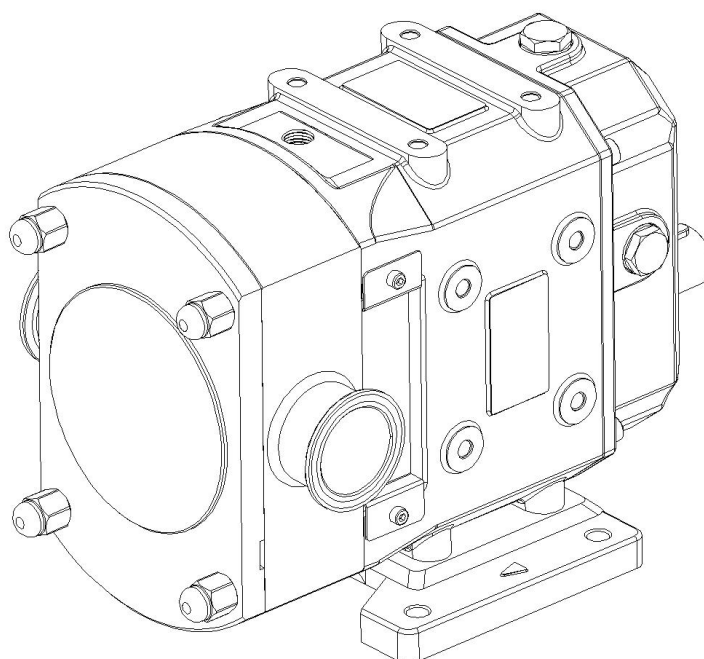




ROTOR PUMP USER'S MANUAL



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ATTENTION

Thank you for purchasing and using LIGAO rotor pump. For your safety and benefits, before using this equipment, please read the manual carefully.

1. This manual includes the installation, operation and maintenance information. These information must be read carefully before installation, operation or maintenance and always readability be available to the pump operator.

2. The pump must not be used with other liquids than those for which it was recommended and sold. Liquids, for which the pump is not appropriate, can damage the pump and other parts of the unit as well as cause personal injury.

3. If there are any uncertainties, contact us or local sales representative.

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1.0 Safety Instructions

This manual includes the basic information for installation, operating and maintenance. The operator and relative persons should read this manual carefully. Always keep this manual within reach at the place of installation of the pump.

1.1 Marking of notes

Symbols and notes, e.g. arrows for direction of rotation or flow and speed changer indicator notes are fixed at the places where can be easily read. Do not demount them.

1.2 Personnel qualification and training

The personnel who operate, inspect and install the pump must be suitably qualified. Range of responsibility and supervision of the personnel are to be clearly defined. If the personnel do not have the knowledge required, they should be trained accordingly. The owner must ensure that the personnel have understood the operating instructions.

1.3 Dangers in case of inobservance of the safety instruction


Inobservance of these safety instructions can result in danger to persons, hazards to environment and damage to the pump.


Inobservance can result in:










- Damage the pump or failure of some important part or function .
- Failure of maintenance .
- Danger to person through mechanical, chemical and electrical influences .
- Hazards to the environment through leaking dangerous media .

1.4 Safety operation







The safety instructions specified in this manual, the national regulations for accident prevention, and the safety operating instructions of the owner are to be observed.

 Caution must be taken when lifting the pump. All parts with a weight of more than 20 kg must be lifted using lifting slings and suitable lifting devices.

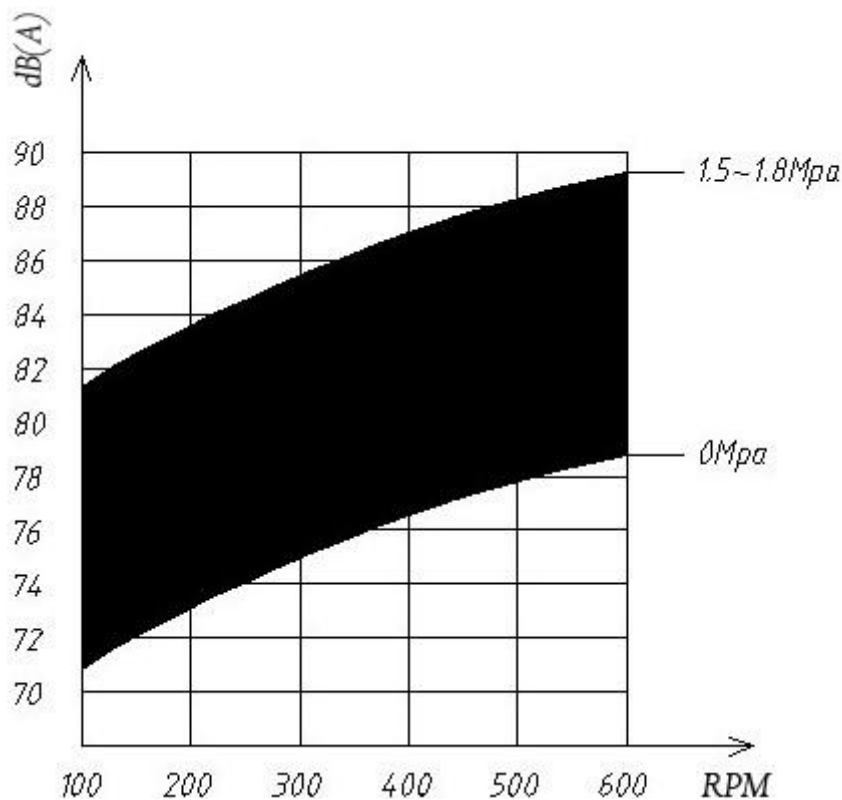
 The nameplate should always be readable, and should not be missed.

-  If the pump is not installed immediately, it must be stored in a suitable environment.
-  Lifting ring fitted to pump must only be used to lift the pump, not the pump with drive and/or baseplate. If the pump is baseplate mounted, the baseplate must be used for all lifting purposes.
-  Never operate the pump if the pump cover or suction and discharge pipework are not in place. Likewise, never operate the pump if other protection such as coupling and touch guards are missing or incorrectly fitted.
-  Never stick your fingers inside the rotor case, connections to the casing or in the end cover if there is any possibility that the pump shafts may rotate. This can lead to serious personal injury.
-  Do not exceed the pump's maximum operating pressure, speed or temperature. Do not modify the operating parameters/system for which the pump was originally delivered without first consulting the manufacturer.
-  Some sort of safety equipment should be connected to the pump, system or the drive to prevent the pump from exceeding maximum allowable pressure. Do not operate the pump with a closed/blocked discharge unless a safety relief valve is incorporated.
-  If the pump is equipped with an integrated safety relief valve, this valve is only for short time protection, do not allow extended periods of recirculation through the relief valve.
-  The installation of the pump must be sturdy and stable. Pump orientation must be considered with respect to drainage requirements. Once mounted, check the alignment between the pump and the drive assembly. Misalignment of the pump, drive and shaft coupling will result in unnecessary wear, increased operating temperatures and noisier operation.
-  Fill the pump's and drive's gearboxes with the recommended lubricants and amounts. Change the lubricants at the recommended

intervals. If equipped stepless speed reducer, the speed only can be adjusted when the device is running. It will cause damage to the machine if rotate the speed hand wheel in a non-operation state.

-  Before operating the pump, make sure that it and the pipe system are clean and free from debris and that all the valves in the suction and discharge pipelines are fully opened. Make sure that all pipework connected to the pump is fully supported and correctly aligned. Misalignment and/or excessive loads will cause severe damage to the pump.
-  Do not install the pump into a system where it may run dry (i.e. without a supply of pumped media) unless the mechanical seals are equipped with flushing system.
-  Do not attempt maintenance work or disassembly of the pump without making sure that the power is off. Depressurize and purge any pressure relief valve and/or flushing system. Check that any other associated equipment is turned off and disconnected. Allow the pump and components to cool down to a safe handling temperature.
-  Do not attempt to loosen or remove the pump cover, connections to the pump, or other components until you are sure that such actions will not lead to the unsafe escape of any pressurized media.
-  The pump installation must allow for safe routine maintenance and inspection (check for leakage, change of lubricants, pressure monitoring, etc) and provide adequate ventilation to prevent overheating.
-  Pumps and/or drive units can produce sound levels in excess of 85dB(A) under unfavorable operating conditions. When necessary, personal protection against noise must be used.

Sound Level



- ⚠️ Avoid any contact with hot parts of the pumps or drive units which may cause personal injury. Bad installation or poor maintenance can promote unnormally high temperatures on pumps and/or drive units.

- ⚠️ During a CIP cleaning, a pump differential pressure of between 1 and 2 bar is recommended to ensure that suitable velocities are reached in the pump head. The exterior of the pumps should be cleaned periodically.
Always follow all applicable safety measures when manually cleaning the pump:
 1. Drive unit must be shut down so that it cannot be started.
 2. Any compressed air controlled, mounted safety relief valve must be closed and depressurized.
 3. Connections to flushed mechanical seals must be closed and depressurized.

1.5 Safety protection for maintenance, inspection and installation

- Don not demount the safety cover on the shaft when the pump is under working.

- Maintain the pump only when the pump stops and not under pressure.
- The pump must be cleaned after transporting hazardous medium.
- Safety and protection equipments must be installed after the maintenance.
- The star-up of the pump must follow the in instructions in this manual strictly.
- Protection from electricity.

1.6 Change of spare parts

Any modification or change should be permitted by the manufacture. Or the manufacturer will not take any responsibility for the risk caused by this.

1.7 Specificity of application

This pump is ensured to use under specific conditions. It is only to be deployed according to the intended purpose stated by the owner. Any other applications are not allowed.

If the pump is to be used for other medium than for which the pump was originally selected , especially hazardous medium with corrosion or poison, then the suitability of the pump for the new medium must be consulted with the manufacturer.

The specificity of applications includes:

- The pump materials which touches the medium directly are suitable for the medium ;
- The seals are suitable, especially the mechanical seals;
- The pump pressure and temperature ;
- The quantity and size of the particles In the medium ;

Besides the safety instructions described in this manual, there may be other local safety codes and restrictions. The operator should be familiar with those regulations before operation.

2.0 Introduction

Rotor pump is a kind of displacement pump. The working volume is changed by the relative rotation between the rotor and pump body, which leads to increase the liquid energy. Cam rotor pump is designed for transporting liquid of high viscosity or with particles, especially for medium which is easily foamed or whose structure is easily be damaged. It transports medium gently with low rpm, which can be adjusted from 40rpm to 600rpm. It is better for sanitary and sterile

condition and is an ideal pump used as metering pump.

2.1 Features

a) Safe and clean

All parts of the pump that touches the medium are made of stainless steel and the seals are made from natural rubber.

b) Nice appearance

The surface of the pump head is mirror-polished, which is easy to clean and with nice appearance.

c) Advanced internal structure

The pump rotors and driving gear are separated, and all pump parts in pump head keep a certain clearance, thus they can not touch each other, which makes the pump no wearing, low noise, long service life and energy saving.

d) Transport high viscosity medium

This pump can transport high viscosity, high concentration medium and medium with particles. The medium transported by this pump keep the original character without physical and chemical reaction.

e) Good sealing

The pump adopt balance mechanical seals, which can endure high pressure with no wearing and leakage.

f) High pressure

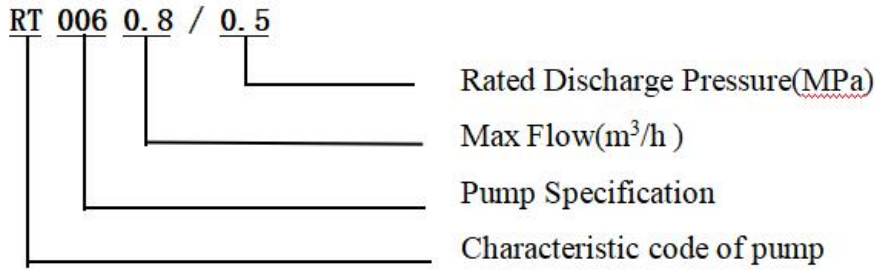
This pump has high pressure and flow, especially used for long transportation at fix quantity.

2.2 Application

It is especially suitable for medium of high viscosity and with particles. It also can be used for transporting medium mixed with vapors, liquids and solids, and ensure its original physical and chemical character.

2.3 Pump Model and Nameplate

According to the characteristics of pump flow and pressure parameters, it is represented as follows:



2.4 Nameplate

LIGAO ROTOR PUMP

Model: _____ Serial No.: _____

Flow: _____ m /h Pressure: _____ MPa

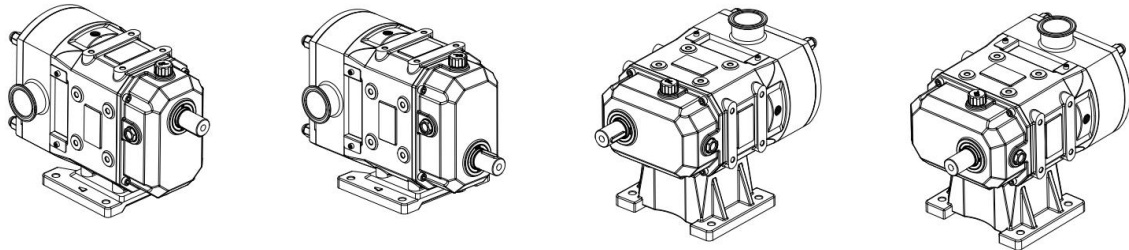
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www.ligaopumps.com E-mail: sales@ligaopumps.com

(Note: the user shall protect the nameplate and provide the nameplate information in the replacement and maintenance of vulnerable parts in the future)

3.0 Components and working principle

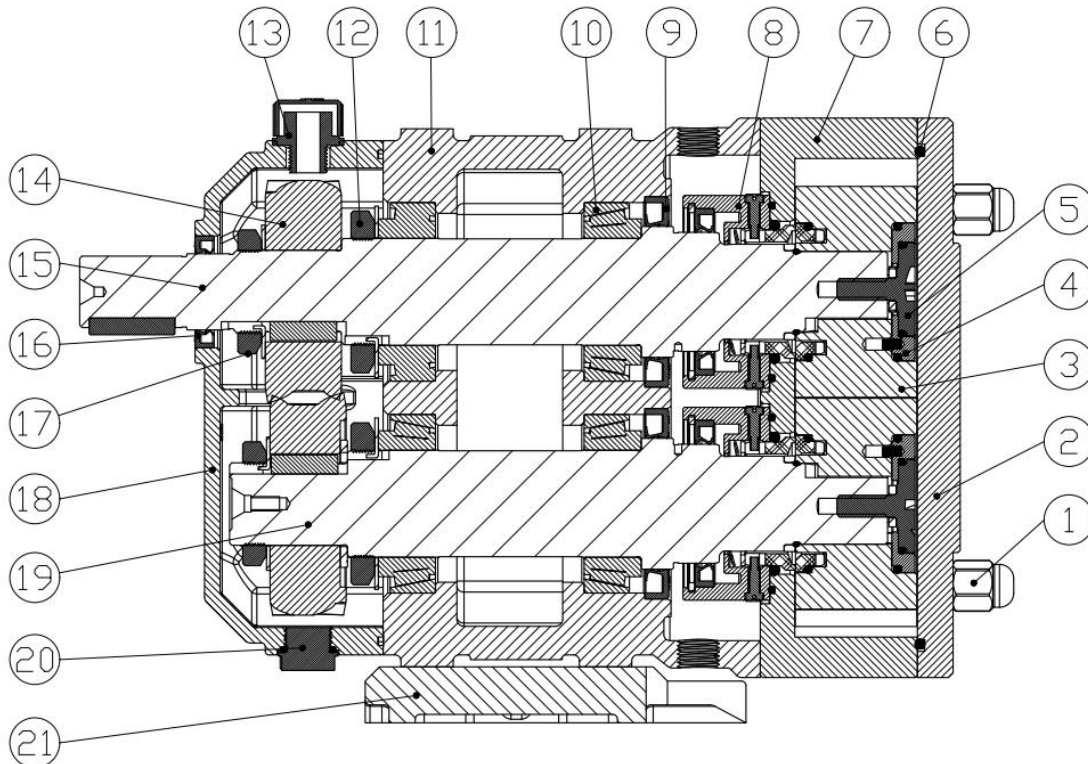
3.1 Pump head types

According to the inlet direction and driving units, there are 4 types for the pump head:



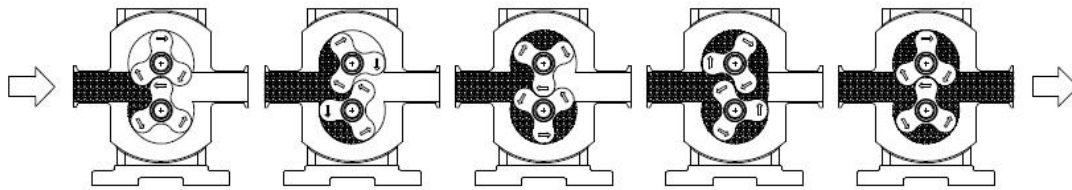
3.2. Main components in pump body

1. Head screw 2. Pump cover 3. Rotor 4. Eccentric washer 5. Rotor screw 6. Pump cover O-ring 7. Pump body (standard type) 8. Mechanical seal assembly 9. Framework oil seal 10. Tapered roller bearing 11. Gear box chamber 12. Round nut (bearing end) 13. Refueling vent cap 14. Helical gear 15. Main shaft 16. Rear case cover framework oil seal 17. Round nut (gear end) 18. Rear case cover 19. Countershaft 20. Oil drain screw 21. Pump base (left and right position)



3.3. Working principle

Liquid is drawn into the pump as the rotors disengage, forming cavities. The liquid is transported in the cavity of the rotors around the space of the rotor case. Liquid is pressured out from the pump as the rotors engage, closing the cavities. The following is the diagram of the working principle:



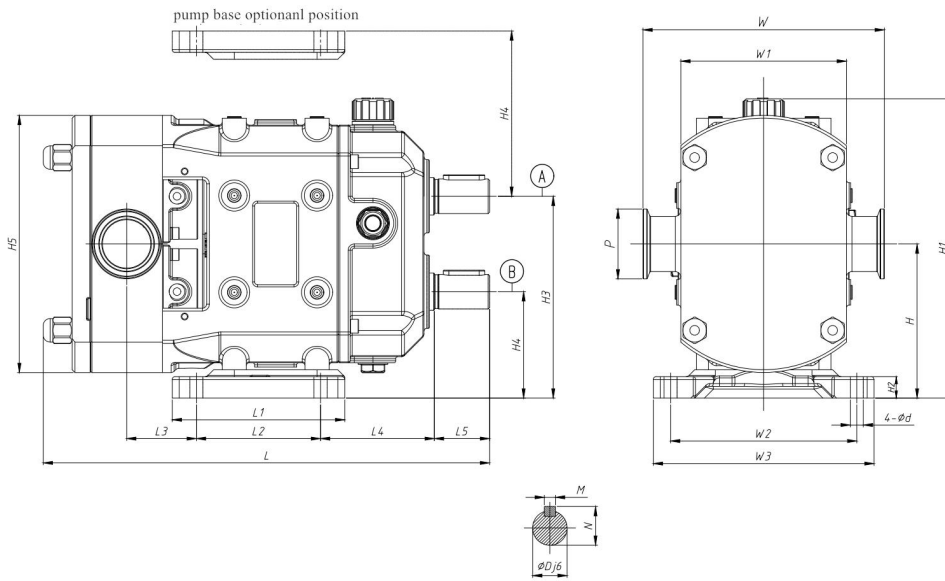
4.0 Technical parameters and installation dimensions

4.1 Technical Parameter

Model	Capacity	Speed	Flow	Rated Pressure	Power	Viscosity	Connection
	L/r	r/min	m ³ /h	MPa	kw	cp	(mm)
RT006	0.06	50-1000	1	1.0	0.37-1.5	1-1000000	22.5
RT015	0.15	50-800	2	1.5	0.25-2.2		35
RT032	0.32	50-500	5	1.5	0.37-3		46
RT070	0.7	50-500	10	1.5	2.2--7.5		59
RT170	1.7	50-500	20	1.5	2.2-18.5		80
RT320	3.2	50-500	40	1.5	4-30		100
RT510	5.1	50-400	60	1.5	5.5-45		125
RT830	8.3	50-400	100	1.5	7.5-75		125

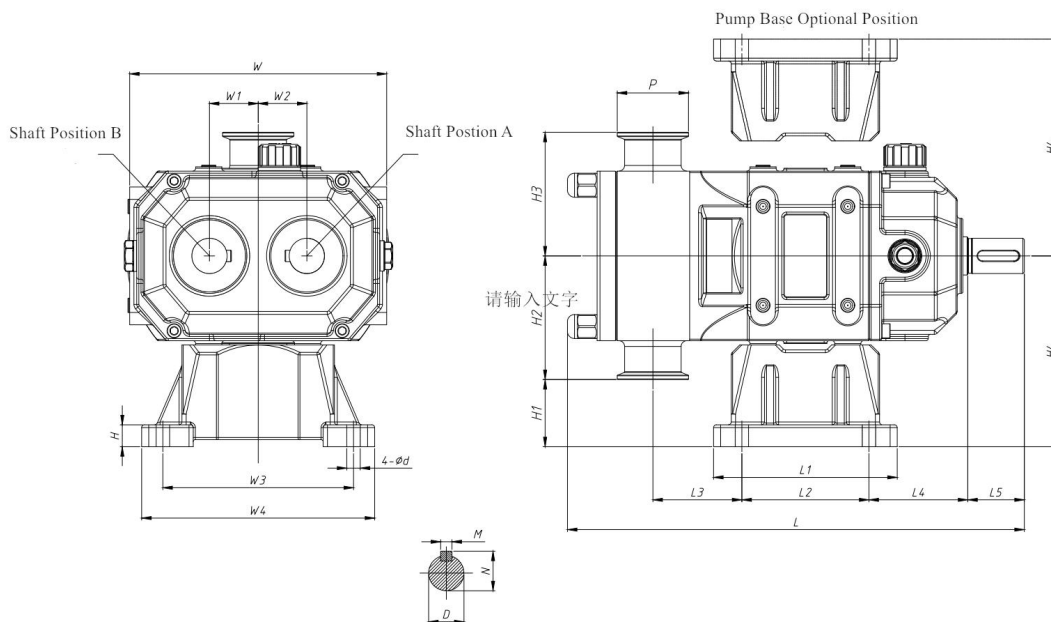
4.2 Installation dimensions

Horizontal Port Type



Model	L	L1	L2	L3	L4	L5	H	H1	H2	H3	H4	H5	W	W1	W2	W3	M(h8)	N	D(j6)	d	p	
																					Clamp	Flange
RT006	296.5	110	80	53	75	38	90.5	169.3	13	118	63	150	132	98	115	140	5	18	φ16	φ9.5	1"	DN25
RT015	323.5	125	90	50.5	82.5	40	111.5	216.5	15.5	146	77	186	175	120	135	160	8	28	φ25	φ9.5	1.5"	DN32
RT032	393.5	160	120	59	95	45	136.5	264	17.5	181	92	235	215	150	170	200	8	33	φ30	φ11.5	2"	DN50
RT070	479	200	150	67	110	60	168	317	22.5	223	113	290	266	186	215	255	12	43	40	14	2.5"	DN65
RT170	609.5	235	180	78.5	152	82	207.5	390	26	276	139	365	320	230	265	310	14	53.8	50	18	3.5"	DN80
RT320	614	278	218	104	/	/	239	439	26	306	171	/	432	266	298	348	18	64.5	60	18	4"	100
RT510	727	295	215	154	/	/	287	527	32	369	204	/	522	318	370	430	20	74.5	70	22	4.5"	125
RT830	818	340	260	162	/	/	339	619	37	435	239	/	570	366	410	480	22	85	90	22	4.5"	125

Vertical Port Type



Model	L	L1	L2	L3	L4	L5	H	H1	H2	H3	H4	W	W1	W2	W3	W4	M(h8)	N	D(j6)	d	p	
																					Clamp	Flange
RT006	296.5	110	80	63	65	38	13	66	66	49	115	145	27.5	27.5	115	140	5	18	16	9.5	1"	DN25
RT015	323.5	130	90	63	70	40	15.5	87.5	87.5	47.5	135	182	34.5	34.5	135	165	8	28	25	9.5	1.5"	DN32
RT032	393.5	170	120	75.5	78.5	45	17.5	107.5	107.5	73.5	181	226	44.5	44.5	170	205	8	33	30	11.5	2"	DN50
RT070	479	210	150	86.5	90.5	60	23	133	133	90	223	290	55	55	215	255	12	43	40	14	2.5"	DN65
RT170	609.5	250	180	105.5	125	82	26	160	160	94	254	347	68.5	68.5	265	315	14	53.8	50	18	3.5"	DN80

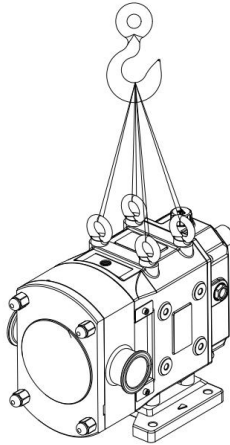
5.0 Packing , transport and handling

5.1 Packing and transport

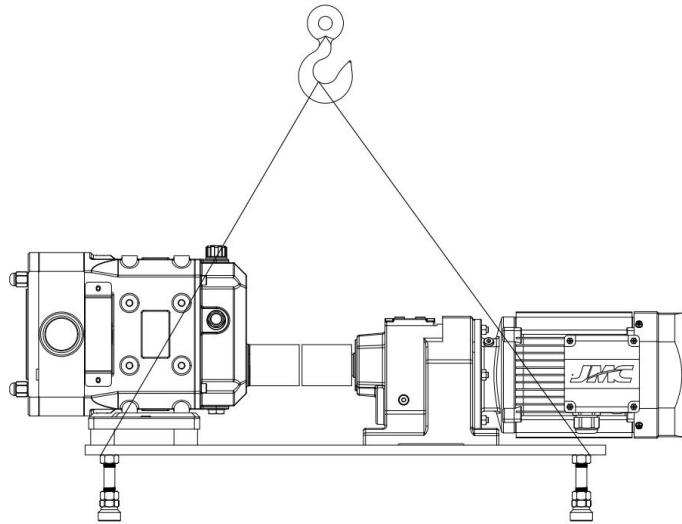
- If the users do not have special requirements, the packing will be wooden package .
- The users have to check the product for transport damage immediately after receipt. Any damage detected is to be reported immediately to the carrier and the supplier.
- Open the package until it reaches the place where it is used.
- Lifting ring fitted to pump must only be used to lift the pump, not the pump with drive and/or baseplate. If the pump is baseplate mounted, the baseplate must be used for all lifting purposes. When using slings, they must be safely and securely attached.
 - All parts (including pump unit and other parts) with a weight of more than 20 kg must be lifted using lifting slings and suitable lifting devices.

5.2 Handling

5.2.1 Pump head handling



5.2.2 Whole pump unit handling



When the pump unit is equipped with mobile unit, the following must be noted:

- Lock the motor ; Make sure the motor can not rotate.
- Do not move the unit too fast, especially on a rough road, in case it over .
- The pump unit must be installed steadily during operation or storage, in case the pump slides down.
- Check the bolts on the pump before start-up. If the bolts get loose when the pump is on working, tighten them in time.

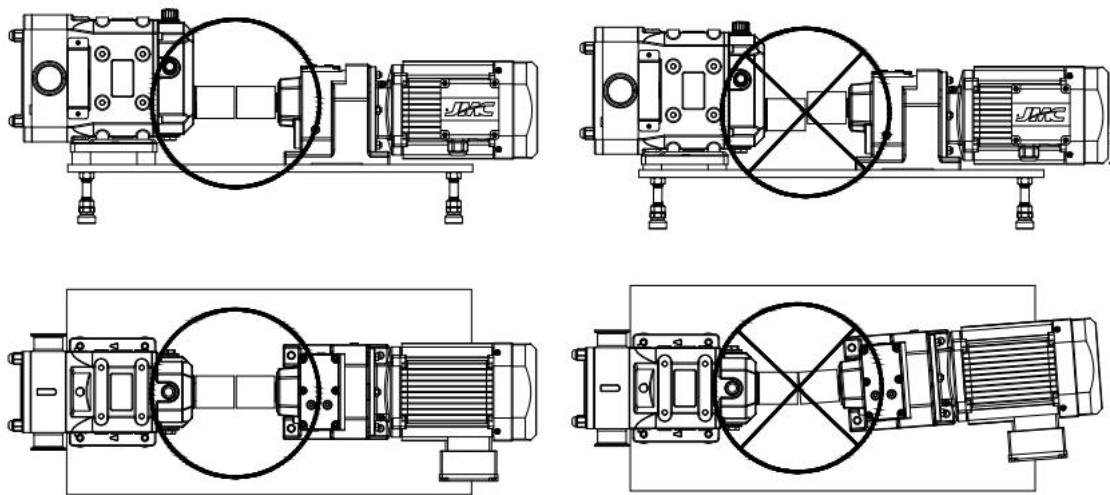
6.0 Installation

6.1 Coupling installation

When install the coupling, please use suitable tool to push it into the drive shaft . Hitting the coupling with iron hammer is forbidden.

6.2 Alignment for pump shaft and motor shaft

- The max tolerance range of the different axis between the two shaft(standard installation):
 - Radial offset : 1% (max external diameter)
 - Offset angle: $\leq 1^{\circ}30''$
- The pump unit, including the driving unit and baseplate, has been adjusted in the factory. Take off the shaft cover and check the axuality again when it is fixed. If the ground is not flat enough, it will make pump baseplate bend and will cause accidents.



6.3 Rotation direction of the pump

The rotation direction of LIGAO rotor pump can be both forward and reverse.

6.4 Rotation direction of the motor

If the driving unit with frequency conversion motor, the motor rotation must following the motor instruction, as well as the fan rotation direction.

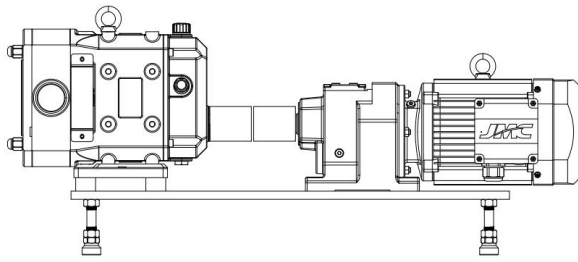
6.5 Pressure

The pump has rated pressure which has marked on the nameplate. Users should choose the pump in accordance with the pressure of your pipe system.

6.6 Pump unit installation

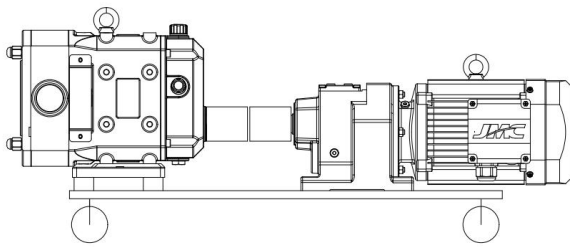
In a typical installation configuration, the pump and drive unit are mounted on a common base plate. The unit can be installed in any of the

arrangements shown below:



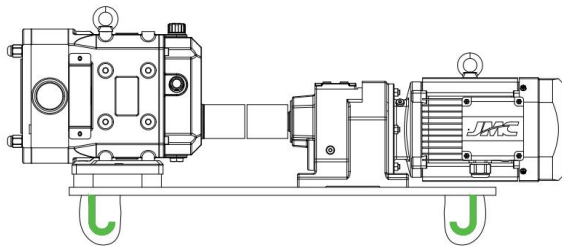
1. Adjustable leg base

The baseplate is fixed with 4 adjustable screws.



2. Portable base

The baseplate is fixed with 2 fixed wheels and 2 universal Wheels.



3. Fixed base

The pump unit permanently installed on foundation by setscrews.

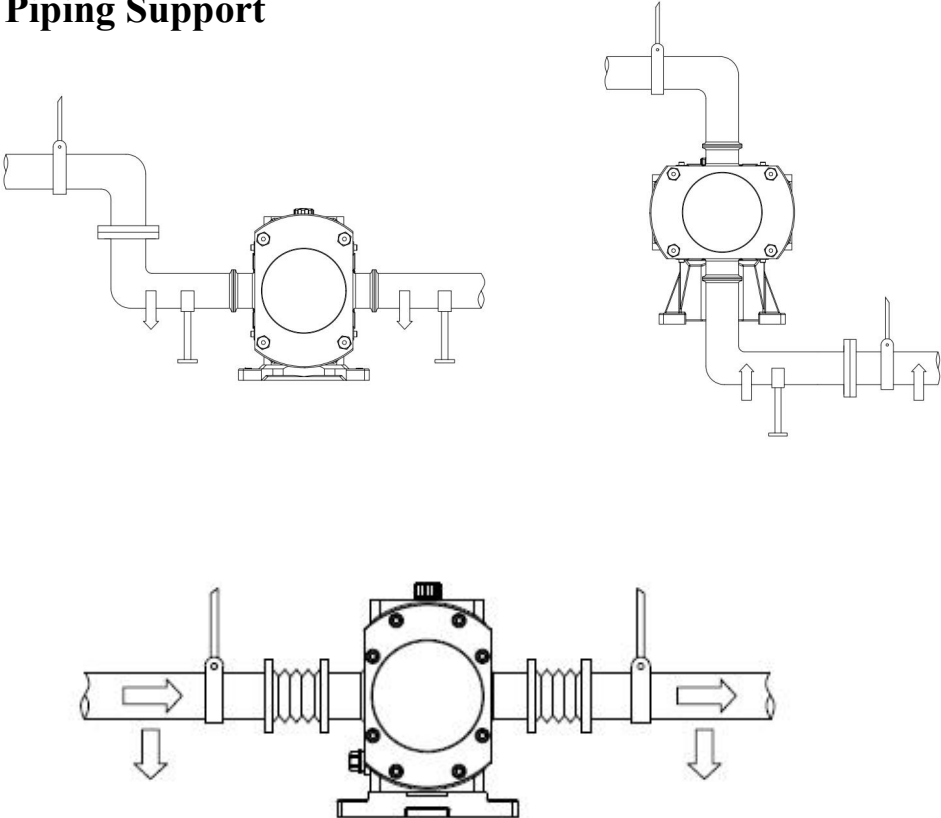
6.7 Pipe system

- Clean the pipes before the installing the pump unit.
- No extra pressure on the pump unit when the pipes connected to it. Make sure the inlet and outlet pipe will not influence the pump installing to the pump baseplate.
- Keep the pipes on level, in case there is residual air in the pipes
- For medium with high viscosity, high position feed method is suggested, which will increase the inlet pressure. The higher viscosity of the medium is , the higher position of the medium tank should be.
- Make sure the vibration of the pipes will not do harm to the pump .

6.7.1 Connections types between the pump and pipes

- Hoop connection (ISO/SMS/DIN)
- Flange connection
- Screw connection(DIN/ISO/SMS/NPT)

6.7.2 Piping Support



To minimize forces exerted on the pump, support all piping to the pump independently with hangers or pedestals. Such forces can cause misalignment of the pump parts and lead to excessive wear of rotors, bearings, and shafts.

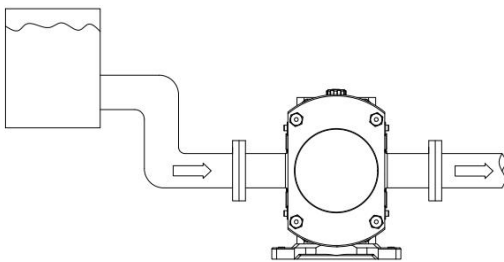
The above pictures show typical supporting methods used to independently support each pipe, reducing the weight effect of piping and fluid on the pump.

6.7.3 Inlet and outlet expansion joints

Thermal expansion of piping can cause tremendous forces. Use thermal expansion joints to minimize these forces on the pump.

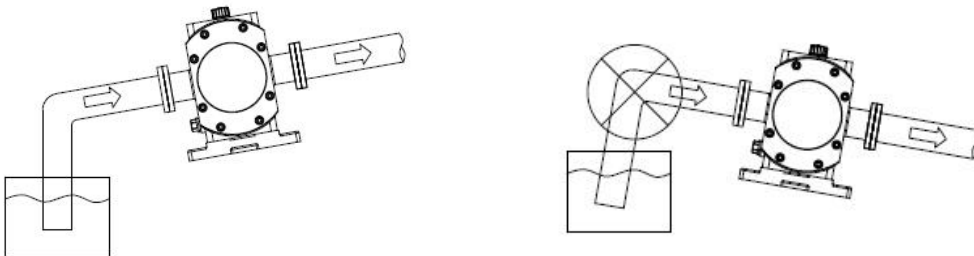
Flexible joints can be used to limit transmission of mechanical vibration. Ensure that the free ends of any flexible connections in the system are anchored.

6.7.4 Medium tank position



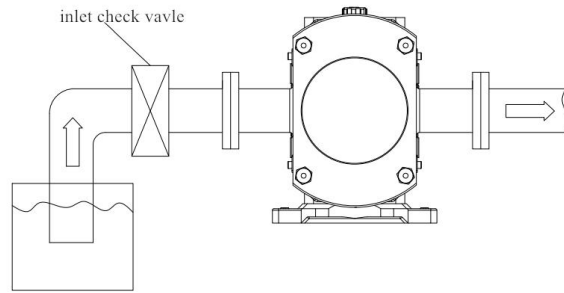
Install the pump below the medium tank to reduce the air in the system by flooded suction.

6.7.5 Pump above the liquid level



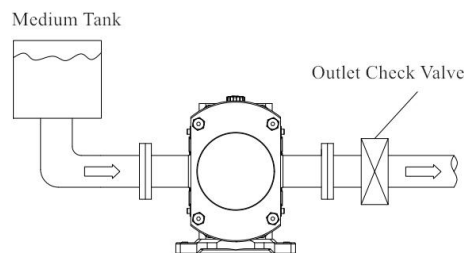
If the pump is installed above the supply liquid level, the piping on the inlet side must slope up toward the pump, preventing air pockets in the pipes

6.7.6. Install Inlet Check Valve



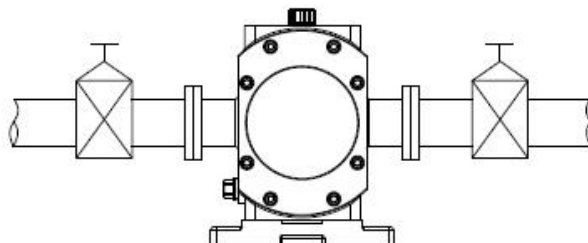
Use check valves to keep the inlet line full, particularly with low-viscosity fluids.

6.7.7 Install Outlet Check Valve



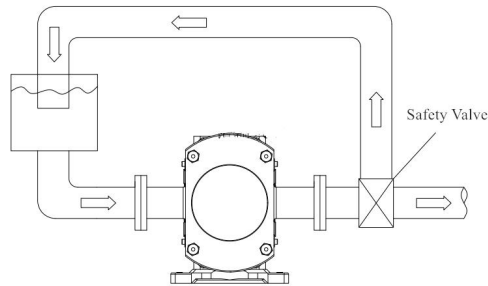
For systems with liquid under a vacuum, install a check valve on the discharge side of the pump. The check valve prevents backflow (air or fluid) to aid in the initial start-up by minimizing the required differential pressure supplied by the pump to start the flow.

6.7.8 Install Isolation Valves



Isolation valves permit pump maintenance and safe pump removal without draining the system.

6.7.9 Install Safety Valves



Install safety valve to protect the pump and piping system against excessive pressure. We recommend installing an external safety valve designed to bypass fluid from the pump outlet to the inlet side of the system.

6.7.10 Install Pressure Gauges

Pressure and vacuum gauges provide valuable information about pump operation . Wherever possible, install the gauges to help provide information on the following:

- Normal or abnormal pressures
- Indication of flow
- Changes in pump condition
- Changes in system conditions
- Changes in fluid viscosity

6.8 System design and installation

When a pump is to be incorporated in a system, it is considered good practice to, as far as possible, minimise the length of the pipes and the number of pipe fittings (tees, unions, bends etc.) and the restrictions. When designing the suction lines, particular care should be taken. These should be as short and straight as possible, using a minimum of pipe fittings to achieve a good product flow to the pump. Always consider the following when designing a system:

1. Ensure there is space enough around the pump to allow for:
 - a) Routine check and maintenance of the complete pump unit, seal area,

drive motor, etc.

- b) Good ventilation for the drive to avoid overheating.
2. Both the suction and the discharge ports must be provided with valves.
3. During check- up procedures or maintenance work, the pump must be isolated from the system.
4. The system design, pipes and other equipment must have independant supports to avoid heavy loads on the pump. In the case of pipe work or other equipment relying on the pump fixings for support, there is a big risk for serious damage to the pump.
5. For positive displacement pumps as LIGAO it is recommended to install some safeguards, for example:
 - a) External pressure relief valve system for recirculation to tank or suction side of the pump.
 - b) Torque device in the system, mechanical or electrical.
6. It is considered good practice to thoroughly clean all pipework and associated equipment from the suction port to the discharge port before installation of pump. This is to avoid the risk of debris entering the pump and causing damage.
7. If possible, pressure gauges should be placed at the suction port and the discharge port of the pump.
8. It is very important that the suction condition at the pump inlet meets the NPSH required of the pump. Failure to observe this can cause cavitation, which leads to a noisy operation, reduced flow and mechanical damage on the pump and associated equipment.

The NPSH available from the system must always exceed the NPSH required by the pump. If the following guidelines are observed it should ensure the best possible suction conditions.

 - a) The suction line should have at least the same diametre as the pump connections.
 - b) The suction line should be as short as possible.
 - c) Use a minimum of bends, tees and pipework restrictions.
 - d) If a filter is used on the suction pipe, check pressure drop at the actual flow. This is important to avoid cavitation which can damage the pump.
8. When installing a pump complete with drive motor and baseplate the following guidelines must be observed:
 - a) The most suitable drive for the LIGAO pumps is to use a motor with direct coupling. Please contact your local distributor if using some other method.
 - b) Flexible couplings must always be used and aligned correctly within the limits recommended by the coupling manufacturer. Turn the shaft at least one full rotation to control the alignment of the coupling and that the shaft rotates smoothly.

- c) Couplings must always be enclosed in a suitable guard to prevent contact with rotating parts which could cause personal injury. Such guards must be of suitable material - see point d - and be of sufficiently rigid design to prevent contact with the rotating parts during normal operation.
- d) When installing pump sets in flammable or explosive environments or for handling flammable or explosive media, special consideration must be given not only regarding the security of the drive unit enclosure, but also for the materials used both in couplings and guards to eliminate the risk of explosion.
- e) The baseplate must be secured to a flat level surface to avoid misalignment and distortion. When the baseplate is fastened in position, the alignment must be checked again.
- f) If the pump is driven by an electric motor, check that the motor and other electrical equipment are compatible with the drive and that the wiring is correct, i.e. Direct On-Line, Star Delta etc. Ensure that all components are correctly electrically grounded.

6.9 Safety valve installation

In the equipment pipeline, the safety valve protects the equipment from damage through backflow. In the practical application of the rotor pump, it is possible to use the rotor pump to directly transport the materials to the quantitative output equipment such as the filling machine or high-pressure pump (such as homogenizer). In this case, if the discharge port of the rotor pump is directly connected to the inlet of the next level equipment without any protective measures in the middle, the conveying capacity of the rotor pump may be greater than that of the next level. The use of class I equipment, resulting in excessive outlet pressure of the rotor pump, pipe expansion or even pipe cracking, and serious damage to the rotor pump.

Solutions to this problem:

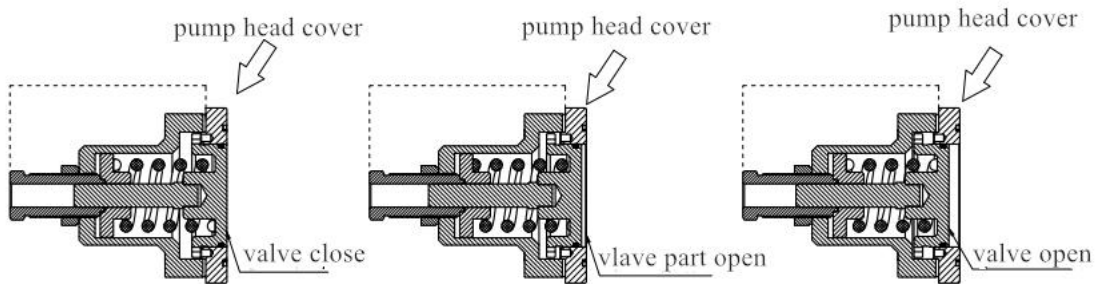
1. Equipped with built-in safety valve
2. Configure external pipeline return safety valve

6.9.1 Built-in safety valve

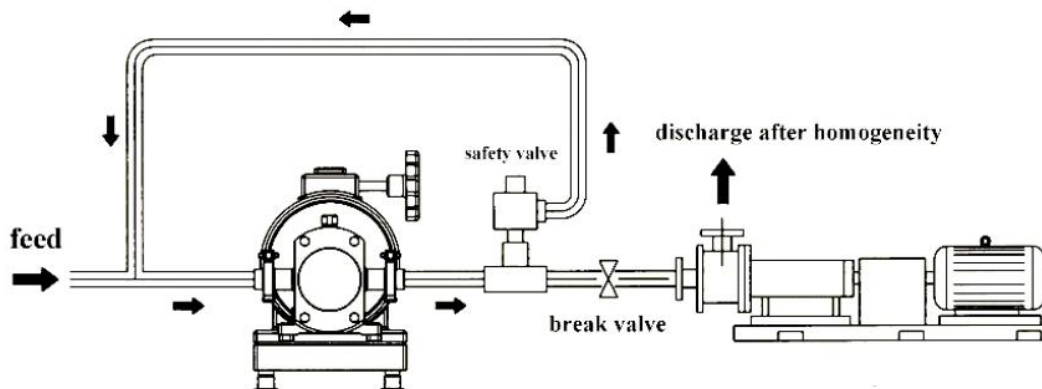
Working principle of built-in safety valve:

The valve seat at the bottom of the built-in safety valve covers the inlet and outlet ends of some pumps, and also covers the front of most rotors. When the pressure in the pump cavity is higher than the safety set pressure of the safety valve, the valve will open, and the materials in the pump cavity will push the safety valve base open by extrusion, so that the inlet end and outlet end of the pump are connected, and some materials circulate in the pump cavity, So as to achieve pressure relief.

The built-in safety valve prevents the pressure from exceeding the set value through the circulating movement of materials in the pump chamber. Due to the long-term circulating movement of materials in the inner chamber, heat will be generated, the temperature will rise, and the temperature will exceed the limit value of the pump, or the liquid will vaporize. These two situations should be avoided. Therefore, the built-in safety valve should be regarded as a safety relief valve rather than a flow control valve.



6.9.2 External pipeline return safety valve

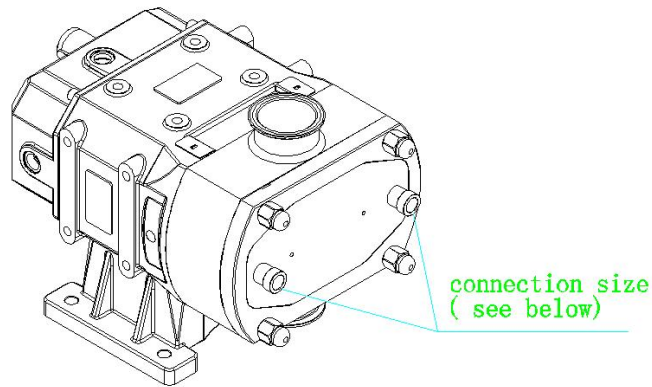


6.10 Jacket

All LIGAO pump can be supplied with jacket. Water and steam jacket and electricity heating jacket are for optional. The heat jacket is mainly used for bringing the medium inside the rotor case on temperature before or after starting up the pump.

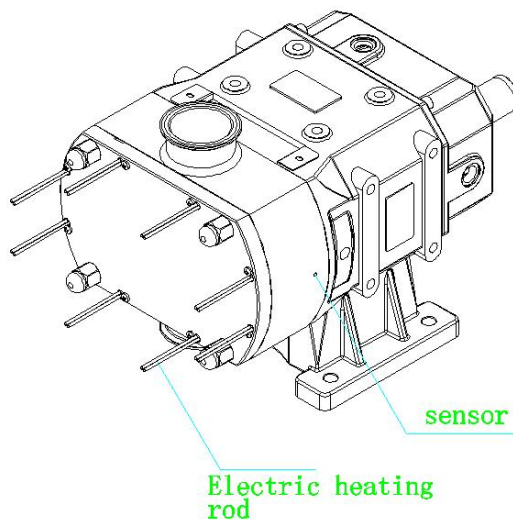
6.10.1 Water or steam jacket

The max pressure for water and steam jacket is 10 bar.



Model	RT006	RT015	RT032	RT070	RT170	RT320	RT510	RT830
Connection	Rc1/2" M thread			Rc1" M thread			Rc1.5" M thread	

6.10.2 Electricity heating jacket



6.11 Mechanical Seal

The shaft seal of rotor pump can adopt single face mechanical seal structure and double face mechanical seal structure.

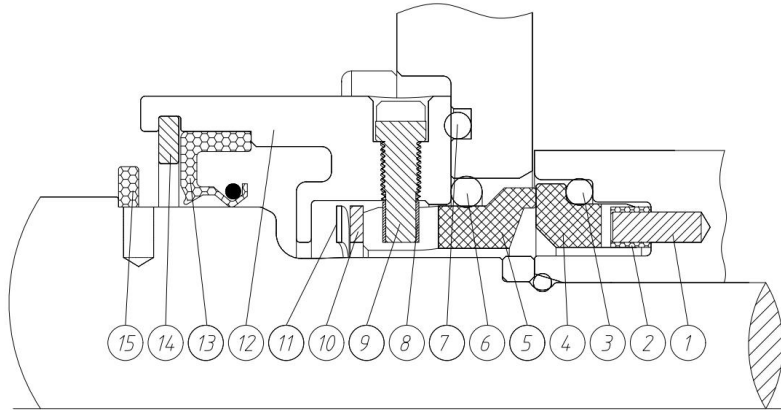
Optional materials for mechanical seal: alloy, silicon carbide, graphite and ceramic.

As the sealing material alloy, silicon carbide, graphite and ceramics are high hardness materials, when the pump is running, the contact surface of the rotary ring and the stationary ring generates great friction, resulting in strong friction heat. When there is medium running, the heat generated by the friction is cooled by the medium in the pump head; When there is no medium passing through, the friction heat will rise sharply, resulting in

the burning of the sealing surfaces of the rotary and stationary rings, affecting the sealing effect and damaging the mechanical seal.

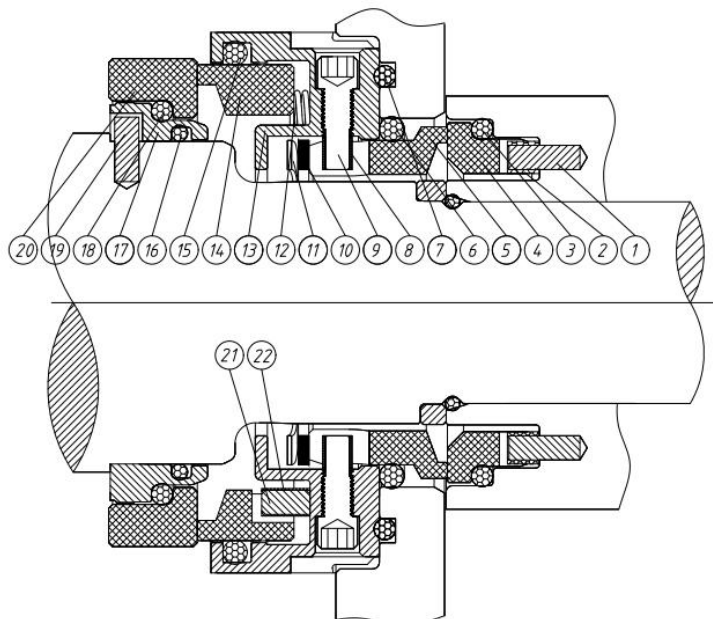
When the material is viscous or has poor fluidity, a water cooling device must be installed.

Structural drawing of single face mechanical seal :



- 1. single face rotary ring drive pin
- 2. Single face protective sleeve
- 3. single face rotary ring O ring
- 4. Single face rotary ring
- 5. single stationary ring
- 6. single face stationary ring O-ring
- 7. single face stationary ring seat O-ring
- 8. single face main sealing protective sleeve
- 9. single face stationary ring anti-rotation screw
- 10. single face wave spring retaining ring
- 11. single face multi-wave spring
- 12. single face stationary ring seat
- 13. skeleton oil seal
- 14. circlips for holes (Type A)
- 15. protective spacer

Structural drawing of double face mechanical seal :



1. Single face rotary ring drive pin 2. single face protective sleeve 3. single end face rotary ring O-ring 4. single face rotary ring 5. single face stationary ring 6. single face stationary ring O-ring 7. double face stationary ring seat O-ring 8. single face protective sleeve 9. double face stationary ring anti-rotation screw 10. single face wave spring retaining ring 11. single face multi-wave spring 12. double face small spring 13. two face stationary ring seat 14. double face stationary ring 15. double face stationary ring O-ring 16. double face sleeve O-ring 17. double face sleeve 18. double face rotary ring O ring 19. double face shaft sleeve drive pin 20. double face rotary ring

7.0 Start up

The following regulations must be observed:

- Make sure that all associated equipment is clean and free from debris and that all pipe connections are secure and correctly sealed.
- The drive shaft and motor shaft should be concentric, or will cause damage to the pump.
- Dry running is forbidden, or it will burn the mechanical seals.
- Check the pump and driving unit lubrication reach the required oil level.
- Check that the valves are completely open on both inlet and outlet and that the pipelines are free from obstructions. Rotor pumps are of the positive displacement type and should therefore never be operated against a closed valve, as this would result in pressure overload, damages on the pump and possibly damage on the pump system.
- Before operating the pump, briefly start and stop it to check the direction of rotation and to make sure that there are no obstructions of the function.
- For sanitary pump, clean it up before start it.

8.0 Shutdown

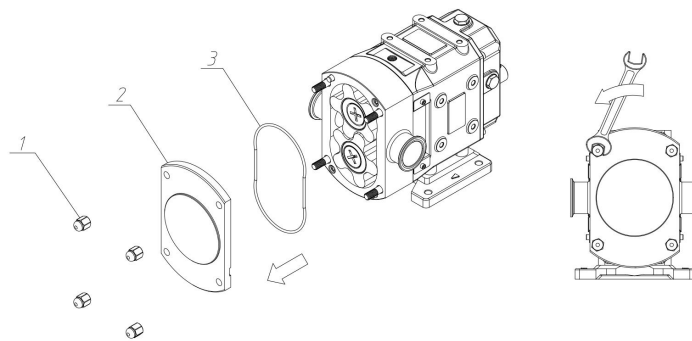
When shutting the pump down the valves on the suction and discharge side must be closed. Following precautions must be taken:

1. Shut off the power and lock the starting device so that the pump cannot be started.
2. The connections for the flushed mechanical seals are shut off. (if with this system)
3. The pipe line is depressurised.
4. Shut off the valves on the inlet and outlet.
5. Empty and clean the pump head.
6. Clean other outside parts of the pump unit.

9.0 Disassembly and assembly

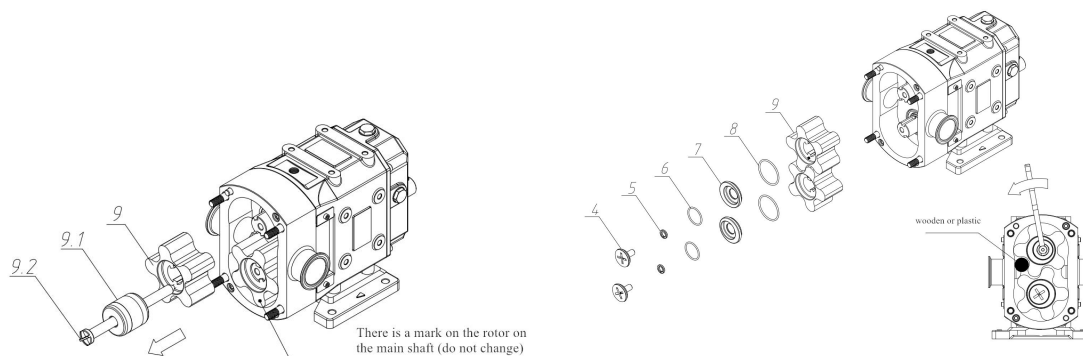
9.1 Disassembly

9.1.1 Disassembly of pump cover



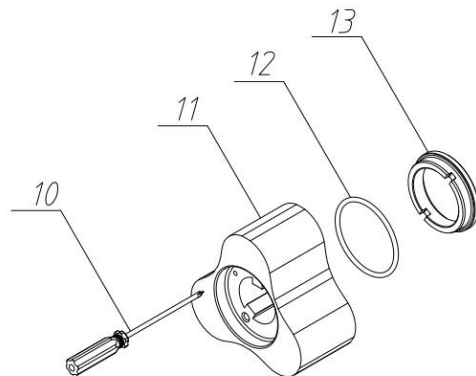
1. Use an open-end wrench to loosen the pump cover nut (1) to remove the pump cover (2), take out the O-ring (3) from the pump cover, and check whether the O-ring is intact. 2. After opening the pump cover, check the condition of the parts in the pump cavity and remove the sundries in the pump cavity.

9.1.2 Disassembly of rotor



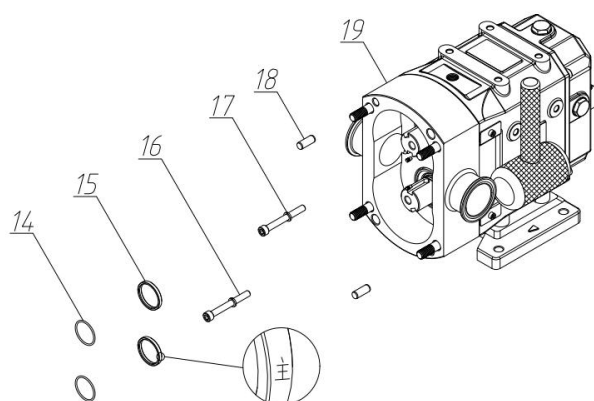
1. Insert a piece of plastic or wood between the two rotors to prevent the rotor from rotating, and use a special rotor disassembly tool to loosen the rotor screws. 2. Remove the rotor screw (4), take out the spring washer (5), rotor screw O-ring (6), eccentric washer (7), eccentric washer O-ring (8), and check whether the O-ring is intact. 3. The upper plane of the rotor has threaded holes for taking out. You can use a special rotor disassembly tool to pull out the rotor (9).

9.1.3 Disassembly of mechanical seal rotary ring



Use a screwdriver (10) to push out the mechanical seal moving ring (13) and O-ring (12) on the rotor (11), and check whether the end face of the moving ring and the O-ring are intact.

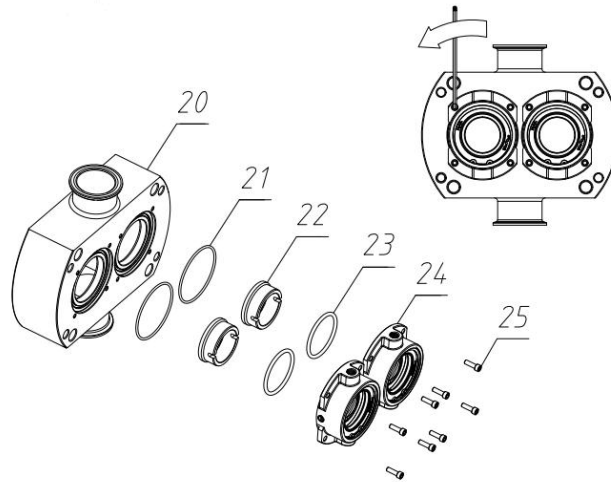
9.1.4 Disassembly of pump head



1. Remove the rotor adjusting washer O-ring (14) and the rotor adjusting washer (15).
2. Use a special tool to pull out the two positioning pins (18).
3. Remove the screw (16) and spring washer (17)

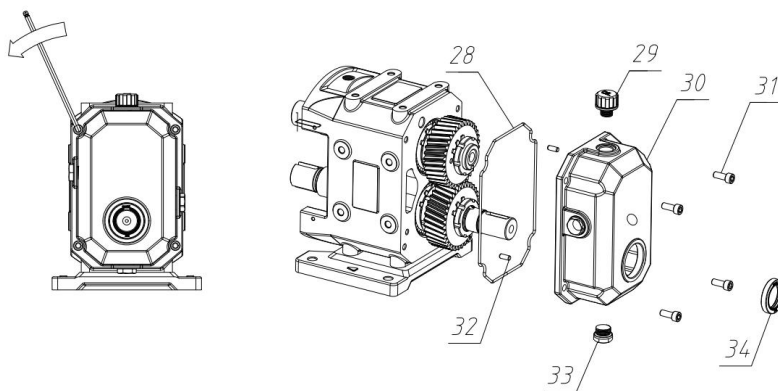
5. Use a hammer to gently knock the inlet and outlet pipes of the pump head (19), remove the stainless steel pump head (19), avoid the pump head colliding with the shaft when disassembling the pump head, and be careful to damage the mechanical seal.

9.1.5 Disassembly of mechanical seal stationary ring



1. Unscrew the screw (25).
2. Remove the single face stationary ring seat (24) from the pump body (20), and take out the single face stationary ring seat O-ring (21), stationary ring (22) and stationary ring O-ring (23), It is best not to disassemble the stationary ring assembly in the single face stationary ring seat. If the stationary ring and O-ring are worn, please replace the parts in time.

9.1.6 Disassembly of rear box cover

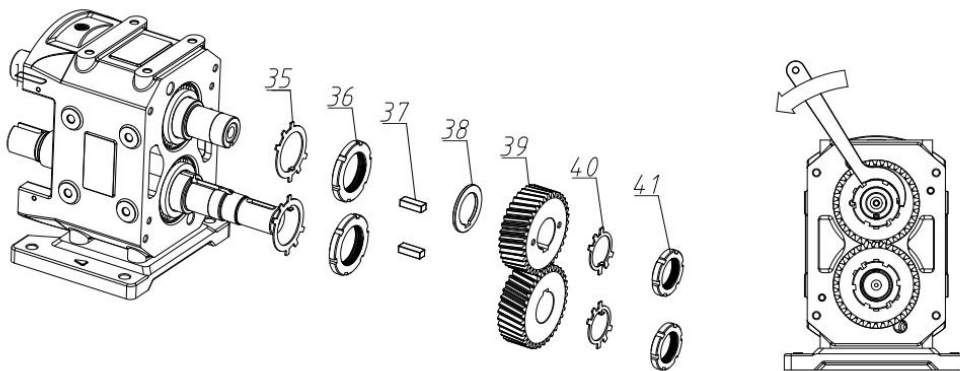


1. Before disassembling the rear box cover (30), first unscrew the vent cap (29) on the rear box cover (30) and the plug (33) under the rear box cover.

The oil is vented.

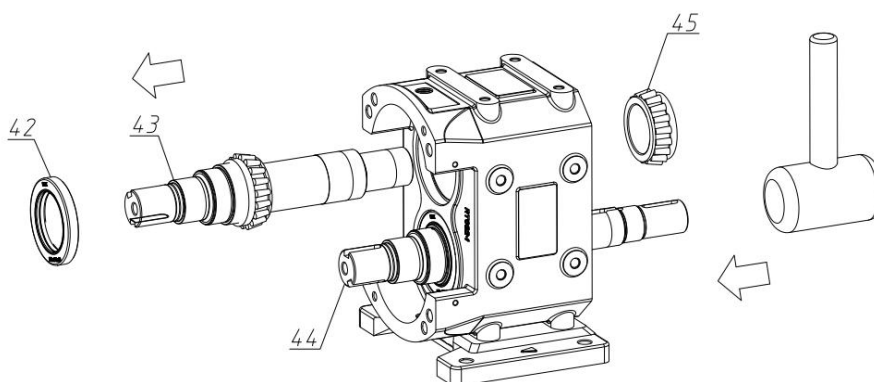
2. Unscrew the hex screw (31).
3. Remove the rear cover (30), take out the O-ring (28) on the rear cover, and check whether it is in good condition.
4. Knock out the rear box cover skeleton oil seal (34), and it is recommended to replace the new skeleton oil seal when reinstalling.
5. Use strong pliers to pull out the positioning pin (32)

9.1.7 Disassembly of gear



1. Use a round nut hook wrench to unscrew the gear round nut (41), and take out the stop washer (40).
2. Use a special tool to pull out the gear (39) and take out the gear adjustment washer (38).
3. Pull out the flat key (37).
4. Continue to use the round nut hook wrench to unscrew the bearing round nut (36), and take out the stop washer (35).

9.1.8 Disassembly of shaft



1. Knock the main shaft (44) and the back end of the counter shaft (43) with a soft hammer, take out the main and counter shafts from the front of the box, pay attention to excessive force when striking, so that the shaft

and the bearing inner ring (45) fall to the ground and bump .

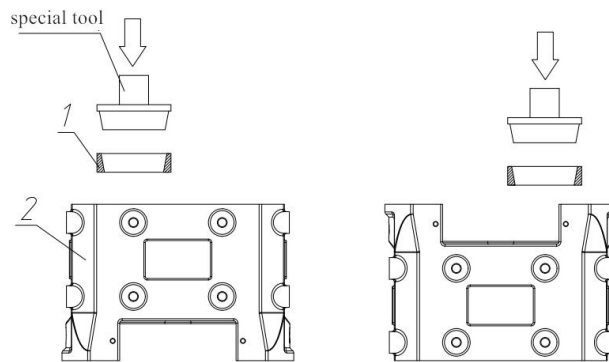
2. Remove the skeleton oil seal (42) on the shaft, and it is recommended to replace it with a new skeleton oil seal when reinstalling.

9.2 Assembly

Preparation before assembly:

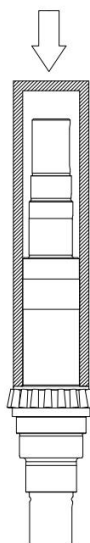
1. Check the assembled parts and purchased parts. If you find that it does not meet the requirements, please exchange it.
2. Use clean kerosene to do a thorough cleaning, and remove burrs and oil stains in time. The cleaned parts should be placed on a clean installation table.

9.2.1 Assembly of bearing outer ring



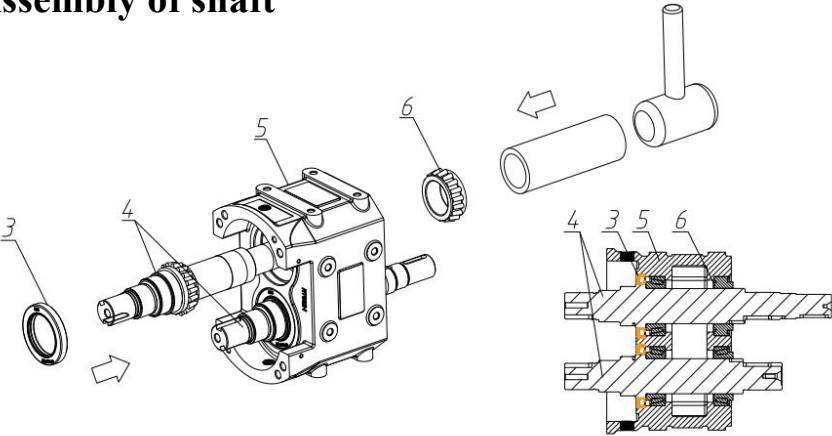
Brush the bearing hole of the box (2) with lubricating oil, and knock the outer ring of the bearing (1) into the box with a special tool.

9.2.2 Assembly of bearing inner ring



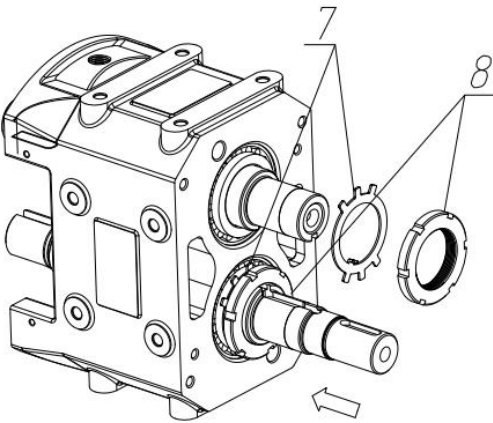
Erect the front ends of the main and auxiliary shafts downwards, heat the inner ring of the bearing to 90C°-100C° with an electromagnetic heater, then take out the inner ring of the bearing and insert it into the shaft file, tap it with the sleeve to ensure that the bearing is inside The ring is assembled in place.

9.2.3 Assembly of shaft



1. Insert the main shaft and the counter shaft (4) from the front bearing hole of the box body (5). Brush the lubricating oil on the inner ring of the rear bearing (6) and use the sleeve to knock it into the main and counter shafts.
2. Front bearing frame oil seal (3) Use special tools to press into the front frame oil seal hole.

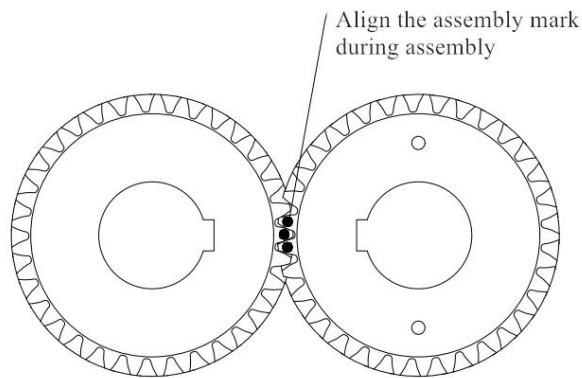
9.2.4 Assembly of round nut



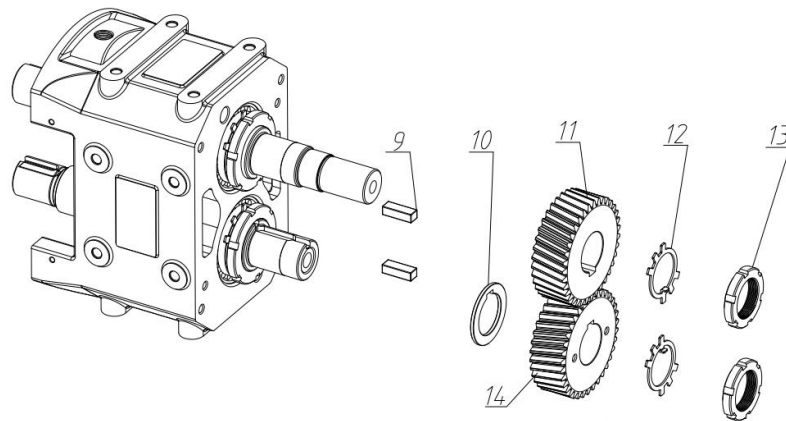
Put the round nut washer (7) into the rear end of the rear bearing, and tighten the round nut (8) with a torque wrench (see the table for tightening torque).

9.2.5 Assembly of helical gear

The work of disassembly the must be carried out by qualified worker.
The following points must be observed:



1: The gear used in the rotor pump is a hardened helical gear. When installing the paired left and right spiral helical gears, you must pay attention to the marks on the gears to ensure that the mark on one gear is in the middle of the two marks on the other gear.



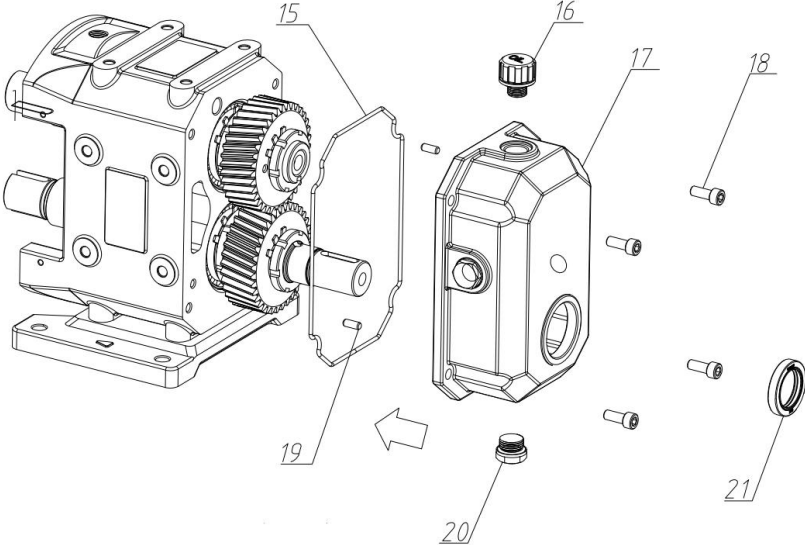
2: Adjust the thickness of the washer (10) to adjust the gap between the rotors. The adjustment washer size has been debugged before leaving the factory, please do not replace it privately. If it is lost or damaged, please contact the manufacturer in time.

1. Knock the pin (9) into the keyway of the main and counter shafts.
2. Put the adjusting washer (10) on the counter shaft.
3. Set the gear (11) into the main shaft and knock it in place with a copper

rod, and put on the thrust washer and round nut. The round nut is tightened with a torque wrench.

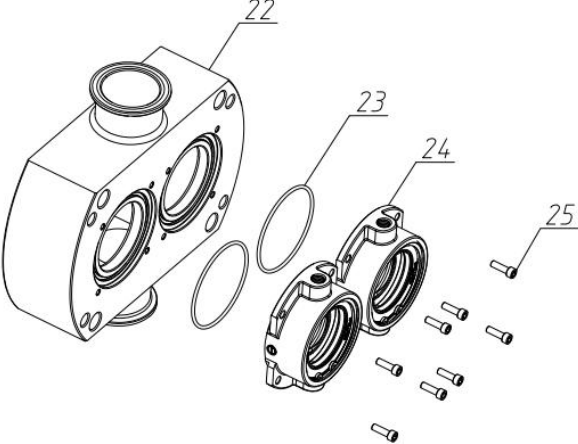
4. Set the gear (14) into the countershaft. After the marks between the left and right rotating gears are aligned, use a copper rod to knock them in place, and put on the thrust washers and round nuts. The round nut is tightened with a torque wrench.

9.2.6 Assembly of gear box

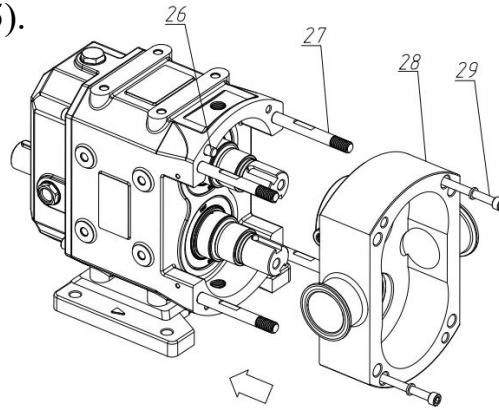


1. Knock the positioning pin (19) into the positioning pin hole of the box.
2. Blow the inside and outside of the rear box cover (17) with compressed air, and apply a little lubricating oil to the 0-ring groove of the rear box cover (17), and insert the 0-ring (15) into the groove.
3. Install the rear case cover to the case body according to the position of the positioning pin, and fasten the rear case cover to the gear case with screws (18), tighten the oil plug (20), oil mirror and other parts.
4. Knock the skeleton oil seal (21) into the rear cover.

9.2.7 Assembly of mechanical seal stationary ring seat and pump body

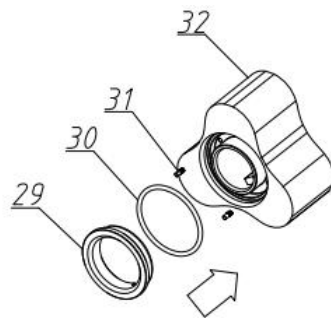


1. Before assembling the stationary ring seat of the mechanical seal, all parts must be cleaned to ensure that no impurities enter.
2. Apply a little grease to the O-shaped groove of the pump body (22), and insert the O-ring (23) into the groove.
3. Fix the two mechanical seal stationary ring seats (24) on the pump body (22) with screws (25).

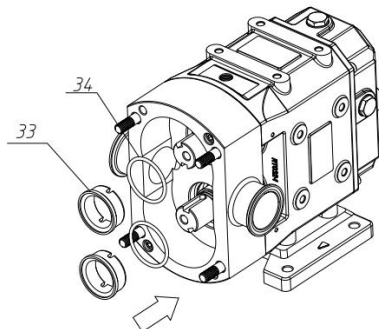


4. Place the box assembly on the workbench and wipe the end surface with a clean cloth. Align the upper and lower positioning holes and use a soft hammer to knock the positioning pins (26) into the holes, and at the same time, lock the pump head screws (27) to the box respectively.
5. Push the pump body (28) horizontally to connect with the box body, and tighten and fix it with screws (29).

9.2.8 Assembly of rotary ring and stationary ring

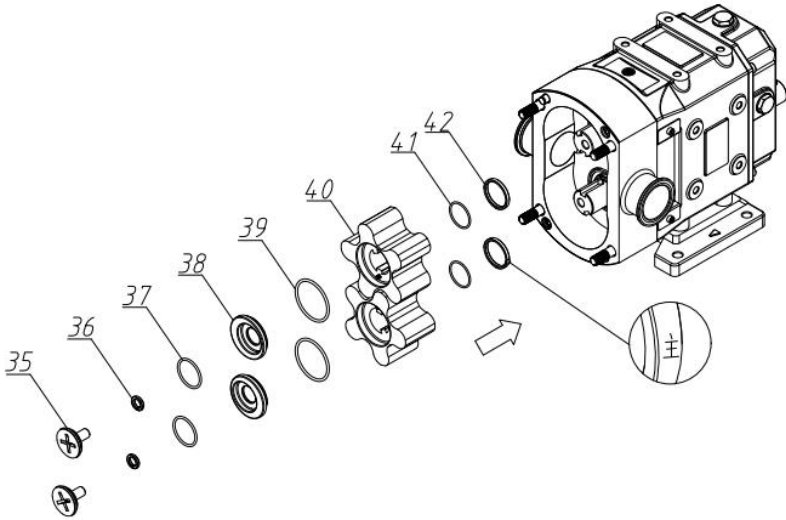


1. Knock the positioning pin into the pin hole of the rotor (32).
2. Apply grease to the surface of the O-ring (30), then insert the rotary ring (29), and press it into the rotor groove together.



3. Apply grease to the surface of the 0-ring (34), then insert the stationary ring (33), and then insert into the stationary ring seat on main and counter shafts . (Note: Check whether the opening groove of the stationary ring is aligned with the pin of the stationary ring seat and whether it is installed in place.)

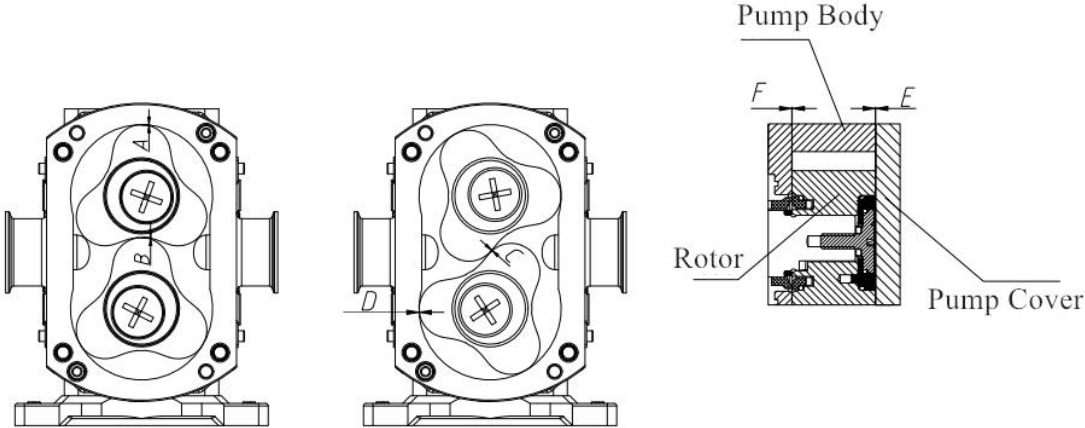
9.2.9 Assembly of rotors



Note: The thickness of the rotor adjustment washer (42) is used to adjust the gap between the rotor and the pump body. The adjustment washer size has been debugged before leaving the factory, please do not replace it privately. If it is lost or damaged, please contact the manufacturer in time.

1. Set the rotor adjusting washer (42) into the main and counter shafts.
2. Sleeve O-ring (41) into the main and counter shafts.
3. Rotor (40), eccentric washer 0-ring (39), eccentric washer (38), rotor screw 0-ring (37), rotor screw (35), install them in sequence.

9.2.10 Rotor clearance adjustment



- A: Clearance between rotor and pump cavity
- B: Clearance between rotor tip and root
- C: Clearance between rotor and rotor
- D: Clearance between the rotor and the bottom surface of the pump cavity
- E: Clearance between the rotor and the pump cover

Standard rotor clearance (mm)

Model	A	B	C	D	E
RT006	0.15	0.15	0.2	0.2	0.2
RT015	0.15	0.15	0.25	0.2	0.2
RT032	0.175	0.18	0.3	0.2	0.2
RT070	0.2	0.2	0.35	0.2	0.2
RT170	0.25	0.25	0.4	0.25	0.25
RT320	0.25	0.3	0.4	0.25	0.25
RT510	0.25	0.3	0.4	0.25	0.25
RT830	0.25	0.3	0.4	0.25	0.25

10.0 Maintenance

10.1 Daily cleaning:

- ◆ The pump should be cleaned frequently to prevent the medium from solidifying in the pump.
- ◆ If the pump is opened for cleaning, the power supply must be disconnected before disassembling the pump.
- ◆ The cleaning cycle depends on the medium and operating mode.

The pump should be cleaned in the following situations:

- A) Use the pump for the first time;
- B) If the pump is placed in a humid environment for a long time, the parts may be dirty or corroded;
- C) After running, it is impossible to run again in a short period of time;
- D) Before running after a long time;
- E) After temporarily stopping the pump, if the ambient temperature is too low, the medium in the pump may freeze. The medium in the pump must be emptied and cleaned. Especially for pumps installed outdoors, the medium is prone to solidification or hardening and must be cleaned.

It is recommended to clean as follows:

- Connect the tap water pipe for initial washing to wash away the residual medium left on the pump;
- Clean with 1-2% sodium hydroxide at a temperature of 60°-80° for 10-20 minutes;
- Rinse with clean water for 5-10 minutes;
- Clean with 1-1.5% nitric acid solution at 50-70° temperature for 5-10 minutes;
- Finally rinse with clean water for 5-10 minutes.

10.2 Seals change

There must be no scratches or bruises on the surface of the seal ring of the pump, otherwise it will affect the sealing effect of the pump. If there are scratches or bruises, it should be replaced in time.

For mechanical seals, due to the corrosion of the pressure and the conveying medium, and the wear of particles in the medium, if you are not careful, leakage is likely to occur. Once a medium leakage occurs, it should be shut down and repaired in time. :

- ◆ If the sealing contact surface is flat visually, wipe the sealing surface with a soft and clean cotton cloth, and then apply a layer of glycerin. After assembling, rotate it manually, and turn it on only after it feels dexterous.
- ◆ If cracks or bruises are found, the parts should be replaced in time.

10.3 Lubrication system:

For the gears and bearings in this pump, good lubrication conditions must be maintained, and the level of lubricating oil in the gear box should be checked regularly to ensure a pure, clean and appropriate amount of lubricating oil.

Regularly observe the vibration and temperature of the pump, which can tell whether the bearing is normal.

The user must check the oil level of the lubricating oil before using it and change the lubricating oil regularly. Generally, it is recommended that the lubricating oil be replaced after 150 hours of operation during the first use, and replace per 6 months to one year after that according to working condition.

10.3.1 Recommended oil

Pump head, reducer gear box:

When the environment or working temperature is low, use medium-duty industrial gear oil L-CKC220 (ISO VG220);

At room temperature, use medium-duty industrial gear oil L-CKC320 (ISO VG320);

When the environment or working temperature is high, use medium-duty industrial gear oil L-CKC460 (ISO VG460);

Stepless speed:

Use special traction oil UB-1 or UB-3.

10.4 Electrical system

Electrical work must be carried out by the user's electrical engineer in accordance with relevant regulations. Apparatus, substances or gases that damage the insulation are not allowed to be stored around the pump. At the same time, it must be ensured that the operating environment of the pump is in a dry environment. If it is unavoidable, moisture-proof facilities should be added.

10.5 Change of Wetted part seals

Materials for wetted part seals:

Viton FPM

Silicone rubber PVMQ

Fluorosilicone rubber FVMQ

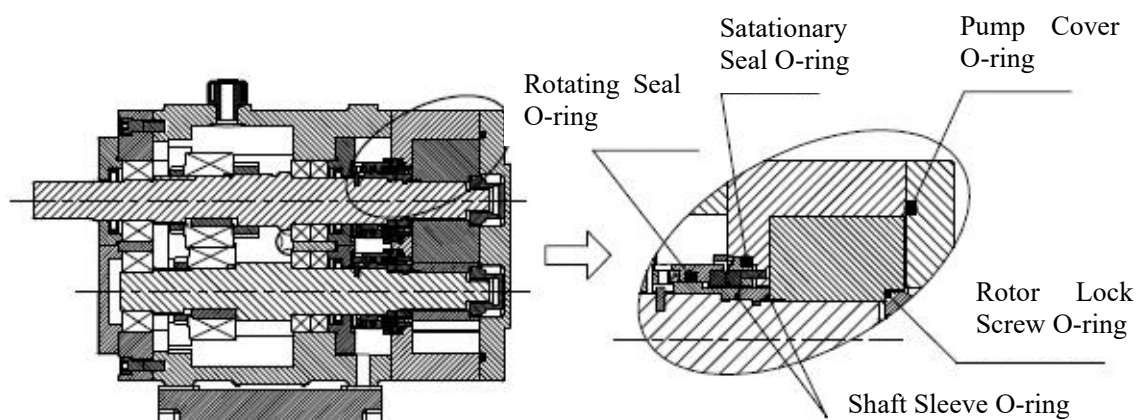
EPDM(E)

EPDM food grade EPDM-FDA

Full PTFE or PTFE coated

NBR

Due to the characteristics of the material or the O-ring at the over-flow part of the pump, the sealing ring must be replaced when it is aging, damaged, or corroded. Otherwise, the sealing effect of the pump will be affected. For the replacement operation steps of the sealing ring, see Section 9 Disassembly and Assembly.



The following tips to be observed when change the O-ring:

1. When disassembling the O-ring, pay special attention not to touch the thread, to prevent the O-ring from being scratched, and to ensure that the O-ring is installed in the groove without twisting.

2. It is recommended to lubricate the O-ring seal with a suitable lubricant, such as soapy water, to prevent the O-ring from being scratched. Pay special attention to the O-ring in the mechanical seal. Scratches, cracks and other defects are never allowed. .

3. O-rings made of PTFE or PTFE should be heated in hot water at 60°C ~ 80°C before installation. The heated O-rings are softer and easier to install.

Specification list of wearing parts:

Name	Pump Cover O ring	Eccentric washer O-ring	Rotor screw O-ring	Sleeve O-ring	Rotary ring O-ring	Stationary ring O-ring	Stationary ring seat O-ring	Rear box cover O ring	Mechanical seal skeleton oil seal	Gear box frame oil seal	Back box cover skeleton oil seal	
Specification	RT006	110x3.1	/	21x2.0	/	26x3.5	30x3.1	/	128x2.5	/	32x50x8	17x30x7
	RT015	135x3.55	40x2.65	25x2	23.6x1.8	40x2.65	40x3.1	53x2.65	150x3.0	40x55x7	42x65x7	27x40x7
	RT032	170x4	52x3.1	35.5x26.5	32x2	52x3.1	52x4.0	70*2.5	195x3.0	50x70x8	32x47x8	55x80x10
	RT070	212x5.3	64x3.5	45x2.65	41.5x2	64x3.5	64x4.5	85x3.0	245x3.0	60x85x10	65x105x12	42x60x10
	RT170	270x5	/	60x3.1	50x2	76x3.55	75x5	100x3.1	297x4.0	70x100x12	75x120x12	52x72x10

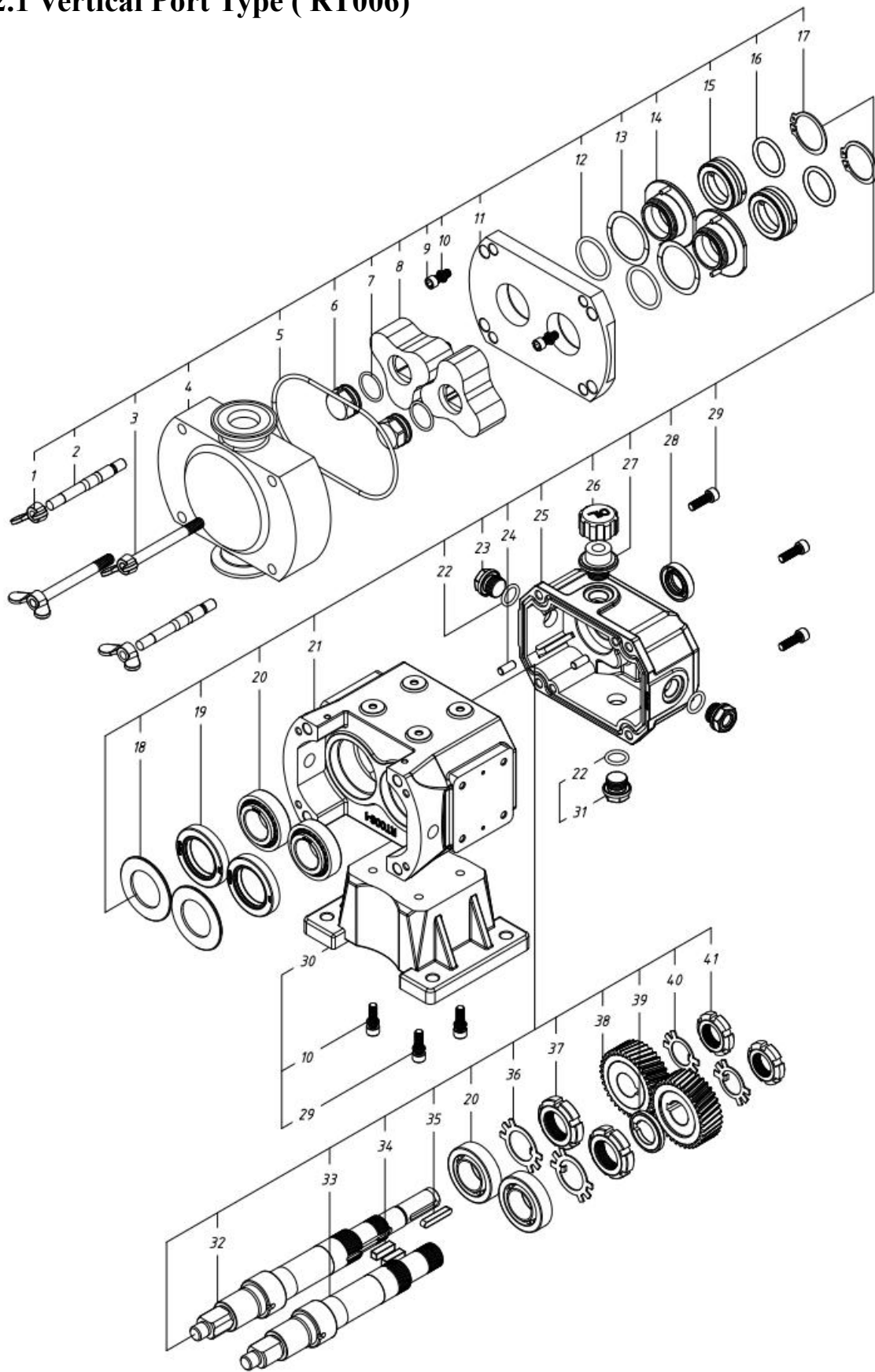
11.0 Troubleshootings

The list is troubleshootings for some problems. If you can still can not handle the problem, contact the manufacture or local dealer for more informations.

	Cannot start	Cannot suck in	Low flow	Low pressure	Flow not in constant	Too much noise	Outlet cavitations	Drive damage	Seal leakage	Pump vibration	Problem	Solutions
					※					※	Pump shaft and motor shaft are not in concentric	Adjust them to be concentric
	※							※			Motor not match the power supply	Check the contract and your power supply
	※						※				Inlet pressure too low	High position feed the medium
	※				※						Big foreign matter block the pump	Clean the foreign matter
					※					※	Too much deposits or hard solid particles in the pump	Clean the pump
	※	※	※	※							Air in the pipes or leakage at the connection joints	Discharge the air and repair the pipes
	※	※	※	※	※						Seal leakage	Clean the seal or replace it
	※	※	※	※							Speed too low	Increase the speed if it is CVT
			※	※	※						Suction too high, suction pipe too long or perfusion pressure too low	Lower the pump installation position
※					※			※		※	Bearing broken	Change the bearing
					※					※	Coupling elastic block wearing	Change the elastic block
								※	※	※	Speed too high	Reduce the motor speed or change the drive system
	※	※	※	※							Medium viscosity too high or proportion too big	Reduce the viscosity or change the drive system
				※							Too much high proportion particles	Reduce the high proportion particles or change the drive system
									※		The mechanical seal material does not in accordance with the medium	Choose the suitable mechanical seal
									※	※	The two mechanical seal surface don't adjust well	Adjust them again according to this manual
		※	※	※	※				※		Mechanical seal seriously damaged	Change the seal
			※	※					※		Mechanical seal spring broken	Change the spring
		※									Outlet pressure too high	Reduce the quantity of outlet valves and bends
					※						Rotor broken	Change the rotor
	※										Filter or inlet pipe block	Cleaning and dredging
		※	※	※			※				Inlet pipe is too slim and long, too many valves and bends	Enlarge the pipe, reduce the length and the quantity of valves and bends
		※	※				※	※			The viscosity of medium is too high to transport	Reduce the speed, change to higher flow rotor
※								※			Reducer broken	Repair the reducer
	※							※			Inlet pipe is closed or blocked	Open the inlet pipe, or dredge the pipe
	※							※			Motor rotation direction is wrong	Adjust wiring, change the motor rotation direction

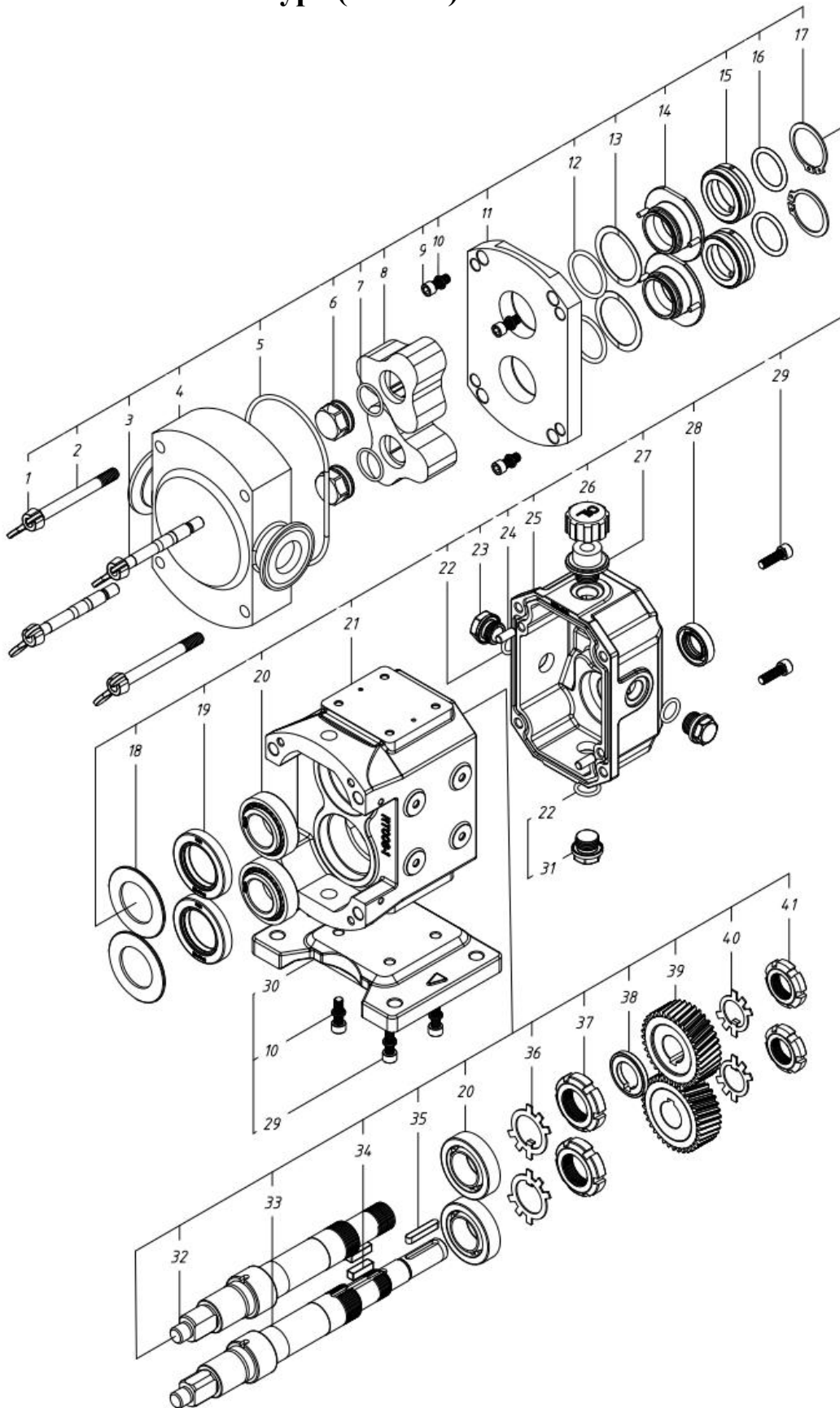
12.0 Drawings and Parts List

12.1 Vertical Port Type (RT006)



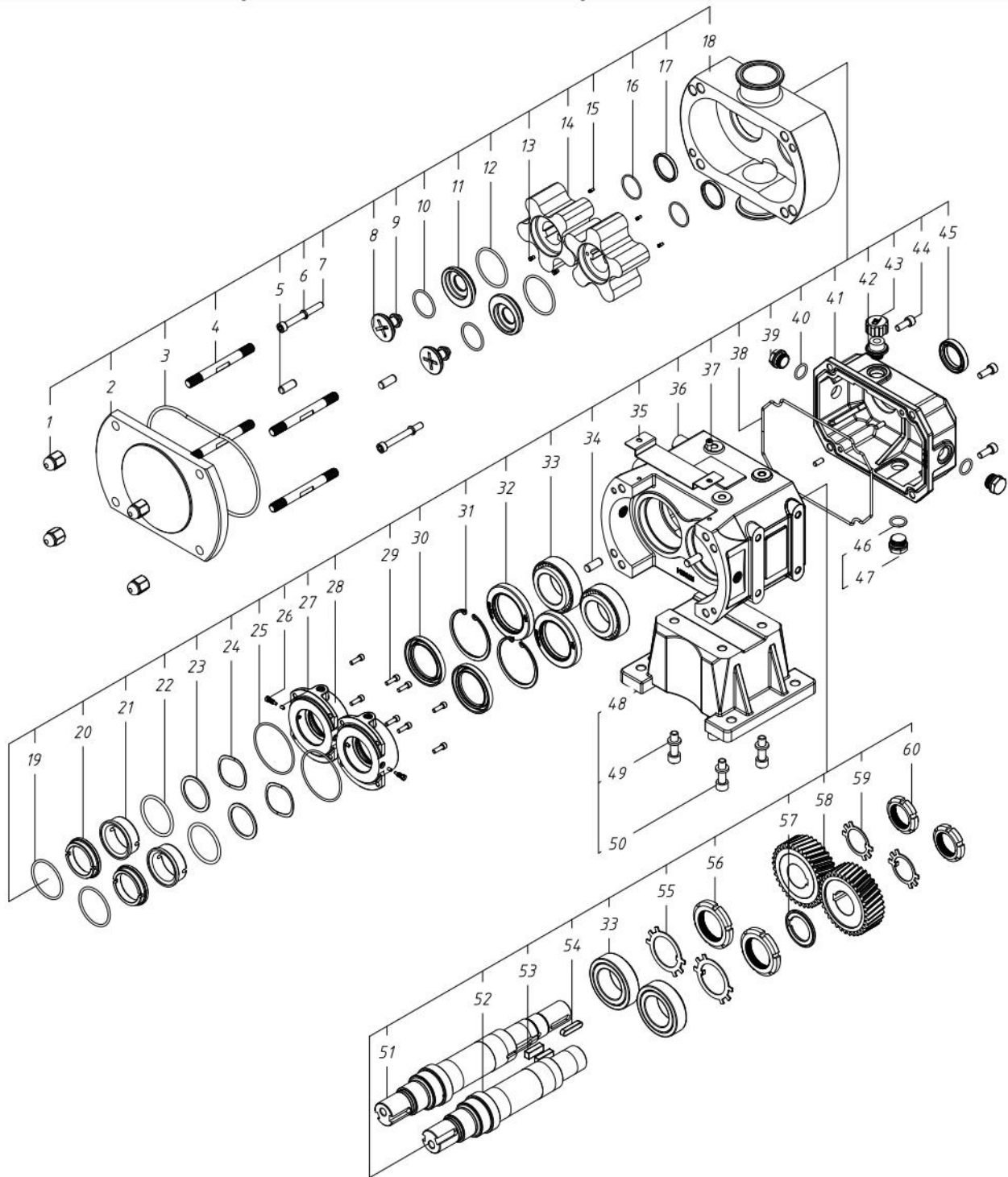
No	Name	Material	qty	No	Name	Material	qty
1	butterfly nut	304	4	22	O ring Φ 14x2.5	NBR	1
2	pump head Position screw	SUS630	2	23	Oil glass	copper	1
3	Hand screw assembly	304	2	24	Cylindrical pin6x15	304	2
4	Pump head	304	1	25	Rear box cover	ZL105	1
5	O ring 110x3.1	EPDM	1	26	Refueling accessories 1 cover	plastic	1
6	Rotor screw cap	316	2	27	Refueling accessories 2 cover	plastic	1
7	O ring Φ 21x2.0	FKM	2	28	Skeletal oil seal Φ 17* Φ 30*7	NBR	1
8	rotors	304	2	29	hexagon screw M6X20	304	8
9	hexagon screw M6X15	304	4	30	Pump base	HT250	1
10	spring washer	304	4	31	Oil blocking	304	2
11	Pump cover	304	1	32	Main shaft	SUS630	1
12	O ring Φ 30x3.1	FKM	2	33	counter shaft	SUS630	1
13	Wave spring	SUS631	2	34	Key 6x6x20 (ends flat)	45	2
14	M seal stationary ring	Alloy	2	35	Key 5x5x30 (ends round)	45	1
15	M seal rotary ring	Alloy	2	36	Non-return washer Φ 25	carbon steel	2
16	O ring Φ 26x3.5	FKM	2	37	Round nut (M25x1.5)	45	2
17	retaining ring	304	2	38	Adjusting washer	45	1
18	Protective ring	PTFE	2	39	Helical gear	20CrMnTi	2
19	Skeletal oil seal Φ 32* Φ 50*8	NBR	2	40	Round nut stop washer Φ 20	carbon steel	2
20	tapered roller bearing 32005	bearing steel	4	41	Round nut (M20x1.5)	45	2
21	Pump body	HT250	1				

12.2 Horizontal Port Type (RT006)



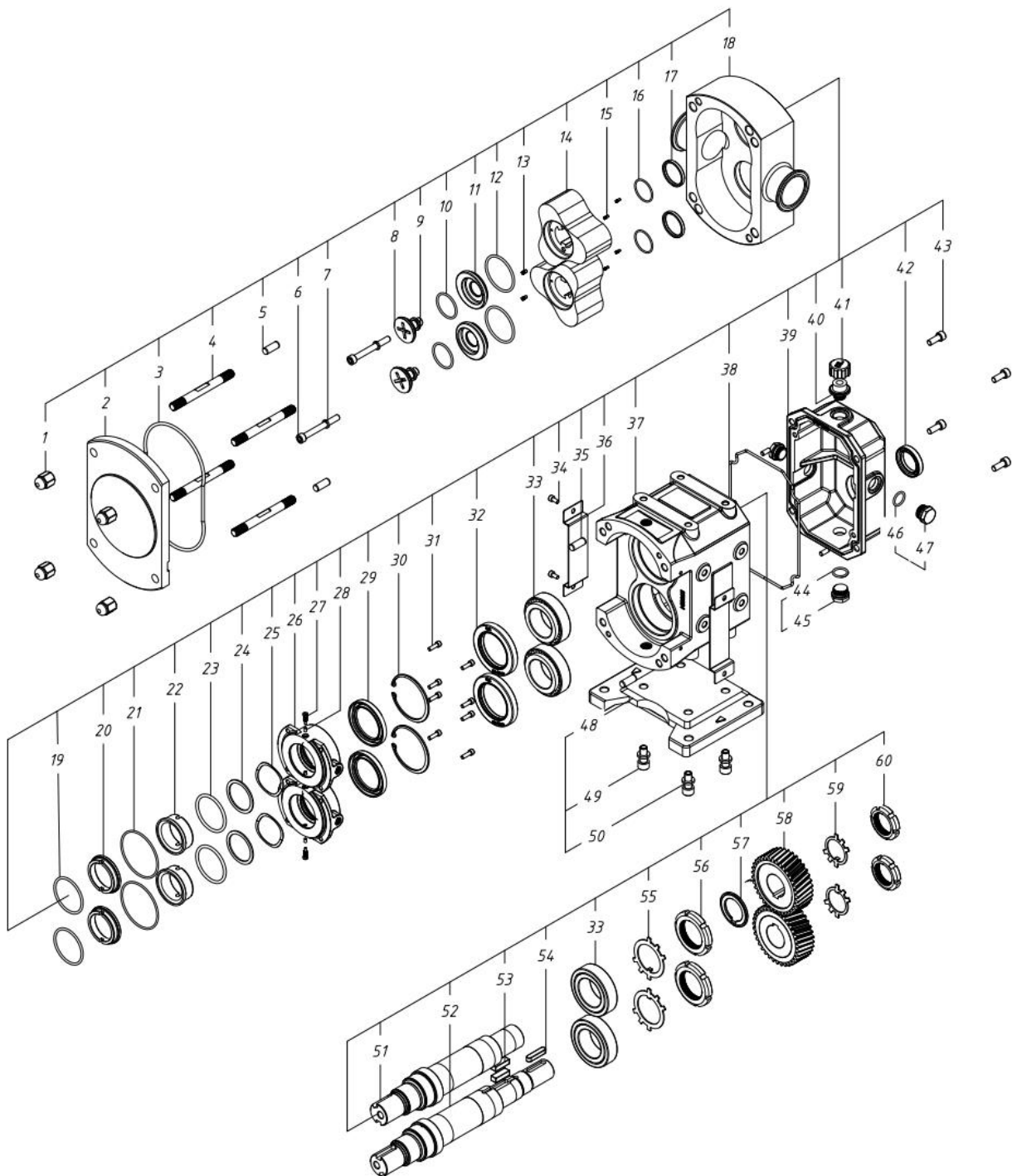
No	Name	Material	qty	No	Name	Material	qty
1	butterfly nut	304	4	22	O ring $\Phi 14 \times 2.5$	NBR	1
2	Hand screw assembly	304	2	23	Oil glass	copper	1
3	pump head Position screw	SUS630	2	24	Cylindrical pin 6×15	304	2
4	Pump head	304	1	25	Rear box cover	ZL105	1
5	O ring 110×3.1	EPDM	1	26	Refueling cover accessories 1	plastic	1
6	Rotor screw cap	316	2	27	Refueling cover accessories 2	plastic	1
7	O ring $\Phi 21 \times 2.0$	FKM	2	28	Skeletal oil seal $\Phi 17 * \Phi 30 * 7$	NBR	1
8	rotor	304	2	29	hexagon screw M6X20	304	8
9	hexagon screw M6X15	304	4	30	Pump base	HT250	1
10	spring washer	304	4	31	Oil blocking	304	2
11	Head cover	304	1	32	Main shaft	SUS630	1
12	O ring $\Phi 30 \times 3.1$	FKM	2	33	counter shaft	SUS630	1
13	Wave spring	SUS631	2	34	Key $6 \times 6 \times 20$ (ends flat)	45	2
14	M seal stationary ring	Alloy	2	35	Key $5 \times 5 \times 30$ (ends round)	45	1
15	M seal rotary ring	Alloy	2	36	Non-return washer $\Phi 25$	carbon steel	2
16	O ring $\Phi 26 \times 3.5$	FKM	2	37	Round nut (M25x1.5)	45	2
17	retaining ring	304	2	38	Adjusting washer	45	1
18	Protective ring	PTFE	2	39	Helical gear	20CrMnTi	2
19	Skeletal oil seal $\Phi 32 * \Phi 50 * 8$	NBR	2	40	Round nut stop washer $\Phi 20$	carbon steel	2
20	tapered roller bearing 32005	bearing steel	4	41	Round nut (M20x1.5)	45	2
21	Pump body	HT250	1				

12.3 Vertical Port Type (RT015/RT032/RT070)



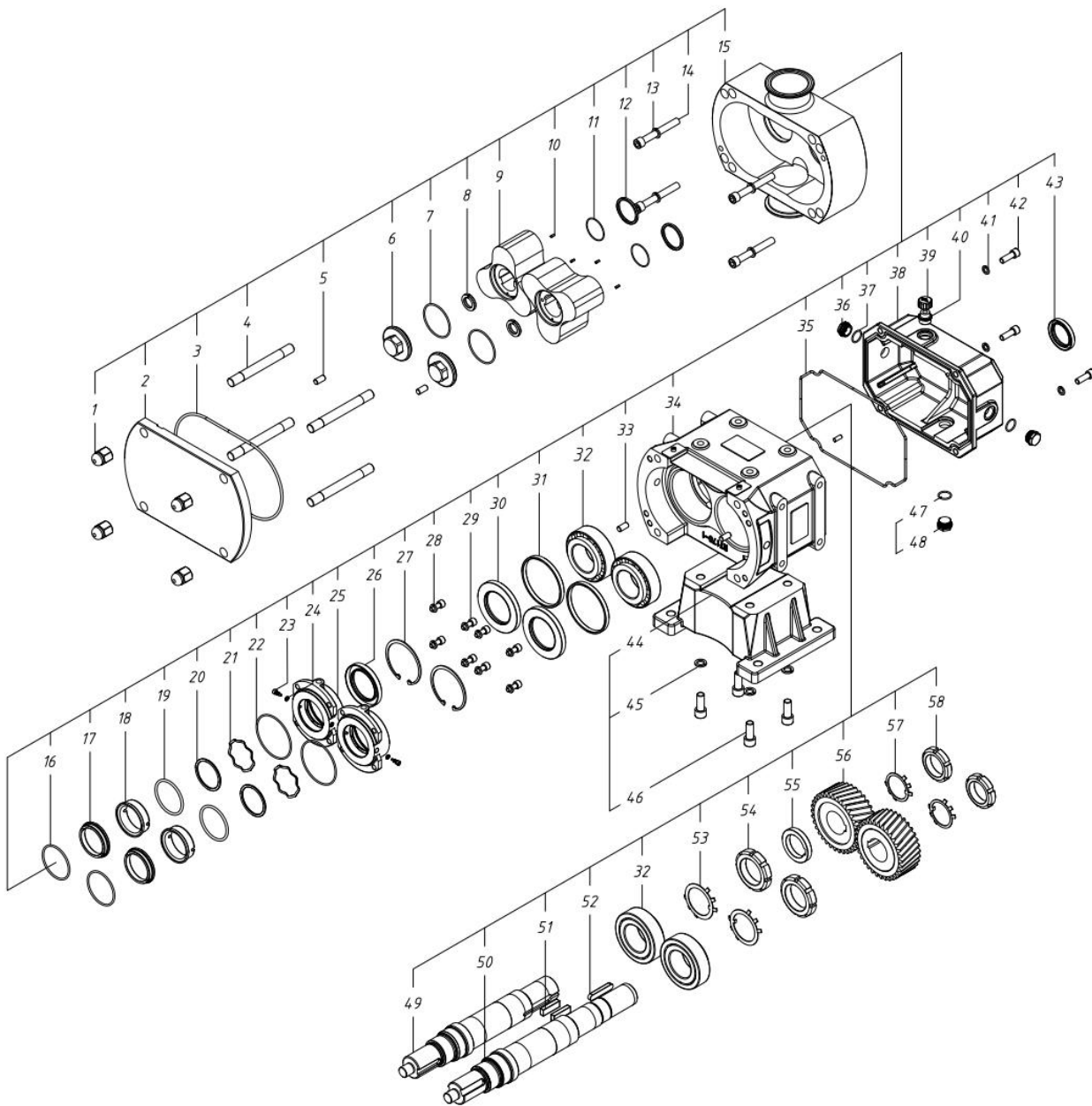
No	Name	Material	qty	No	Name	Material	qty
1	Pump head screw cap	304	4	31	Elastic retaining ring for hole	65Mn	2
2	Pump cover	304	1	32	Box skeleton oil seal	NBR	2
3	Pump cover O ring	FKM	1	33	tapered roller bearing 33009	bearing steel	2
4	Pump head screw	304	4	34	Box cylinder pin	304	2
5	pump cover position pin	304	2	35	dust guard plate	304	2
6	spring washer	304	2	36	Gear box	HT250	1
7	hexagon screw	304	2	37	Hagon screws in dust board	304	4
8	Rotor screw	SUS630	2	38	Rear box cover O ring	NBR	1
9	Rotor-screw-spring gasket	304	2	39	Oil glass	copper	1
10	Rotor screw O-ring	FKM	2	40	Oil glass O ring	NBR	1
11	Eccentricity washer	316	2	41	Rear box cover	ZL105	1
12	Eccentricity washer O-ring	FKM	2	42	Refueling cover accessories 1	plastic	1
13	Eccentricity washer positioning pin	304	2	43	Refueling cover accessories 2	plastic	1
14	Rotor	304	2	44	Rear box cover hexagon screw	304	4
15	Single face rotary ring drive pin	304	4	45	Rear box cover skeletal oil seal	NBR	1
16	Rotor adjustment gasket O ring	FKM	2	46	Block O ring	NBR	2
17	rotor adjusting gasket	304	2	47	Block	304	2
18	Pump head	304	1	48	Pump base	HT250	1
19	Single face rotary ring O ring	FKM	2	49	Pump base hexagon screw	304	4
20	Single face rotary ring	silicon carbide	2	50	Pump base spring washer	304	4
21	Single face stationary ring	Alloy	2	51	Main shaft	SUS630	1
22	Single face stationary ring O ring	FKM	2	52	counter shaft	SUS630	1
23	Single face wave retaining ring	304	2	53	B type key	45	2
24	Single face multi-wave spring ring	SUS631	2	54	A type key	45	1
25	Stationary seat O ring	FKM	2	55	Multi-foot non-return washer	carbon steel	2
26	Single face stationary ring anti-rotating screw	304	2	56	Bearing-fixed round nut	45	2
27	Single face protective cover	PTFE	4	57	adjusting washer	45	1
28	Single face stationary ring seat	304	2	58	helical gear	20CrMnTi	2
29	Single face ring seat screws	304	8	59	non-return washer	carbon steel	2
30	Mechanical seal and skeleton oil seal	NBR	2	60	Gear fixing round nuts	45	2

12.4 Horizontal Port Type (RT015/RT032/RT070)



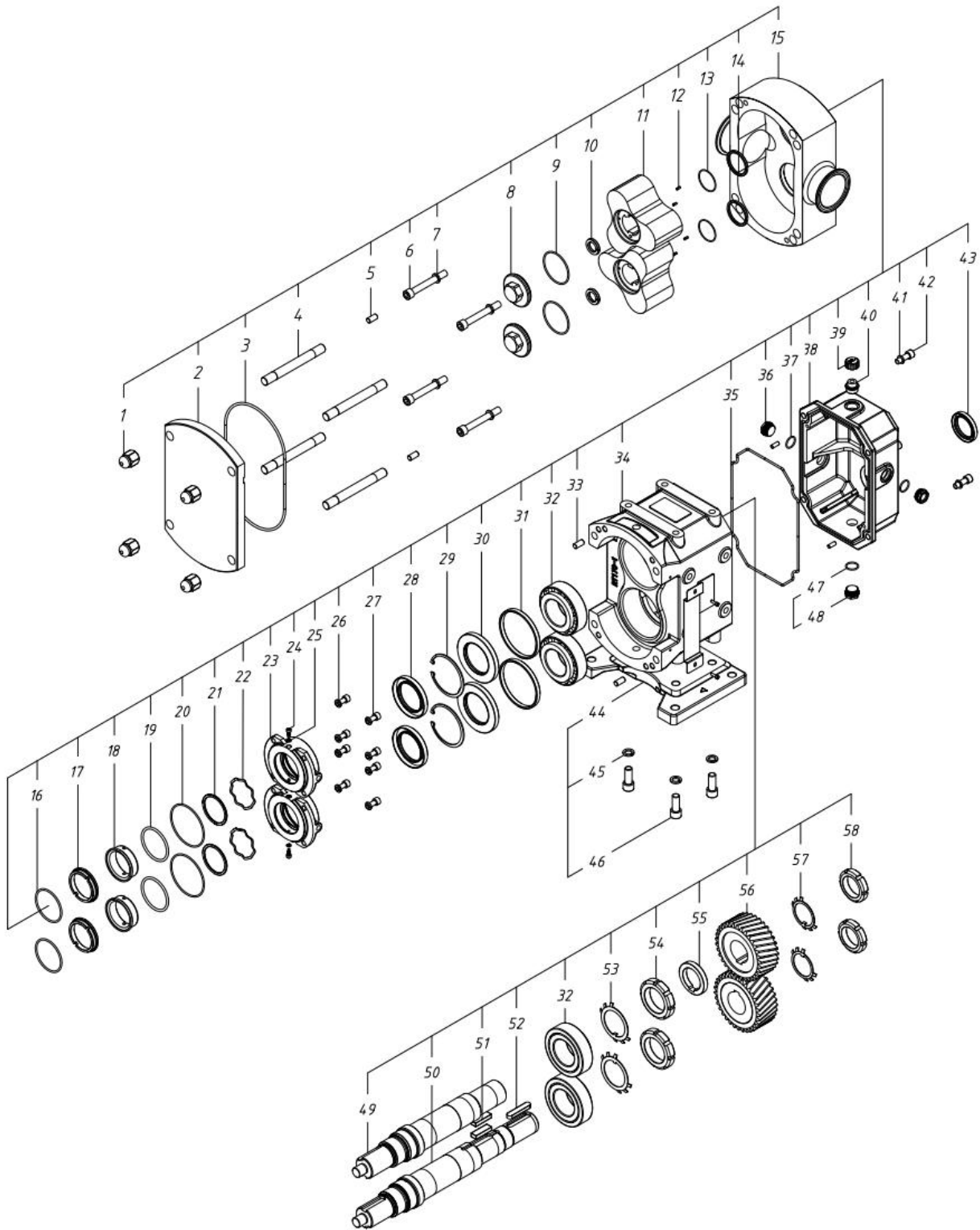
No	Name	Material	qty	No	Name	Material	qty
1	Pump head screw cap	304	4	31	Single face ring seat screw	304	8
2	Pump cover	304	1	32	Gear box skeleton oil seal	NBR	2
3	Pump cover O ring	FKM	1	33	tapered roller bearing 33009	bearing steel	2
4	Pump head screw	304	4	34	Hexagon screws in dust board	304	4
5	pump cover position pin	304	2	35	Gear box cylinder pin	304	2
6	hexagon screw	304	2	36	dust guard plate	304	2
7	spring washer	304	2	37	Gear box	HT250	1
8	Rotor screw	SUS630	2	38	Rear box covers O ring	NBR	1
9	Rotor-screw-spring gasket	304	2	39	Rear box cover	ZL105	1
10	Rotor screw O-ring	FKM	2	40	Refueling cover accessories 2	plastic	1
11	Eccentricity washer	316	2	41	Refueling cover accessories 1	plastic	1
12	Eccentricity washer O-ring	FKM	2	42	Rear gear box skeleton oil seal	NBR	1
13	Eccentricity washer positioning pin	304	2	43	Rear box cover hexagon screw	304	4
14	Rotor	304	2	44	Block O ring	NBR	2
15	Single face rotary ring drive pin	304	4	45	Block	304	2
16	Rotor adjustment gasket O ring	FKM	2	46	Oil glass O ring	NBR	1
17	rotor adjusting gasket	304	2	47	Oil glass	cooper	1
18	Pump head	304	1	48	Pump base	HT250	1
19	Single face rotary ring O ring	FKM	2	49	Pump base hexagon screw	304	4
20	Single face rotary ring	silicon carbide	2	50	Pump base spring washer	304	4
21	Stationary ring O ring	FKM	2	51	Counter shaft	SUS630	1
22	Single face stationary ring	Alloy	2	52	Main shaft	SUS630	1
23	Single face stationary ring O ring	FKM	2	53	B type key	45	2
24	Single face wave spring ring	304	2	54	A type key	45	1
25	Single face multi-wave spring ring	SUS631	2	55	Multi-foot non-return washer	carbon steel	2
26	Single face stationary ring seat	304	2	56	Bearing-fixed round nut	45	2
27	Single face stationary ring anti-rotary screw	304	4	57	adjusting washer	45	1
28	Single face protective cover	PTFE	2	58	helical gear	20CrMnTi	2
29	M seal skeleton oil seal	NBR	8	59	Non-return washer	carbon steel	2
30	Elastic retaining ring for hole	65Mn	2	60	Gear fixing the round nut	45	2

12.5 Vertical Port Type (RT170/RT320)



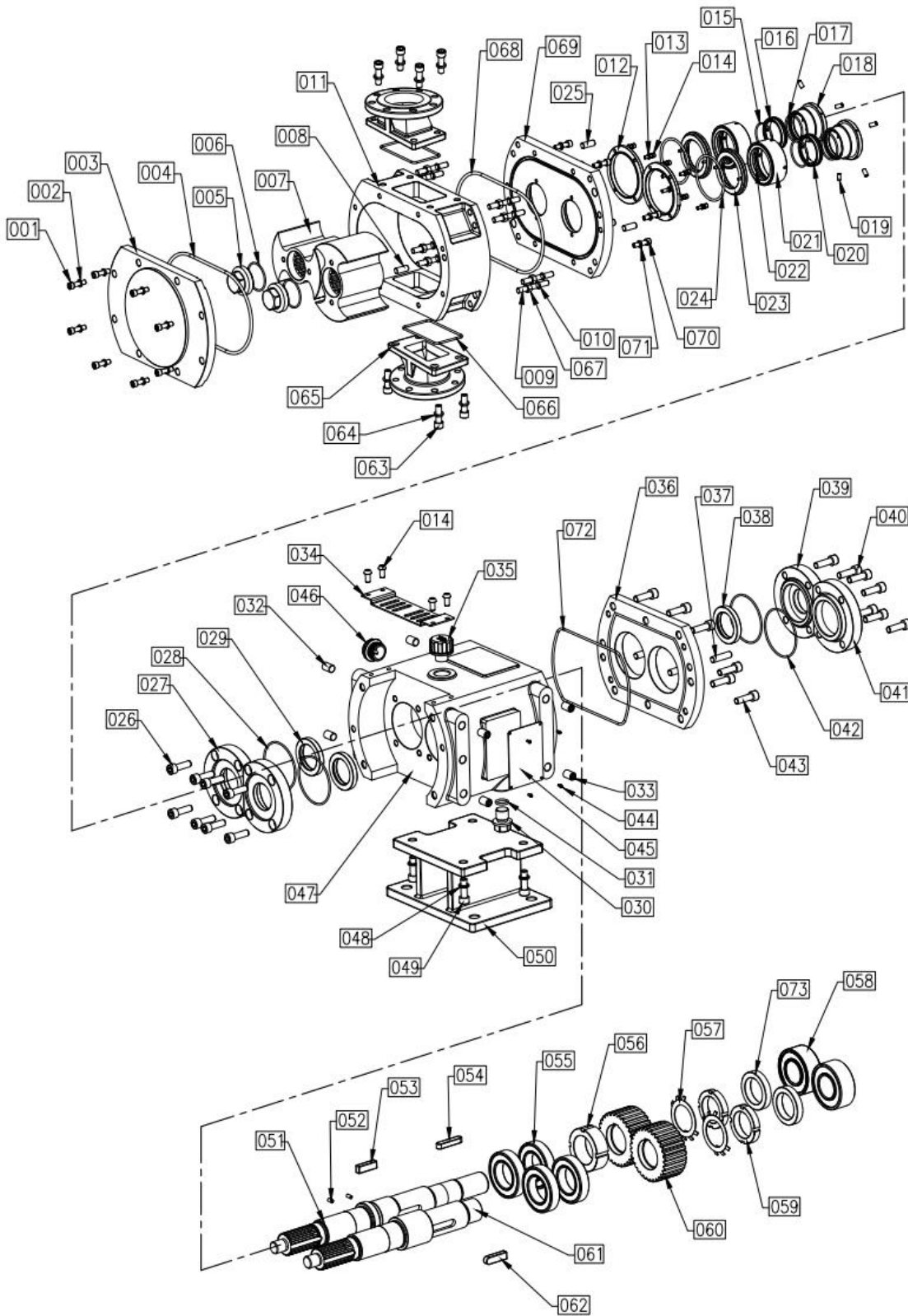
No	Name	Material	qty	No	Name	Material	qty
1	Pump head screw cap	304	4	31	Oil seal gasket	45	2
2	Pump cover (Standard type)	304	1	32	tapered roller bearing 33009	bearing steel	2
3	Pump cover O ring	FKM	1	33	Bear box cylinder pin	304	2
4	Pump head screw	304	4	34	Gear box	HT250	1
5	pump cover Position pin	304	2	35	Rear box cover O ring	NBR	1
6	Rotor screw cap (positive and reverse teeth)	SUS630	4	36	Oil glass	copper	1
7	Rotor screw cap O ring	FKM	4	37	Oil glass O ring	NBR	1
8	Rotor nut cap spring gasket	304	2	38	Rear box cover	ZL105	1
9	Rotor	304	2	39	Refueling cover accessories 1	Plastic	1
10	Single face rotary ring drive pin	304	2	40	Refueling cover accessories 2	Plastic	1
11	Rotor adjustment gasket O ring	FKM	2	41	Rear box cover spring gasket	304	4
12	Rotor adjusting gasket	304	4	42	rear box cover hexagon screw	304	4
13	spring washer	304	2	43	Rear box cover skeleton oil seal	NBR	1
14	Pump body hexagon screws	304	2	44	Pump base	HT250	1
15	Pump body	304	1	45	Base spring gasket	304	4
16	Single face rotary ring O ring	FKM	2	46	Base hexagon screw	304	4
17	Single face rotary ring	silicon carbide	2	47	Block cap O ring	NBR	2
18	Single face stationary ring	Alloy	2	48	Block cap	304	2
19	Single face stationary ring O ring	FKM	2	49	Counter shaft	SUS630	1
20	Single face wave spring ring	304	2	50	Main shaft	SUS630	1
21	Single face multi wave spring ring	SUS631	2	51	B type key	45	2
22	stationary ring seat O ring	FKM	2	52	A type key	45	1
23	Single face stationary ring anti-rotary screw	304	2	53	Multi-foot push gasket	carbon steel	2
24	Single face protective sleeve	PTFE	2	54	Bearing fixed round nut	45	2
25	Single face stationary ring seat	304	4	55	adjusting spacer	45	1
26	Mechanical seal skeleton oil seal	NBR	8	56	helical gear	20CrMnTi	2
27	Hole circlip	65Mn	8	57	thrust washer	carbon steel	2
28	Single face stationary ring seat spring gasket	304	2	58	Gear fixing the round nuts	45	2
29	Single face stationary ring seat screw	304	2				
30	Gear box skeleton oil seal	NBR	2				

12.6 Horizontal Port Type (RT170/RT320)



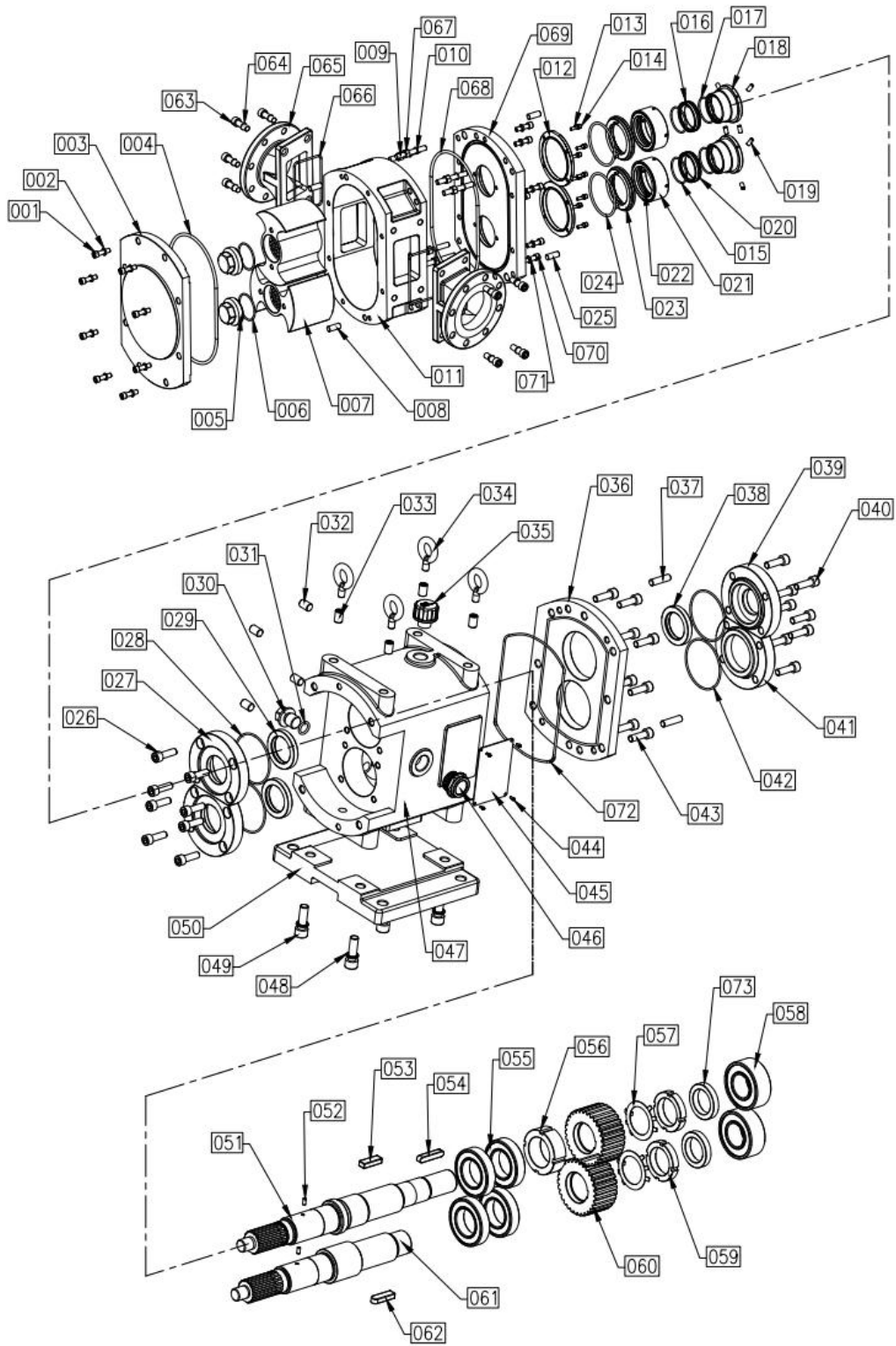
No	Name	Material	qty	No	Name	Material	qty
1	Pump head screw cap	304	4	31	Oil seal gasket	45	2
2	Pump cover (Standard type)	304	1	32	tapered roller bearing 33009	bearing steel	2
3	Pump cover O ring	FKM	1	33	Bear box cylinder pin	304	2
4	Pump head screw	304	4	34	Gear box	HT250	1
5	pump cover Position pin	304	2	35	Rear box cover O ring	NBR	1
6	Pump body hexagon screw	304	2	36	Oil glass	copper	1
7	Spring washer	304	2	37	Oil glass O ring	NBR	1
8	Rotor screw cap (positive and reverse teeth)	SUS630	2	38	Rear box cover	ZL105	1
9	Rotor screw cap O ring	FKM	2	39	Refueling cover accessories 1	Plastic	1
10	Rotor nut cap spring gasket	304	4	40	Refueling cover accessories 2	Plastic	1
11	Rotor	304	2	41	Rear box cover spring gasket	304	4
12	Single face rotary ring drive pin	304	2	42	rear box cover hexagon screw	304	4
13	Rotor adjustment gasket O ring	FKM	4	43	Rear box cover skeleton oil seal	NBR	1
14	Rotor adjusting gasket	304	4	44	Pump base	HT250	1
15	Pump body	304	1	45	Base spring gasket	304	4
16	Single face rotary ring O ring	FKM	2	46	Base hexagon screw	304	4
17	Single face rotary ring	silicon carbide	2	47	Block cap O ring	NBR	2
18	Single face stationary ring	Alloy	2	48	Block cap	304	2
19	Single face stationary ring O ring	FKM	2	49	Counter shaft	SUS630	1
20	stationary ring seat O ring	FKM	2	50	Main shaft	SUS630	1
21	Single face wave spring ring	304	2	51	B type key	45	2
22	Single face multi wave spring ring	SUS631	2	52	A type key	45	1
23	Single face stationary ring seat	304	2	53	Multi-foot push gasket	carbon steel	2
24	Single face stationary ring anti-rotary screw	304	4	54	Bearing fixed round nut	45	2
25	Single face protective sleeve	PTFE	2	55	adjusting spacer	45	1
26	Single face stationary ring seat spring gasket	304	2	56	helical gear	20CrMnTi	2
27	Single face stationary ring seat screw	304	2	57	thrust washer	carbon steel	2
28	Mechanical seal skeleton oil seal	NBR	8	58	Gear fixing the round nuts	45	2
29	Hole circlip	65Mn	8				
30	Gear box skeleton oil seal	NBR	2				

12.7 Vertical Port Type (RT510/RT830)



No	Name	Material	qty	No	Name	Material	qty
1	Pump cover lock screw	304	8	38	Skeletal oil seal		1
2	spring washer	304	8	39	Main shaft bearing rear cover	QT250	1
3	Pump cover	304/316L	1	40	Bearing cover screw		8
4	Pump head O ring	FKM/Silicone/PTFE	1	41	Counter shaft bearing rear cover	QT250	1
5	Rotor lock screw cap	304/316L	2	42	Bearing cover O ring	NBR	2
6	Rotor lock screw cap O ring	FKM/Silicone/PTFE	2	43	Gear box cover screw		8
7	Rotor	304/316L	2	44	Nameplate screw		4
8	Pump head position pin	431	2	45	Nameplate		1
9	Pump head lock screw	304	8	46	Oil glass		1
10	Spring washer	304	8	47	Gear box	QT250	1
11	Pump head	304/316L	1	48	Spring washer		4
12	Mechanical seal stationary ring retaining ring	304	2	49	Pump head base screw		4
13	spring washer	304	8	50	Pump base	QT250	1
14	Screw	304	8	51	Main shaft	431	1
15	Adjusting sleeve O ring	FKM/Silicone/PTFE	2	52	Main shaft positioning pin	304	2
16	Main shaft adjustment sleeve	304/316L	1	53	Main shaft key		1
17	Shaft sleeve leeve O ring	FKM/Silicone/PTFE	2	54	Drive key		1
18	Shaft sleeve	304/316L	2	55	Front bearing		4
19	Shaft sleeve lock screw	304	8	56	Self-locking nut		1
20	Counter shaft adjustment sleeve	304/316L	1	57	Round nut gasket		2
21	M seal rotary ring	304/316L	2	58	Rear bearing		2
22	M seal rotary ring O ring	FKM/Silicone/PTFE	2	59	Round nut		2
23	M seal stationary ring	304/316L	2	60	Helical gear	42CrMo	2
24	M seal stationary ring O ring	FKM/Silicone/PTFE	2	61	Counter shaft	431	1
25	Pump head rear position pin	431	2	62	Counter shaft key		1
26	Bearing cover screw		8	63	Flange connection seat screw	304	8
27	Bearing front cover	QT250	2	64	Spring washer	304	8
28	Bearing front cover O ring	NBR	2	65	Flange connection	304/316L	2
29	Skeleton oil seal		2	66	Flange connection O ring	FKM/Silicone/PTFE	2
30	Oil drain bolt		1	67	Nut	304	8
31	Oil drain bolt O ring	NBR	1	68	Pump head rear cover O ring	FKM/Silicone/PTFE	1
32	Block screw	304/Rubber	4	69	Pump head rear cover	304/316L	1
33	Block screw	304/Rubber	4	70	Pump head rear cover screw	304	8
34	Dust proof cover	304	1	71	Spring washer	304	8
35	Vent cap		1	72	Gear box cover O ring	NBR	1
36	Gear box cover	QT250	1	73	Transmission shaft gasket	45	2
37	Gear box cover positioning pin		2	74			

12.8 Horizontal Port Type (RT510/RT830)



No	Name	Material	qty	No	Name	Material	qty
1	Pump cover lock screw	304	8	38	Skeletal oil seal		1
2	spring washer	304	8	39	Main shaft bearing rear cover	QT250	1
3	Pump cover	304/316L	1	40	Bearing cover screw		8
4	Pump head O ring	FKM/Silicone/PTFE	1	41	Counter shaft bearing rear cover	QT250	1
5	Rotor lock screw cap	304/316L	2	42	Bearing cover O ring	NBR	2
6	Rotor lock screw cap O ring	FKM/Silicone/PTFE	2	43	Gear box cover screw		8
7	Rotor	304/316L	2	44	Nameplate screw		4
8	Pump head position pin	431	2	45	Nameplate		1
9	Pump head lock screw	304	8	46	Oil glass		1
10	Spring washer	304	8	47	Gear box	QT250	1
11	Pump head	304/316L	1	48	Spring washer		4
12	Mechanical seal stationary ring retaining ring	304	2	49	Pump head base screw		4
13	spring washer	304	8	50	Pump base	QT250	1
14	Screw	304	8	51	Main shaft	431	1
15	Adjusting sleeve O ring	FKM/Silicone/PTFE	2	52	Main shaft positioning pin	304	2
16	Main shaft adjustment sleeve	304/316L	1	53	Main shaft key		1
17	Shaft sleeve leeve O ring	FKM/Silicone/PTFE	2	54	Drive key		1
18	Shaft sleeve	304/316L	2	55	Front bearing		4
19	Shaft sleeve lock screw	304	8	56	Self-locking nut		1
20	Counter shaft adjustment sleeve	304/316L	1	57	Round nut gasket		2
21	M seal rotary ring	304/316L	2	58	Rear bearing		2
22	M seal rotary ring O ring	FKM/Silicone/PTFE	2	59	Round nut		2
23	M seal stationary ring	304/316L	2	60	Helical gear	42CrMo	2
24	M seal stationary ring O ring	FKM/Silicone/PTFE	2	61	Counter shaft	431	1
25	Pump head rear position pin	431	2	62	Counter shaft key		1
26	Bearing cover screw		8	63	Flange connection seat screw	304	8
27	Bearing front cover	QT250	2	64	Spring washer	304	8
28	Bearing front cover O ring	NBR	2	65	Flange connection	304/316L	2
29	Skeleton oil seal		2	66	Flange connection O ring	FKM/Silicone/PTFE	2
30	Oil drain bolt		1	67	Nut	304	8
31	Oil drain bolt O ring	NBR	1	68	Pump head rear cover O ring	FKM/Silicone/PTFE	1
32	Block screw	304/Rubber	4	69	Pump head rear cover	304/316L	1
33	Block screw	304/Rubber	4	70	Pump head rear cover screw	304	8
34	Dust proof cover	304	1	71	Spring washer	304	8
35	Vent cap		1	72	Gear box cover O ring	NBR	1
36	Gear box cover	QT250	1	73	Transmission shaft gasket	45	2
37	Gear box cover positioning pin		2	74			

Appendix: Reducer Operation Manual

1. Summary

The friction speed reducer is composed of an electric motor, a friction transmission mechanism, a pressure device and a speed regulation control mechanism. Friction transmission mechanism working process: A set of tapered planetary friction wheels, the outside is clamped between the fixed ring and the speed control cam, and the inside is clamped between the driving wheel and the pressure plate to form a friction pair: when the driving wheel is driven by the motor, the friction wheel is rolling, because the fixed ring and the speed control cam do not move, the friction wheel rotates while rotating: the planet carrier is driven by the shaft and sliding bearing of the friction wheel rotate. The pressure device is composed of a set of butterfly springs, which exert axial force on the pressure plate and the driving wheel.

Working process of the speed control mechanism: Turn the hand wheel to drive the speed control cam to change the angular position, and by fixing the cam curve surface, the speed control cam produces axial movement to change the interval between the speed control cam and the fixed ring, the friction wheel moves radially. Finally, evenly change the working radius of the planetary wheel, the pressure plate and the fixed ring, and the speed control cam car model to achieve constant stepless speed reducer

2. Use and maintenance

1. Before use, traction oil must be added to the transmission part of the transmission, and the oil level must exceed the center line of the vernier to allow normal oil bath lubrication.
2. The traction oil of the stepless speed reducer must be replaced regularly. It needs to be replaced after 500 hours of use, and replaced once a year in the future. Generally, the traction oil of the continuously variable transmission is specially formulated by the transmission manufacturer. It can be purchased from the transmission manufacturer. The model is UB-1 or UB-3 traction oil.
3. For the stepless speed reducer, it is only allowed to adjust the speed when the equipment is running, and the speed change handwheel on the equipment cannot be rotated in the non-operating state.
4. The working environment temperature of the continuously variable transmission should not exceed 40°C, and the surface temperature of the machine body should not exceed 75°C



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