

Instructions for type H-150 slide valve vacuum pump

I. overview of H-150 slide valve vacuum pump:

The sliding threshold mechanical vacuum pump is one of the vacuum equipment for removing general gas or gas with a small amount of condensable steam. It is used in vacuum smelting, vacuum drying, vacuum dip, and other vacuum operations. It can be used alone or as a front pump of other high vacuum pumps, but it is not used for pumping from one vessel to another. When removing air containing excessive oxygen, explosive, corrosive to ferrous metal, chemical reaction to vacuum pump oil, water, dust, etc., a device shall be added

II. Purpose of h-150 slide valve vacuum pump:

Widely used in the aerospace, aviation, atomic, petroleum, chemical, pharmaceutical, electrical, ceramics, smelting, new materials, vacuum heat treatment, vacuum coating and other industries.

III. Structure description of h-150 slide valve vacuum pump:

3.1 structure: H - 150B type rotary piston vacuum pump guide hole and pump cavity center connect with level into 30 °, is horizontal structure, the motor have side and overhead two kinds, overhead space can be smaller. In order to identify faults during debugging and overhaul, the oil tank has a side cover, and the exhaust port is located on the side cover. he pump improves the anti-injection ability when it runs under higher intake pressure, which can reduce oil consumption and environmental pollution.

3.2 Pumping principle: This pump has pump body 1, guide rail 2, slide valve 3, eccentric wheel 4, shaft, two pump cover 5, and exhaust valve 6, constitute the pump suction cavity and exhaust cavity. When the shaft rotates counterclockwise, the eccentric wheel drives the slide valve to make up and down compound operation. When the suction cavity expands gradually, the gas is sucked into the pump cavity through the slide valve post through the pump intake. At this point, the exhaust cavity gradually shrinks, compressed gas and oil will eventually push the exhaust valve and exhaust into the tank, and then into the next cycle, to achieve the exhaust effect. The pump is equipped with a gas ballast 7. When the gas ballast is opened, the gas can be mixed into the exhaust cavity of the pump to reduce the partial pressure of the steam during the period. A certain amount of water vapor can be pumped out and the pump oil can be purified, the service time of the pump oil can be prolonged, the lubrication conditions can be improved, and the reliability of the pump can be increased.

3.3 Oil circuit: oil from the tank through the oil filter into the oil pump, and then

from the oil pump into the oil tank, distribute to the two ends of the pump chamber, sliding valve and guide rail, eccentric wheel friction parts, from the exhaust valve flow back to the tank.

IV. Purpose and scope of use of H-150 slide valve vacuum pump

4.1 The pump is also a volumetric vacuum pump. It is the basic equipment for extracting gases from sealed containers to obtain a medium vacuum. It can be used alone. It can also be used as the front-stage pump of Roots pump and diffusion pump. It can be used in vacuum smelting, vacuum drying, vacuum impregnation, chemical pharmaceuticals, high-altitude simulation test and other vacuum operations. Due to a certain gap between the slide valve ring and the pump chamber, the outer zone of the pump chamber and the valve is not easy to wear.

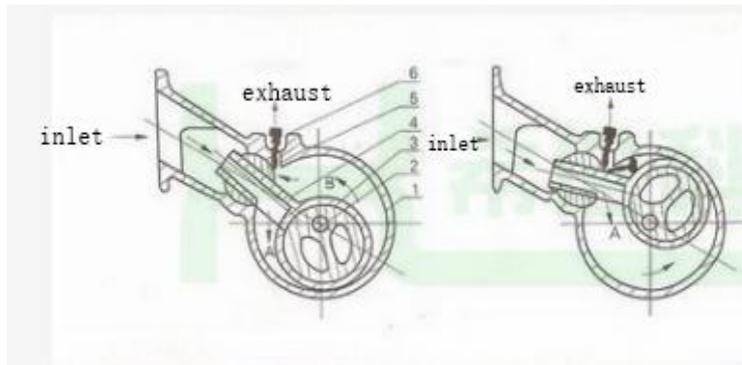
4.2 The pump can operate continuously for a long time in the ambient temperature range of 5-40 °C and the highest oil temperature measured at the filling hole is less than 80 °C.

4.3 The pump shall not be used to remove air containing excessive oxygen, toxic, explosive, corrosive to metal, chemical reactions to pump oil, and gas containing particulate dust, nor is it suitable for the transport of gas from one container to another as a transport pump. When necessary, it is necessary to install accessories such as filters with good effect and easy cleaning.

4.4 The maximum he maximum intake pressure and time for pump continuous operation is recommended as 133pa hours <1 hours, 1013 PA <5 minutes. In order to avoid bad lubrication, oil injection, pump temperature is too high, thermal expansion changes the movement clearance, and exhaust valve disc and rubber parts of the aging deformation.

V. Main specifications of h-150 slide valve vacuum pump:

Operating principle of h-150 slide valve vacuum pump:



The serial number	name
1	pump body
2	shaft
3	eccentric wheel
4	slide valve
5	slide valve guide rail
6	exhaust valve

The pump body (1) is equipped with a slide valve (4) and an eccentric wheel (3) is installed in the sliding pass. The eccentric wheel is driven by the shaft (2) outside the pump cylinder. The center of the shaft coincides with the center of the tied cylinder. The outer circle of the sliding valve slides on the inner surface of the pump cylinder. The upper part of the sliding valve slides freely up and down and swings left and right in the semicircular sliding valve guide rail (5). Therefore, the pump cylinder is divided into two chambers A and B by the slide valve, as shown in the figure above, if the shaft rotates counterclockwise, then A chamber gradually enlarges, B chamber gradually reduces, and finally A chamber becomes the largest, B chamber becomes the smallest.

On the other hand, the upper part of the slide valve is hollow, and a rectangular hole is opened on the side of chamber A. During the expansion of chamber A, gas flows into chamber A through the hollow part of the slide valve.

When the slide valve turns to the upper dead point of the chamber, the original chamber B disappears, and chamber A replaces chamber B, forming A new chamber A in the original position of chamber A. In the last stage when chamber B is compressed, the compressed gas opens the exhaust valve 6 and goes out of the pump, so continuous circulation forms the work of the pump.

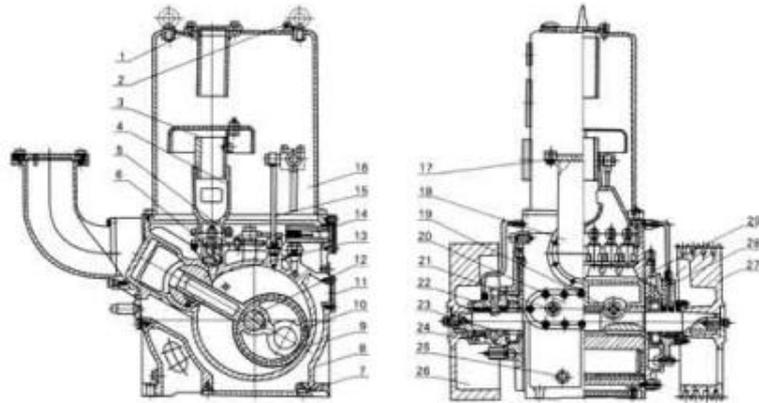
The pump is equipped with six sets of disc-type exhaust valves (6) (see structural diagram), the exhaust valve is mainly composed of springs and valves, and other parts. When the gas and oil in the pump chamber are discharged from the exhaust valve, the oil and gas are separated by the oil cap(in the oil tank (16)), the gas is discharged to the air, the oil is filtered by the oil filter (15), and then pumped into the oil pump (22) under high pressure. Transfer to the small oil tank (15), and then supply the bearing, sliding valve, pump chamber and other moving parts, with the operation of the pump, compressed gas and oil are exhausted by the exhaust valve, so the lubrication of this type of pump is automatic, pump oil in addition to the role of lubrication seal, there is an important role, is when the pump pumped less gas, exhaust valve Can also work, a small amount of compressed gas and oil with the top of the exhaust valve, to achieve the purpose of exhaust.

Pump body, A, B pump cover, eccentric wheel, slide valve guide rail made of high-strength cast iron, after rough processing after aging treatment to eliminate its internal stress, and after precision processing, they form a pump studio together, the shaft is made of carbon steel, the middle is equipped with eccentric wheel, one end of the shaft is equipped with oil pump impeller, the other end is safe. Equipped with the pump triangle belt pulley, connected with the motor through the triangle leather.

The joint surface of the rotating part and the air intake part of the pump is sealed by rubber sealing ring, and between the pump body and the pump cover is sealed by paper pad and 107 resin or soft plane sealant.

Pumping rate	L/S	150	Remarks
Ultimate pressure	pa	1.3	Bench type mercury vacuum gauge
Motor power	kw	15	Motor type Y160L-4
Pump speed	r/min	500	Motor speed 1460 r/min
Intake caliber	mm	Φ100	Standard: SH0528-92
Exhaust caliber	mm	Φ80	Reference index: measured by thermocouple vacuum gauge
Pump oil brand		Mineral oil type 100	
oil quantity	kg	30	
When the cooling water is		700	
L/h P<10Pa			
When the cooling water is		2000	
L/h P=133Pa			
Shape(appende drawings)		1495×850×1095	
L×W×H		Motor side placement	
		1000×850×1650	
		Motor top placement	
		Steel tank, steel base	
Weight	kg	970kg	
Allowable quantity of steam		=8kg	
Ultimate total pressure	pa	<6.6	

Structure diagram of H-150 slide valve vacuum pump



Installation instructions for H-150 slide valve vacuum pump

Serial number	Name	Serial number	Name	Serial number	Name
1	Exhaust lid	11	Long stuffy cover	21	Outlet pipe
2	Refueling screw plug	12	Shaft	22	Oil pump components
3	Oil baffle cap components	13	Guide rail components	23	Rolling bearing 42312
4	Exhaust hood	14	Oil filter components	24	B pump cover
5	Exhaust seat	15	Oil-way components	25	1/2 water release screw plug
6	Exhaust valve components	16	Oil tank components	26	Balance wheel
7	Bottom cap	17	Intake lid	27	Pump pulley
8	Pump parts	18	Intake elbow	28	Seal components
9	Slide valve	19	Inlet pipe	29	A pump cover
10	Eccentric wheel	20	Water inlet and outlet cover		

VI. Installation instructions for H-150 slide vacuum pump

- 6.1 pumps should be installed in dry, well ventilated and clean places. The ring temperature should be between 5 and 40 degrees.
- 6.2 pumps should be installed on the basis of concrete, should be left around 5-10 cm groove, so as not to discharge water, oil, water pollution site. There should be room for maintenance, repair and disassembly.
- 6.3 when installing the pump, the level should be calibrated and then screwed down with the foot screws. The connection pipes between the pump and the system are metal bellows, rubber pipes or plastic hoses lined with springs, which are excessive to improve the sealing of the joints and reduce vibration.
- 6.4 Connect the power supply according to the motor's label, connect grounding wire and proper capacity fuse, and install the corresponding thermal relay to protect the motor. The rotation direction of the motor should be consistent with the arrow direction shown by the pump. At this point, the suction port of the pump should be inhale and correct. Pump can not be continuously inverted, so as not to damage the pump and pump oil pollution.
- 6.5 according to the specified marking and water volume to install the inlet pipe, the inlet pipe should be equipped with valves to adjust the cooling water volume.
- 6.6 Mineral oil vapor is harmful to health. Oil mist will be discharged in the process of exhaust gas. It is more suitable to install defoggers in the open air town or at higher inlet pressure. The exhaust port should be lowered to prevent rain from entering. The pipe diameter should be regulated according to the standard. Smaller will increase resistance.
- 6.7 inlet pipe diameter should not be less than $\phi 100$, shorter and less elbow, in order to reduce pumping loss.
- 6.8 in order to keep the pump off when it is shut off from the pumping system, the vacuum valve should be installed on the intake pipe of the pump. In order to slow

down the oil return during pump shutdown, a manual exhaust valve is arranged between the pump port and the globe valve. If the globe valve is allowed to be fully opened by the pumping system, the solenoid valve with straight cut-off belt can be selected. When the valve is mounted, it can be mounted on the flange of the pump port and should be mounted horizontally.

If there is no starting cluster, the pump port can be sealed to start, otherwise it can start too gas. When the vent valve is installed, the pump can be stopped in straight air condition, and then the gas pump is enlarged.

VII.Instruction for use of H-150 slide valve vacuum pump

7.1 Cooling water for joints of water-cooled pumps, the inlet temperature of cooling water should be less than 30 °C, and the temperature difference between inlet and outlet should not exceed 10°C.

7.2 Observe the oil level before starting the motor.The oil level of H-150B pump should be 10-15mm above the bottom of the oil marking hole of the oil tank.

7.3 If the temperature of the ring is below 5 degrees C and can not start, the pump oil can be released and heated to 15-30°C and then added to the pump to start again.

7.4 If the pumped gas contains a small amount of condensable gases such as steam, when opening the pump should open the gas ballast and operate for 30-60 minutes; if the whole process contains water vapor or pump oil has been mixed with a certain amount of water, can also open the gas ballast operation, to extend the use of the pump some time.

7.5 The maximum allowable oil temperature is 80 degree C. The measuring point is from the filling hole to the bottom of the tank near the exhaust valve. Otherwise, the cooling water should be increased to improve the ventilation and heat dissipation and reduce the intake temperature.

7.6 Inhalation gas should be treated properly before entering the pump when it is harmful to pump or pump oil.

7.7 The gas valve should be closed after stopping the pump , close the cooling

water. In cold weather, water should be discharged from the water outlet holes so as not to freeze cracks.

7.8 Inspection of this product should be carried out according to GB6306.1-86 and other test methods. The extreme pressure of the pump is the lowest stable limit pressure measured by the compression mercury vacuum meter at the pump mouth or with a standard test cover when the pump is not connected to the system and the temperature is stable. For the measurement of limit total pressure, there are many influencing factors, so there is no regulation in the current industry standard, only for reference.

7.9 The new pump should be tested without connecting the system, and then installed with the system until it is satisfied, so as to avoid confusion between the influence of air leakage and bleeding and the quality of the pump.

7.10 Before starting, the belt should be fitted and adjusted to the appropriate tightness.

7.11 Before starting, if the oil level is below the stipulation, the pulley of the pump must be discharged so that the oil enters the tank from the pump chamber. The pump is not allowed to start in the vacuum state and there is a large amount of oil in the pump cavity to avoid damaging the rotating parts of the pump.

7.12 Pumps run for about 5 minutes and after normal conditions, they slowly open the intake valve to make the load increase steadily.

7.13 Stop pump according to the following steps:

- (1) close the intake valve on the intake line.
- (2) open the charging valve and destroy the vacuum in the pump.
- (3) open the charging valve for about half a minute and stop the pump. Shut down after being charged to atmosphere.

The inflatable valve. In order to protect the pump from damage, please proceed according to the steps strictly.

VIII. Principle and operation method of slide valve type vacuum pump valve

This type of vacuum pump is equipped with pneumatic mechanism, which is capable

of accelerating steam removal without polluting oil quality. If the vacuum pump only pumps out permanent gas, the gas does not liquefy due to the increase of pressure, then there is no deterioration of pump oil, but if the pump is used to vacuum dry or extract humid air, then not only permanent gas but also water vapor in the gas, if the pump does not take the air out of this part of the steam, steam The steam will liquefy and dissolve in the oil, and the vacuum property of the oil will deteriorate, thus reducing the pumping speed and vacuum degree of the pump. The compression process of water vapor is further elaborated as follows:

The vapor pumped out by the pump should be compressed in the compression chamber until the exhaust valve is opened. If the temperature in the pump is assumed to be 60 degrees Celsius, the saturated vapor pressure of the water at this temperature is 20 000 Pa (149.4 Tors). Once the above pressure is reached, the vapor begins to condense into water, but at 20 000 Pa (149.4 Tors). The exhaust valve can not be pushed open because the exhaust valve is compressed by a spring leading to the atmosphere with an exhaust valve (the exhaust valve spring is calculated at 1.2 kgf/cm²), that is, the internal pressure of the pump chamber must be compressed to 1200 Pa or more (900 Tors) before the exhaust valve can be pushed open. After compression, the water vapor has completely condensed into water at the end of compression, and mix in oil.

In order to satisfy the requirement of extracting moist air without polluting oil by steam, the pump is equipped with an air-stabilizing device. The principle is to put a certain amount of air into the compressed process to increase the pressure of the mixed gas. The pressure of the mixed gas is the sum of the partial pressure of the air and the partial pressure of the steam, and the partial pressure of the steam. Before the saturated vapor pressure at the pump temperature is reached, the mixed gas pressure exceeds the pressure of the exhaust valve and opens the exhaust valve so that the vapor can not liquefy in the pump chamber and is excluded from the pump.

Gas ballasts are used to recover the extreme pressure of vacuum pumps. Sometimes, although we use them to extract ordinary air with less condensable gas, the general gas ballasts are closed, but over time, the oil is gradually polluted by a small amount of condensable gas in the air. For pumps without air ballasting mechanism, only The original limit pressure of the pump can be restored by replacing the new oil or heating the pump oil so that the liquefied vapor evaporates. For the gas ballast pump, the limit pressure of the vacuum pump can be restored only after opening for one to two hours.

The operation of gas valve is very convenient. When air ballast is needed, the hand wheel of air ballast can be opened. The opening of the hand wheel can be adjusted. Thanks for opening the hand wheel, the air volume will be larger, and vice versa. So the opening of the handwheel depends on the degree of vacuum required by the user. Generally speaking, when the handwheel is fully opened, its vacuum degree is 13Pa (10-1 Tor). If the user does not need aeration, the gas valve can be closed.

IX. Maintenance and repair

- 9.1 Pumps and their environment should be kept clean.
- 9.2 Should always pay attention to the oil level, see 5.2, low should be refueling, high should be released. When the oil is emulsified, gas can be cleaned or changed.
- 9.3 The new pump is recommended to be changed once after 150 hours of work, to pump dry and clean air, and to be changed once every 500-1000 hours. The oil change cycle can be shortened if necessary.
- 9.4 Pay attention to the detection of oil temperature and cooling water outlet temperature, so as to take timely measures to prevent occlusal failure.
- 9.5 When the ambient temperature is low, stop the pump and release the water jacket in time to prevent freezing and cracking.
- 9.6 Pump oil. See 3., if the vacuum performance requirements are low, and frequent oil change, allow the use of mechanical oil HJ - 50.
- 9.7 Clean the copper mesh of the oil meter frequently, keep it clear and clean, otherwise, the insufficient oil will reduce the performance of the pump.
- 9.8 Pumps do not need to stop, every 7-10 days to pump about 1 hours, so as to avoid corrosion in the pump.
- 9.9 demolition steps:
 - (1) drain and drain oil.
 - (2) remove the protective cover.
 - (3) remove the triangle belt pulley and balance wheel.
 - (4), diesel pipe and oil pump.
 - (5) bearing cap and sealing device.
 - (6), remove armor and B pump cover.
 - (7) pull out slide valve and guide assembly.
 - (8) pull out eccentric wheel, flat key and shaft.
 - (9) if you want to overhaul the exhaust valve, remove the oil tank, the oil shield assembly, the exhaust sleeve and the connecting block. When the connector is detaching, the loose nut, the fixing screw and the exhaust valve assembly can be taken out first.
- 9.10 assembly procedure is opposite to the above.
- 9.11 Removal and assembly matters needing attention: to prevent hammering bang,

can not hammer processing surface directly, before installation must do a good job of cleaning, to prevent the entry of impurities, friction surface to be coated with clean lubricant, pump cover sealing surface must be clean without oil, to prevent oil leakage, gas leakage.

9. 12 If the silicone rubber seal is adopted, the silicone rubber, catalyst and catalyst should be blended according to the prescribed proportion. The sealing surface should be clean and oil-free.

X. Failure phenomena and Troubleshooting:

10. 1 vacuum degree is not high:

- (1) the pump has leakage.
- (2) oil tank small hole has suction, oil mist appears: clean oil receiver, check oil pipe and oil pump.
- (3) pump oil contamination: gas operated valve operates for 1-2 hours or longer, or new oil is replaced.
- (4) oil quantity is insufficient, oil level is too low: refueling.
- (5) Excessive oil temperature: increase the amount of water, reduce the ambient temperature and inhalation gas temperature, eliminate occlusion, poor lubrication.
- (6) exhaust valve piece damage: replace valve piece.
- (7) damage to the spring of the exhaust valve: replace it with new one.
- (8) pump parts wear, abnormal sound, abnormal power: dismantling and repairing all rotating parts.

10. 2 oil spill: check the shaft seal and seal parts, adjust or replace them.

10.3 Noise: abnormal noise: check whether foreign objects fall into the pump chamber, bearing and pump transmission parts are damaged. Remove, trim and replace.

10. 4 Injection: a large number of oil ejection: check whether the oil level is too high, such as too high, release; oil shield assembly, anti-injection parts, etc. are intact.

10.5 Vibration: vibration is very large: check whether the base is solid, tight, and the foundation is enough. Are there any signs of occlusion or jamming?

10.6 Pump temperature abnormal bearing heating: slightly loose belt, check the oil road is smooth, cooling water is enough. The fuel tank is heated and the exhaust valve is overheated: reducing the inlet pressure and increasing the cooling water volume.

10. 7 Bite stuck: check whether foreign bodies fall into, parts intact, lubrication

is enough, oil volume, oil pipeline, oil pump.

10. 8 Motor current is too big or fuse burned out: check the cause of excessive current, check the fuse capacity, adjust, replace.