CBP SERIES

ROTARY LOBED
VACUUM BOOSTERS

Models CBP100, CBP200, CBP400, CBP700, CBP1400

INSTALLATION
OPERATION
MAINTENANCE
MANUAL

WARNING

DO NOT OPERATE BEFORE READING MANUAL

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Important Notification

1. This manual describes structure, function, operation and maintenance of CBP series roots vacuum pump. Read this manual in details before turn on the vacuum pump; Start operation or maintenance after understanding the structure and functions.
2. During the process of editing, we have looked through the consistency of hardware and software described as well as the content of this manual. But it may still exist contradictions and fallacious points, It is impossible to ensure they are entirely consistent, we will check the contents of the manual covers regularly and modify such amendments in the revised version in future. We are very welcomed to receive recommendations for improvement.
3. Please note: the manual content may be different from actual situation, due to improvement of structure during different periods.
4. Without written permission, it is strictly forbidden to pirate, disseminate this manual or the application of this manual and related content. The violator will be liable to legal responsibility caused by damage, we reserve all the rights.
5. If the users are not very clear about the manual during the operation, please contact to the local agent or corporate customers service.

Introduction

This manual introduces working principle and main structure of CBP series roots vacuum pump and tries to provide function, operation, reparation and maintenance knowledge for important parts of vacuum pump.

Safety Precautions

Before installing and testing, please be sure to read cautions and safety regulars as follows, and the sign of cautions stuck on the machine and equipments, because they provide you the guarantee of body security, and help to extend the working life of machine and important parts.

Security caution signs “Danger”、“Warning” 、“Caution” explanation:


″Danger″

The "danger" in the manual and machine means if we do not comply with the relevant requirements, without taking corresponding measures, it may result in death, serious body injury or substantial damage to property.


″Warning″

Before the installation and commissioning of the machine, Please be sure to read the following safety rules and warnings, and all caution signs stick to equipment. Make sure that warning signs are placed in the prominently place and replace the loss or damage signs.


″Caution″

The "Caution" sign in the manual and machine means that if we do not comply with the relevant requirements, without taking corresponding measures, it may lead to slight body injury or losses of equipment.

The following “Danger”, “Warning”, “Caution” are provide for your body security and protect the machine and parts from damage. Please be sure to read “Danger”, “Warning”, and “Caution” before using machine.

1. Regular：


″Danger″

This type of vacuum pump is not suitable for：

1）flammable and explosive gas or steam

2）Radioactive and toxic substances


"Caution"

Before using the machines, must be familiar with the manual concerning all the safety instructions and the installation, operation and maintenance requirements. It is the reliable guarantee for the machine running safely and operation successfully.

This equipment can only be in accordance with the prescriptive purposes to use. Our company does not guarantee the normal operation of machine if unauthorized modification occurs to the machine.

If the customer change the vacuum pump parts and accessories, our company does not guarantee that vacuum pump can be normal operation, also not responsible for the running's consequences followed after you change the pump.

2. Worker Safety


″Caution″

Before the installation and operation, all relevant installation and operation staff should be familiar with and comply with the relevant regulations of labor insurance, as well as the regulation of laws and standard in local countries and regions.

2. Fireproof, Waterproof


Warning

If lubricant or other flammable material spills over, it should be removed immediately.

Mars, flame or other combustible material are strictly forbidden. When inspecting or adding lubricants, prohibits smoking around. The maintenance is supposed to be carrying out when the machine is in the state of stop.

When the machine is ready for maintenance or cleaning, all the power should cut off.

Ensure that the electrical lines (including wiring terminals and contacts) are normal. If the wires are getting damaged, scratched, low insulation, old thrum, faded, rusted, it should be changed over. Be sure to keep the clean of connector and thrum. Keep the grounding or conductive objects (such as tools, etc.) away from the exposed electrical parts (the wiring terminals) to avoid sparking when discharge.

If it needs to weld when repairing, please move the flammable, explosive items nearby to safety place to avoid accidents. Please remove the tarpaulin, paper and other flammable material from the machine.


Caution

No matter what state the machine is, it is not allowed to splash water into the distribution boxes, operation panel, motor, safety switches or other electrical equipments to avoid the accidents like short circuit and so on.

It is prohibited to open the back door of the machine, so as not to splash water into the equipment which may cause unnecessary accidents when cleaning the machine.

If water is splashed into the equipment, electrical equipment should be immediately shut down. When

cleaning, electrical equipment is allowed to operate only after insulation testing is qualified.

4. Maintenance and Test

Warning

Machinery maintenance can only be executed by certified qualified operator, who is supposed to be very familiar with the operation steps mentioned in the manual.

Any defective parts and devices must be replaced with the appropriate spare parts.

Be sure to cut off the power before maintenance.

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Chapter I CBP Series Roots Vacuum Pump Outline

The roots vacuum pump (also known as the booster pump) which is a volume type vacuum is one of the main equipment of vacuum in the current society.

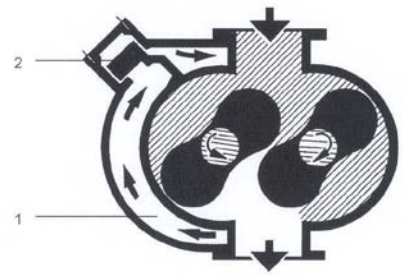
Because the roots vacuum pump in low inlet pressure still has high extraction rate, it particularly suitable for low inlet pressure need to large pumping speed of vacuum in the system as the main pump or pump before use, such as vacuum metallurgy, vacuum coating, vacuum heat treatment, vacuum impregnation, vacuum dust, vacuum freezing, etc.; Also in food, chemical, pharmaceutical, textile and other industries of vacuum distillation, concentration, evaporation, drying, etc.

Working Principle

Schematic Diagram

CBP series roots vacuum pump （Hereinafter referred to as a vacuum pump）is to use two figure 8 rotor vertical installed on a pair of parallel axis, the ratio of 1:1 of the pair of gears to make reverse synchronous rotation, the rotor and the pump cavity between the inner wall to keep a certain gap, so as to complete the suction and exhaust process, achieve the purpose of pumping gas inside the system.

When the rotor of the pump cavity is in position Ⅰ and Ⅱ, volume in the air inlet side is increase.



When the rotor of the pump cavity reaches the position Ⅲ, part of the volume from the air inlet side is sealed. When in position Ⅳ, the volume opens to the exhaust port side inflow. When the rotor goes on rotating, the gas will discharge through the vent port. Each rotor rotation once completed the above process twice.

The differential pressure of the roots pump between inlet and outlet is limited. CBP series roots pump set a bypass valve (2) between intake and exhaust ports, when the differential pressure of the exhaust port reaches a certain value, the bypass valve will automatically open, part of the gas vent place through by-pass valve and reverse circulation reflux (1) to the inlet port, this greatly reduces the pressure difference of roots pump and backing pump operation load. At the same time, because the opening

bypass valve has the discharge effect, it can ensure the CBP series vacuum pump and backing pump start at the same time and won't make the roots pump and backing pump overload.

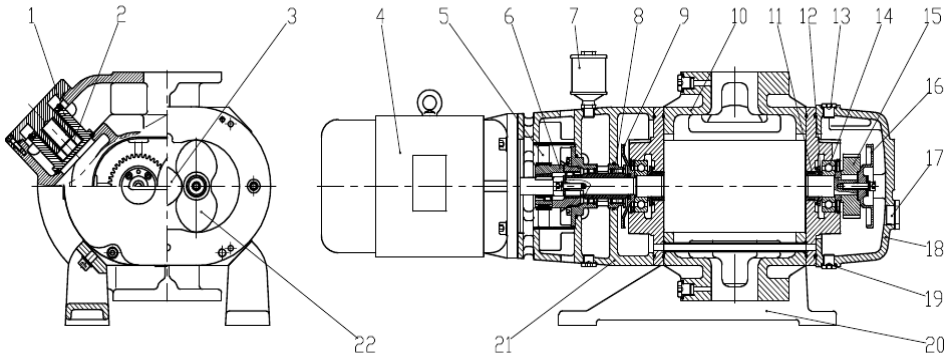
Because of the roots pump can't work alone, it must be level with the vacuum pump (such as rotary vane pumps, slide valve pumps, water ring pump, etc.) of roots pump units to use, if you want get higher vacuum degree, you can use two roots pump series of tertiary roots pump unit.

CBP series roots vacuum pump, with a bypass valve and natural air cooling, is a department of our company by digestion refer to foreign advanced technology and the development and production of roots vacuum pump, the key components are imported components. JRP series roots vacuum pump can completely replace the similar foreign products.

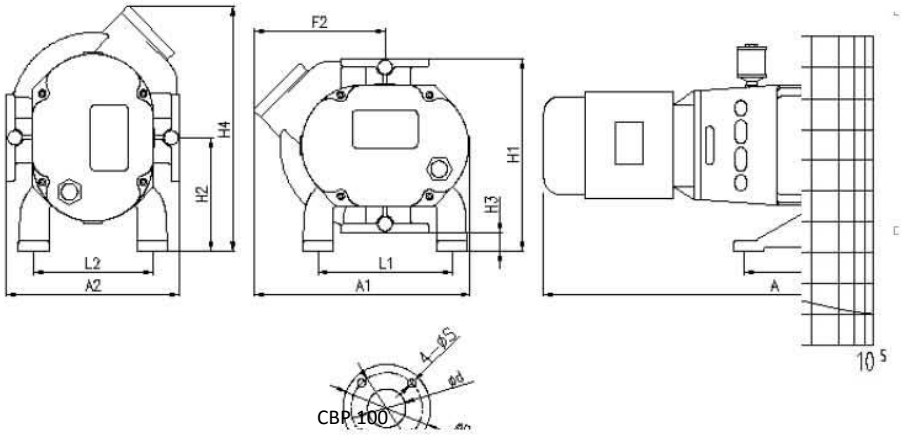
CBP series roots vacuum pump has the following features:

1. The rotor and pump chamber, rotor and rotor have no friction, without lubricating oil, so the pump cavity without oil, this can avoid the pollution of oil in the vacuum system.
2. Compact structure, small volume, can be installed in a horizontal or vertical.
3. Has a good dynamic balance, smooth running, small vibration, low noise.
4. Can be ejector non-condensable gas.
5. Start fast, can achieve limit pressure in a short period of time.
6. Power is small, operation maintenance cost is low.
7. Roots pump with a bypass valve, automatic overload protection effect, therefore, safe and reliable operation.

Structure Introduction



1. Bypass valve 2. Spring 3. Driven rotor 4. Motor 5. Cooling fan 6. Coupling 7. Oil cup 8.Seal 9. Dump oil pan 10. Pump body 11. The sealing piston 12. Oil baffle plate 13. Note oil plug 14.Bearing 15. Synchronous gear 16. Dump oil pan 17. The oil window 18. Gearbox 19. The drain plug 20. Base 21.Connector 22. The active rotor



Model	A	A1	A2	H1	H4	L	L1	L1	F	F2	H3	H2	l	d	S	D	N
CBP 100	570	300	290	285	348	325	240	194	165	180	5	168	40	70	M12	160	130
CBP 200	740	300	290	280	330	350	240	185	180	180	5	160	40	70	M12	160	130
CBP 400	845	395	316	350	446	370	246	218	236	238	35	207	106	70	M12	160	130
CBP 700	1080	495	370	419	553	510	275	240	301	302	49	252	129	100	M16	210	170
CBP 1400	1236	642	460	530	760	740	388	292	370	410	70	351	154	150	M16	265	225

Note: if no special requirements, the vacuum pump installation is according to the horizontal (airflow is top down out) way.

Pumping Speed Characteristic Curve

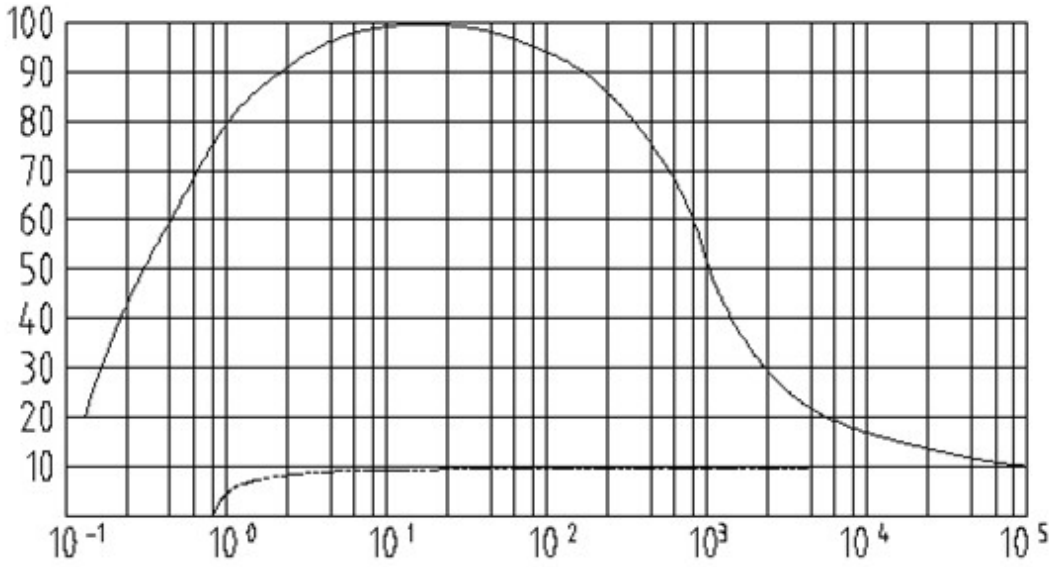
Main Parameters

Model / Item	CBP-100	CBP-200	CBP-400	CBP-700	CBP-1400
Pumping rate CFM	103	171	341	676	1353
Stalled pressure Pa	0.05				
Stalled full pressure Pa	0.5				
The max. permissible differential pressure Torr	60				37
Port size of inlet and outlet mm	65	65	65	100	150
Zero flow compression rate $K_{0.max}$	≥35	≥35	≥40	≥40	≥50
db L_w dB(A)	63	63	63	68	75
Motor power Hp	2	2	3	5	10
Motor synchronous speed r/min , 60hz	3450				
Cooling type	Natural air cooling				
Weight kg	90	100	155	233	465
Recommended backing pump					

Note: As shown in the table above the limit of the pressure, the extraction rate is in the factory under the condition of debugging and gained by the use of different level of vacuum pump.

Size

Pumping rate S %



Entrance Pressure (Pa)

Dotted line represents the backing pump pumping speed of 10%

Chapter II Transportation and Installation

Warning

Correct transportation and installation is important for vacuum pump normal and safe operation and human safety.

Caution

Only those qualified in machine installation, commissioning, and operation is allowed to operate on the machine.

Cautions When Open the Case

Check the packing case is damaged or not before installation, then check the vacuum pump damaged or not, if damaged please contact with our company immediate.

Vacuum Pump Transportation

Vacuum pump fixed on to tray with bolts, screw off the bolts, and tie the lifting device to ring of vacuum pump safely, tie the lifting device to the hook with qualified lock, and then lift with suitable lifting equipment.

In the handling process, no hit, to avoid damage to the pump.

Before handling the vacuum, you should first drain the oil, and then put the drain plug screw back, clean the housing droplets; otherwise oil will flow from the gear box or oil chamber into the pump chamber.

Warning

No walk, stay or work under lifting object.

Vacuum Pump Installation

The users usually find a place freely after buying, and use it as soon as install the pipes without any plan before. Such cursory operation will cause vacuum pump malfunction, difficult maintenance, etc, so proper installation site is the precondition for vacuum pump use.

1) The installation site should be wide, with rich light, dry air, little dust and good aeration.
2) Environmental temperature: 12-40 ℃.
3) Peripheral pressure: air pressure.
4) Vacuum pump must be horizontal (longitudinal axis≤5°) installation, otherwise oil will from gear oil tank or connection end cover of the chamber into the pump chamber.
5) Vacuum pump with bolt tightened in seat or rack should not make the pump body produces any additional stress, the existence of stress can lead to pump damage (using gasket can be adjust)
6) Vacuum pump shall be installed in the explosive, flammable area. Vacuum pump surface should be mot contact with flammable and explosive.
7) Vacuum pump shall be in good ventilation place with at least 0.5 meters distance between walls. Make vacuum pump can get sufficient cooling, if in a closed space use, must be equipped with suction, exhaust equipment, and to facilitate air circulation.
8) Vacuum pump should be set up around the pit lane.
9) During the normal operation of the vacuum pump, the surface temperature could be as high as 80 ℃, be careful burns, protective facilities can be added if necessary.
10) The location should be set aside to observe the oil window, convenient to observe the state of oil.

11) The position of the vacuum pump is easy to operate all the arrangements should be control knob.

Tubing

1. Attentions for piping
   1) Pipeline piping, pipe size should not be less than the inlet size of vacuum pump, if the line is longer, should choose the bigger diameter. At the inlet should be configured with a valve to shut off the air intake.
   2) When the suction gas contains more dust or particulate matter, you can set a filter at the inlet port, so as not to damage the roots pump and the backing pump.
   3) Make the exhaust pipe downward sloping when installing, in case of condensation inside the liquid back into the pump
   4) Don't narrow any pipe size. If you must narrow pipe sizes shall use the tapered tube, otherwise will lead to a larger pressure loss; Use less elbow and all kinds of valves in the pipe as far as possible, in order to reduce the pressure loss of pipeline.
   5) Connected to the vacuum pump pipeline should not generate additional stress, if necessary, intake and exhaust side using corrugated pipe or compensation.
   6) You can't restrict or block exhaust airflow in any way.
2. Foundation

   The vibration caused by the vacuum pump is very small, so there's no need to make special base, but the ground for placement should be flat, horizontal, and hard ground. Or fix it by bolts.

Electric Security Specifications

1. Choose the correct cable diameter according to the power of the vacuum pump.
2. Make sure if the voltage and the frequency correct.
3. It is better for the vacuum pump to adopt one sole power suppliers. Generally, the voltage drop can't less than 5% of the rated voltage; the three-phase current unbalance should not reach to 5%.
4. The ground line for the vacuum system should install reliably, and cannot be connected with the convey pipe and the cooling pipe.
5. Ensure the electrical wiring (including terminal blocks and contactors, etc.) is in good condition. If the wire is damaged or scratched, it will reduce the insulation, if the wire is old, corrosion, etc., you should replace it. Keep the thread and contactor clean.

Caution 

Pump motor power supply is a standard three-phase AC 380V/50HZ; if customer's local supply voltage and frequency is different, please contact our sales to change the motor

specifications.

 **Danger**

Electric connecting should be carried out by professional workers according to national safety standard.

Chapter III Operation

 **Caution**

You will damage the vacuum pump if not comply with the following protective measures:

Air inlet don't suction small parts (screws, nuts, washers, wires).

Before the vacuum pump running, you must ensure that the medium and vacuum pump compatible with each other, avoid dangerous situations. All relevant safety codes must be complied.

Do not use the pump if there is grinding or adhesive powder and condensable vapor occasion, because the adhesion or high viscosity sediment will be retained in the pump.

Before the vacuum pump suction vapor, you should first reach its operating temperature. The vacuum pump should start at least 30 minutes can reach its operating temperature. During this time, vacuum pump should disconnect with process system, such as installed a valve at the suction mouth.

If it is a wet process, we suggest installing a liquid separator in the upstream and downstream, so as to avoid large amounts of fluid into the pump.

In all cases must avoid particles and fluid entering the pump.

Check before Operation, Start and Shutdown

1. Check before operation
   1) Connect the power line and the ground line; test the voltage and three phases.
   2) If the vacuum pump is not connected to the vacuum system, or with a blind flange seal air inlet (user should bring along their own blind flange), shall not start the vacuum pump.
   3) Check whether the oil level in the 1/3 ~ 2/3, the shortage should be added. Do not mix up different grade of lubricating oil.
   4) Ensure that the oil pocket is fully filled lubricant under the cup, which ensure the lub ricant reach to the volume from 1/4 to 1/3 capacity of the cup
   5) If the motor rotation direction is not correct, it will damage the pump in a short time. Point and check the vacuum pump and roots vacuum pump rotation direction, if the direction of rotation is wrong, Swap any two phases will work.

2. Start
    1) Close the inlet valve.
    2) Start forestage pump.
    3) Then start roots pump (or with forestage pump starting at the same time).
    4) Open the inlet valve slowly, and the pump is operating.
3. Shutdown sequence
    1) Close inlet valve.
    2) Shutdown roots pump first
    3) Then shutdown forestage pump, at the same time inflated to vacuum pump inlet port, vacuum unit stop running.

Attention...

1. If there is strange sound or abnormal vibration, shutdown immediately and check.
2. Even if the vacuum pump is not running, under a vacuum condition, do not loosen the pipe flange.
3. In operation, always check the oil level and color. Add or replace lubricating oil as required.
4. Vacuum pump shall be run under the specified operating conditions. A long time to change the operating parameters, can damage the roots pump and backing pump.

Caution

During normal operation, the temperature of the fuel tank and exhaust can reach over 80 ℃. When touch these place may be scalded. Pay attention to the label on the pump.

Under vacuum condition or the pump is running, do not open the oil plug and drain plug. Because oil spurts out cause dangerous.

Method for Long Term.storage

If the long-term stop, it should be carefully dealt with in accordance with the following methods, especially in wet season or wet place.

1. If stop for above two months, It should be carefully dealt with in accordance with the following methods:
    1) When the pump is required to set aside for a long time, the oil should be drained and the pump intake and exhaust ports should closed with flanges. If desired, put some bags containing a desiccant into the pump chamber.
    2) Appliances regional must be waterproof, dustproof.
    3) Move the vacuum pump to migrate with less dust and dry ventilated place.

2. Re-start process

1) Remove the intake and exhaust ports flanges, connect the pipe properly.

2) Measure the electrical insulation should be 1MΩ or more.

3) Add the requirements lubricant before use.

4) Numbers of turns must be turned by hand to ensure that no abnormal pump rotation

5) Point the pump several times to lubricate the gears and bearings fully can put it into use.

Chapter IV Repair and Maintenance

Caution

If there is pollutant which damage health and environment in the exhausted air, the pollutant will stay on oil and oil filter and also in vacuum pump air holes and inner. Thus it is bad for health when taking down vacuum pumps with pollutant. Protecting device should be equipped to operators. Oil, exhaust air filter and oil filters should be managed by the professional environment protecting department, and the used oil should be managed according to rules.

Lubricating Oil Specification and Oil Change Steps

Vacuum pump of the lubricating oil is mainly to provide bearing and gear lubrication.

1. The selection of lubricating oil

Lubricating oil quality has the direct influence to the roots pump's stable and reliable running, if use improperly or take a mistake, it will greatly shorten the life of the pump or even cause some damage. Suggestion: recommended JOYSUN oil for vacuum pump to ensure the service life of vacuum pump.

Lubricating oil recommended

Oil model	temperature	type
US350SS	0-12℃	Mineral oil
US550SS	12℃-30℃	Mineral oil
US350PAO	＞30℃	Synthetic oil

2. The impact of the oil-time factors

1) Poor ventilation, high ambient temperature.

2) The working environment and process conditions is harsh.

3) The bad quality of the lubrication.

3. Lubrication using notes

1) Time of the oil-lubricants change:

In clean operating conditions, bearing and gear lubrication fuel consumption is

very little. After running of 500 hours, a new pump should change its oil to remove the wear residues. Then, under the condition of normal operation, change the oil every 3000 hours. When suction contains corrosive gas or large numbers of dust or from the atmosphere to the working pressure, oil changes should be more frequent.

2) Never exceed the lubricant oil life, oil should be replaced timely, otherwise the quality of oil dropped, lubrication performance deteriorated.

4. The step of lubrication oil change
   1) Stop running of the vacuum pump and cut off the power.
   2) After the vacuum pump shut down completely, the system pressure releasing to atmosphere, after cooling the pump (the temperature of the vacuum pump and the oil will be very high in operation), unscrew the oil plug and drain plug. After the lubricating drained off, screw on the oil drain plug along with good sealing ring tightly, wipe away the residue oil.
   3) Inject the new lubricating oil to the oil window's 2/3, screw on the oil inject plug along with good sealing ring tightly, and wipe away the residue oil.

   Note: a. If the oil level is too low, inadequate bearing and gear lubrication, if too high, oil enters the pump chamber.

   b. Injection or drain hole must have good compactness; otherwise the oil gas will enter the pump chamber and can affect the vacuum degree of vacuum pump.

Vacuum Pump Repair and Maintenance

1. Daily or before each operation, pay attention to the color of the lubricating oil, if oil is black or still have sediment, lubricating oil must be changed.
2. The fan cover and cooling fin cleaning (maintenance cycle which shall be determined according to the process conditions) :

   According to the use environment condition, the fan cover on the grid and the motor and pump cooling fin can be contamination. In order to ensure the motor and pump body has enough cooling air flow, you should clean the fan cover of the grid with a clean brush when there's much dust. Any major contaminants must be removed from the machine and vacuum pump cooling fin.
3. Filter cleaning (maintenance intervals depending on process conditions):

   If the suction mouth set the filter, should keep it clean so as not to reduce the pumping speed of vacuum pump. Therefore, open suction pipe, remove the filter from the suction flange, with the proper solution to clean, and then use compressed air to blow dry completely. If the filter is damaged, should be replaced.
4. Vacuum pump cavity clean (maintenance cycle which shall be determined according to the process conditions) :

   Under the dirty work condition, or rotor pump housing deposit with dirt. After tear down the connecting line between inlet and outlet, clean the dirt with dry compressed air or

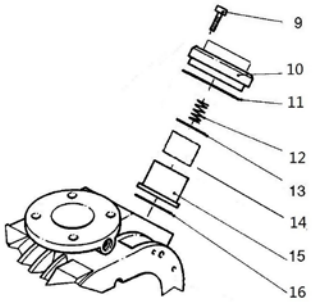
cleaning fluid. The remaining dirt can use wire brushes, metal cotton or scraper. Then, change the lubricating oil.

After cleaning, slowly turn the rotor by hand, check the workings of the pump, they should be free rotation without any resistance. There shall not have loose sediments in pump.

In general, the pump cavity clean doesn't collapse. If needed, please contact us.

Caution

During the maintenance cleaning, the rotor can rotate by hand. You can't reach your hand into the pump cavity, so as to avoid chewing your hand.



5. Clean the bypass valve

   Disconnect the screw (9); take off the cover (10) with the ring (11). Remove the spring (12).Remove the valve head (15) with the O-ring (13), (16).If sleeve (14) has wear and tear, take it down from the head of this valve and replace it. If necessary, checking all parts or replacement parts. Reassemble in reverse order. When installation, check all of the O-rings is damaged or not, if damaged, should be replaced. Leak tests shall be carried out at last.

6. Replace the seals

   Vacuum pump in normal operating conditions, replace the seals every 2 ~ 3 years. For the relatively poor working environment and the process conditions, the maintenance cycle interval should be appropriate shorten.

7. Remove and install oil seal seat

   Remove sequence

   Unload motor→ remove the coupling elastic piece, →remove two lock screw, Screw one of the screwing into the screw hole, and remove the shaft end half coupling→ spin down oil plug, drain the lubricating oil→ unload four socket head cap screw from the oil seal seat, remove the oil seal seat (oil seal seat has two threaded hole for remove) → remove the collar→ remove the o-ring → remove the elastic ring →remove the shaft seal (note the installation position and direction of the shaft seal).

   Install sequence

   Install according to the reverse order of the remove sequence. When pressing the oil seal into the oil seal seat, be careful not to crush the oil seal, shaft seal must be parallel to the plane with oil seal. If the outer surface of the sleeve has grooves caused by the seals, turn around the seal and install. In addition, change the o-ring if it has serious deformation or damaged.

Chapter V Transportation and Storage

The vacuum pump is heavy machine made by cast iron (> 70 kg), so only use lifting equipment can handling the machine ring.

Watch out! Before transport the pump, oil in bearing housing must be released, screw down the oil drain plug, and then wipe the oil droplets on the shell.

Pump transportation and storage should be kept horizontal position (vertical axis direction 5 ° or less). Otherwise, even before the first time to pump oil, the oil in gear or connect the end cover can flow into the pump chamber.

When left the pump unused for a long time, the oil should be drained, the oil should be drained and the pump intake and exhaust ports should closed with flanges. If desired, put some bags containing a desiccant into the pump chamber.

Equipped with PFPE oil pump, sealed with nitrogen blow-down sealing method should be used.

Motor area at gap must be waterproof, dustproof.

Chapter VI Regular Failure and Obviate Method

Accessory

Malfunctions	Reasons	Solutions
Pump cannot start	Electrical wiring errors	Correct electrical wiring
	Thermal overload relay	Exclude thermal overload relay reasons
	Motor failure	Repair or replace motor
	Foreign body stuck in the rotor	Remove the foreign body
Excessively low pumping speed	Piping path is not enough	Increase pipe diameter
	Pump inlet filter blocked	Clean the inlet filter
	Bypass valve leakage	Clean or repair the bypass valve
	Pump or pump system leakage	Find and eliminate the leakage
Motor overload	Excessively low power supply voltage	Access the correct power supply
	Rotor contact with the end cap surface	Adjust the gap between rotor and end cap surfaces
	Motor failure	Repair or replace motor
	Pump overheating	See “pump overheating”
	Excessively high temperature or blocked ventilation	Install the pump in a cool, well ventilated place

Excessively high pump temperature	Excessively high inlet pressure	Adjustment or control inlet pressure
	Excessively low lubricating oil level, causing poor lubrication of the gears and bearings	Add oil to the specified oil level
	Excessively much oil in gear box	Adjusted the lubricating oil to the required level
	Rotor and pump friction	Clean the pump chamber, adjust the gap between rotor and pump body
	Bypass valve unopened	Clean or repair the bypass valve
Abnormal sound	Bearing or gear damaged	Replace the bearing or gear
	Collision between the rotor , the rotor and the pump body , rotor and cap produced friction	Adjusting the rotor member , the rotor and the pump body , the gap between the rotor and the end cap
	Elastic coupling damaged	Replace coupling elastic member
	Seal piston ring damaged	Replace the seal ring
	Excessively low oil level to result in poor lubrication in gears, bearing	Add oil to the specified oil level
Bearings, gears badly worn	Poor quality or deteriorated oil	Oil change
	Lack of lubricating oil	Add oil
Abnormal pump rotation	Elastic coupling damaged	Replace the coupling elastic member
	Collision between the rotor , the rotor and the pump body , rotor and cap produced friction	Adjusting the rotor member , the rotor and the pump body , the gap between the rotor and the end cap
	Foreign body stuck in the rotor	Remove foreign body
The spill	O-ring rubber aging, deformation	Replace the O-rings
	Seal wear deformation or deterioration	Replace oil seal

Chapter VII Parts table and exploded view

Parts table 1

Pos.	Quantity				See Fig. 1	Part Number、Specifications			
	CBP-200	CBP-400	CBP-700	CBP-1400	Description	CBP-200	CBP-400	CBP-700	CBP-1400
1	4	4	4	4	Cylinder screw	M10*40	M10*30	M12*35	M12*30
2	1	1	1	1	AC-Motor 3 phase	1.1kW	2.2kW	4kW	7.5kW
3	1	1	1	1	Fan	JRP500-34	JRP500-34	JRP1000-12	JRP2000-85
4	1	1	1	1	Circlip	60	60	68	100
5	1	1	1	1	Cylinder screw	M8*30	M8*40	M12*40	M12*55
6	1	1	1	1	Coupling press plate	JRP250-55	JRP500-06	JRP1000-09	JRP2000-60
7	1	1	1	1	Coupling element				
8	1	1	1	1	Coupling compl.	JRP250-16	JRP500-33	JRP1000-08	JRP2000-86
9	1	1	1	1	Connection cover	JRP500-30	JRP500-32	JRP1000-11	JRP2000-04
10	2	2	2	2	Cylinder pin	8*26	8*28	10*30	12*40
11	1	1	1	1	Magnet				
12	1	1	1	1	O-ring	189.3*3.1	242*3	274.3*3.1	360*4
13	1	1	1	1	Oil cup	G3/8	G3/8	G3/8	G3/8
14	4	4	8	8	Cylinder screw	M8*20	M8*45	M10*45	M12*60
15	3	3	3	3	Plug screw	G3/8	G3/8	G3/8	G3/8
16	3	3	3	3	Gasket ring	15*2	15*2	15*2	15*2
17	1	1	1	1	O-ring	61.5*5.3	61.4*3.1	91.67*3.53	98*4
18	1	1	1	1	O-ring	69*4	79.4*3.1	139.4*3.1	144.4*3.1
19	1	1	1	1	Circlip	47	47	72	80
20	2	2	2	2	Simmerrings	35*47*7	35*47*7	50*72*8	80*50*10
21	1	1	1	1	Circlip	47	47	72	80
22			1	1	Bearing			6910	6911
23	1	1	1	1	Shaft seal housing	JRP500-22	JRP500-30	JRP1000-20	JRP2000-53
24	4	4	4	4	Cylinder screw	M6*20	M6*20	M6*20	M8*20
25	1	1	1	1	Circlip	47	47	72	80
26	1	1	1	2	Simmerrings	35*47*7	35*47*7	50*72*8	80*50*10
27	1	1	1	1	Circlip	47	47	72	80
28	1	1	1	1	Protective tube	JRP250-53/57	JRP500-34A	JRP1000-07	JRP2000-58
29	1	1	1	1	O-ring	189.3*3.1	242*3	274.3*3.1	360*4
30	1	1	1	1	Motor port cover	JRP500-33	JRP500-23	JRP1000-30	JRP2000-09
31	2	2	4	4	Cylinder screw	M8*20	M8*20	M10*20	M12*25
32	6	6	8	8	Piston ring	JRP500-34	JRP500-17	45*2*2	50*2*2.5

33	2	2	2	2	Piston ring holder	JRP500-35	JRP500-18	JRP1000-32	JRP2000-44
34	2	2	2	2	O-ring	25*2.4	29.5*2	34.65*1.78	40*1.8
35	2	2	2	2	Splash ring	JRP250-37	JRP500-15	JRP1000-29	JRP2000-42
36	2	2	2	2	Ball bearing	6305	6306	6307	6308
37	2	2	2	2	Elastic shims	D62	D72	D80	D90
38	2	2	2	2	Gauge disc	JRP500-29	JRP500-25	JRP1000-26	JRP2000-76
39	2	2	2	2	Circlip	62	72	80	90
40	1	1	1	1	Oil splash duct	JRP500-27	JRP500-26	JRP1000-24	JRP2000-48
41	1	1	1	1	O-ring	24*2.7	23.47*2.62	31.42*2.62	38*3
42	1	1	1	1	Bushing	JRP500-19	JRP500-29	JRP1000-22	JRP2000-61
43	2	2	2	2	Cylinder pin	8*26	8*30	10*35	12*40

Parts table 2

Pos.	Quantity				See Fig. 2	Part Number、Specifications			
					Description	CBP-200	CBP-400	CBP-700	CBP-1400
1	2	2	2	2	O-ring	189.3*3.1	242*3	274.3*3.1	360*4
2	2	2	2	2	Cylinder pin	8*26	8*30	10*35	12*40
3	1	1	1	1	Front end plate	JRP250-73	JRP500-20	JRP1000-34	JRP2000-15
4	1	1	1	1	Long oil tube	JRP250-63	JRP500-03	JRP1000-61	JRP2000-80
5	8	8	8	16	Hexagonal bolts	M8*45	M12*35	M16*35	M16*35
6	2	2	2	2	flange	JRP500-45	JRP500-45	JRP1000-67	JRP2000-14
7	2	2	2	2	O-ring	92*4	92*4	109*4	155*5
8	1	1	1	1	Housing JRP	JRP250-04	JRP500-22	JRP1000-74	JRP2000-11
9	4	4	4	4	Cylinder screw	M6*20	M6*20	M6*25	M8*20
10	1	1	1	1	Cover	JRP250-10	JRP500-47	JRP1000-54	JRP2000-33
11	1	1	1	1	O-ring	69*4	88.57*2.65	120*5	179.3*3.1
12	1	1	1	1	Spring	JRP250-09	JRP500-49	JRP1000-56	JRP2000-32
13	1	1	1	1	O-ring	38.7*5.3	55*5	100*5	125*5
14	1	1	1	1	SF-1W Lead-Free Beari	5530	4050	9060	11060
15	1	1	1	1	Valve plate	JRP250-08	JRP500-51	JRP1000-55	JRP2000-31
16	1	1	1	1	O-ring	38.7*5.3	65*5	100*5	148*5
17	1	1	1	1	Gasket ring	15*2	15*2	15*2	15*2
18	1	1	1	1	Plug screw	G3/8	G3/8	G3/8	G3/8
19	1	1	1	1	Auxiliary impeller	JRP250-05	JRP500-68	JRP1000-62	JRP2000-74
20	1	1	1	1	Driven impeller	JRP250-62	JRP500-21	JRP1000-63	JRP2000-46
21	1	1	1	1	Key	8*22	8*22	8*5.4*21	10*25
22	1	1	1	1	Key	6*20	8*28	10*22	10*45
23	4	4	4	8	Cylinder screw	M10*30	M10*35	M12*25	M12*40
24	4	4	4	8	Washer	10	10	12	12
25	1	1	1	1	Foot right	JRP250-01	JRP500-38	JRP1000-75	JRP2000-24
26	1	1	1	1	Foot left	JRP250-11	JRP500-71	JRP1000-73	JRP2000-23
27	2	2	2	2	Short oil tube	JRP250-65	JRP500-40	JRP1000-52	JRP2000-25
28	2	2	2	2	O-ring	11*2.5	11*2.5	16*3	16*3
29	2	2	2	2	O-ring	11*2.5	11*2.5	16*3	16*3
30	2	2	4	4	Cylinder screw	M8*20	M8*20	M10*20	M12*25

Parts table 3

Pos.	Quantity				See Fig. 3	Part Number、Specifications			
	CBP-200	CBP-400	CBP-700	CBP-1400	Description	CBP-200	CBP-400	CBP-700	CBP-1400
1	4	4	8	8	Cylinder screw	M8*30	M10*30	M10*45	M12*60
2	1	1	1	1	Sight glass	G1	G1	G1	G1
3	3	3	3	3	Plug screw	G3/8	G3/8	G3/8	G3/8
4	3	3	3	3	Gasket ring	15*2	15*2	15*2	15*2
5	1	1	1	1	Housing cover	JRP250-72	JRP500-09	JRP1000-39	JRP2000-19
6	1	1	1	1	Magnet				
7	1	1	1	1	Oil splash duct	JRP250-42	JRP500-10	JRP1000-42	JRP2000-38
8	1	1	1	1	Pair of gearwheels	JRP250-67/68	JRP500-12/46	JRP1000-49/50	JRP2000-40/67
9	2	2	2	2	Circlip	62	72	80	90
10	2	2	2	2	Gauge disc	JRP250-40	JRP500-67	JRP1000-37	JRP2000-70
11	2	2	2	2	Gauge disc	JRP250-40	JRP500-67	JRP1000-37	JRP2000-70
12	2	2	2	2	Gauge disc	JRP250-40	JRP500-67	JRP1000-37	JRP2000-70
13	2	2	2	2	Ball bearing	6305	6306	6307	6308
14	2	2	2	2	Splash ring	JRP250-37	JRP500-15	JRP1000-29	JRP2000-42
15	2	2	2	2	O-ring	25*2.4	29.5*2	34.65*1.78	40*1.8
16	2	2	2	2	Piston ring holder	JRP250-35	JRP500-17	45*2*2	50*2*2.5
17	6	6	8	8	Piston ring	JRP250-34	JRP500-18	JRP1000-32	JRP2000-44
18	1	1	1	1	Swelling sets	KTR250-20	KTR250-25	KTR250-32	KTR250-38
19	2	2	2	2	Swelling sets press plate	JRP250-70	JRP500-06	JRP1000-41	JRP2000-65
20	2	2	2	2	Cylinder screw	M8*30	M8*40	M12*40	M12*55

Exploded view 1

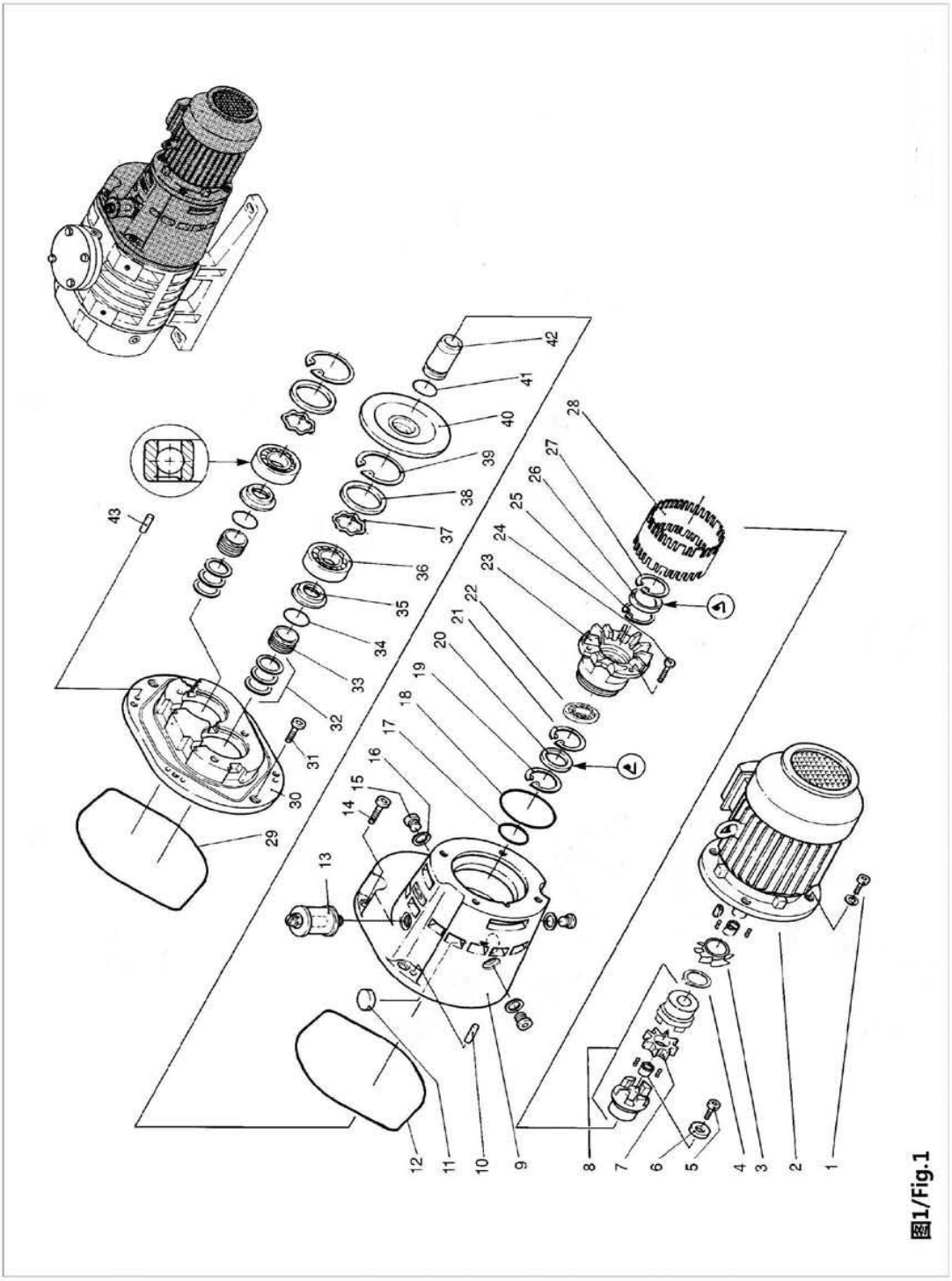


图1/Fig.1

Exploded view 2

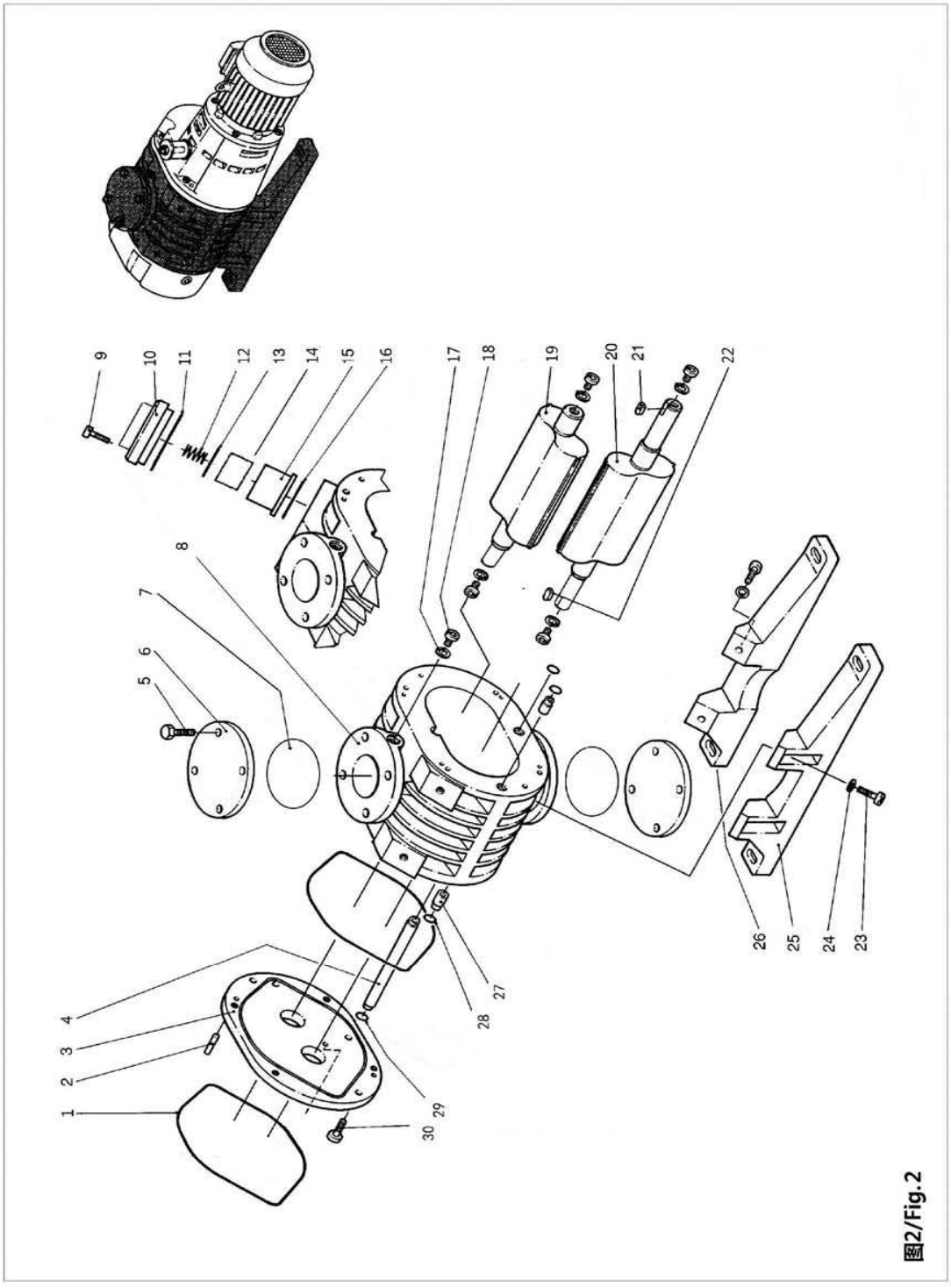


图2/Fig.2

Exploded view 3

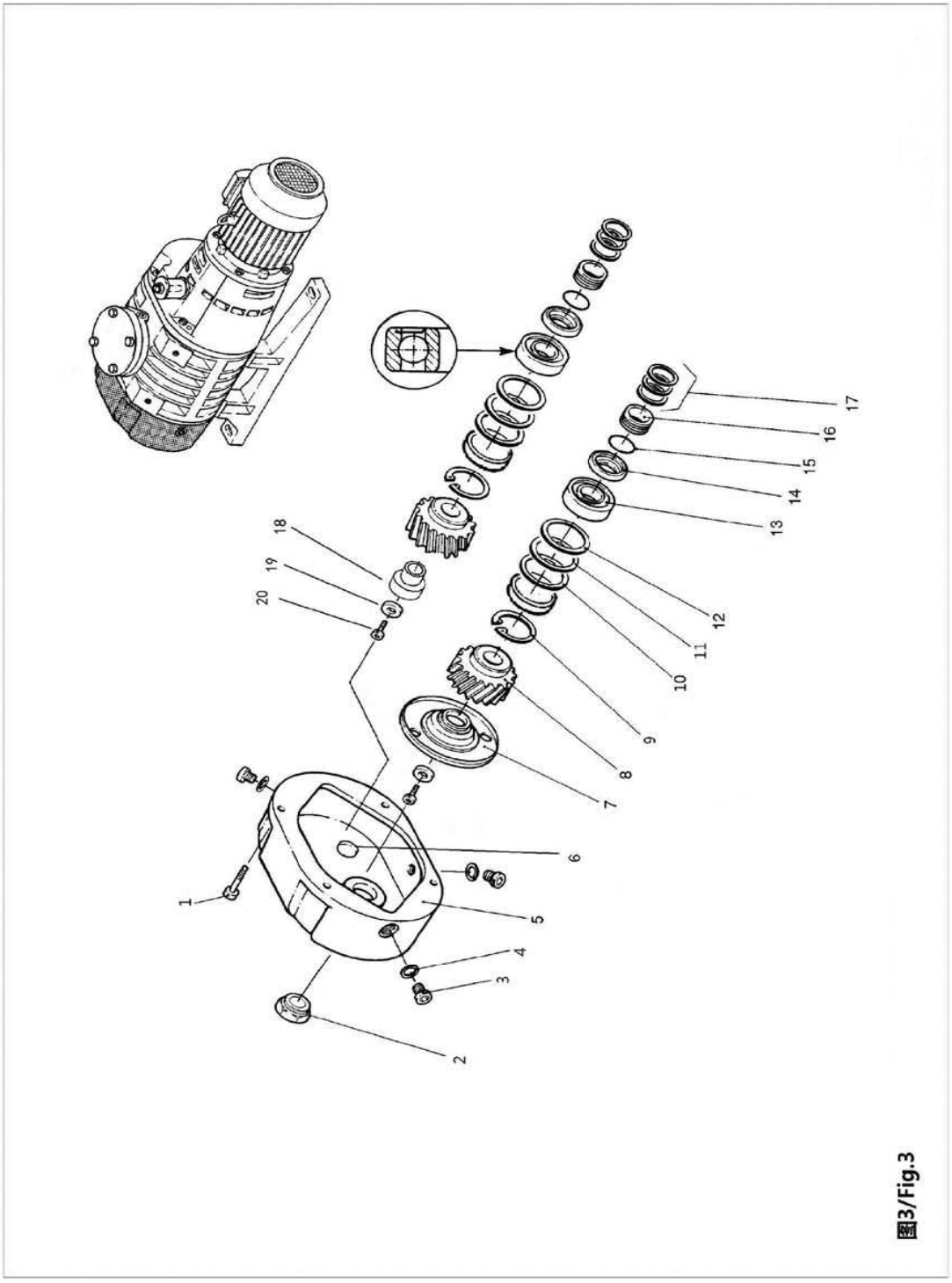


图3/Fig.3

Chapter VIII Devanning and Checking

1. When opening the boxes，be sure to avoid damage the machine
2. Check the files followed the machine:
   1) Operation manual 1 piece.
   2) Production qualification certification (including packing list) 1 piece.

   Inspect the machine and spare parts according to packing list.

Appendix

1. Following sign is on surface of pump, it emphasizes" please read the introduction carefully before installation and operation".

2. Scale warning sign. The sign is on the pump. Vacuum pump surface temperature can reach up to 80 ℃, thus workers should not touch the pump in case of any scald, burn and death.

3. Electric shock warning. The sign is on motor junction box. Only authorized person can open the junction box and connecting wires. Take care of electric shock to avoid any body hurt.
4. Protective grounding. The sign is in the motor junction box. It means terminal connecting conductor for outside protection or protective grounding electrode. The grounding wires must be grounded during connection. Once electric leakage happens, the leaked electric current can be grounded and avoid electric shock and death.

5. Rotating direction sign is pasted on motor vane cover. Confirm whether the rotating direction is the same as the sign, or the vacuum pump can't work normally.