, gloves and bottles stained with oil directly, otherwise the environment will be polluted. Hand them over to a waste disposal agency.
- When the product needs to be scrapped, please follow the local laws, regulations and environmental protection policies.

4 Fire prevention

4.1 Fire prevention measures

⚠ WARNING
If the machine is used in an environment prone to fire, e.g. in an explosive environment, special equipment shall be provided. Be careful when cleaning the machine using a high-pressure nozzle, because electrical components and wires may be damaged even at very low water pressure and temperature. Protect the electrical components and wires properly. Meanwhile, shut down the engine and turn off the main power switch.

- Never place other unrelated matters around the electrical wires of the machine to avoid friction between them, which may cause short circuits in the wires, and even a fire.
- Be alert to fire hazards. Learn how to use the fire extinguisher and know where it is stored so that you can find it if required.
- When refilling or opening the fuel tank, never smoke near the machine and ensure that there are no open flames around the machine.
- Do not use diesel to clean the machine because it is flammable (except for some smaller components), and instead, use an approved solvent.
- Some solvents can cause skin rashes, so minimize

inhaling these solvent vapors.

- Most solvents are flammable and should be stored properly to avoid a fire hazard.
- Keep the maintenance site clean. Cleanliness is essential to the normal operation of all systems in the machine. If oil or water is accumulated, the ground and steps will be slippery, and the relevant electrical systems and power tools will also be affected adversely. Clothes covered with oil or cloth dipped in grease will bring about serious potential fire hazards.
- Check the machine and equipment on a daily basis to make sure that there is no dirt and oil on the guard plates, which can reduce the risk of fire and help you find out the faulty or loose parts more easily.
- When working in sensitive environments (e.g. sawmill, garbage dump or similar places), keep the machine clean. When operating the machine in such environments, equip the machine with proper facilities (e.g. muffler cover, radiator partition, high-power fan or special filter) to reduce the possibility of accumulation of flammable materials.
- Ensure that any fire extinguishing equipment on the machine is in the working state. Some additional devices can also be used by the operator for fire fighting in the event of a fire, but they cannot substitute the fire prevention work that shall be done by the operator.
- Check the wires especially when they are not

connected with fuses, and confirm that they are not and will not be damaged due to friction.

- After disconnecting the wires that are not connected with fuses, check them, and confirm that they are connected and clamped in such a way that they aren't affected by friction. Meanwhile, ensure that these wires don't rest on oil and fuel pipes.
- Check the fuel hose, hydraulic system and brake hose, and confirm that they are not damaged due to friction.
- Only carry out welding and grinding in clean places. Do not weld or grind the parts filled with compressed air or flammable fluids (e.g. fuel tank and hydraulic pipe). Be careful to weld and grind the parts near flammable objects. Always have fire extinguishers available.
- Do not discard batteries, plastics and other materials that may endanger the environment. Ensure that they are disposed of in such a way that the environment will not be polluted.

4.2 Measures in the event of a fire

Take the following measures immediately after a sign of fire is found:

- Drive the machine to a safe place to prevent the fire from spreading.
- Lower the working device to the ground.
- Turn the ignition switch to “OFF”, and leave the cab.
- Turn off the main power switch.
- Try to extinguish the fire. If necessary, call the fire department for rescue.

4.3 Measures after fire is extinguished

Take the following protection measures when handling the machine which was damaged by fire or high temperature:

- Wear thick rubber protective gloves and goggles.
- Do not touch the parts by hand directly, so as not to get burned. Use lime water for thorough cleaning.
- Dispose of hot fluorocarbon rubber. Refer to “5.3 Heated fluorocarbon rubber”.

5 Disposal of hazardous materials

5.1 Heated paint

⚠ WARNING
The paint will be decomposed and produce irritating compounds when heated. Working in this environment for a long time is very harmful to health.

Heated paint will emit toxic gas. Therefore, remove paint in areas 10cm (4in) away from the part subject to welding, grinding or gas cutting, otherwise your health and the welding quality will be affected adversely.

Methods and precautions for removal of paint

- Powerful blowing. In case that this method is adopted, wear respiratory protective equipment and goggles.
- Paint remover or other chemicals. In case that this method is adopted, use a portable air pump, and wear respiratory protective equipment and goggles.
- Grinding machine. In case that this method is adopted, use a portable air pump, and wear respiratory protective equipment, gloves and goggles. Do not discard these devices after use. Hand them over to a qualified department for disposal.

5.2 Heated rubber and plastic

CAUTION! When polymeric materials are heated, the compounds that have a bad effect on your health and the environment may be formed.

- Do not weld or cut the parts near the polymer materials (plastic and rubber parts) that aren’t

subjected to thermal insulation in advance.

- Do not burn polymer materials when removing them.
- Be careful when handling the machine that has been burnt or exposed to high heat.
- Always use gloves, goggles and respiratory protective equipment.

5.3 Heated fluorocarbon rubber

⚠ WARNING
When fluorocarbon rubber is heated to a high temperature, it will be decomposed into hydrogen fluoride and hydrofluoric acid which are very corrosive to the skin and respiratory tract.

Take a series of measures to handle the machine that has been burnt or exposed to high hear:

- Wear thick rubber gloves and goggles.
- After rubber gloves, rags, etc. get into contact with heated fluorocarbon rubber, wash them with lime water and discard them.
- Decontaminate the surrounding area thoroughly and adequately with hydrated lime after the parts that may be made of fluorocarbon rubber are subjected to high heat.
- Dispose of all seals (O-rings or oil seals) as fluorocarbon rubber products for the purpose of prevention.
- Note that hydrofluoric acid may remain on the machine for several years after the fire.
- Seek medical care immediately in case of swelling,

redness or tingling after contact with heated fluorocarbon rubber.

CAUTION: It may take several hours for any symptom to appear.

- As hydrofluoric acid cannot be washed away from the skin, treat it with medicine, and seek medical care.

5.4 A/C refrigerant

CAUTION! The workshop disposing of refrigerants must have been qualified r approved, and its responsible personnel must have corresponding qualifications.

⚠ WARNING
If exposed skin comes into contact with refrigerant, frostbite is likely to be caused. Refrigerant may be heated into gas, which can harm the lungs and nervous system.

IMPORTANT! Do not use refrigerants of different types together.

If exposure to leaked refrigerant occurs, take the following measures:

- If there is suspicion of refrigerant leakage, leave the hazardous area and contact a qualified workshop for repair.
- The gas formed by heating of refrigerant can harm the lungs and nervous system. Even in cases where the gas has a too low concentration to be smelt, it is important to immediately leave this area; if the concentration is too high, the victim may be anesthetized and should be immediately moved from

the hazardous area to a place with fresh air. If symptoms persist, please seek medical attention.

- Liquid refrigerant may cause frostbite. If this occurs, warm the affected area with warm water or warm clothing. If the symptom persists, please seek medical treatment.
- If liquid refrigerant is splashed into eyes, rinse with flowing warm water and then seek medical attention.

5.5 Battery

- Do not smoke near the battery which will release explosive gas.
- Make sure that metal objects (such as tools, rings and watch bands) don't contact the battery poles, otherwise personal injury or fire may be caused.
- Make sure that protective components are always

⚠ WARNING
The battery contains sulfuric acid which is very corrosive to the skin.

installed on the battery poles.

- Do not place the battery upside down or horizontally or subject it to any mechanical shock or heavy load.
- Do not connect a discharged battery with a fully charged battery in series, otherwise explosion may be caused.

- Disconnect the ground wire first when removing the battery and connect it last when installing the battery, so as to reduce the risk of sparks.
- The battery contains substances that are harmful to health and pollute the environment. Therefore, dispose of the waste battery in accordance with relevant local/national regulations.
- For battery charging, refer to "11.1 Charging the battery" in Chapter 6.

Chapter VI Repair and maintenance

1 Clean the machine

The machine shall be cleaned regularly.

Important! Avoid using corrosive cleanser or chemicals at the time of cleaning, so as to avoid damage to paint of the machine.

Attention! Clean the parts with accumulation of inflammables such as wood chips, leaves and paper on the machine every day, clean up fuel, lubricating oil, etc. on the machine, and ensure that there are no oilcloths or other inflammables.

Precautions for cleaning the machine:

- Water temperature cannot exceed 60°.
- Soft sponge shall be used.
- The machine shall be lubricated again after cleaning.
- Paint shall be made up if necessary.

2 Paintwork maintenance

The machine is easier to rust in a humid and corrosive environment. It is suggested that paintwork of the machine should be maintained once every six months.

3 Clean the cab

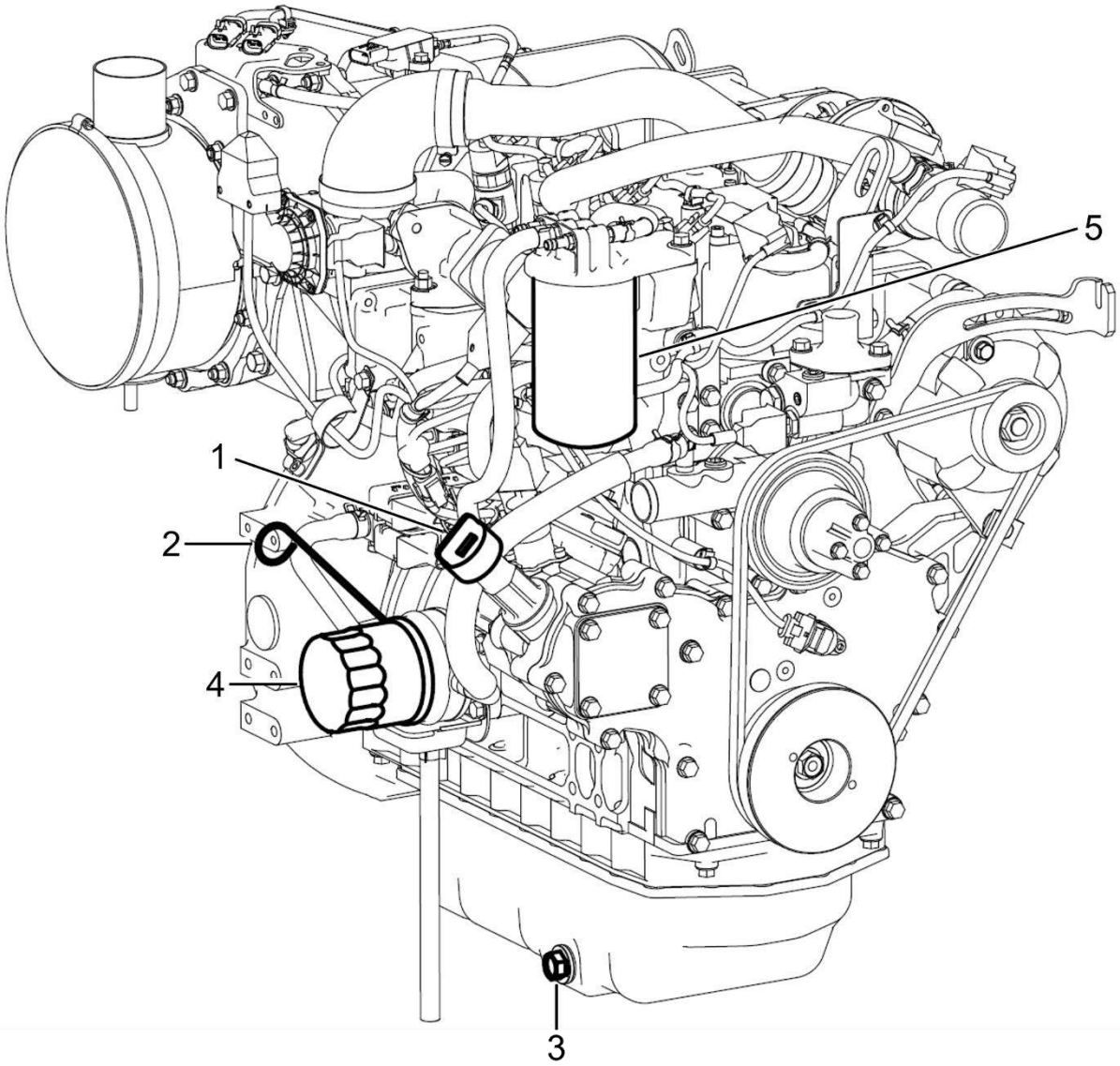
If the machine works in an environment with a lot of dust or with a fire hazard, its cab needs to be cleaned every day.

When it operates in other environments, inspection and cleaning shall be carried out at least once a week.

⚠ Warning
The engine cannot be run when the cab is cleaned, because damage will be caused by the rotating spare parts.

- It would be best to carry out cleaning after finishing work schedules and before parking the machine.
- Use personnel protection equipment such as goggles, gloves and breathing mask.
- Inspect and repair all leakages after cleaning.
- Close all covers and hoods.

4 Engine



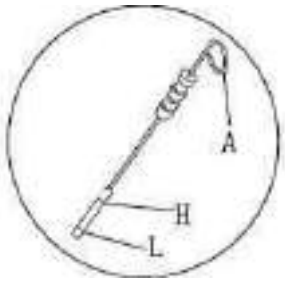
1 Oil filler 2 Oil dipstick 3 Oil drain screw plug

4 Oil filter element 5 Filter element of fuel fine filter

4.1 Check the engine oil level

Check the engine oil level daily.

- Place the machine in the maintenance position. Refer to "1 Maintenance position" of Chapter V.
- Open the engine hood.
- Pull out oil dipstick A, wipe it clean, insert it, and pull it out again (at least twice).
- If the oil level is higher than the H mark, find out the cause and conduct troubleshooting. If there is no abnormality, drain the excess oil from the oil drain screw plug at the bottom of the engine, and then check the oil level.
- If the oil level is between "H" and "L", it indicates that the oil level is normal. If the oil level is lower than the "L" scale line, add the specified oil through the engine filler. For the selection of oil, refer to "20 Oil selection" of this chapter.
- If the oil level is normal, put back the oil dipstick and close the engine hood.



H Upper scale line
L Lower scale line

IMPORTANT!! If the oil level is checked after the engine stopped, check it 10 minutes after the engine is shut down. If the machine is tilted, place the machine horizontally before inspection.

4.2 Replacing the engine oil and oil filter element

Change the oil and replace the oil filter element every 500 hours.

If the machine is working in an acidic or dusty environment, the replacement period shall be shortened. The oil filter is a disposable appliance that cannot be cleaned and must be replaced.

⚠Warnings
Be careful when changing the oil. Hot oil may burn the skin without any protective measures.

- Start the engine, run it at idle speed, and shut it down after the oil temperature reaches 80 ℃ (176 °F).
- Place the machine in the maintenance position. Refer to "1 Maintenance position" of Chapter V.
- Clean the engine oil drain screw plug and filler cap as well as the surrounding area.
- Unscrew the oil drain screw plug at the bottom of the engine, and connect a connector and a matching drain hose that is provided as an attachment tool, to drain the oil and collect it with a container.

Notice! Pay attention to environmental protection when disposing of waste oil and waste liquid!

- Open the engine hood.
- Open the oil filler cap to speed up oil drainage.
- Drain the old oil, remove the connector and drain hose, and screw on the drain screw plug.
- Clean the engine oil filter mounting base and surrounding area.

- Turn the oil filter counterclockwise with a wrench.
- Clean the mounting surface of the oil filter.
- Fill the filter element with oil, place the new gasket on the new filter, and apply a proper amount of oil to the surface of the gasket. Turn the filter right to install it on the engine until the surface of the filter touches the engine. Then tighten it by 3/4 turns with a wrench.

IMPORTANT!! Mechanically over-tightening may damage the thread or the tightness of the oil filter element.

IMPORTANT!! After replacing the filter element, the engine must run at low idle speed for at least 1 minute to ensure that the engine has been lubricated before it is put into operation.

- Fill the specified oil from the oil filler and tighten the filler cap by hand. Over-tightening will damage the cap.
- Run the engine at idle speed for about 5 minutes and then shut down the engine. Check the oil filter and the oil drain screw plug for oil leakage.
- After the engine is shut down for about 10 minutes, recheck the oil level and fill oil if necessary.

4.3 Adjusting the clearance of intake/exhaust valves

Check and adjust the valve clearance every 1000 working hours.

To ensure the accuracy of valve opening and closing time, its clearance must be adjusted correctly. Otherwise, the engine will be noisy during operation, which will affect the engine performance and cause damage to the machine. The clearance adjustment shall be carried out by the after-sales service personnel designated by Shandong Lingong Construction Machinery Co., Ltd.

4.4 EGR system maintenance

Check the EGR valve and pilot valve every 500 hours and clean them every 3000 hours.

(If the oil that does not meet the relevant requirements is used, the servicing time shall be halved)

⚠ Warnings

Beware of smog or burns!

Carefully read and follow the instructions outside the equipment on hazardous substances, such as detergents, detonators, sealants, and sealant removers. Failure to comply may result in serious personal injury or death.

⚠ Notice

Beware of flying objects!

Wear eye masks when repairing engine or handling compressed air and high-pressure water. As dust, flying debris, compressed air, high-pressure water, or steam may injure the eyes.

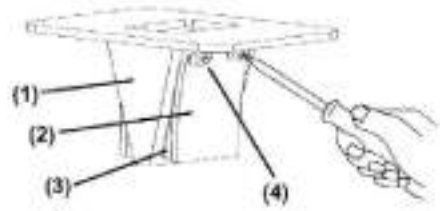
Failure to comply may result in serious personal injury or death.

Due to long-time circulation of the exhaust gas through the EGR valve, carbon will accumulate on its inner surface, thereby deteriorating the EGR performance. Therefore, it is required to clean the EGR valve regularly.

- Use compressed air (0.19 Mpa (2 kg/cm^2) or lower) to remove carbon deposits in the valve.
- If there is a lot of carbon deposit, clean the EGR valve with carbon cleaner, kerosene, or other liquid that may remove carbon and soft brush, and be careful not to damage its parts.

Notice! Do not allow water, solvent, cleaner, and other liquids and gases to flow into the motor and connector terminals. Otherwise, it will not work properly.

Similar to the EGR valve, the pilot valve also needs to be inspected every 500 hours and cleaned regularly every 3000 hours, as the exhaust gas needs to circulate through the pilot valve for a long time, and carbon accumulates on its inner surface, which will damage the EGR performance.



1－盖板
2－制动器
3－气门
4－机器螺钉

Clean the EGR valve:

- Remove the EGR valve, and clean the deposits on its inner surface.
- Soak the pilot valve in diesel or kerosene for 15 minutes (be sure that the valve stem is completely immersed in the fluids), spray the valve stem and its interior with carbon cleaner, and rinse the carbon deposit in the valve with a soft brush. Be careful not to damage its parts.
- After spraying with carbon cleaner, flush it with diesel or kerosene.
- After cleaning, wipe off the oil and other liquids and dry it completely in the air. Make sure that the cover plate, valve, and brake are free of foreign matter, and then reinstall the EGR valve and related parts.

5 Fuel system

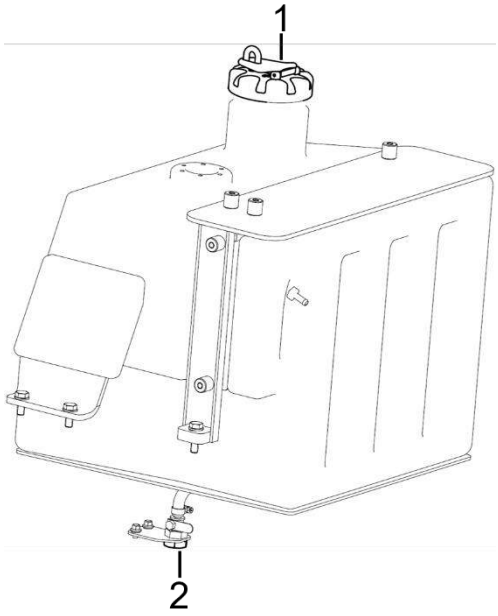
IMPORTANT!! Clean fuel is essential to avoid engine running failure.

IMPORTANT!! Before removing the fuel filler cap, carefully clean its surrounding parts, and avoid fuel splashing during refueling. In cold seasons, keep the fuel tank full to prevent condensation in the fuel tank.

5.1 Fuel filling and oil level inspection

The operator may check the fuel level at any time through the fuel level gauge on the IECU. If the pointer drops to the red area, the specified fuel shall be filled. Before filling the fuel, the upper frame of the machine may be rotated to a suitable angle relative to the lower frame, so that the personnel may stand on the track for filling after shutdown. For the selection of fuel, refer to "18 Oil selection" of this chapter, the same below.

5.2 Discharge of sediment



1 Fuel filler
2 Fuel drain port

Drain the sediment every 50 hours.

- Place a container under the drain screw plug.
- Open the filler cap.
- Open the drain screw plug at the bottom of the fuel tank, drain all sediments, and collect them with a container.

IMPORTANT!! Dispose of waste oil and waste liquid in an environmentally safe manner!

- Install the drain screw plug and close the filler cap.

5.3 Replacing the fuel fine filter

⚠Warning
Just after operating the machine, the fuel is hot, so wait for the fuel to cool down. Avoid open flames.

It shall be replaced every 500 hours, and the replacement period shall be shortened when inferior fuel is used.

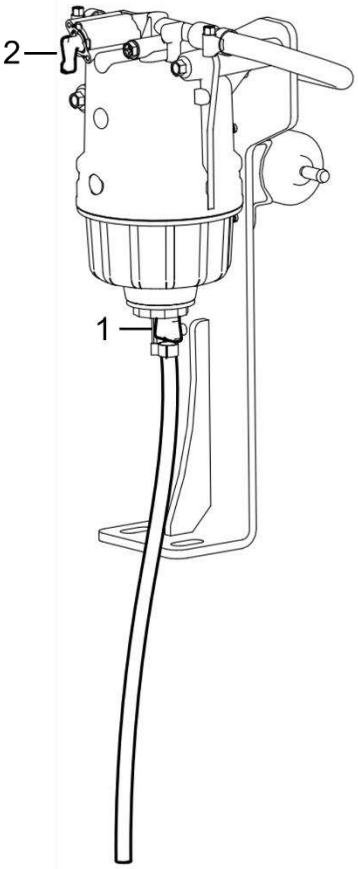
- Place a container to receive the fuel in the filter.
- Close the fuel cock of the oil-water separator (set to the "OFF" position).
- Remove the fuel filter with a filter removal wrench.

IMPORTANT!! Dispose of the filter and fuel in an environmentally safe manner!

- After thoroughly cleaning the filter cover, fill the new fuel filter with clean fuel.
- Apply engine oil to the new O-ring and attach it to the filter cover. During installation, turn it 2/3 turns first, and then rotate it slowly by hand.

Notice! If the filter is tightened too much, the O-ring may be damaged, resulting in fuel leakage; If it is loosened too much, the fuel will also leak from the O-ring. Therefore, it should be screwed just right.

- After completing the installation, open the cock of the oil-water separator (set to the "ON" position).



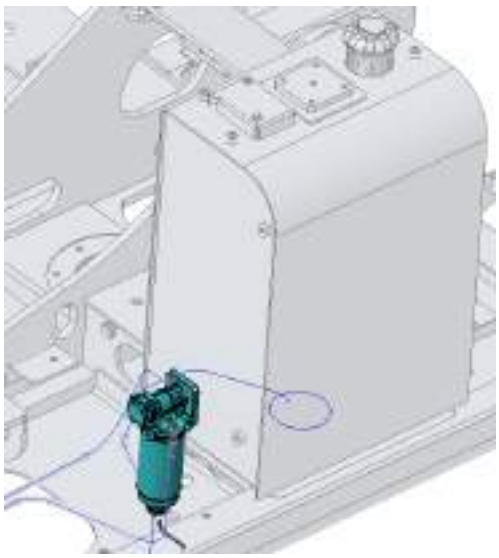
Oil-water separator

1 Fuel drain cock

2 Fuel cock

5.4 Drainage of oil-water separator

- Prepare a container and place it under the oil-water separator.
- Close the fuel cock of the oil-water separator (set to the "OFF" position).
- Drain water according to the instructions on the oil-water separator.
- Open the fuel cock (set to the "ON" position).
- Exhaust the air in the fuel system.



5.4 Replacing filter element of oil-water separator

It shall be replaced every 500 hours, and the replacement period shall be shortened when inferior fuel is used.

1. Clamp the fuel pipelines.
2. Place fuel container under the fuel oil-water separator to recover the fuel in the filter.
3. Unscrew the oil-water separator from the coarse filter bracket.
4. Replace with a new filter, use a new O-ring and lubricate it.
5. Tighten the cup by 1/4 to 1/2 turn.

6. Fill the filter with fuel.

7. Use a new filter sealing ring and lubricate it.

Notice! The sealing ring must be positioned and placed properly!

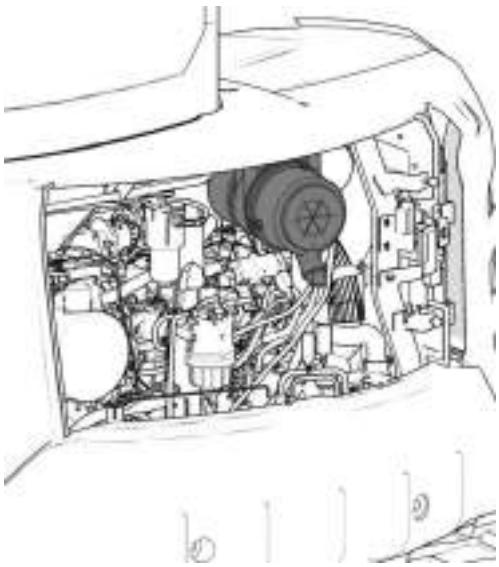
8. Tighten the filter on the bracket by 1/4 turn.

Notice! If the filter is tightened too much, the O-ring may be damaged, resulting in fuel leakage; If it is loosened too much, the fuel will also leak from the O-ring. Therefore, it should be screwed just right.

5.5 Bleeding of fuel system

Note! The air in the fuel system will result in difficult staring and abnormal running of the engine. After draining the water and sediment in the oil-water separator and replacing the fuel filter, it must be ensured that the air in the fuel system is exhausted. The engine of this machine is equipped with an automatic exhaust function, so manual exhaust is not required.

6 Air filter



The air filter may prevent dust and other impurities from entering the engine. The wear of the engine depends largely on the cleanliness of the inhaled air. Therefore, the air filter shall be checked regularly and maintained properly.

IMPORTANT!! In no case shall the engine without a filter or with a damaged filter be started.

Regularly check the hoses and pipe connections from the air filter to the engine suction pipe for leakage.

Prepare a spare air filter and keep it in a dust-proof place.

6.1 Cleaning the ash discharge valve of the air filter

Clean the ash discharge valve every day.

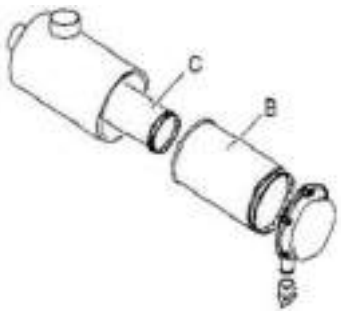
Press the ash discharge valve to discharge the dust or remove the ash discharge valve from the air filter to discharge the dust and clean it.

6.2 Cleaning and replacing the filter element

When the clogging alarm indicator light of the air filter on the IECU is on, clean or replace it. Even if the warning light is not on, the main filter element shall be replaced at least every 500 hours. When the main filter element is replaced for the third time, the safety filter element shall be replaced at the same time. If the filter element is damaged, it must be replaced regardless of whether the replacement interval is reached.

IMPORTANT!! The replacement cycle of the filter depends on the working environment of the machine. If the operating environment is harsh, the replacement cycle should be shortened.

Notice! The safety filter element does not need to be



cleaned, just replaced.

Clean the main filter element

- Loosen the snap ring.
- Remove the air filter cover, and gently rotate the main filter element B back and forth to slowly take it out.
- Mechanical cleaning of the filter element:

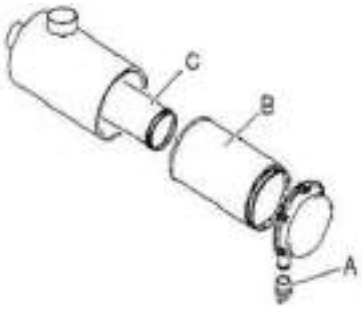
Carefully tap the end of the outer core against a soft, clean surface.

Notice! Do not knock against a hard surface.

- Clean the filter element with compressed air:

Use clean and dry compressed air with a maximum pressure of 500 kPa (5 bar) (73 psi) for cleaning. The distance between the nozzle and the filter shall not be less than 3~5 cm (1~2 inch). Blow the filter clean along the inner folding part.

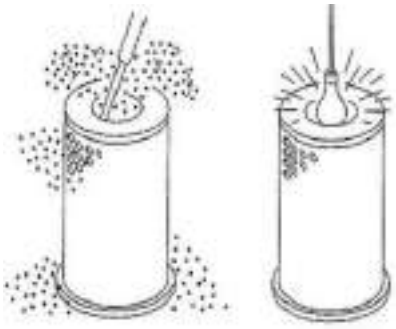
Notice! After cleaning, check the filter element for damage. It may be checked with a light in a dark room. Even if there are minor holes, scratches, cracks or other damages, the filter element must be replaced.



Replace the main filter element

- Take out the main filter element. Refer to "Cleaning the main filter element" for steps.
- Clean the inner surface of the housing with a wet rag, paying particular attention to the sealing surface of the housing and the pipe at the outlet.

IMPORTANT!! Never use compressed air to clean the housing.



- After confirming that the elasticity of the rubber ring on the new filter element is good, install the new filter element into the housing.

Replace the safety filter element

If the main filter element is damaged, the safety filter element acts as a protective filter. If the main filter element has been replaced or cleaned, the safety filter element is blocked as long as the warning light is on.

Notice! The safety filter element may only be replaced but not cleaned.

- Take out the main filter element according to the steps of "Cleaning the main filter element".
- Clean the filter housing.
- Carefully take out the safety filter element C from the housing.
- Wipe the mounting surface of the safety filter element with a clean, wet cloth.
- Install the new filter element, and then install the main filter element.
- Install the end cover.

Notice! Be careful when removing the safety filter element, and ensure accuracy to prevent impurities from entering the engine. Carefully check whether the new safety filter element is installed correctly.

Notice! Do not remove the safety filter element unless it is to be replaced.

7 Cooling system

If the coolant level is normal and the engine temperature becomes high, the radiator must be cleaned.

IMPORTANT!! Be careful not to damage the radiator chip.

7.1 Checking the coolant level

Check the coolant level daily.

- Open the engine hood.
- Check the coolant level.

  If the coolant level is below the "MIN" (minimum) mark on the auxiliary radiator, fill the coolant to the level between the "MIN" (minimum) mark and the "MAX" (maximum) mark.

IMPORTANT!! It is recommended to use SDLG special coolant. It is strictly forbidden to mix coolant of different brands to avoid radiator blockage.

IMPORTANT!! Do not use water as a cooling medium.

IMPORTANT!! Do not fill the hot engine with cold coolant, which may cause cracks in the cylinder block and cylinder head.

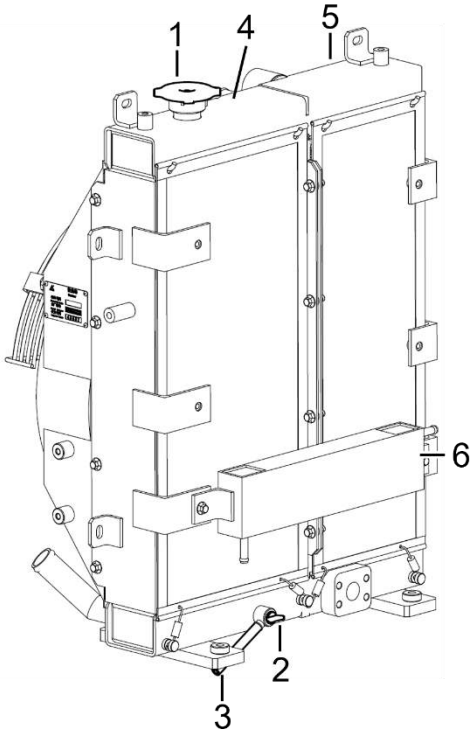
Notice! If the auxiliary radiator is empty, check whether there is leakage, check the coolant level of the radiator, and fill water to the specified level if it is insufficient.

7.2 Replacing the coolant

The coolant shall be changed every 2000 hours or 1 year, whichever comes first.

⚠Warning
Antifreeze is flammable, so keep it away from open flame.

⚠Warning
The coolant will be very hot just after the engine stops running. Do not open the radiator cap before the coolant cools down. Otherwise, the high-temperature vaporized engine coolant may spray out and cause burns! Open the radiator cap slowly to release the internal pressure.



1 Filler
2 Drain valve
3 Drain hose
4 Coolant radiator
5 Hydraulic oil radiator
6 Fuel radiator

⚠Notice
Wear goggles and rubber gloves when handling engine coolant. If eyes or skin come into contact with engine coolant, rinse immediately with clean water and seek medical advice immediately.

IMPORTANT!! Different types of coolant cannot be mixed, otherwise the engine will be damaged.

- Open the right hood.
- Slowly loosen the radiator filler cap (1).
- Place a container for collecting coolant under the drain valve at the bottom of the radiator, and open the

drain valve to drain the coolant.

- Open the drain screw plug on the engine cylinder block, drain the coolant and collect it with a container.
- After draining the coolant, close the drain valve and drain screw plug, and refill the radiator with clean soft water.
- Start the engine and run it at low idle speed for about 10 minutes.
- Shut down the engine, open the drain valve and the drain screw plug, and drain the coolant.
- Clean the radiator with descaling agent. For cleaning methods, follow the instructions of descaling agent.
- After cleaning, close the drain valve and drain screw plug, open the water pipe, and refill the radiator.
- Start the engine and run it at low idle speed. Open the drain valve and drain screw plug, and flush with a hose until the outflow water is clear.

IMPORTANT!! Do not allow the discharge to exceed the water supply during flushing, because the cylinder block must be kept full of water.

- Shut down the engine, close the water pipe, drain the cooling system, close the drain valve, wrap the drain screw plug with a sealing tape and tighten it.
- Fill the coolant to the middle of the level observation window through the radiator filler.
- Run the engine at low idle speed for about 5 minutes, and then run it at medium idle speed for 5 minutes to discharge the air mixed into the coolant. (Do not cover

the radiator filler cap at this time.)

- Shut down the engine, wait for about 3 minutes, add the coolant to a proper level, and then tighten the radiator filler cap.
- Install the radiator bottom cover and check the cooling system for leakage.

IMPORTANT!! Pay attention to environmental protection when discharging coolant.

7.3 Cleaning radiators, hydraulic oil and fuel coolers and condenser fins

Clean all chips every 500 hours of operation.

⚠Warning
Wear goggles and a face mask when cleaning with compressed air.

- Open the rear and right engine hoods of the machine.
- Remove the sludge, dust, and leaves attached to the radiator fins, hydraulic oil and fuel cooler fins with compressed air. At the same time, clean the guard net in front of the oil cooler and clean the A/C condenser fins.
- Check the rubber hose. If the hose is found to be cracked or hardened due to aging, replace it with a new one. In addition, check whether the hose clamp is loose.

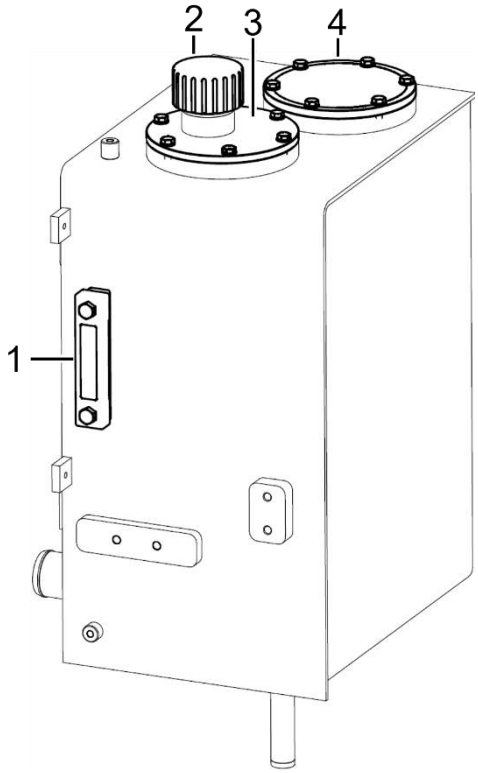
IMPORTANT!! When using compressed air, keep a certain distance from the chip to prevent damage. If the chip is damaged, it may lead to leakage and overheating. When working in a dusty environment, check it every day regardless

of whether it is time for regular maintenance.

8 Hydraulic system

IMPORTANT!! For all operations performed on the hydraulic system, very high cleanliness must be guaranteed. Even very small particles may cause damage or blockage of the system.

8.1 Checking the hydraulic oil level



1 Level gauge
2 Ventilation filter
3 Oil suction filter element
4 Oil return filter element

Check the hydraulic oil level daily.

- Park the machine on a solid, flat and level ground.
- Operate the left and right work equipment control handles to their respective ends to release the internal pressure in the hydraulic circuit.
- Set the control lockout lever to the "Locked" state. Refer to "3.5 Safety lock control system" of Chapter II.
- Check the hydraulic oil level with the level gauge.

If the oil level is at 1/2~2/3 of the liquid level gauge, it means that the liquid level is normal. If the oil level is lower than 1/2 of the liquid level gauge, open the filler cap on the top of the oil tank and add the specified hydraulic oil. For the selection of hydraulic oil, please refer to "Chapter 19 Selection of oil products", the same below.

IMPORTANT!! Do not exceed the normal level when filling the hydraulic oil. Excessive hydraulic oil may overflow or cause damage to the hydraulic circuit.

IMPORTANT!! Hydraulic oil of different grades shall not be mixed.

8.2 Replacing the hydraulic oil

Change the hydraulic oil every 3000 hours of operation under excavation working conditions; Under the crushing

working conditions, the replacement cycle of the hydraulic oil shall be shortened, and the hydraulic oil shall be replaced according to the use frequency of the hydraulic hammer.

⚠Warning
Be careful when changing oil; hot oil may burn unprotected skin..

- Park the machine on a solid, flat and level ground.
- Start the engine and rotate the upper frame structure to make the oil drain plug at the bottom of the hydraulic oil tank located between the left and right tracks.
- Fully retract the bucket cylinder and arm cylinder, and then lower the boom.
- Shut down the engine and place the control lockout lever in the locked state. Refer to "3.5 Control lockout lever" of Chapter II.
- Release the pressure in the hydraulic oil tank through the ventilation filter.
- Remove the cover plate at the bottom of the hydraulic oil tank. (if with cover plate)
- Place a container under the oil drain plug.

1 Oil drain screw plug

- Remove the drain plug, install the drain valve, drain the hydraulic oil, and collect it with a container.
- Unscrew the filler cap to speed up the oil draining process. Remove the O-ring and oil suction filter.
- Drain the hydraulic oil, remove the drain valve and install the drain plug.
- Clean the suction filter thoroughly and reinstall it.
- Fill the hydraulic oil and tighten the filler cap.
- Start the machine, check the oil level on the round oil dipstick, and fill in the oil when it is insufficient.

8.3 Replacing the filter element of the hydraulic oil return filter

Replace it every 1000 hours under excavation working conditions; Under the crushing working conditions, the replacement cycle of the hydraulic oil shall be shortened, and the hydraulic oil shall be replaced according to the use frequency of the hydraulic hammer.

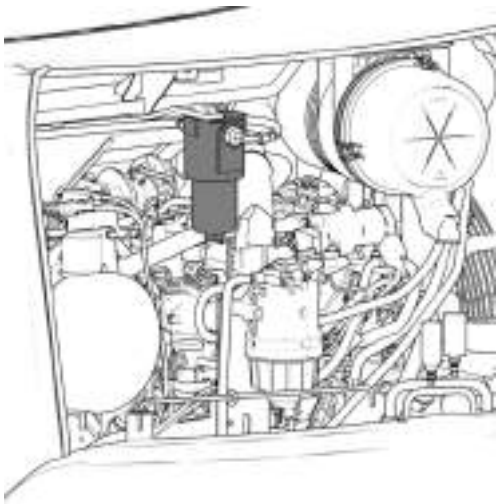
- Release the pressure in the hydraulic oil tank by the air filter.
- Unscrew the fixing cover, remove the O-ring, spring and gasket, pull out the filter and remove the filter element.
- Clean the removed parts.
- Install new filter element and all parts. When installing the cover, press the cover downward while tightening the bolts.
- Start the engine and idle at low speed for 10 minutes to release air.

- Stop the engine.

8.4 Replacing the filter element of the hydraulic oil suction filter

Replace it every 2000 hours of operation.

- Unscrew the screw plug, remove the cover and pull out the filter element.
- Clean it and replace it if damaged.



8.5 Replacing the filter element of the hydraulic pilot filter

Replace it every 1000 hours of operation.

- Place a container under the filter.
- Remove the filter body.
- Replace the filter element of the hydraulic pilot filter.

8.6 Replacing the filter element of the ventilation filter

Replace the ventilation filter every 2000 hours.

- After working in a dusty working environment for a period of time, the ventilation filter will be blocked.
- Unscrew the bolts on the ventilation filter and pull out the filter element.
- Replace the air filter element with a new one.

8.7 Releasing the pressure in the hydraulic oil tank and hydraulic circuit

IMPORTANT!! In the hydraulic circuit, there is always internal pressure. Before releasing the pressure, do not fill oil or drain oil, and do not maintain or inspect the machine. When unscrewing the hydraulic oil tank cap and hose connector, stand aside and slowly loosen it.

- Release the pressure in the hydraulic circuit.
- Rotate the start switch to the "ON" position, and operate the left and right work equipment control handles and pedals to their respective ends several times to remove the pressure in the hydraulic circuit.
- Release the pressure in the hydraulic oil tank.
- Press the ventilation filter several times to remove the pressure in the oil tank.

9. Swing drive mechanism

★ Notice

Notice! This machine adopts a maintenance-free swing drive mechanism, and there is no need to replace the gear oil.

10 Traveling drive mechanism

10.1 Checking the gear oil level of traveling drive mechanism

Check the oil level every 250 hours at the working temperature.

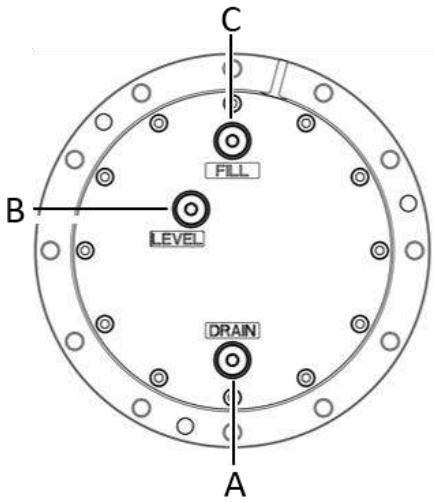
IMPORTANT!! Before checking the oil level of traveling drive mechanism, be sure to clean around the oil port. If there are impurities in the oil, the traveling drive mechanism will be damaged.

Check the oil level at the working temperature, and make sure to keep the gear oil level normal.

If the oil is too low, the traveling drive mechanism cannot be driven correctly, resulting in damage.

If there is too much oil, it will foam, resulting in overheating of the traveling drive mechanism.

⚠Warning
The oil will be very hot after the machine stops working. Please wait until it cools down before operating..



- Park the machine on a flat ground.
- Adjust the oil drain plug A to the lowest position and vertically face the ground, as shown in the figure.
- Place the control lockout lever in the "Lock" position. Refer to "3.5 Control lockout lever" of Chapter II.
- Remove the oil level oil inspection plug B. If the gear oil almost overflows from the hole, it means the oil level is normal.

- If the oil level is too low, add the specified gear oil through the filler plug C. For the selection of gear oil, refer to "18 Selection of oil products" of this Chapter, the same below.

10.2 Replacing the gear oil

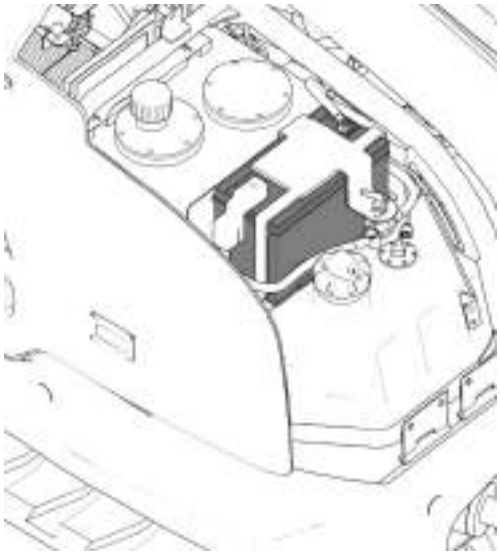
Replace it every 2000 hours.

- Prepare a container to collect the drained gear oil.
- Place the oil inspection plug B in the horizontal position so that the oil drain plug A is at the lowest point.
- Remove the oil drain plug A and oil inspection plug B, and collect the gear oil with a container.
- Check the O-ring on the plug, and replace it in time if damaged.
- After the oil is drained completely, install the oil drain plug A.
- Fill in the specified gear oil through the filler plug C.
- Recheck the oil level and fill in oil when it is insufficient.
- Install the oil inspection plug B and oil filler plug C.

11 Electrical system

11.1 Battery charging

⚠ Warning
When charging the battery quickly, remove the battery cover first. When the battery is charged, explosive hydrogen-oxygen mixture may be generated, and short circuit and nearby open flame may cause strong explosion.



- The battery cover is equipped with an indicator showing the battery state of charge. When the indicator is in green, the battery may be used normally. When it is in black, the battery should be charged in time, and when it is in white, it should be replaced immediately.
- If the battery is not handled correctly during charging, the battery may explode. Therefore, the battery handling procedures and the charging procedures in the instructions for use shall be followed, and the following precautions shall be observed:
- The battery will produce hydrogen and oxygen during charging, which will cause explosion in case of open flame or blocked exhaust port. Therefore, the battery shall be kept away from open flame to avoid short circuit.
- Remove all screw plugs during charging for good ventilation. Keep fire or sparks away to avoid explosion.

- When charging the battery, the positive pole of the charger shall be connected to the positive pole of the battery, and the negative pole of the charger shall be connected to the negative pole of the battery. Charging with reverse connection is strictly prohibited.
- The battery will produce gas during charging. Regularly check that the vent hole on the battery is not blocked to avoid battery explosion.
- During charging, when the electrolyte temperature of the battery exceeds 45℃ (113°F) , the charging voltage or charging current shall be reduced as appropriate to prevent electrolyte splashing caused by too high temperature.
- Before charging, remove the cable from the negative pole of the battery. Otherwise, high voltage will be generated and the alternator will be damaged.
- The positive pole of the charger is connected to the positive pole of the battery, and the negative pole of the charger is connected to the negative pole of the battery. Never charge batteries in series (24V).
- It is recommended to use a charger with constant voltage of 16.0 V (which cannot exceed 16.2 V. Otherwise, water will be heavily electrolysed, resulting in a decrease in the liquid level, the indicator will be in white, and the battery will be scrapped) and a limited current of 25 A to charge the battery until the charging current is less than 2 A and the indicator turns green.

- During the charging process, if a large amount of acid is sprayed from the battery vent, the charging shall be stopped immediately and the cause shall be found out.
- During the battery charging, check the indicator status every hour. The battery indicator turns green, indicating that the battery is fully charged and the charging is stopped.
- The voltage of a freshly charged battery may be above 13 V, but this is floating electricity and will disappear after a few days or several times of discharge.
- After the charging is completed and the test is passed, it is recommended to apply grease to the end post to prevent electric corrosion.
- Turn off the charger immediately after charging. Overcharging will lead to the following conditions: Battery overheating; Reduction of electrolyte; Damage to the electrode plate.

11.2 Precautions during welding

Electric welding operations shall be carried out by welders with corresponding qualifications and skills, and shall be carried out in places equipped with appropriate equipment. Electric welding will produce gas, which may cause fire and electric shock during operation, so it is absolutely forbidden for unqualified personnel to conduct electric welding. The following precautions must be observed during welding:

- Turn off the master power switch before welding.
- Disconnect the battery terminals to prevent the

battery from exploding.

- Remove the paint from the place to be welded (in the area at least 10 cm (3.9 inch) around the welding spot) to prevent the generation of harmful gases.
- If electric welding is carried out on or very close to hydraulic equipment or pipelines, flammable steam and sparks will be generated, and there is a risk of fire or explosion. Therefore, electric welding in such places shall be avoided.
- During welding, splashing sparks will directly fall on rubber hoses, wires or pressurized pipes, which may suddenly rupture and damage the insulation of wires, so cover them with fire dampers.
- Protective clothing shall be worn for electric welding.
- The electric welding site shall be well ventilated.
- Clean up all flammable materials, and the work site must be equipped with fire extinguisher.
- Modifications affecting the performance, safety and strength of vehicles and work equipment shall not be carried out.

11.3 Distribution box (EPD)

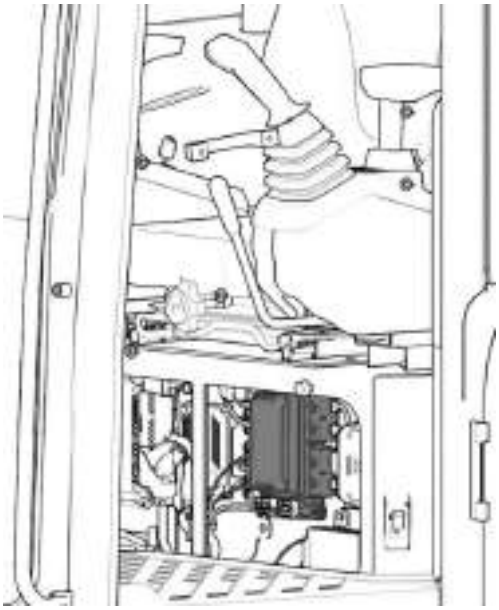
The distribution box is located in the cover plate under the seat. After opening the distribution box cover, the relay and fuse may be seen.

Relay and fast fuse

When the high-capacity current flows, the fast fuse protects the component, the circuit is disconnected, the distribution box sends the fault information of the fuse to the display through the CAN network, and the display displays the relevant fault information of the fuses, then the operator needs to shut down the machine to troubleshoot the fault.

If the electrical system cannot work after repair, check the slow-blow fuse.

Fuse



The box contains most of the fuses on the machine.

Warning
Never install a fuse with a rated current higher than that indicated on the label (there is a risk of damage or circuit board fire).

The fuse may be easily removed after opening the cover of the distribution box. A mark on the box cover shows the exact position and specification of each fuse.

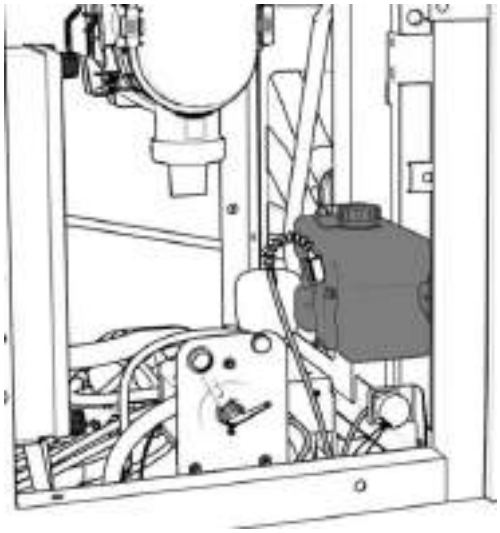
★ Notice

If the fuse at the same position is blown repeatedly, the cause of the fault must be found out.

★ Notice

When replacing the fuse, turn the Start button key to the "O" position and ensure that the fuse specifications are consistent.

11.4 Sprinkling can



Check the windshield washer fluid level daily.

★ Notice

When the temperature is lower than the condensation point, antifreeze shall be added to the windshield washer fluid.

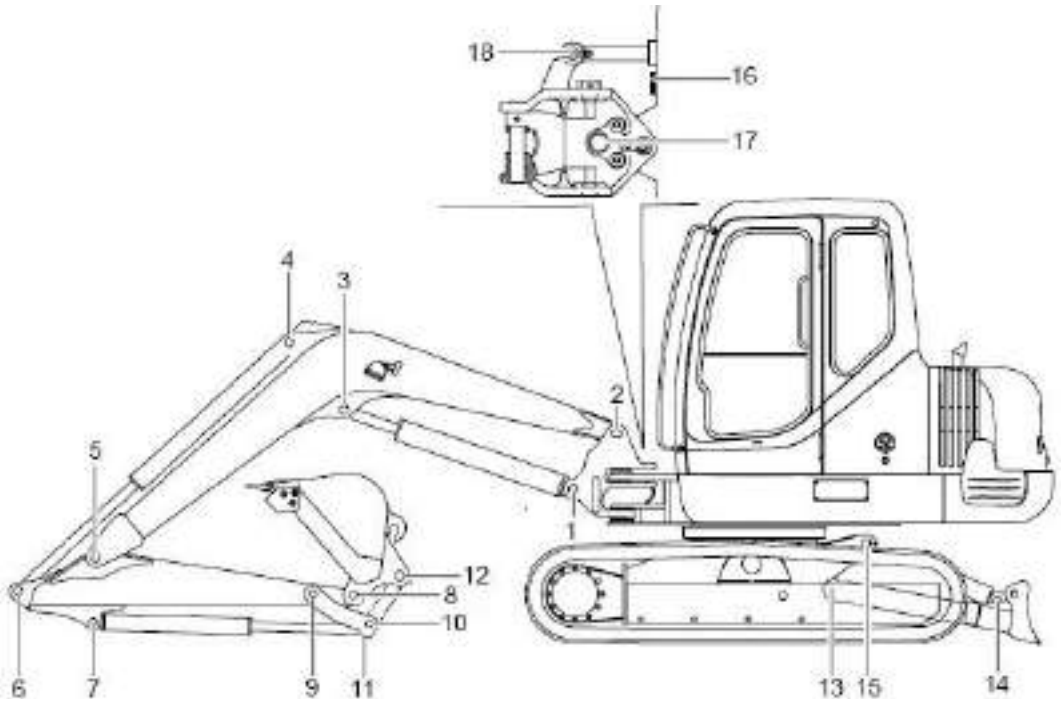
12 Lubrication system

12.1 Greasing the work equipment

For the linkage lubrication points 1-12 of the work equipment, lubricate and maintain them every 10 working hours or every day.

For lubrication points 13-15, lubrication maintenance should be carried out every 50 working hours. When silt, water or abrasive may enter the gear bearing under severe working conditions (or after the hydraulic hammer is used), or within the first 100 working hours of machine operation, it shall be lubricated and maintained every 10 working hours or every day.

Place the work equipment on the ground and shut down the engine as shown in the figure.



1 Boom cylinder mounting pin 2 Boom mounting pin 3 Pin shaft at the end of the boom cylinder piston rod 4 Arm cylinder mounting pin 5 Boom and arm connecting pin 6 Arm cylinder mounting pin 7 Bucket cylinder mounting pin 8 Arm and bucket connecting pin 9 Connecting pin shaft of arm and connecting rod 10 Connecting pin shaft of piston rod and connecting rod 11 Pin shaft at the end of the bucket cylinder piston rod 12 Connecting pin shaft of bucket and piston rod 13 Dozer blade mounting pin 14 Dozer blade cylinder mounting pin 15 Dozer blade cylinder piston rod end pin 16 Boom slewing cylinder mounting pin, slewing gear, and slewing bearing 17 Boom support mounting pin 18 Boom slewing cylinder piston rod end pin

- Remove the spilled grease.

Note: After working in the water, new grease shall be applied to the parts immersed in the water regardless of the filling cycle of the grease, such as the pin shaft of the bucket, and the old grease shall be removed.

12.2 Greasing the swing bearing

Check each lubrication point every day, and apply grease when it is insufficient.

1) Park the machine on a level ground and lower the

bucket to the ground.

2) Turn the Start key to the "O" stop position.

3) Move up the control lockout lever to lock this system. Refer to "Control lockout lever" of Chapter II.

4) Clean the grease filler nozzle and fill the grease manually.

★ Notice

It is forbidden to use an electric gun to fill the grease, to prevent damage to the sealing ring.

5) Place the safety lock control handle in the "Unlock" position, start the engine, raise the bucket to about 1 m above the ground, and rotate the superstructure by 1/8 turn.

6) Lower the bucket to the ground.

7) Starting from step 2, repeat the operation steps 4 times.

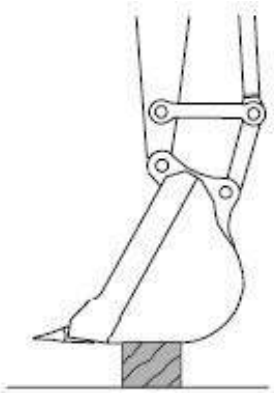
8) Fill the swing bearing with grease until the grease overflows from the swing bearing.

9) Do not add too much grease. After applying the grease, remove the overflowing grease.

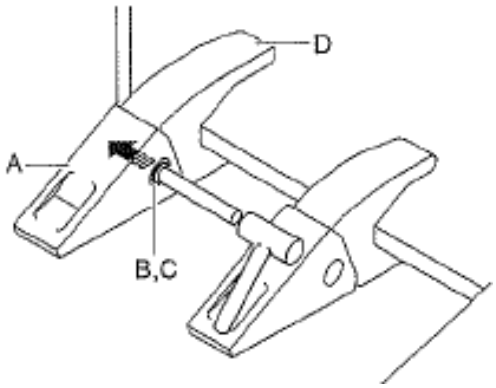
13 Replacing the bucket teeth

⚠Warning
It is very dangerous to move the work equipment due to mis-operation when replacing the bucket teeth. Keep the work equipment in a stable state, then shut down the engine and lock all control levers securely. If the dowel pin is knocked out with excessive force, there will be a danger of the dowel pin flying out. Make sure that no one is in the surrounding area. Wear goggles, gloves and other protective equipment because there are flying pieces occasionally.

Replace the bucket teeth before the bucket teeth seat is worn.



- Place a cushion block under the bucket so that the pin assembly may be removed, then place the bucket horizontally on the cushion block, shut down the engine, and place the control lockout lever in the Lock position.



- Place a metal rod (its diameter is smaller than the diameter of the pin shaft) on the fixed pin head, knock the metal rod with a hammer to knock out the pin shaft B, and be careful not to damage the locking gasket C, and remove the bucket teeth.
- Clean the mounting surface. Install the new bucket

teeth A into the teeth seat, push in the pin assembly partially by hand, then knock the pin assembly in with a hammer, and install the bucket teeth on the bucket.

14 A/C maintenance

Clean the filter every 500 hours. Replace them every 1000 hours.

If the A/C filter is blocked, the air flow, cooling and heating capacity will be reduced. Therefore, it should be cleaned regularly.

IMPORTANT!! The A/C system contains pressurized refrigerant R1234yf, which cannot be intentionally discharged.

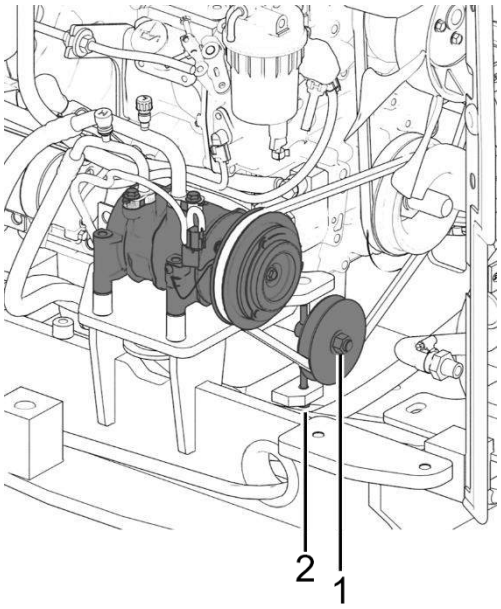
IMPORTANT!! Only specially trained personnel may carry out the maintenance of refrigerating system and the filling of refrigerant. Never mix it with different types of refrigerants!

IMPORTANT!! Always keep the A/C in a good state, start the A/C at least once a week to prevent refrigerant from leaking from the compressor seals regardless of the season.

14.1 Checking before A/C operation

Sites to be inspected weekly

- Parallelism and tension of the V-belt for compressor drive.



IMPORTANT!! If the belt tension is incorrect, the performance of the compressor will be reduced and the belt and compressor may be damaged.

Press down the center of the belt with a force of about 10 kg (22.1 lb), which shall be pressed down by 7-10 mm (0.3 – 0.4 inch). If the tension of the V-belt does not meet the requirements, it may be adjusted as follows:

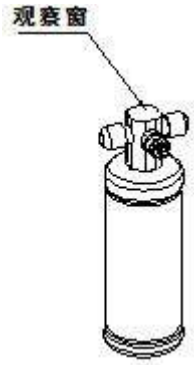
Loosen nut 1 of the idle pulley and adjust the tension of the belt with the adjusting bolt 2.

- Check the surface of the heat exchanger of the condenser for foreign matter.
- It is required that the inside of the radiator fins shall be clean, and there shall be no blockage between the fins. Cold water or compressed air shall be used for cleaning rather than hot water and hot air.

Parts to be checked before starting A/C in summer

- Use compressed air to clean the surroundings of the compressor, especially to avoid foreign matters between the clutch suction cup and the pulley.
- Check the proper amount of refrigerant by checking the pressure.

Notice! If the refrigerant quantity is insufficient, the refrigeration performance will be poor.

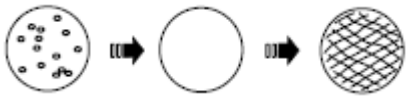


a Start the engine and gradually increase the engine speed to 1500 rpm.

b Open the cab door and all windows.

c Turn on the temperature control switch and turn it to the maximum, and turn the air volume adjustment switch to the maximum.

d Check the flow state of the refrigerant in the pipeline through the sight glass.



Appropriate amount of refrigerant: There are bubbles first, and it gradually becomes clear, almost without any bubble, and then it turns slightly white.

Excessive refrigerant: There is no bubbles.

Insufficient refrigerant: There are bubbles emerging continuously.

- Check the connection status of nuts and screws around the compressor.
- Check whether there is refrigerant leakage at the connection of the refrigerant pipe and the connection inside the unit.
- Check whether the refrigerant pipe is defective due to interference with the vehicle body or friction on the pipe surface.
- Check that the belt is free of cracks, excessive wear, notches and burrs.

14.2 Parts that should be checked at any time when A/C is running

- Check the compressor for abnormal noise.
- Check whether the cooling and other switches of the control panel are normal.
- Check whether the evaporator may be started at high, medium and low gears, whether the air speed changes at different gears, and check whether the air temperature at the air outlet drops.

14.3 Maintenance of A/C in off-season

- When the A/C is not used for a long time, it is forbidden to discharge the refrigerant or refrigerant oil inside the system. If the refrigerant or refrigerant oil is discharged, it will cause internal corrosion of the hose and components.
- When the A/C is not used for a long time in the off-

season, start the A/C at least once a month (for about 5 minutes) to prevent the drying of the gasket, O-ring or bearing inside the compressor, so as to increase the durability of the compressor and the system and minimize the leakage of the refrigerant.

Notice! When starting the A/C in winter, the compressor clutch does not work due to the low interior temperature. Start the heater first, and then start the A/C after a certain period of time. When increasing the compressor speed, it shall be operated in the idling state due to the start of the low pressure switch (Low-pressure start is normal, and no additional check is required.).

14.4 Troubleshooting of common A/C faults

The steam generator is not started

a. Poor power connection; Check the power connection status.

b. The power fuse is disconnected; Check and replace the fuse.

c. The wire is disconnected or short-circuited; Check whether it is energized and short circuited.

Insufficient air volume

a. The steam generator starts poorly; Check and replace.

b. Foreign matters are attached to the surface of the evaporative heat exchanger; Clean with compressed air or water.

c. Frozen evaporative heat exchanger; Check the temperature sensor to prevent the heat exchanger from being frozen.

d. Air leakage; Check for air leakage between the evaporator and the air duct.

Poor compressor start

a. The fuse in the fuse box is disconnected; Check and replace the fuse.

b. Poor pressure switch or abnormal pressure; Check the connection of pressure and high-voltage switch harness or replace the high-voltage switch.

c. The temperature sensor for setting the interior temperature is defective or the temperature setting is abnormal; Adjust the temperature setting of the control panel downward, and check or replace the temperature sensor.

d. The clutch is burnt or the voltage is too low; Check the clutch voltage, and replace the clutch if it is burnt out.

Low pressure is too high

a. The expansion valve is abnormal. Replace the expansion valve.

b. Abnormality of the internal valve body of the compressor: The high pressure and low pressure are almost the same; Check the compressor valve body.

Low pressure is too low

a. The dryer or pipeline is blocked; If there is temperature difference between the inlet and outlet of the dryer, replace the dryer.

b. The expansion valve is frozen or blocked; Check whether the expansion valve is blocked and whether it is frozen due to internal freezing of moisture.

High pressure is too high

a. Poor condensation of the condenser; Check the surface of the condensing heat exchanger for foreign matters and clean it.

b. Excessive refrigerant: The temperature of the low-pressure pipe is too low or the pressure is too high; Inject an appropriate amount of refrigerant after discharging the refrigerant or re-vacuumizing.

High pressure is too low

a. Insufficient refrigerant; Fill the refrigerant after confirming with the sight glass.

b. Abnormality of the internal valve body of the compressor: The high pressure and low pressure are almost the same; Check or replace the compressor valve body.

c. The external temperature is too low; It is normal.

Abnormal noise

a. The evaporator fan is damaged or deformed; Check and replace.

b. The compressor connecting nut is loose; Tighten the nuts and screws.

c. Poor parallelism or tension of V-belt; Adjust the V-belt.

15 Operation of accumulator

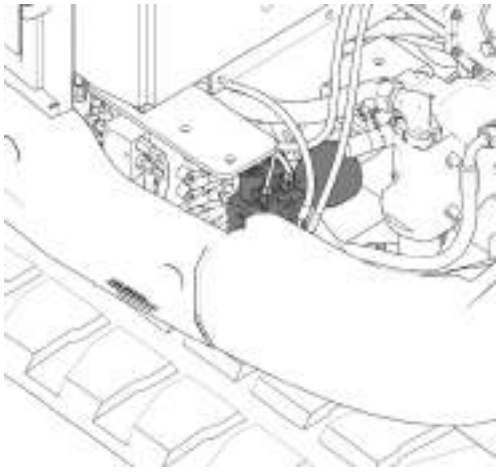
Warning
The accumulator is filled with high-pressure nitrogen. Handle with care. Otherwise, it will cause serious accidents or injuries.

- Do not knock, drill, or weld the accumulator.

- Keep it away from open flame or other high heat sources.

- If you operate the control lever downward just after the engine stops, the accumulator may make the accessory move by its own weight.

- After releasing the pressure in the accumulator, move the control lock rod downward to lock the system safely. Refer to relevant chapters.



Operation of pressure accumulator (in emergency)

1 Turn the ignition key to the "Off" position to shut down the engine.

2 Turn the ignition key to the RUN position

3 Move the lock control lever downward to unlock the system. Refer to relevant sections.

4 Place the control lever in the downward position of the boom to lower the auxiliary device with its weight.

5 Move the lock control lever upward to lock the system safely.

Release of accumulator pressure

1 Lower the auxiliary device completely to the ground.

2 Turn off all auxiliary devices, such as the breaker falling (if optional).

3 Turn the ignition key to the RUN position after turning off the engine.

4 Move the lock control lever downward to unlock the system.

5 Move the control lever and pedal forward/backward and leftward/rightward to their end positions respectively so as to release the pressure in this control circuit.

6 Turn the ignition key to the "O" position.

7 Move the lock control lever upward to lock the system safely.

8 Slowly loosen the hose connector and avoid the injection direction of hydraulic oil when disconnecting the accumulator.

9 Before discarding the accumulator, please contact the repair department of SDLG authorized dealer to relieve the pressure therein.

16 Track tension

16.1 Check the track tension

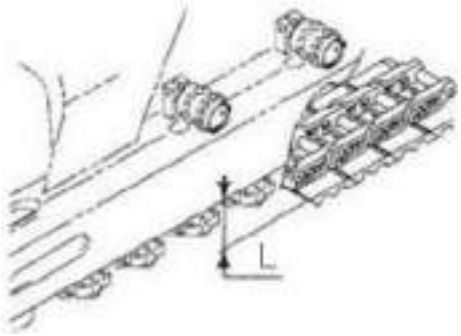
Check the track tension every 50 hours.

⚠Warning
Check the track tension, in which case the track must be lifted off the ground. When taking measurements, great care should be taken to avoid the track falling or moving.

The wear of the track usually varies with the working conditions or soil characteristics.

Check the track tension frequently and keep it at the specified value.

Clean the lower chassis thoroughly once or more times each day according to the soil conditions of the work site.



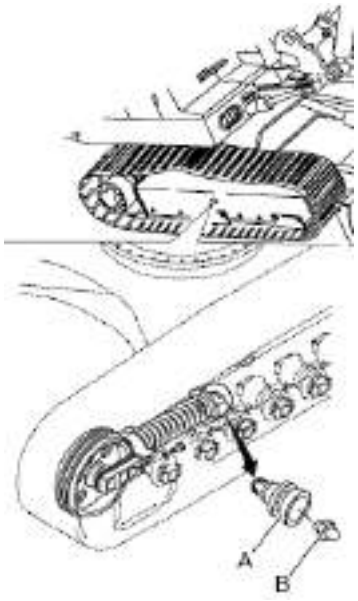
Track tension is measured by the clearance L between the bottom surface of the track frame and the upper surface of the lower track shoe. The methods of measurement are as follows:

- Operate the handle slowly, and lift the track with the boom and arm.
- Check the track tension according to the soil characteristics.

Working conditions	Clearance L (mm)
General soil	195～205 (7.7～8.1)
Rocky ground	185～195 (7.3～7.7)
Medium soil (sand, snow ground, etc.)	205～215 (8.1～8.5)
Rubber track	175～185 (6.9～7.3)

16.2 Adjusting the track tension

⚠Warning
Valve A may be ejected by the high-pressure compressed grease in the oil cylinder. Do not loosen more than one turn when loosening valve A. Do not loosen other components except valve A. In addition, keep away from the valve installation position. If the track tension cannot be adjusted by the methods in this Manual, please contact the repair center of Shandong Lingong Construction Machinery Co., Ltd.



Increase the track tension:

- Fill grease with a high-pressure grease filling gun through the grease filler nozzle.
- Move the machine forward and backward to check the adjusted track tension.
- If the tension is not correct, it shall be adjusted again.

Reduce the track tension:

- Gradually loosen valve A to drain the grease.

Note: Do not loosen valve A for more than one turn. If the grease drainage is not smooth, the machine may be moved back and forth. Do not use the grease filler nozzle to drain the grease.

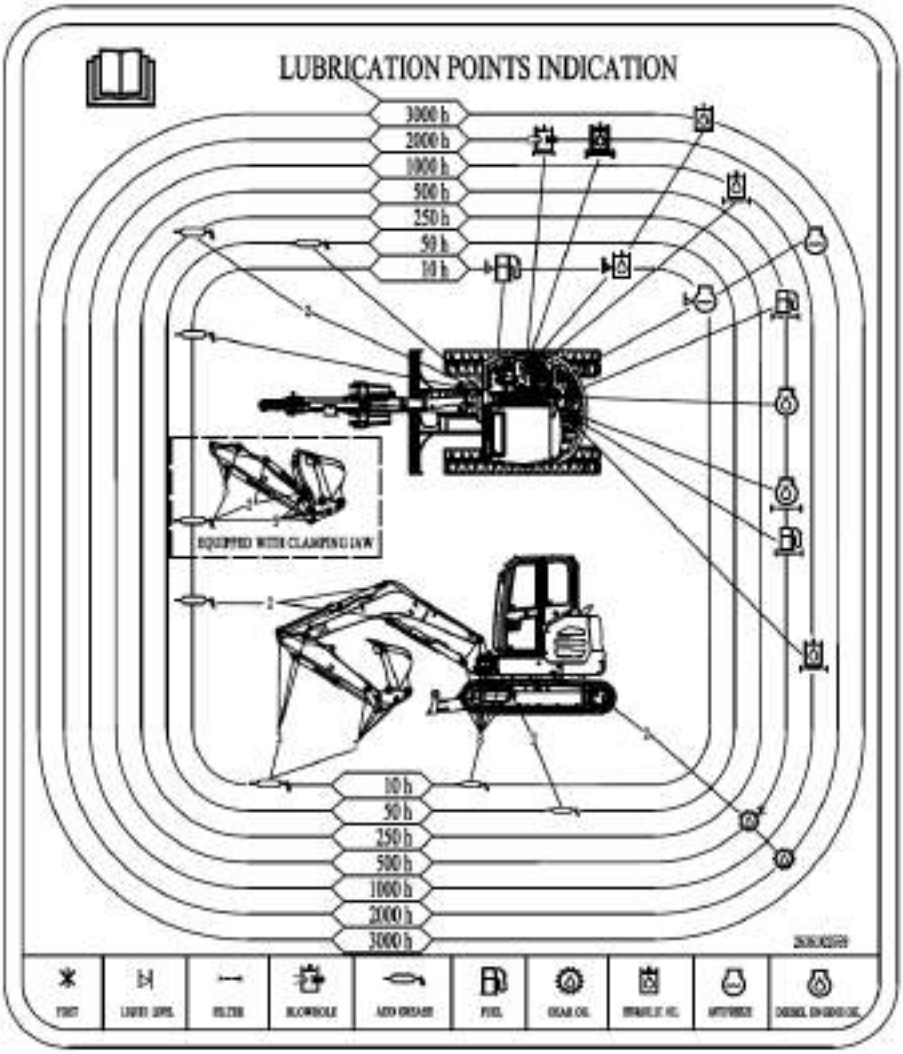
- Close valve A, but do not tighten it too much, otherwise the connector will be damaged.
- Check the track tension again. If the tension is not correct, it shall be adjusted again.

17 Lubrication

Lubrication is an important part of maintenance. If the machine is lubricated correctly, the service life of the gasket, bearings, and bearing pins may be greatly extended. Lubrication diagrams may make lubrication easier and avoid the missing of lubrication points.

Lubrication may be used to supply grease to the bearing, reducing wear between the bearing pin and the bearing bushing; It may also be used to replace old and dirty grease.

IMPORTANT!! Before filling the grease, the grease filler nozzle and grease gun shall be wiped clean to avoid sand and dirt during filling.



18 Regular maintenance

Regular servicing is divided into servicing every 10 hours, every 50 hours, every 250 hours, every 500 hours, every 1000 hours, and every 2000 hours.

18.1 Maintenance every 10 hours

- Check the engine oil level. Refer to "4.1 Checking the engine oil level" of this Chapter.
- Check the coolant level. Refer to "7.1 Checking the coolant level" of this Chapter.
- Check the fuel level. Refer to "5.1 Fuel filling and fuel level check" of this Chapter.
- Check the hydraulic oil tank level. Refer to "8.1 Checking the hydraulic oil level" of this Chapter.
- Check the glass cleaner level.
- Clean the air filter ash discharge valve. Refer to "6.1 Cleaning the air filter ash discharge valve" of this Chapter.
- Check all control levers and control switches.
- Check the light, horn, and IECU.
- Check the bucket teeth for wear.
- Check whether the safety belt operates properly.
- Check the hydraulic system for leakage.
- Clean the track and drive sprocket (after daily work).

18.2 Maintenance every 50 hours

The same maintenance as that every 10 hours shall be carried out at the same time.

- Drain the sediment from the fuel tank. Refer to "5.3 Draining the sediment" of this Chapter.
- Fill the work equipment lubrication points with grease.

Refer to "12.1 Filling grease into work equipment" of this Chapter. (It shall be filled daily within the first 100 working hours of a new machine.)

- Check the oil-water separator for water or sediment and drain it (if any). Refer to "5.4 Draining water from the oil-water separator" of this Chapter.
- Check the track tension. Refer to "15.1 Checking the track tension" of this Chapter.
- Check the air filter of the engine, and clean and replace it if necessary. Refer to "6 Air filter" of this chapter.
- Check and adjust the tension of engine and A/C compressor belts.
- Check the working condition of the battery. Refer to "11 Electrical system" of this Chapter.
- Check the operation of the A/C, and start it for one minute.
- Check the lubrication of each hinged pin shaft and swing bearing of the work equipment.
- Check and tighten the fixing bolts of counterweight, track shoe, traveling motor, swing motor, and swing bearing.

18.3 Maintenance every 250 hours

The same maintenance as that every 10 hours and every 50 hours shall be carried out at the same time.

- Clean the air filter element. Refer to "6 Air filter" of this Chapter.
- Fill the swing gear bearing with grease. Refer to "12.2 Filling grease into the swing gear bearing" of this Chapter.

18.4 Maintenance every 500 hours

The same maintenance as that every 10, every 50 and

every 250 hours shall be carried out at the same time.

- Replace the engine oil and filter element. Refer to "4.2 Replacing the engine oil and oil filter element" of this Chapter.
- Replace the fuel fine filter element.
- Replace the air filter element. Refer to "6 Air filter" of this Chapter.
- Fill the swing motor bearing with grease. Refer to "9.3 Filling grease into the swing motor bearing" of this Chapter.
- Clean the water radiator, oil cooler, and condenser fin. Refer to "7.3 Cleaning radiator, oil cooler, and condenser fin" of this Chapter.
- Clean the sliding surface of the guide buffer.
- Clean the battery surface and terminal, and apply vaseline to the terminal surface.
- Clean the A/C filter.

18.5 Maintenance every 1000 hours

The same maintenance as that every 10, 50, 250 and 500 hours shall be carried out at the same time.

- Replace the filter element of the hydraulic oil return filter (when the hydraulic hammer is used, the replacement period shall be shortened). Refer to "8.3 Replacing filter element of hydraulic oil return filter" of this Chapter.
- Replace the A/C filter element.
- Adjust the engine valve clearance.
- Tighten the engine fixing bolts.

18.6 Maintenance every 2000 hours

The same maintenance as that every 10, 50, 250, 500 and

1000 hours shall be carried out at the same time.

- Replace the filter element of the ventilation filter of the hydraulic oil tank (or replace it if necessary). Refer to "8.6 Replacing filter element of ventilation filter" of this Chapter.
- Replace the coolant. Refer to "7.2 Coolant replacement" of this chapter.
- Replace the gear oil of traveling drive mechanism. Refer to "10.2 Replacing gear oil".

18.7 Maintenance every 3000 hours

The same maintenance as that every 10, 50, 250, 500 and 1000 hours shall be carried out at the same time.

- Change the hydraulic oil (when the hydraulic hammer is used, the replacement period shall be shortened). Refer to "8.2 Replacing the hydraulic oil" of this Chapter.

19 Regular replacement of main components

When operating or driving the machine, the user must check and maintain the machine regularly to ensure safety. In addition, to further improve safety, users should also regularly replace the parts specified in the list of parts subjected to periodic replacement. These parts are particularly relevant to safety and fire prevention, so please contact the dealer for replacement.

These parts changes over time and are susceptible to wear or deterioration. However, it is difficult to fully judge the condition of the parts through regular maintenance. Therefore, when it is time for replacement, replace the parts regardless of the condition to ensure the good performance of these parts.

However, if these parts are abnormal before the replacement, they must be repaired or replaced immediately. If the hose clamp is deteriorated, such as deformation or cracks, it shall be replaced while replacing the hose.

In addition, check the hydraulic hose that is not listed as parts subjected to regular replacement. If any abnormality is found, tighten or replace it. When replacing the hose, replace the O-ring, gaskets and other similar parts at the same time.

SN	Regular replacement of safety-critical parts	Quantity	Replacement cycle
1	Fuel hose (fuel tank - fuel	2	Every 2 years or 4000 hours, whichever comes first
2	Fuel hose (fuel filter	1	
3	Fuel return hose (nozzle -	1	
4	Hose (main pump oil	1	
5	Hose (pump oil return)	1	
6	Hose (main pump oil	1	
7	Hose (boom cylinder -	4	
8	Hose (arm cylinder -	4	
9	Hose (bucket cylinder -	4	
10	Hose (swing motor -	2	
11	Safety belt	1	Every 3 years

20 Recommended lubrication

System	Oil quality grade	Recommended viscosity at different ambient temperatures
	℃	—30 —20 —10 0 +10 +20 +30 +40 +50
	°F	—22 —4 +14 +32 +50 +68 +86 +104 +122
Engine	Engine oil API CK-4	SAE 5W—30 SAE 10W—30 *SAE 15W—40 SAE 30 SAE 40
Traveling motor gearbox	Gear oil (with EP additives) API GL4 or GL5	*SAE 90 SAE 140
Swing ring gear (bath ball and sphere)	Grease	Multi-purpose EP - grease NLGI 2
Hydraulic system Swing motor gearbox	Hydraulic oil	ISO VG32 HV *ISO VG46 HV ISO VG68 HV
Pin and bushing	Grease (Multi-purpose EP - grease NLGI2)	*ISO—L—XBCFB2
Fuel	Diesel	ASTM D975 No.1 *ASTM D975 No.2
Cooling system	Coolant	Use the same coolant as the previously filled coolant. Refer to relevant sections.
A/C System	Refrigerant	R1234yf
	℃	—30 —20 —10 0 +10 +20 +30 +40 +50
	°F	—22 —4 +14 +32 +50 +68 +86 +104 +122

*: Assembled before delivery.

★ Notice

When starting the engine at a temperature below 0°C (32 °F), even if the temperature may rise to about 10°C during the day, make sure that the engine oil used is SAE 10W, SAE 10W-30, and SAE 15W-40.

Engine oil

Use engine oil that meets or exceeds the following standards or grades:

- API Servicing Classification CJ-4
- ACEA Servicing Classification E6
- JASO Servicing classification DH-2

★Notice

Use the specified engine oil only. Using other engine oil will affect the warranty, thereby causing seizure of internal components of the engine and/or shortening the service life of the engine.

Do not mix engine oils of different models, otherwise, the lubricating performance of engine oil may be affected.

Do not fill excessive engine oil, otherwise, it may cause white smoke from, overspeed of, or internal damage to the engine.

Do not mix engine oils of different brands.

Fuel

★Notice

The fuel oil shall meet at least the standards stipulated by the law, as well as the national and international standards for the fuel oil in the relevant market, such as ASTM D975 (US Technical Specification), and EN 590 (EU Technical Specification).

★Notice

Ultra-low-sulfur diesel (ULSD) must be used for the proper operation of the after-treatment system. If ultra-low-sulfur diesel is not used, the after-treatment system may be damaged.

Sulfur content

Ultra-low-sulfur diesel (ULSD) must be used for the proper operation of the after-treatment system. If ultra-low-sulfur diesel is not used, the after-treatment system may be damaged.

ULSD refers to diesel with a mass percentage of sulfur not exceeding 0.0010 (10 ppm). There are no acceptable substitutes.

Incorrect filling of fuel with high sulfur content will result in the following negative effects:

- Have negative impacts on engine emissions

- Reduce engine efficiency and durability
- Increase corrosion
- Increase sediments
- Reduce fuel economy
- Shorten the time interval between oil replacement period
- Increase overall operating costs

Biodiesel

Biodiesel is a renewable oxygen fuel made from agricultural and renewable resources such as soybeans or rapeseeds, and biofuel is a fuel composed of methyl or ethyl ester-based oxygenators using long-chain fatty acids, which are obtained in the form of transesterification from vegetable oils, animal fats, and edible oils. It does not contain petroleum diesel, but it may be mixed with petroleum diesel. If not mixed with petroleum diesel, this type of biodiesel is called "B100 ", which means that it contains 100 % (pure) biodiesel. However, the most common biodiesels are blended with conventional (petrochemical) diesel. Specific mix proportions may be identified by their names. For example, B7 represents 7% biodiesel and 93% conventional petroleum diesel; B20 represents 20% biodiesel and 80% conventional diesel. Vegetable oils pressed from raw materials shall not be deemed as biodiesel.

SDLG only approves the biodiesel with a blend of less than 7% and produced by oil companies.

Mixing with biodiesel higher than 7% may result in the following:

- Increase emissions of nitrogen oxides (thus not meeting legal requirements)
- Shorten service life of engine and injection system
- Increase fuel consumption
- Change engine output power
- Shorten the engine oil replace interval by half
- Shorten service life of rubber materials in fuel system
- Worse cold treatment characteristics of fuel
- Limit the storage time of the fuel. If the machine is stopped for a long time, it may cause blockage of the fuel system.

Warranty conditions

Warranty does not cover damage caused by mixing with biodiesel higher than 7%

Coolant

For filling and replacing the coolant, it is recommended to use SDLG coolant LCS. Do not mix different coolants or corrosion protectants as this may cause damage to the engine. If concentrated coolant LCS and purified water are used, the mixture shall contain 40-60% of concentrated coolant and 60-40% of purified water. The coolant content shall not be lower than 40% of the total mixture. Refer to the table below.

Minimum temperature for antifreeze protection	Content of concentrated coolant
—25℃(—13℉)	40%
—35℃(—31℉)	50%
—46℃(—50.8℉)	60%

Concentrated coolant LCS cannot be mixed with hard water or water containing salt or metal.

The clean water used for cooling system must also meet the following requirements:

Description	Value
Total number of solid particles	＜340ppm
Total hardness	＜9.5 °dH
Chloride	＜40ppm
Sulphate	＜100ppm
PH value	＜5.5—9

Description	Value
Silicon dioxide	＜20mg SiO_2/L
Iron	＜0.10mg Fe/L
Manganese	＜0.05mg Mn/L
Conductivity	＜500μS/cm
Organic content, COD-Mn	＜15mg/L

If there is any doubt about the quality of the water, use coolant LCS, which contains 40% of concentrated coolant. Do not mix it with other coolants as this may cause damage to the engine.

Use long life coolant (LLC) or extended life coolant (ELC) that meet or exceed the following standards or specifications:

- ASTM 06210, 04985 (American Standard)
- JIS K-2234 (Japanese Standard)
- SAE J814C, J1941, J1034 or J2036 (International Standard)

If there is no extended life coolant or long life coolant available, a common coolant (green) containing ethylene glycol or propylene glycol may be used temporarily.

- Longer life or longer-lasting coolant shall not be mixed with common coolant (green).

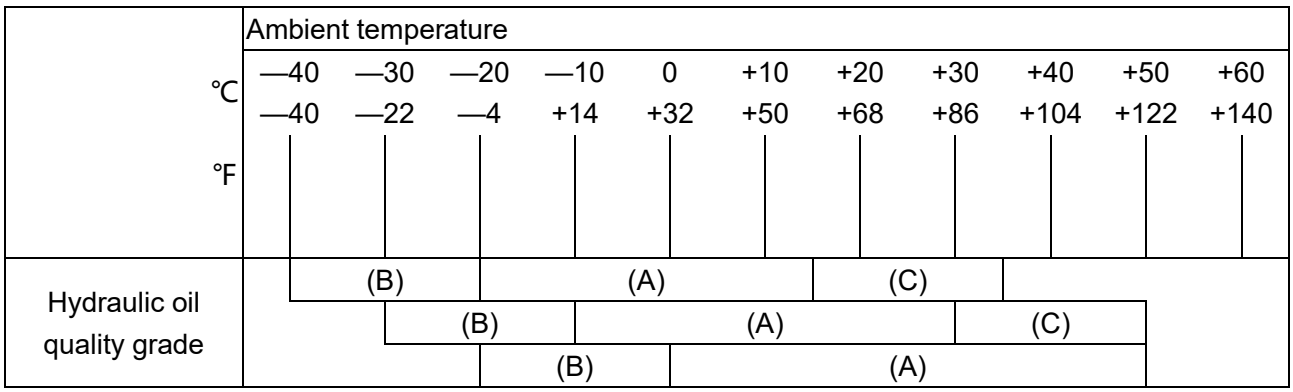
- Long-life coolants of different models and/or different colors shall not be mixed.

Hydraulic oil

Only the SDLG hydraulic oil certified by us may be used. Do not mix different brands of hydraulic oil as this may cause damage to the hydraulic system.

★Notice

Refer to the relevant section for hydraulic oil specifications.



(A): General oil used for hydraulic system and components, and its applicable ambient temperature.

(B): From the perspective of hydraulic oil only, it cannot guarantee that the ambient temperature applicable to the oil suitable for other machine conditions working in this temperature range, such as engine performance. When working within this range, it is required to preheat first to obtain the corresponding performance.

(C): Ambient temperature range corresponding to the hydraulic oil under certain conditions.

Grease

Possibility of mixing different types of grease with different additives

	Possibility of mixing different types of grease with additives					
	Lithium	Calcium	Lithium compound	Calcium compound	Aluminium compound	Clay
Lithium	√	√	√			
Calcium	√	√	√			√
Lithium compound	√	√	√	√		
Calcium compound			√	√		
Aluminium compound			√		√	
Clay		√			√	√

√: Acceptable

21 Capacity

Oil	Capacity
Engine oil	11.5L (338.9 fl oz)
Coolant	11.5L (338.9 fl oz)
Hydraulic oil (hydraulic oil tank)	45L (1521.9 fl oz)
Hydraulic oil (hydraulic system, total)	96L (3246.7 fl oz)
Gear oil (swing motor gearbox)	-
Gear oil [traveling motor gearbox (each)]	1.3L (44.0 fl oz)
Fuel	65L (2198.3 fl oz)

22 Units and Conversions

Common units and conversions in the Manual

Unit prefix

前缀	符号	系数
百万	M	× 1000000
千	k	× 1000
厘	c	× 0.01
毫	m	× 0.001
微	μ	× 0.0000001

Length unit

mile	×1.6090	= km
ft	×0.3050	= m
in.	×2.5400	= cm
in.	×25.4000	= mm
km	×0.6210	= mile
m	×3.2810	= ft
cm	×0.3940	= in.
mm	×0.0394	= in.

Volume unit

gal (U.S.)	×3.78540	= L
qt (U.S.)	×0.94635	= L
cu in.	×0.01639	= L
cu in.	×16.38700	= ml
fl oz (U.S.)	×0.02957	= L
fl oz (U.S.)	×29.57000	= ml
cm^3	×1.00000	= ml
cm^3	×0.03382	= fl oz (U.S.)

Mass unit

lb	×0.45360	= kg
oz	×28.35000	= g
kg	×2.20500	= lb
g	×0.03527	= oz

Force unit

lbf	×4.4480	= N
lbf	×0.4536	= kgf
N	×0.2248	= lbf
N	×0.1020	= kgf
kgf	×2.2050	= lbf
kgf	×9.8070	= N

Torque unit

ft-lb	×1.3558	= N·m
ft-lb	×0.1383	= kgf·m
in.-lb	×0.1130	= N·m
in.-lb	×0.0115	= kgf·m
kgf·m	×7.2330	= ft-lb
kgf·m	×86.8000	= in.-lb
kgf·m	×9.8070	= N·m
N·m	×0.7376	= ft-lb
N·m	×8.8510	= in.-lb
N·m	×0.1020	= kgf·m

Pressure unit

psi	×0.0689	= bar
psi	×6.8950	= kPa
psi	×0.0703	= kg/cm²
bar	×14.5030	= psi
bar	×100.0000	= kPa
bar	×29.5300	= in.Hg(60°F)
kPa	×0.1450	= psi
kPa	×0.0100	= bar
kPa	×0.0102	= kg/cm²
kg/cm²	×98.0700	= psi
kg/cm²	×0.9807	= bar
kg/cm²	×14.2200	= kPa
in.Hg(60°)	×0.0333	= bar
in.Hg(60°)	×3.3770	= kPa
in.Hg(60°)	×0.0344	= kg/cm²
mmAq	×0.0394	= in.Aq

Power unit

hp (公制或 PS)	×0.9863201	= hp SAE
hp (公制或 PS)	×0.7354988	= kW
hp SAE	×1.0138697	= hp (公制或 PS)
hp SAE	×0.7456999	= kW
kW	×1.3596216	= hp (公制或 PS)
kW	×1.3410221	= hp SAE

Temperature unit

°F = (1.8 × °C) + 32

°C = 0.556 ×(°F - 32)