

Product use and maintenance instructions



This manual consists of eight parts, and the following is a brief explanation of these eight parts.

Chapter 1: Overview of Cranes

This section includes some important overall product information, mainly to give you an overall understanding of cranes.

Chapter 2: Technical Parameters

This section includes all technical data and characteristic indicators of the on-board crane under standard configuration.

Chapter 3: Use of Safety Rules

This section presents all specific guidelines and instructions for the correct operation and safe use of on-board cranes.

Chapter 4: Requirements for Operators

This section specifies the skills and requirements that operators must master.

Chapter 5: Use of Cranes

This section mainly introduces the various usage processes of on-board cranes.

Chapter 6: Common Fault Analysis

This section mainly introduces common faults and troubleshooting methods that may occur during the use of on-board cranes.

Chapter 7: Maintenance

This section introduces some routine maintenance items that need to be carried out during the normal use of the on-board crane.

Chapter 8: Use and Maintenance of Electronic Control System

This section introduces the instructions for using the electronic control system.

The operating instructions in this manual are designed by the crane manufacturer.

Warning: When accepting products, attention must be paid to checking

the following points:

1. Written requirements for product maintenance manuals.

The technical indicators, rated load, and other information in this manual refer to the maximum capacity of the on-board crane product itself.

2. It is strictly prohibited to weld randomly on the crane to prevent damage to the crane's steel structure and hydraulic components. It is strictly prohibited to replace any other components except for those provided by the crane manufacturer; It is strictly prohibited to remove protective facilities and devices.

3. Maintenance should be carried out according to the requirements and within the specified time period in Part seven of this manual.

Chapter 1: Overview of Cranes

Section 1 Explanation of Terms

The following are the professional terms in this manual, accompanied by brief explanations.

Joint point: the hinge point of two or more parts

Hydraulic telescopic arm: a lifting arm controlled by a hydraulic cylinder that can perform telescopic motion

Extreme point: the extreme position of component movement

Lifting torque: the product of the weight of the lifted cargo and the working range

Operator: The operator and user of the on-board crane

Lifting curve: a device that can display the lifting capacity of a crane reaching 90% -100%

Working range: The distance between the center of the hook and the center of rotation in the horizontal direction

Power line: hydraulic transmission system for various actions of cranes

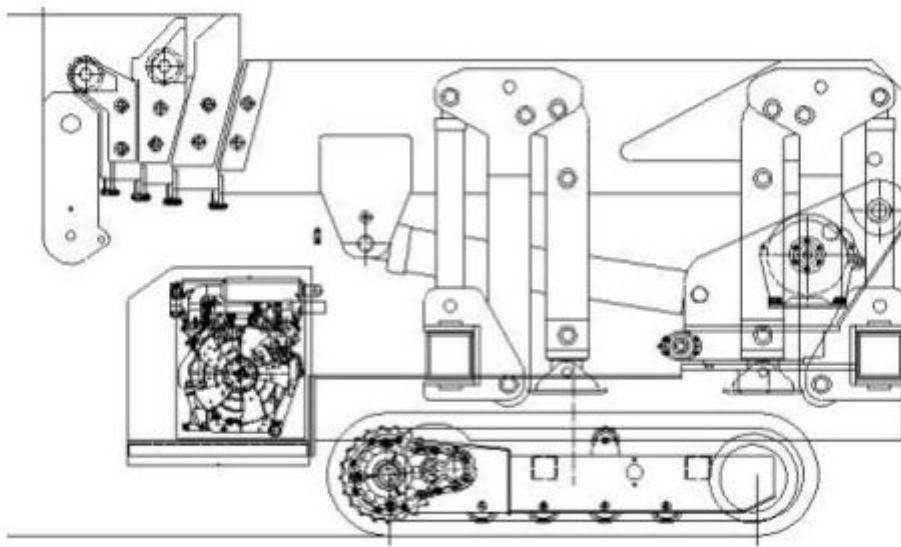
Rated lifting capacity: The maximum weight that a crane can lift at a certain position (the same as the rated lifting capacity)

Standard configuration: Truck mounted crane without optional accessories

Executive components: hydraulic cylinders, motors, etc

Control components: hydraulic valve, lock

Chapter 2: Appearance



Chapter 3 Use of Safety Rules

Section 1 Working Conditions

Unless there are other protective devices in the area where you operate the crane, maintain a minimum safety distance of 5 meters near the high-voltage power line.

Section 2 Environmental Conditions

Before using a crane, it is necessary to estimate the surrounding environmental conditions (wind, temperature, lightning) for safer

operation.

Do not use cranes in case of lightning or thunderstorms, and do not use cranes when the wind speed is greater than level 6

The ambient temperature should be between -25°C and $+45^{\circ}\text{C}$

Section 3 Requirements for Lifting Appliances

When lifting goods with a crane, the angle between the lifting rope (cable) should not be too small (Figure 1) or too large (Figure 2), and the maximum angle A should not exceed 120° . Otherwise, the tension borne by the lifting rope is too large and it is easy to break. If the angle A is too small, the lifting rope will be too long and cannot reach sufficient lifting height.



Figure 1

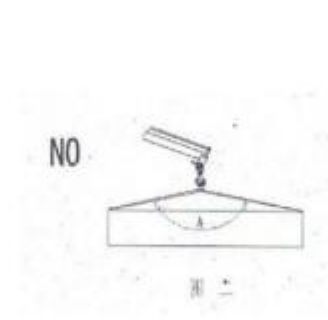


Figure 2



Figure 3

Section 4 Overview of Safety Rules

- The operator must have a clear understanding of the crane and maintain its high efficiency. If there are any doubts, please carefully refer to this user manual.
- Only after receiving operational training can the crane be used and

operated.

- **During load lifting or crane operation, it is not allowed to leave the control system.**
- **Do not enter the operation and working range of the crane without the permission of the operator.**

When lifting, it is strictly prohibited for two types of actuators to act simultaneously.

Operators should have a rough understanding of the weight of the lifted load and should not exceed the load value specified in the crane load diagram.

Use manipulation control on one side of the load to ensure maximum visibility of the load.

It is prohibited to stand under lifting objects and lifting arms.

Do not lift the load at an angle (with a slope).

Do not drag or diagonal pull loads, and do not lift heavy objects buried or frozen on the ground.

When the load first leaves the ground, ensure that there are no obstacles in the direction of my load's movement.

Guiding the load with a rope at a certain distance to prevent the load from rotating is a good way to ensure safety.

It is strictly prohibited to use a crane to lift people.

Before starting the lifting operation, it is necessary to check whether the lifting device (ropes, hooks, etc.) has undergone safety design and meets the weight and safety protection requirements of the goods you are lifting. For safety and safety reasons, the goods should be firmly fixed.

Before moving the vehicle, the crane must be fully retracted and locked.

Section 5 Safety Devices

Control valve on hydraulic cylinder

In the event of a malfunction in the power circuit hose, the control valve is still able to control the current position of the load and provide safety protection.

Emergency measures in case of unexpected failure of power system

1. There is a square head exposed outside the gearbox at the end of the worm gear. In the event of an unexpected power outage, one person can operate the control lever for the crane's rotation separately (pay attention to the direction of the control lever), while the other person can use the joystick to rotate the worm gear, which can cause the crane to rotate to the desired position.

Unpredictable and predictable hazards

Unpredictable danger: It is impossible to estimate the danger of components during the design phase and cannot be protected by safety devices.

Predictable danger: refers to any known potential danger point within the crane itself or within its operating range.

Here are the sources of unpredictable hazards:

The position of the crane during operation is incorrect, which cannot provide a reasonable escape route for the operator.

Charged to the body due to touching high-voltage electrical wires or working in rain or lightning.

Suffering from prolonged proximity to the engine's exhaust pipe.

The danger caused by operating or modifying the crane without

following the instructions in the manual.

Hazards caused by not following the maintenance instructions in the manual.

Chapter 4: Requirements for Operators

Basic Requirements

Anyone operating and using a crane must have the ability to achieve and meet the following requirements.

body

Good eyesight, hearing, coordination skills, and the ability to safely complete all tasks required for crane operation. Do not be affected due to discomfort or weakness, and do not operate the crane after taking medication or alcohol that leads to a decrease in personal ability.

spirit

Ability to understand and apply rules, regulations, and safety precautions. Utilize judgment skills to ensure the safety of oneself and others, as well as the safety of the product. Work diligently and responsibly.

emotion

You must remain calm, be able to withstand pressure, and use judgment to evaluate your physical and mental condition.

train

This is very important. It is necessary to read, learn, and understand the instructions and charts, warning signs, and slogans. Before performing any operation on the crane, it is necessary to confirm familiarity with the use of the control handle and related movements. Empty operation should be performed before applying a load.

If required by law, a license must be obtained.

Recommended clothing

Safety helmets, gloves, shoes, and goggles

Responsibilities and Responsibilities

responsibility

Crane operators have the obligation to master the start-up and various operations of the power system, as well as the disassembly, assembly, and maintenance of simple components.

Operators must pay attention to safety rules and devices, and be familiar with the use of operational controls and non-invasive loading and unloading techniques.

Professional responsibility

The operator is fully responsible for the correct operation of the crane, and must follow the requirements of this manual for maintenance,

loading operations, and every action of the crane.

Chapter 5: Use of on-board cranes

Section 1 Precautions before Operation

Danger:

- 1、 It is absolutely not allowed to use a crane when installing a positioning vehicle without sufficient support and locking.
- 2、 Before connecting the power source, be sure to check if the control handle is in the center position: if the handle is not in the center position, it should be restored to the center position.

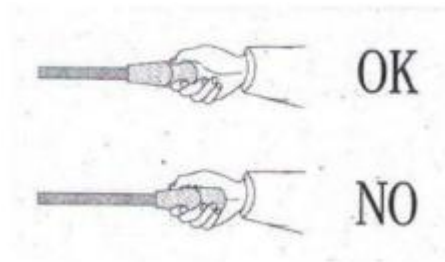
Warning: Before starting the crane, it is necessary to ensure that the engine has sufficient fuel to avoid power interruption during operation:

At the same time, it is necessary to check whether the battery pack is functioning properly so that it can be restarted at any time in case of power interruption.

Attention: Before using the crane, check whether the safety device of the crane is working properly.

Please hold the control lever in the "OK" manner as shown in the diagram to ensure that it can quickly reset (return to the

center position) in case of danger.



Section 2 Stability of Cranes

Attention: Generally, the operation and lifting of heavy objects should be on the same side to ensure the best perspective and safe operation.

Operation of telescopic arm:

Before lifting the goods, you must estimate the weight of the goods (this value should be compared to the rated load on the lifting torque) and calculate the route from the point of descent of the goods.

When putting down the goods, the operation should be slow, accurate on the ground, and there should be no swinging. Be careful not to let the goods collide with the crane or other objects.

In order to improve the service life of the crane's rotation, it is advisable to avoid rotating the turntable with load under high lifting torque conditions. It is best to shorten the telescopic arm before turning.

After lifting the cargo, sudden starting and stopping should be avoided, as this will generate additional impact force on the crane structure.

Attention: In order to improve the service life of the crane, sudden forward and reverse rotation of the lifting mechanism should be avoided when lifting the maximum load, as this can cause unnecessary pressure and wear on the crane structure and lifting mechanism.

Requirement: The pause time between the forward and reverse rotation of the lifting mechanism is 4-6 seconds.

Attention: For multi section telescopic arms, the handle used to operate the telescopic arm remains the same.

Caution: 1. After completing the work, turn off the engine.

2. After the operation is completed, check whether each control handle automatically resets. If the handle is not in the center position, manually restore it to the center position.

Maintenance of cranes

The crane must undergo regular maintenance to check whether all parts, especially the safety devices, are functioning properly.

1. Check the power line connection

_ Check the entire power pipeline to ensure that there is no oil leakage or distortion.

_ Inspect the steel structure of the crane. (*)

_ Check/replace adjustment screws and sliders.

_ Replace hydraulic oil.

When a crane is not in use for a long period of time (usually more than six months), the following maintenance and storage measures should be taken_ Wipe off dust and oil stains from the body and keep it clean.

_ Retract the piston rods of all cylinders back to the shortest position.

_ Apply lubricating grease to all moving parts.

_ Remove the dust and sand from the steel wire rope and reapply with ZG-S calcium based graphite lubricating grease.

_ Generally, it should be placed in a well ventilated and dry warehouse. If placed outdoors, a rainproof cloth and quick cover should be used.

_ Start once a month and idle all institutions to observe if they are functioning properly.

Maintenance of cranes

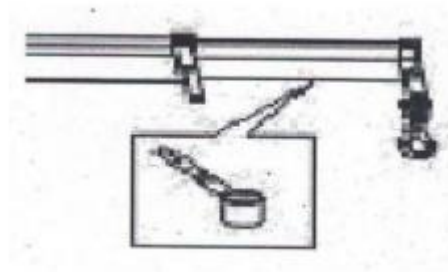
Lubrication of joint points

The joints shown in the figure must be lubricated regularly, and lubricating oil should be injected at a certain pressure until it overflows from between the two connecting parts. After adding oil, each joint should perform several complete movements, and then add more oil.

Lubrication of telescopic arms

Park the crane at the position shown in the diagram to lubricate the outer side of the boom. Before applying new oil, use a rubber knife to

scrape off the old butter and use a brush to apply a layer of butter on the entire outer surface of the boom.



Warning: The butter characteristics used above must be compatible with the butter characteristics specified in this chapter.

Inspection of slider wear.

The wear of the slider between the extension arms must be checked at regular intervals.

Excessive wear of the slider can cause friction between metal parts, causing the extension arms to open out of sequence or becoming too loose, resulting in each extension arm not being able to maintain the same straight line.

Inspection of screw tightness

Vibration may cause loosening of fasteners that secure crane components. The tightness of the following fasteners must be checked regularly.

A-Screw for the pin shaft clamp plate

B-Telescopic arm shaft nut

C-The screws and nuts of the control lever

D-Reversing valve support screw

E-The bolts and nuts of the slewing support

Characteristics of butter and gear oil

Butter is a No.3 calcium based fat

The grade of gear oil is HM-46 in summer and HM-32 in winter

Warning: When adding or replacing hydraulic oil in the power system, it is generally necessary to ensure that the new oil is compatible with the oil in the hydraulic pipeline. Do not use oil containing molybdenum and sulfides as they can damage the support mechanism.

Disassembly

You must contact the manufacturer to disassemble the crane.

Warning: Do not disassemble the valve lock.

Chapter 6: Common Fault Analysis

Fault	Reason	Troubleshooting
Vibration of the telescopic oil cylinder and crawling of the intermediate telescopic arm	1) There is air in the hydraulic system 2) Aging of sealing components inside the telescopic oil cylinder 3) There is dirt inside the balance valve	1) Repeatedly operate all actuating components in the unloaded state to the two limit points to remove air from the system 2) Replace the cylinder seal 3) Clean the balance valve

When unloaded, the working speed is too slow	1) The suction pipe is flattened by squeezing. 2) Air is sucked in from the oil suction pipe	1) Replace the oil suction pipe. 2) Tighten the suction pipe joint
The crane cannot complete the rated lifting capacity	1) Insufficient power of hydraulic pump. 2) The overflow valve is set incorrectly. 3) The hydraulic pump seal is damaged.	1) Replace the hydraulic pump. 2) Readjust the pressure of the relief valve (to be resolved by the manufacturer). 3) Replace the hydraulic pump seal.
The lifting arm automatically falls after lifting	1) Damaged piston seal of the support oil cylinder 2) The balance valve throttle port is clogged with dirt or the reset spring is fatigued and damaged	1) Replace the cylinder seal 2) Clean the balance valve and remove any dirt before replacing the spring.
The crane cannot rotate correctly	1) The rail car exceeds the maximum allowable inclination.	1) Leveling the rail car back to within the allowable tilt error.
Knot or rotation sound	Lack of lubrication	Inject lubricating oil according to the prescribed cycle
Oil cylinder leakage, external leakage, internal leakage	1) The end cover seal is aging and damaged. 2) The piston sealing ring is worn.	Replacing seals
High noise, large pressure fluctuations, and hydraulic valve noise	1) The oil suction pipe or oil suction filter is blocked. 2) The viscosity of the oil is too high. 3) The sealing of the oil suction port is poor, and air is being sucked in. 4) The parts inside the pump are worn out 5) The system pressure is too high	1) Remove blockages and dirt 2) Replace hydraulic oil according to regulations or preheat with a heater 3) Replace the seal, tighten the screws, 4) Replace or repair internal parts. 5) Readjust the system pressure.

Chapter 7: Maintenance

Precautions before maintenance

- The maintenance marked with * must be carried out by the manufacturer.
- Maintenance work must be carried out with the engine turned off and the operating switch disconnected.
- Before inspecting pipelines with pressure, release the pressure by reversing the control lever (the engine must be stopped).
- Keep all handles, footboards, and work surfaces free of oil stains, and add anti slip agents to prevent them from slipping.
- When cleaning the crane, electrical components and connections should be protected. Because the jet can cause damage to electrical equipment.
- After maintenance and repair, before starting the crane, check if there are any tools, rags, or other things lost on moving parts.

Maintenance schedule arrangement

The following content represents the main items that need to be inspected by the crane within the specified period.

Maintenance every 50 hours

- _ Check if the system connectors are leaking oil.
- _ Check if the oil cylinder is leaking oil.
- _ Check if the bolts and other fasteners that secure the crane are loose.

Maintenance every 450 hours or 6 months

- _ Add grease to the slewing bearing.
- _ Add butter to the joints.
- _ Add butter to the telescopic arm.
- _ Add grease to the exposed part of the oil cylinder piston rod.
- _ Check the wear of the slider and replace it if it is damaged.
- _ Check the wear of the steel wire rope and replace it in a timely manner.
- _ Check if the bolts fixing the slewing support on the crane turntable and base are loose.

Maintenance every 900 hours or one year

- _ Check the hydraulic cylinder. (*)_ Check if the base screws are loose.
- _ Check if the assembly and safety devices of the wave pressure system are effective. (*)
- _ Check if the bolts that secure the crane are loose.