



PRODUCT MANUAL

RP series

ROOTS VACUUM PUMP

IRAN GEV



浙江卓捷真空技术有限公司
ZHEJIANG REMARKBL VACUUM TECHNOLOGY CO., LTD

Any changes to the product's appearance or technical specifications will not be separately notified.

1.Before Use

Upon receiving the RP series Roots vacuum pump product, please check if the model matches the pump, inspect for any transportation damage, breakage, defects, or packaging issues, and promptly contact our company if any discrepancies are found.

This manual provides instructions for the installation, operation, and maintenance of the RP series Roots vacuum pump. Please read it carefully and strictly follow the instructions provided.

2. Overview

2.1 Caution This product should only be operated, installed, and maintained by trained personnel, and it should be used in accordance with the safety regulations of your country and locality.

2.2 Warning



Warning

Failure to comply with the following protective measures may result in serious personal safety

2.2.1 Before connecting, using, or performing maintenance, all power sources connected to it must be disconnected.

2.2.2 RP series Roots vacuum pumps should not be used for gases containing corrosive substances, flammable, explosive gases, or mixtures thereof. They should not be used in conditions with excessively high oxygen

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content.

2.2.3 RP series Roots vacuum pumps must not be used in flammable or explosive environments.

2.2.4 Liquids and solid particles must not enter the pump body. If necessary, install a filter or trap at the inlet. For specific technical details, please contact Zhejiang Remarkbl Vacuum Technology Co., Ltd.

2.2.5 The absolute pressure at the inlet must not exceed standard atmospheric pressure, as this could lead to operational hazards or damage.

2.2.6 This product must not be used in a status of no oil or insufficient oil.

2.2.7 The motor rotation direction must be correct; reverse operation can damage the pump.

2.2.8 During normal operation of the RP series Roots vacuum pump, individual surface temperatures may exceed 80°C. Do not touch the surface without protection to avoid burns.

2.2.9 Under no circumstances should any part of your body come into contact with the inlet position. The powerful suction, pumping speed, and atmospheric pressure can result in unforeseen injuries.

2.2.10 Due to the internal pressure being greater than atmospheric pressure during the operation of the roots vacuum pump, do not open the oil filling port, oil drain port, or inlet port while the pump is running.

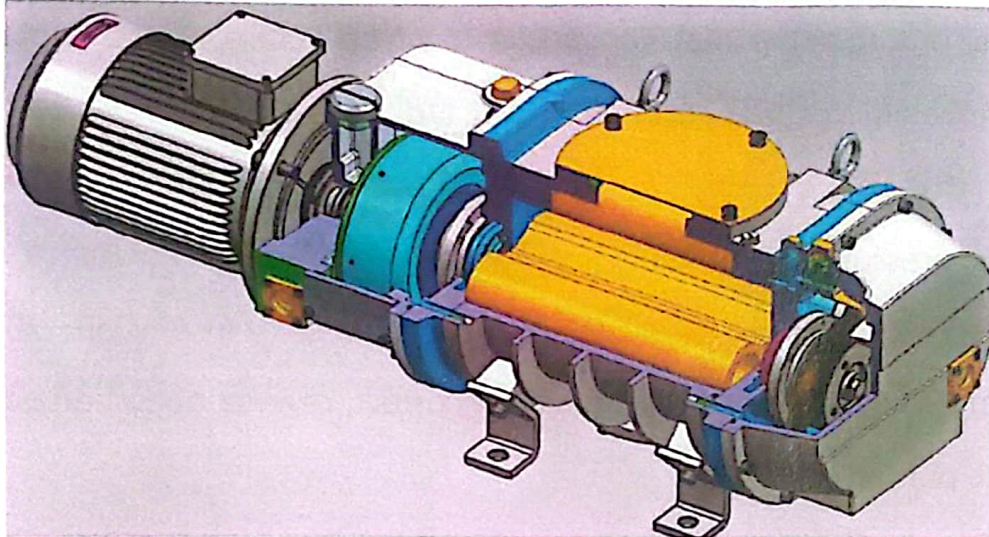
2.3 Scope of Application

The RP series roots vacuum pump is used for extracting inert gases or air within a pressure range from atmospheric pressure (0.1 MPa) to ultimate vacuum pressure.

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The RP series roots vacuum pump is a mechanical booster pump and should not be used directly to exhaust into the atmosphere. A matching RVP series primary pump should be installed.

2.4 Operating Principles



The RP series Roots vacuum pump is a hydraulic coupling-driven vacuum pump.

The electric motor shaft drives one of the rotors through a hydraulic power transmission device. A 1:1 gear inside the hydraulic power transmission device/gearbox reversely drives the second rotor in the stator housing. There is a precise small gap maintained between the rotors and between each rotor and the stator wall. This gap allows the RP series Roots vacuum pump to operate at high speeds without mechanical wear and without the need for lubrication within the working volume.

The hydraulic power transmission device consists of a hydraulic coupling that connects the electric motor shaft to the rotor. The system configuration

ensures a reduction in rotor rotation speed when other loads become excessive. When the gas load decreases, the rotor accelerates to full speed, allowing the RP series roots vacuum pump to operate continuously throughout the entire vacuum range without the risk of motor overload. Additionally, there is no need for bypass valves and related pipelines.

2.5 Technical Features

2.5.1 Technical Parameters Rotation Speed (rpm)

Model	Rotation Speed (rpm)	
Frequency	50Hz	60Hz
RP series	2900	3500

Flow Rate

Model	Flow Rate (m ³ /h)	
Frequency	50Hz	60Hz
RP250	310	375
RP500	505	605
RP1200	1195	1435
RP2600	2590	3110
RP4200	4140	4985

Pressure difference(mbar/Pa)

Model	Maximum Pressure Differential (mbar/Pa)	
Frequency	50Hz	60Hz
RP250	180/18000	150/15000
RP500	110/11000	90/9000
RP1200	90/9000	75/7500
RP2600	80/8000	67/6700
RP4200	60/6000	50/5000

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Motor power

Model	kW
RP250	2.2
RP500	2.2
RP1200	3
RP2600	11
RP4200	11

Water Cooling Req

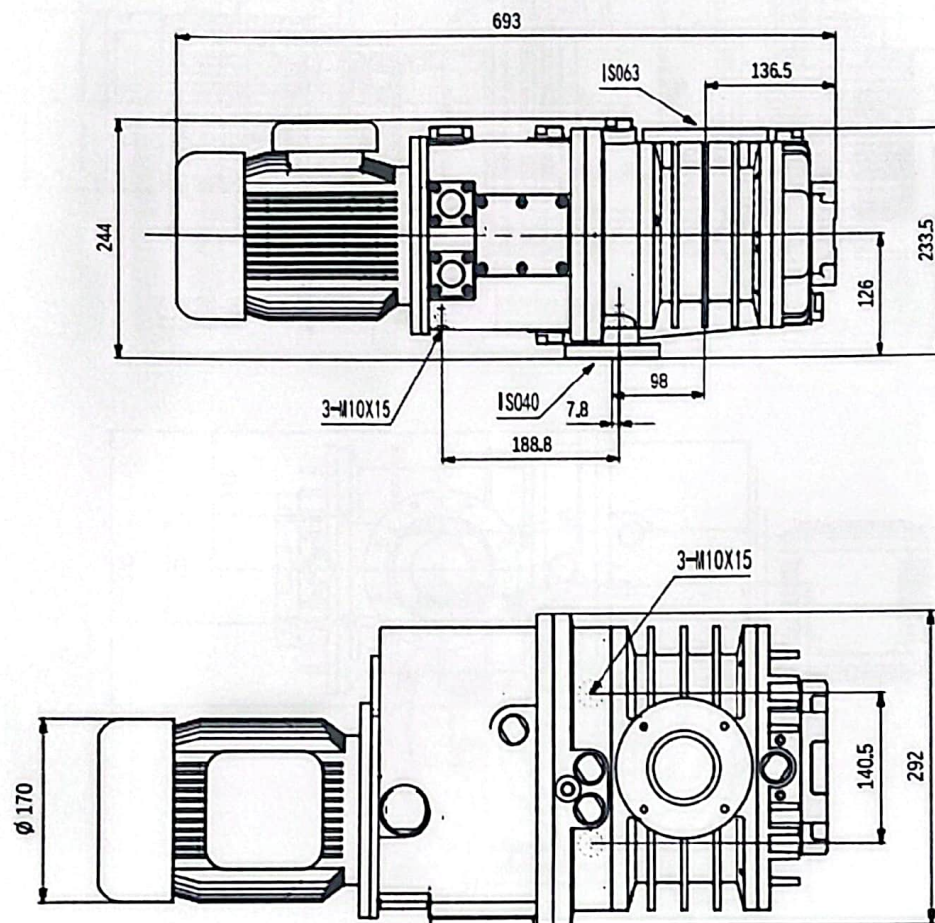
Model	Water Cooling Req (L/h)
RP250	Air Cooled
RP500	Air Cooled
RP1200	120
RP2600	250
RP4200	250

Weight

Model	Weight (KG)
RP250	68
RP500	79
RP1200	169
RP2600	335
RP4200	385

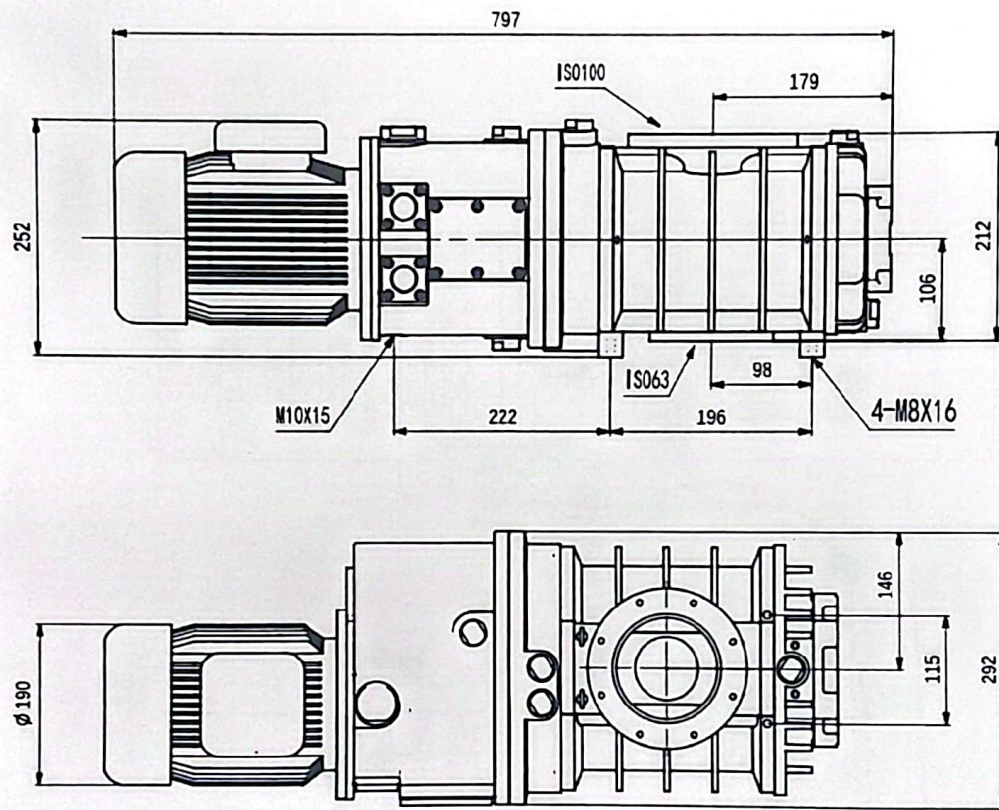
2.6 Installation Dimensions

RP-250



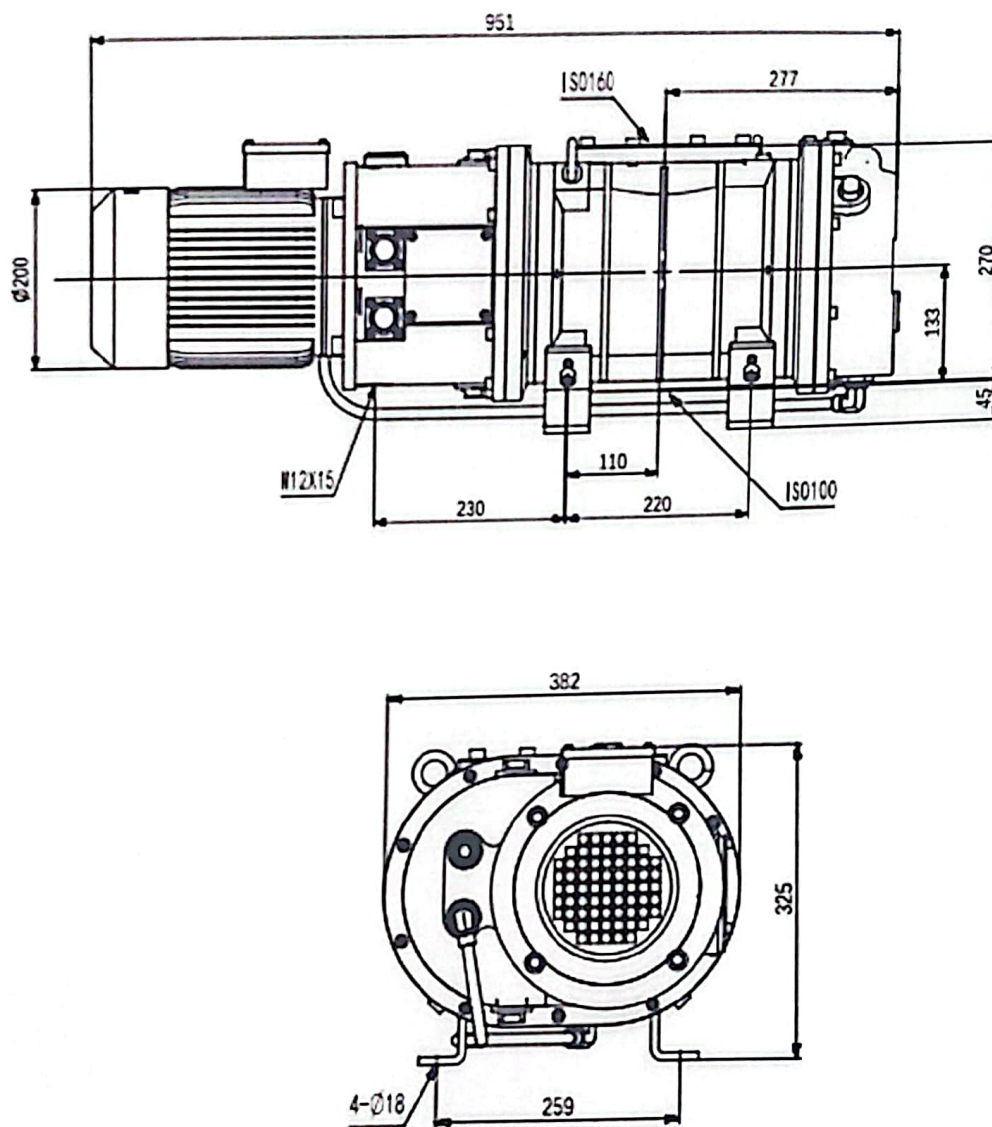
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RP-500



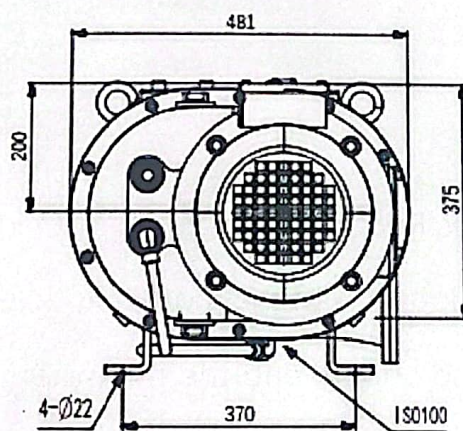
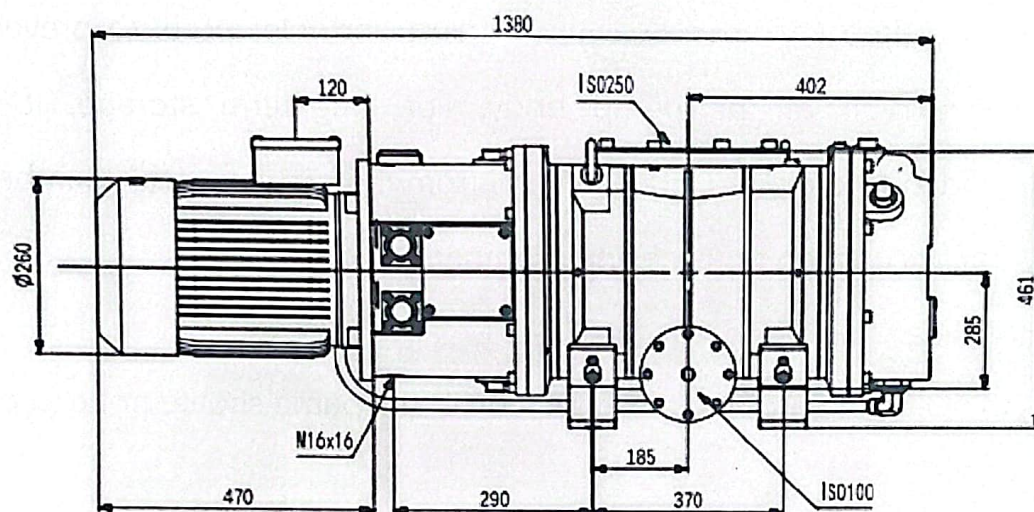
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RP-1200



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RP-4200



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2.7 Storage and Handling

2.7.1 Storage

The storage environment should have a temperature range between -20°C to 80°C . The pump should be stored in a dry environment both inside and outside the pump chamber. Seal the exhaust and inlet ports to prevent internal corrosion of the pump body. For long-term storage, it is recommended to drain the lubricating oil from the gearbox, seal chamber, and hydraulic coupling transmission chamber.

2.7.2 Handling

During the handling process, the inclination of the pump should not exceed 20° .

3. Installation and Use

3.1 Installation

Before use, the RP series Roots vacuum pump should be securely installed. It can be fixed on the support with the mounting holes or additional shock-absorbing blocks can be added, and the pump can be secured using the internal threads of the shock-absorbing base. The Roots pump should be placed in a horizontal position because if it is not level, there may be a difference between the oil level displayed in the oil level window and the actual required oil level, which can affect the pump's ultimate vacuum and lubrication. The pump's operating temperature should be between 10°C and 40°C . If it exceeds this temperature range, please contact Zhejiang

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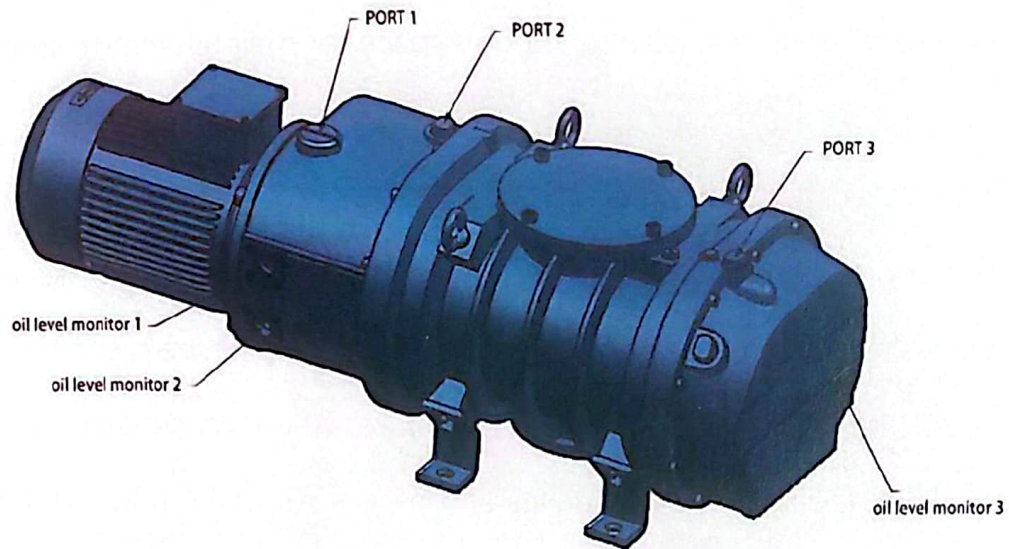
Remarkbl Vacuum Technology Co., Ltd. The pump should be installed in a well-ventilated area, leaving enough space for maintenance, cleaning, and cooling.

3.2 Connection to the Vacuum System

The connection to the roots vacuum pump's inlet should be secure, and there should be no pressure on the inlet after the pipeline is connected. Use flexible hoses or removable flange structures whenever possible to connect the inlet, facilitating maintenance and repairs. The inlet pressure must not exceed atmospheric pressure by 0.1 MPa, as this can lead to product damage and safety hazards.

3.3 Start-up

The RP series roots pump is pre-filled with an adequate amount of vacuum pump oil at the factory. Before starting the pump, carefully check if the oil level is appropriate, with around 2/3 of the oil level being the most suitable. Please refer to the oil filling level and the position of the oil window to ensure they are appropriate.



3.4 Water Cooling

Water cooling should be performed with a water pressure between 2-6 kilograms and clean cooling water with a temperature between 10°C and 25°C.

Cooling Water Flow Rate:

RP-1200: 120-150 liters per hour

RP-2600-4200: 250-300 liters per hour

3.5 Operation

Due to the design characteristics of the RP series Roots pump, it can be started simultaneously with the primary pump during normal unit operation without the need for pressure control and bypass pipeline control.

3.6 Ultimate Vacuum

The RP series Roots vacuum pump is a mechanical booster pump and

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should not be used directly to exhaust into the atmosphere. It can only be used as the main pump for the primary pump, and the ultimate vacuum of the RP series Roots pump is related to the primary pump. With the RVP series rotary vane pump installed as the primary pump, the ultimate system pressure does not exceed 1 Pa. When measuring the ultimate vacuum, it should be done when both the primary pump and Roots pump are in stable operation. Measuring the ultimate vacuum right after startup may result in variations in vacuum level, as the system is not fully stabilized at that point. Once the unit has run steadily, the vacuum level will stabilize.

3.7 Pump Shutdown and Stoppage

The RP series Roots vacuum pump is a mechanical booster pump. When shutting down, the Roots pump should be stopped first, followed by the primary pump, or at least both should be stopped simultaneously.

4. Maintenance

4.1 Maintenance

Regular maintenance of the RP series Roots pump is necessary to extend its lifespan. Proper mechanical maintenance can yield significant benefits. Bearings and seals should be replaced after 15,000 hours of operation to ensure normal use. Replacing bearings, oil seals, and seals falls under major repairs and should not be attempted by the user. Please contact the after-sales service department of Zhejiang Remarkbl Vacuum Technology Co., Ltd. if necessary. Due to the complex pump structure, self-disassembly can lead

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to uncertain consequences. Our after-sales service department can provide on-site maintenance or send the pump back to our company for repairs.

4.2 Oil Level Inspection

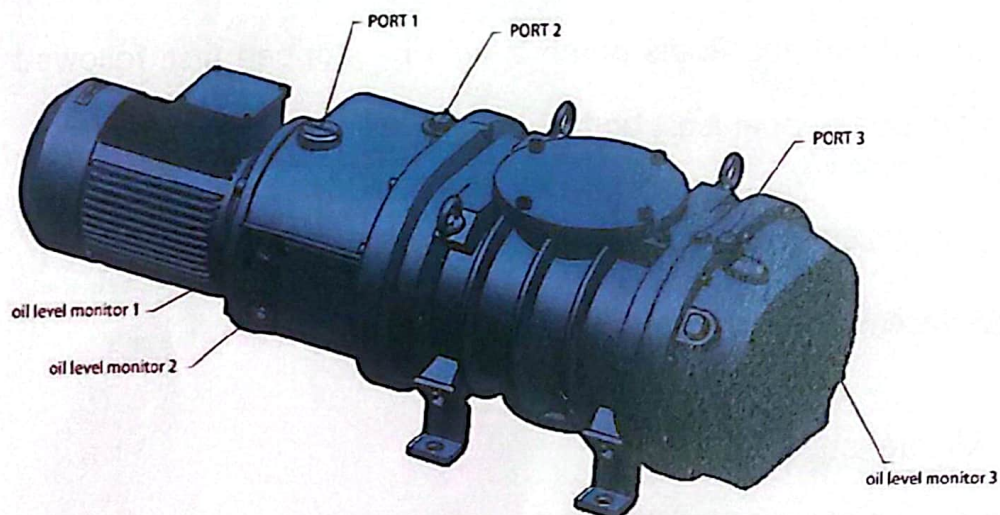
Carefully observe the oil level and oil quality changes daily.

The oil level should be around 2/3 of the oil window.

The oil quality should be translucent and pale yellow. If it becomes cloudy or dark, replace the oil promptly.

4.3 Oil Replacement

Refer to section 3.3 for startup instructions.



4.3.1 Shut down the pump, cool it, vent it to atmospheric pressure, and disconnect the power.

4.3.2 Change the oil of shaft seal oil reservoir": The oil filling port 1, located above the pump, serves as both an oil inlet and an oil outlet. Loosen the oil

plug for oil filling port 1 and use an appropriate pump or siphoning method to extract the oil into a container, approximately 130 milliliters of oil. After draining, refill with new oil, observing the oil level monitor 1 through the oil window to ensure it's at about 2/3, and then tighten the oil plug.

4.3.3 Change the oil for oil in port 2, which is in the hydraulic power transmission chamber. Unscrew the oil plug for oil filling port 2 and remove the drain plug for oil outlet 2 which in the bottom of the pump. Place the used oil in a container. Clean the oil, then tighten the oil plug for oil outlet 2. Fill with new oil through oil port 2, observing oil level 2 through the oil level monitor 2 and ensuring it's at about 2/3, then tighten the oil plug.

4.3.4 Change the oil for oil port 3, which is in the gearbox. Unscrew the oil plug for oil filling port 3 and remove the drain plug for oil outlet 3, which located in the bottom of the pump. Place the used oil in a container. Tighten the oil plug for oil outlet 3 and fill with new oil. Observe oil level monitor 3 and ensure it's at about 2/3, then tighten the oil plug for oil filling port 3. Oil replacement is complete.

☆Note!

①When changing oil, the pump must be shut down, vented to atmospheric pressure, and the power disconnected.

②It is advisable to change the oil when the pump is still slightly warm (35°C-40°C) as the oil's viscosity is lower, making it easier to drain completely. Otherwise, the high viscosity of the oil when cold may cause incomplete drainage.

③Dispose of the used oil in accordance with regulations and do not violate

national environmental protection regulations.

5. Wiring

Motor wiring should only be performed by qualified electricians. At the very least, personnel should be guided by a qualified electrician to complete the wiring, or safety issues may arise. Motor wiring should follow the motor's nameplate and the instructions in the user manual.

For 60Hz, star connection with 440V and 460V is provided. For 50Hz, delta connection with 220V-240V and star connection with 380V-415V are provided.

6. Quality Assurance (Warranty Terms)

All RP series Roots vacuum pumps from Zhejiang Remarkbl Vacuum Technology Co., Ltd. are rigorously tested and fully comply with national standards and factory standards before leaving the factory. Please use them with confidence! This series of products is covered by a one-year warranty from the date of shipment. If material or processing defects occur under normal use, our company is responsible for free replacement or on-site repair.

7. Disclaimer

(1) The quality guarantee for RP series Roots vacuum pumps produced by our company is based on the premise that users must follow the user manual for correct installation, usage, and maintenance. Damages caused by incorrect product usage or lack of maintenance are not covered by the warranty.

(2) Damages caused by incorrect wiring or voltage mismatch are not covered by our company's warranty.

(3) Damages caused by unauthorized disassembly or unauthorized repairs without the consent of our company will not be covered by the warranty.

(4) Usage in conditions that exceed the design parameters or in poor working conditions will not be covered by the warranty.

(5) Please use the vacuum pump oil specifically provided by Zhejiang Remarkbl Vacuum Technology Co., Ltd. Any damages caused by using other brands of oil without authorization will not be covered by the warranty.

Thank you for choosing Remarkbl products!

TEL :
021 - 33961483
021 - 33939813
021 - 33908412
021 - 33950533

MOBILE : 09358989106

WEB : WWW.IRANGEV.COM

ADRESS : IRAN , Tehran , Sady, Nazm Alatbaa South, Plaque 47,
Unit 401, Floor 4

Iran Gev Company

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