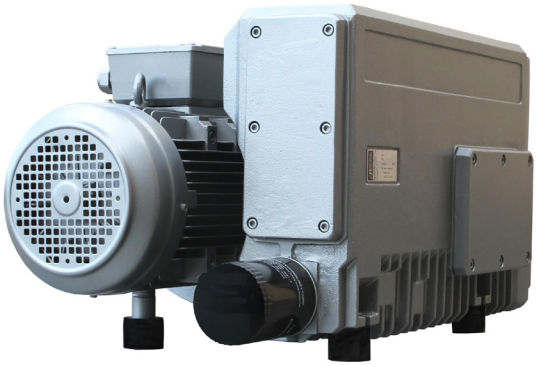
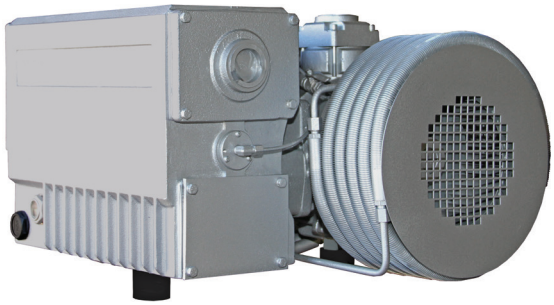
REPUBLIC MANUFACTURING



RX-SERIES
OIL LUBRICATED VACUUM PUMPS
Installation & Operating Instructions



Republic Single Stage Oil Lubricated Vacuum Pumps
RX-Series
Installation Instructions & Operating Manual

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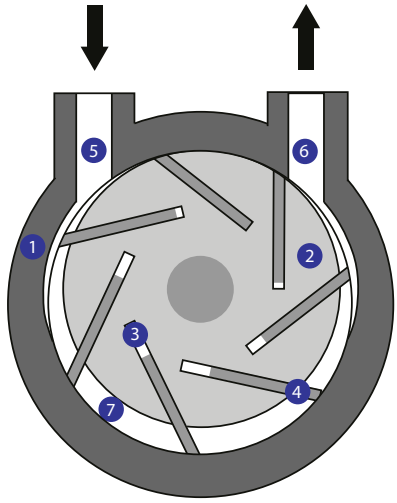
Working Principle

Rotary vane pumps consist of a cylindrical housing (1), eccentrically positioned rotor (2), and numerous free-moving vanes (4). The vanes are placed in the slots of the rotor (3) and, as the rotor turns, the centrifugal force throws the vanes against the cylindrical wall, creating a chamber between the rotor and the cylinder (7). The chamber volume changes as the rotor turns. From the inlet port (5), the chamber volume enlarges, and then decreases towards the outlet port (6). As air enters the inlet port (5) and the chamber enlarges (7), the vanes create a vacuum. As the air is pushed through the chamber and it becomes compressed, pressure is produced at the outlet port (6).



In order to avoid the suction of solids, the vacuum pump is equipped with a mesh screen in the suction connection. In order to avoid reverse rotation after switching off, the vacuum pump is equipped with a non-return valve.

NOTE: It is best practice to install an inlet check valve with the vacuum pump.

In case the vacuum pump is equipped with a gas ballast: Through the gas ballast valve a small amount of ambient air is sucked into the pump chamber and compressed together with the process gas. This counteracts the accumulation of condensates from the process gas inside the vacuum pump. Gas ballast version with ball valve: The gas ballast line can be closed partially or completely by means of a ball valve. In order to improve the operating characteristics the outlet of the pump chamber is equipped with a spring loaded valve.

Table of Contents

Safety Instructions

To ensure safe operation, we have provided many important safety guidelines in this manual for the Republic Oil Lubricated Rotary Vane Pumps. Please read this manual carefully and pay particular attention to instructions with the following signs:

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

DEFINITION: For the purpose of these instructions, "handling" the vacuum pump means the transport, storage, installation, commissioning, influence on operating conditions, maintenance, troubleshooting and overhaul of the pump.

1. Always use qualified electrical and mechanical personnel for installation and maintenance of Republic Rotary Vane Pumps and motors.

2. Disconnect the electrical power at the motor starter, fuse box or circuit breaker before working on the system. Take special precautions to make sure the power cannot be turned on while you are working on the blower. **Use an approved lockout/tagout system.**

3. Make sure the motor is electrically grounded, the mounting bolts are properly secured, and all guards are in place before start-up.

4. Wear safety glasses and earplugs when working on the blower or components within a Republic Vacuum system.

5. **Check the final installation for proper amp loads.**

6. Keep all tools, loose clothing and hands away from rotating or moving parts while the unit is running.

7. Inspect the pump at regular intervals for damaged or worn parts. **Replace damaged parts immediately! Do not connect or turn on a damaged pump!**

8. Inspect the inlet air filter at regular intervals and replace when necessary. A dirty air filter can cause improper pump performance.

9. Use only genuine Republic Manufacturing brand replacement parts.

10. Refer to Troubleshooting section of manual.

11. Make sure to install the inlet air filter or piping to pump inlet before starting the pump/motor.

12. Water, other liquids, aggressive or flammable gases and vapors may not be handled. Consult Republic Manufacturing for recommendations if flammable gases and vapors exist.

13. Improper use of the unit can result in serious or even fatal injuries. Only operate the pump for the purposes indicated under "Intended Use", with the fluids indicated under "Intended Use" and with the values indicated under "Technical Data".

14. High temperatures of up to approximately 167°F (75°C) can occur on the surface of the pump. Allow to cool down after shut-down.

Protect Eyes and Ears

Danger, Warning, Caution

Hot Surface

Toxic/ Bio Hazard

Explosion Risk

Risk of Electrical Shock

Lockout/Tagout Procedures

1. Notify all affected employees that a lockout or tagout is about to occur on a specific piece of equipment or machinery. The authorized employee to use the lockout/tagout system shall know the type and magnitude of energy that the machine or equipment utilizes and the hazards that exist with the energy source before preparing to shutdown.
2. If the machine or equipment is operating, please use normal stopping or rundown procedures for that machine.
3. Operate the switch, valve, or other energy isolating devices so that the equipment is isolated from its energy source. Isolating the equipment from its energy source may involve turning off such items as the operating control, a line valve, or an electrical circuit breaker.
4. Apply the lockout/tagout isolating device with assigned individual locks or tags.
5. Release any potentially-hazardous stored or residual energy. In order to do so, this may mean to return springs to a normal position, or bleeding down. Since the machine must be in a zero energy state, if there is any chance the stored energy may reaccumulate, verification of isolation must be continued until the servicing or maintenance is complete.
6. The machine or equipment is now locked out or tagged out.
7. Keep all tools, loose clothing and hands away from rotating or moving parts while the unit is running.

Model Identification

Republic Vacuum Pumps have a nameplate containing the serial and model number located on the pump body. When placing a service call, please provide the Republic serial number. Call us at (800) 847-0380 or e-mail info@republic-mfg.com.

Equipment Arrival & Inspection

Inspect the pump at time of receipt to ensure that all components and accessories, as noted on the packing slip, were received and in good condition. Verify that the serial number on the packing slip matches the serial number shown on the pump nameplate. Inspect the pump and motor assembly to ensure that the motor horsepower and voltage are correct.

If any equipment was damaged in transit, you will need to make a claim against the freight carrier immediately. If you have any shortages, discrepancies, or damage, please call your Republic Manufacturing Distributor or Republic Manufacturing at (800) 847-0380.

DANGER: Possible danger to health and or the environment. Personal protective equipment must be worn. Liquids must be disposed in compliance with applicable regulations.

Intended Use

This operating manual

- is intended for oil lubricated vacuum pump models RX 16-630 .
- contains instructions regarding transport and handling, installation, commissioning, operation, shut-down, storage, services, and disposal.
- must be completely read and understood by all operating and servicing personnel before beginning to work with or on the pumps.
- must be strictly observed.
- must be available at the site of operation.

The RX-Series

- are pump-motor units for generating deep vacuum.
- are used to extract, pump and compress the following gases:
    - Air.
    - Non-flammable, non-aggressive, non-toxic and non-explosive gases or gas-air mixtures.
    - For differing gases/gas-air mixtures, inquire with Republic Manufacturing.
- are equipped with 3-phase AC drive motor with a standard design.

These operating instructions apply only to pump units with a standard design:

- are intended for industrial applications or designed for continuous operation.
- With increased switch-on frequency (6x per hour with equal pauses and operating times) or with increased gas inflow and ambient temperature, the excess temperature limit of the coil and the bearing can be exceeded. Consult Republic Manufacturing under such conditions.

Foreseeable Misuse

It is prohibited

- to use the RX 16-630 in applications other than industrial applications unless the necessary protection is provided on the system, e.g. guards suitable for children's fingers;
- to use the device in areas in which explosive gases can occur if the pump is not expressly intended for this purpose;
- to extract, to deliver and to compress explosive, flammable, corrosive or toxic fluids, unless the pump is specifically designed for this purpose;
- to operate the pump with values other than those specified in "Technical Data".

Any unauthorized modifications of the pump are prohibited for safety reasons. The operator is only permitted to perform the maintenance and service work described in these operating instructions. Maintenance and servicing work which goes beyond this may only be carried out by companies which have been authorized by Republic Manufacturing.

Product Description

Republic Manufacturing Oil Lubricated Vacuum Pumps are industrial grade pumps made for continuous duty. These pumps provide the vacuum to 29.9 HgV. Several models are available:

- The Republic RX 16-630 oil-lubricated vacuum series is robust and reliable. It has capacities from 11.0 to 490.0 cfm.

The vacuum pump is intended for the suction of air and other dry, non-aggressive, non-toxic and non-explosive gases. Conveying media with a higher density than air leads to an increased thermal and mechanical load on the vacuum pump and is permissible only after prior consultation with Republic Manufacturing.

The vacuum pump is equipped with a gas ballast so water vapor within the gas flow is tolerated within certain limits. The conveyance of other vapors shall be agreed upon with Republic Manufacturing. The vacuum pump is intended for placement in a non-potentially explosive environment. The vacuum pump is thermally suitable for continuous operation.

Air Process

Dust is removed by the inlet air filter, then the air goes into the pump body through the inlet port and mixes with the oil. The mixed air is compressed through the exhaust port, and then filtrated by the exhaust filter. The oil-free air is then exhausted into the atmosphere. The gas ballast should be open if there is moisture in the air.

The inlet air filter is a dry paper filter. It should be removed and cleaned per the instructions in "Maintenance". The inlet port cannot be used as a vacuum system check valve or the vane may rotate in the opposite direction after the machine is switched off.

The pump is equipped with a gas ballast valve, which can be partially or completely closed. A little air enters the pump body through the gas ballast valve and is compressed with the processed air.

Oil Circulation

Oil lubricates the vanes, seals the gaps, and removes compression heat. The oil reservoir is located on the pressure side of the pump (i.e. high pressure) and the bottom of the bottom chamber of the oil separator. The feed openings are located on the suction side of the vacuum pump (i.e. low pressure). Oil is drawn through the oil supply lines and injected on the suction side.

The injected oil mixes with the air/gas and is conveyed through the pump, then is ejected into the oil filter. Oil that separates before the exhaust filter accumulates at the bottom of the bottom chamber of the oil separator. Oil that is separated by the exhaust filter accumulates at the bottom of the upper chamber of the oil separator.

The flow resistance of the exhaust filters causes the inside of the exhaust filters (which is connected to be bottom chamber of the oil separator) to be on a higher pressure level than the outside of the exhaust filters (i.e. the upper chamber of the oil separator). Because of the higher pressure in the bottom chamber it is not possible to let oil that drips off the exhaust filters simply flow down to the bottom chamber. Therefore, the oil that accumulates in the upper chamber is sucked through the oil return line right to the suction connection.

Lubrication Process

The lubrication process is separated into three parts:

1. The first part is cooled in the oil coil and is then injected into the vacuum body to cool the air.
2. The second part goes into both sides of the pump body to cool the bearing housing.
3. The spare lubrication moves into the vacuum body to cool the air. The oil injected into the vacuum body with the inlet air enters the oil separator through the exhaust port as oil mist. After the oil mist hits the oil separator, some oil returns to the bottom of the oil separator while some oil will be separated by the exhaust filter. After being separated by the filter, the oil gathers in the float valve and returns to the vacuum body through the float valve. Then the cycle repeats.

The oil mist is removed almost completely by the exhaust port. The exhaust filter can work for about 3000 hours under normal working conditions, but the lube quality and the pollution of the nearby environment will affect the life of the filter. If the environment is too polluted, consider adding a pre-filter. We recommend using our vacuum pump oil (SHV series), as other brands or reconditioned oil will reduce the performance of the vacuum pump.

Cooling
Ambient air temperature and condition (not to exceed 104°F/40°C)should be considered when choosing placement of the vacuum pump, as the pump is very sensitive to the environmental temperature. If the environment is not optimal, the cooling fan will be covered with dust, which adversely affects the performance. Dust should be removed with low pressure compressed air. If it cannot be removed completely, a solvent should be used and the heat dissipation surface of the oil coil should be kept dry.

The vacuum pump is cooled by:
- ambient air around the vacuum pump, including oil mist separator;
- air flow from the fan wheel;
- conveyed gas; and
- air flow from the fan wheels on the shaft of the vacuum pump.

Emission of Oil Mist
The oil in the process gas is separated to the greatest possible extent, but not perfectly.

DANGER: Aspiration of gas conveyed by the vacuum pump over extended periods can be harmful. The room into which the gas is conveyed by the vacuum pump is discharged and must be sufficiently vented.

ATTENTION: The non-OEM spares market offers exhaust filters that are geometrically compatible with Republic Manufacturing's vacuum pumps, but do not feature the high retention capacity of genuine Republic Manuacturing exhaust filters. In order to keep the emission on the lowest possible level, use only genuine Republic Manufacturing exhaust filters.

Noise Emission
For the sound pressure level in free field according to SKU, see "Technical Data".

WARNING: The vacuum pump emits noise of high intensity. Risk of damage to the hearing. Persons staying in the vacinity of a non-noise insulated vacuum pump over extended periods shall wear ear protection.

Transport

1. Attach lifting gear securely to the eyebolt on the cylinder.
2. Attach lifting gear to a crane hook with safety latch.
3. Lift the vacuum pump with a crane hook.

DANGER: Do not walk, work or stand under suspended loads.

WARNING: Check the weight of the vacuum pump before lifting. (See "Technical Data".) Use adequate lifting gear as needed.

ATTENTION: The position of the eyebolt fits to the center of gavity of the vacuum pump, including the drive motor. If a vacuum pump without a drive motor is to be lifted, attach another belt/rope at a suitable point.

ATTENTION: Tilting a vacuum pump that is already filled with oil can cause large quantities of oil to ingress into the cylinder.

ATTENTION: Starting the vacuum pump with excessive quantities of oil in the cylinder will immediately break the vanes and ruin the vacum pump.

Transport in Packaging
Packed on a pallet, the vacuum pump is to be transported with a forklift. Remove the stud bolts from the rubber feet.

Transport without Packaging
In the event the vacuum pump is bolted to a pallet or a base plate, remove the bolting between the vacuum pump and pallet/ base plate.

Weight Limitations

Pump may be lifted manually or utilizing lifting equipment based on the instructions below. All pumps heavier than the maximums stated below must be lifted using lifting equipment. Manual handling of the unit is only permitted within the following limits:

- Max. 66 lbs (30 kg) for men
- Max. 22 lbs (10 kg) for women
- Max. 11 lbs (5 kg) for pregnant women

Suitability & Environmental Conditions

- The units are suitable for use in the industrial field.
- Use only clean, dry air. Do not use explosive gases or atmosphere that contains such gases.
- The ambient and suction temperatures must be <104°F (40°C). For temperatures outside this range please contact your supplier.
- In all applications where an unplanned shut down of the pump could possibly cause harm to persons or installations, a corresponding safety backup system must be installed.
- Protect all surrounding items from exhausted air. This exhausted air can be very hot.
- When using the pump at a high altitude or high temperatures, please consult with Republic Manufacturing prior to use.
- Water, other liquids, aggressive or flammable gases and vapors may not be handled. Handling of flammable or aggressive gases and vapors is only possible with special versions.
- Do not dispose of solid material directly into suction inlet or use filter before inlet. Doing so may cause damage to the vacuum pump.
- Do not dispose of acid, alkali or flammable gas. Doing so may cause an explosion or damage.

- Do not dispose of high temperature liquid or air.

DANGER: Possible danger to health and/or the environment. Personal protective equipment must be worn. Liquids must be disposed in compliance with applicable regulations.

Storage Conditions

- Store in original packaging.
- Must store pump in a place that meets the following conditions: dry, indoors, dust-free and low vibration (<2.8mm/s).
- The temperature during storage must be ambient temperature <104°F (40°C).
- Store with the inlet and discharged plugged.
- Make sure the ball-cock of the gas ballast is closed.

Conservation

In case of adverse ambient conditions (e.g. aggressive atmosphere, frequent temperature changes) conserve the vacuum pump immediately. In case of favorable ambient conditions conserve the vacuum pump if a storage of more than 3 months is scheduled. During the factory tests, the vacuum pump inside has been completely in contact with oil. In case of favorable ambient conditions, it is not necessary to conserve the pump with conservation oil. In case of unfavorable storage conditions, draining the vacuum pump with conservation oil is advised. If anything remains to be clarified please contact your Republic Manufacturing representative.

1. Make sure that the oil is drained.
2. Make sure that the ball-cock of the gas ballast device is closed
3. Fill in conservation oil (Corex HLP-D 6 or conservation oil from same quality) in small quantities by the suction connection, observe the oil type and the given quantity in the tables below:

Pump Type	Conservation Oil Quantity
RX-16-20	1 Liter
RX-25-140	2 Liters
RX-202	5 Liters
RX-302	7 Liters
RX-402	14 Liters
RX-630	16 Liters

4. Wrap PTFE-tape around the thread of the suction connection.
5. Firmly close the suction connection with a plug.

DANGER: Operation with a gas discharge/pressure connection closed will damage the vacuum pump. Make sure the gas discharge is open.

DANGER: During operation the surface of the vacuum pump may reach temperatures of more than 167°F (75°C). Risk of burns! Do not touch the hot housing.

6. Electrically connect the vacuum pump (see "Installation and Commissioning, Electrical Connection").
7. Let the vacuum pump run for at least half an hour.
8. Switch the vacuum pump off.
9. Drain the conservation oil (see "Maintenance, Oil, Draining Used Oil").
10. Wrap PTFE-tape around the thread of a plug.
11. Firmly insert the plug into the discharge connection.
12. Make sure that all ports are firmly closed ; seal all ports that are not with PTFE-tape, gaskets or o-rings with adhesive tape.

NOTE: VCI stands for "Volatile Corrosion Inhibitor". VCI-products (film, paper, cardboard, foam) evaporate a substance that condenses in molecular thickness on the packed good and by its electro-chemical properties effectively suppresses corrosion on metallic surfaces. However, VCI-products may attack the surfaces of plastics and elastomers. Seek advice from your local packaging dealer. Republic Manufacturing uses CORTEC VCI 126 R film for the overseas packaging of large equipment.

13. Wrap the vacuum pump in VCI film.
14. Store the vacuum pump. If possible in original packing, indoors, dry, dust free and vibration free.
15. Repeat the conservation process after 12 months of immobilization.

ATTENTION: Before a new conservation process or reinstallation of the vacuum pump, make sure that the gasket, plug or adhesive tape from the discharge connection are removed.

Commissioning After Conservation

- Make sure that the gasket, plug or adhesive tape are removed from the ports.
- Commission the vacuum pump as described in "Installation and Commissioning".

Installation and Commissioning

Installation Prerequisites

DANGER: In case of non-compliance with the installation prerequisites, particularly in the case of insufficient cooling, risk of damage or destruction of the vacuum pump and adjoining plant components. Risk of injury. The installation prerequisites must be complied with.

Mounting Position and Space Required for Installation

- Upon installation, please check for and remove any obstruction around pump suction inlet and install under cover to avoid motor damage or electric shock caused by contact with water.
- To avoid overheating, ensure airflow to the pump is undisturbed.
- A distance of at least 4 ft (1.2 meter) must be maintained between pump motor fan and wall to avoid overheating. Heat-resistant piping material is recommended within 4 ft (1.2 meter) of the pump.
- Ventilation screens and openings must remain clear so that discharge air of other units may not be directly sucked in again.
- Do not use the vacuum pump in areas where it would be exposed to high temperatures, excessive dust, smoke, rain, caustic air, or combustible air.
- Install the pump on a level, stable operating surface. The pump causes low vibration, but a special base is not required. If desired, the pump can be bolted down.
- Place the vacuum pump in such a way that the oil sight glass is easy to read.
- Make sure that the environment of the vacuum pump is not potentially explosive.
- Make sure that the following ambient conditions will be complied with:
  - Ambient temperature: see "Technical Data, Oil"
  - Ambient pressure: atmospheric
- If the vacuum pump is installed in a colder environment than allowed with the oil used:
  - Fit the vacuum pump either with an oil sump heater (on request); or
  - Fit the vacuum pump with a temperature switch and control the vacuum pump in such a way that it will start automatically when the oil sump temperature drops below the allowable temperature.
- Make sure that the environmental conditions comply with the protection class of the drive motor (according to the nameplate).
- Make sure that the vacuum pump will be placed or mounted horizontally.
- Make sure that the base for placement / mounting base is even.
- Make sure that the vacuum pump can neither inadvertently nor intentionally be stepped on and cannot be used as a support for heavy objects.
- Make sure that the vacuum pump cannot be hit by falling objects.
- Make sure that in order to warrant a sufficient cooling there will a clearance of minimum 2 ft (0.6 meter) between the fan hood and nearby walls.
- Make sure that no temperature sensitive parts (plastics, wood, cardboard, paper, electronics) will touch the surface of the vacuum pump.
- Make sure that the installation space or location is vented such that a sufficient cooling of the vacuum pump is available.
- Make sure that the vacuum pump will not be touched inadvertently during operation. Provide a guard if appropriate.
- Make sure that the oil sight glass will remain easily accessible. If the oil change is meant to be performed on location, make sure that the oil drain port , the oil filter and the oil fill port will remain easily accessible.
- Make sure that enough space will remain for the removal and the reinsertion of the exhaust filter(s).

DANGER: Make sure the motor is electrically grounded, the mounting bolts are properly secured, and all guards are in place before start-up.

DANGER: During operation the surface of the vacuum pump may reach temperatures of more than 167°F (75°C). Risk of burns!

Plumbing & Accessories

- Remove any foreign material (e.g. burrs, chips, welding drops, pipe cuttings, excess sealant, etc.) from plumbing.
- Verify the motor is securely mounted and proper pump rotation before connecting to plumbing. The inlet and outlet port are not designed to support the plumbing without proper supporting elements.
- Remove safety rubber plugs from the inlet and outlet ports.
- Connect the plumbing with properly sized fittings.
- Install an intake filter to prevent foreign material from entering the pump. In applications where there is high humidity or liquids being used in the process, install a moisture separator with a drain valve.
- When the diameter of the main pipe must be reduced, a tapered pipe should be used.
- Install two (2) gauges - one before and one after the filter - to monitor differential air flow through the filter element. As filters become clogged, performance efficiency will be reduced. Filters should be checked periodically and replaced when necessary.
- Recommended piping should be, at minimum, the same size as the inlet port on vacuum systems.

WARNING: Exhaust air temperature increases significantly above 65"WC (162 mbar). Discharged air is typically too hot for most plastic piping, therefore metal piping is recommended. This piping must be guarded and marked "DANGER-HOT-DO-NOT TOUCH".

Suction Connection

DANGER: Do not put hands into the inlet aperature. Risk of body damage!
WARNING: Intruding foreign objects or liquids can destroy the vacuum pump.

In case the inlet gas can contain dust or other foreign solid particles:

- Make sure that a suitable filter (5 micron or less) is installed upstream of the vacuum pump.
- Make sure that the suction line fits to the suction connection/gas inlet of the vacuum pump.
- Make sure that the gas will be sucked through a vacuum-tight flexible hose or a pipe.
- Make sure that the pipe will cause no stress on the vacuum pump's connection. If necessary use bellows.
- Make sure that the line size of the suction line over the entire length is at least as large as the suction connection/gas inlet of the vacuum pump.

In case of very long suction lines it is prudent to use larger line sizes in order to avoid a loss of efficiency. Seek advice from your Republic Manufacturing representative.

If two or more vacuum pumps work on the same suction line, if the volume of the vacuum system is large enough to suck back oil, or if the vacuum shall be maintained after switching off the vacuum pump:

- Provide a manual or automatic operated valve (non-return valve) in the suction line. NOTE: The non-return valve that is installed inside the suction connection is not meant to be used for this purpose!

If the vacuum pump is planned to be used for the suction of gas that contains limited quantities of condensable vapor:

- Provide a shut-off valve, a drip-leg and a drain valve in the suction line, so that condensates can be drained from the suction line.
- Make sure that the suction line does not contain foreign objects, e.g. welding scales.

Discharge Connection

DANGER: Do not put hands into the inlet aperture. Risk of body damage!

The following guidelines for the discharge line do not apply if the aspirated air is discharged to the environment right at the vacuum pump.

- Make sure that the discharge line fits to the gas discharge connection of the vacuum pump.

In case of using a pipe:

- Make sure that the pipe will cause no stress on the discharge connection. If necessary use bellows.
- Make sure that the line size of the discharge line over the entire length is at least as large as the gas discharge connection of the vacuum pump.

In case of very long discharge lines it is prudent to use larger line sizes in order to avoid a loss of efficiency and an overload of the vacuum pump. Seek advice from your Republic Manufacturing representative.

• Make sure that the discharge line either slopes away from the vacuum pump or provide a liquid separator or a drip leg with a drain cock, so that no liquids can back up into the vacuum pump.

DANGER: The discharged air contains small quantities of vacuum oil. Long exposure to vacuum oil contaminated air bears risk of damage to health. If air is discharged into rooms where persons stay, sufficient ventilation must be provided.

DANGER: Discharge lines made from non-conducting material can build up static charge. Static discharge can cause explosion of potentially existing oil mist. The discharge line must be made of conducting material or provisions must be made against static discharge.

On/Off Switch

The vacuum pump comes without on/off switch. The control of the vacuum pump is to be provided in the course of installation.

Electrical Connection

DANGER: Malpractice can result in severe injuries and material damage. The electrical connection may be performed by trained and authorized electricians only.

ATTENTION: Before beginning work on the unit or system, the following measures must be carried out:

1. De-energize.
2. Perform proper lockout/tagout procedures such that electricity cannot be turned on again.
3. Confirm unit is de-energized.
4. Ground and short-circuit.
5. Cover or block-off adjacent energized parts.
6. Make sure the voltage and frequency of power supply fits the requested electrical condition marked on pump rating plate or label, otherwise injury or motor damage may occur due to incorrect voltage. Standard power supply for the vacuum pump motor is 230v/380v/460v/3ph/50hz/60hz.
7. Install overload protection according to the voltage marked on rating plate or label and choose the appropriate overload device.
8. Make sure that the drive of the vacuum pump will not be affected by electric or electromagnetic disturbance from the mains; if necessary seek advice from the Republic Manufacturing service.
9. Avoid turning pump switch on and off more than 10 times per hour, otherwise motor may overheat.
10. In case of mobile installation, provide the electrical connection with grommets that serve as strain-relief.

DANGER: Risk of electrical shock, risk of damage to equipment. Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations: 1) IEC 364 or CENELEC HD 384 or DIN VDE 0100; 2) IEC-Report 664 or DIN VDE 0110; 3) BGV A2 (VBG 4) or corresponding national accident prevention regulation.

DANGER: Risk of damage to the drive motor. The inside of the terminal box shall be checked for drive motor connection instructions/schemes.

WARNING: Incorrect connection of the motor can lead to serious damage to the unit.

Electrical Power Supply

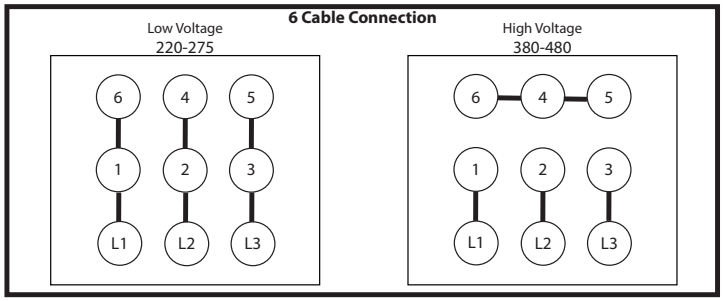
Observe the rating plate. It is imperative that the operating conditions correspond to the data given on the rating plate. Deviations permissible without reduction in performance include:

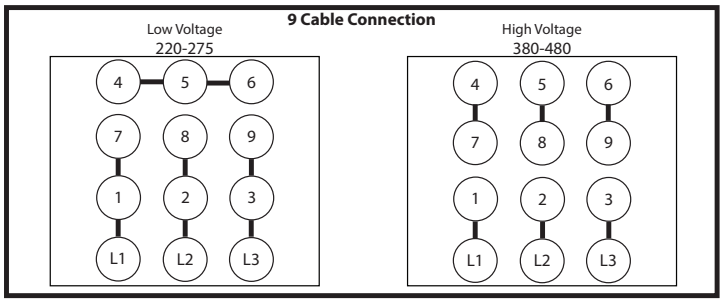
- +/- 5% voltage deviation
- +/- 2% frequency deviation

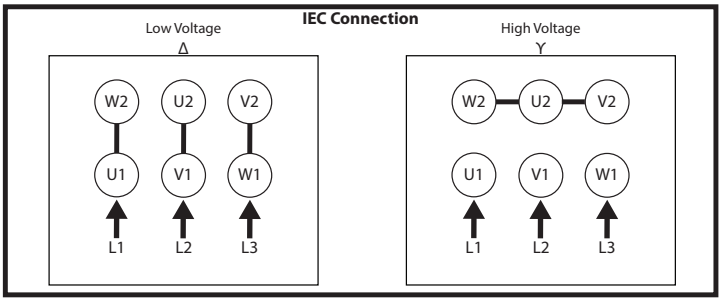
Connection to Terminal Box

11. Remove the motor's terminal box cover.
12. Mount cable glands on the terminal box. Proceed as follows:
    1. Select one cable gland in each case which is suitable for the cable diameter.
    2. Insert this cable gland in the opening of the terminal box. Use a reducer if necessary.
    3. Screw on the cable gland so that no moisture, dirt, etc. can penetrate into the terminal box.
13. Carry out the connection and arrangement of the jumpers in accordance with the wiring diagram. The electrical connection must be carried out as follows:
    1. The electrical connection must be permanently safe.
    2. The terminal box must be free from foreign bodies, dirt, and humidity. Terminal box cover and cable entries must be tightly closed so as to make them dust-proof and waterproof. Check for tightness at regular intervals.
    3. There may be no protruding wire ends.
    4. Clearance between bare live parts and ground : $\geq$ 0.22 in. (5.5 mm) at a nominal voltage of $U_N \leq 690$ V.
14. For motor overload protection, use motor circuit breakers and adjust to the specified nominal current as listed on the rating plate.

DANGER: There is danger of an electrical shock when a defective pump is touched. Mount motor circuit breaker. Have electrical equipment checked regularly by an electrician.







DANGER: Operation in the wrong direction of rotation can destroy the vacuum pump in a short time. Prior to starting-up it must be made sure that the vacuum pump is operated in the proper directions.
DANGER: Risk of explosion!

14. Determine the intended direction of rotation with the arrow.
15. "Bump" the drive motor.
16. Watch the fan wheel of the drive motor and determine the direction of rotation just before the fan wheel stops.
17. If the rotation of the fan wheel must be changed, switch any two of the drive motor wires in the terminal box.

Installation Mounting

Make sure that the "Installation Prerequisites" are complied with. Set down or mount the vacuum pump at its location.

Connecting Lines/Pipes

In case the suction line is equipped with a shut-off valve:

- Connect the suction line.
- Connect the discharge line .

Installation without discharge line:

- Make sure that the gas discharge is open.
- Make sure that all provided covers, guards, hoods etc. are mounted.
- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.

Filling Oil

In case the vacuum pump was treated with conservation oil, drain the remaining conservation oil and top off oil.

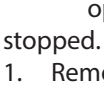
DANGER: The vacuum pump is shipped with oil. Operation without oil will ruin the vacuum pump in short time. Prior to commissioning it must be made positively sure that oil is filled.

Only oils according to DIN 51506, lubricating oil group VC must be used. Using the correct lubricant has an effect on the end pressure (the 0.1 hPa ultimate pressure is obtained with the use of SHV100 oil type).
The application of the vacuum pump will determine the oil to be used.
WARNING: A change from synthetic oil to mineral oil requires a special procedure.
Keep the approximate amount of oil required by the pump (See "Technical Data, Oil".) ready.
ATTENTION: The amount given in these operating instructions is a guide. The actual amount of oil required is indicated by the oil sight glass.

WARNING: Before changing the oil type, compatibility shall be checked and, if necessary, the pump shall be flushed.

DANGER: In case the vacuum pump has potentially been treated with conservation oil, pump must be flushed. Synthetic oils (except for oils based on poly-a-olefin) are incompatible with mineral oils and conservation oils. Risk of foaming leading to destruction of vacuum pump.

DANGER: Filling oil through the gas inlet will result in breakage of the vanes and destruction of the vacuum pump. Oil may be filled only through the oil fill port.



DANGER: During operation the oil separator is filled with hot, pressurized oil mist. Risk of injury from hot oil mist with open oil fill port. Risk of injury if a loosely inserted oil fill plug is ejected. Remove the oil fill plug only if the vacuum pump is stopped. The vacuum pump must only be operated with the oil fill plug firmly inserted.

1. Remove the oil fill plug.
2. Fill oil according to the values set in the table "Technical Data, Oil".
3. Make sure that the oil level is between the MIN and the MAX-markings or the center line of the oil sight glass.
4. Make sure that the seal ring is inserted into the oil fill plug and undamaged. Replace if necessary.
5. Firmly reinsert the oil fill plug together with the seal ring.

NOTE: Starting the vacuum pump with cold oil is made easier when the suction line is neither closed nor covered with a rubber mat.

6. Switch on the vacuum pump.
7. In case the suction line is equipped with a shut-off valve, close the shut-off valve.
8. In case the suction line is not equipped with a shut-off valve, cover the suction connection with a rubber mat.
9. Let the vacuum pump run for a few minutes.
10. Shut down the vacuum pump and wait a few minutes.
11. Make sure that the level is between the MIN and the MAX-markings or the center line of the oil sight glass .
12. In case the level has fallen below the MIN-marking of the oil sight glass, top off oil.
13. In case the suction line is equipped with a shut-off valve, open the shut-off valve.
14. In case the suction line is not equipped with a shut-off valve, block the suction connection with a rubber mat.

Recording of Operational Parameters (optional)

As soon as the vacuum pump is operated under normal operating conditions:

- Measure the drive motor current and record it as reference for future maintenance and troubleshooting work.

Commissioning

DANGER: Improper use of the unit can result in serious or even fatal injuries. Do not proceed without reading "Safety Instructions".

DANGER: Danger from rotating parts cutting/cutting off extremities, grasping/winding up of hair and clothing.

DANGER: Danger due to vacuum and pressure, sudden escape of vapor (skin and eye injuries), sudden drawing in of hair and clothing, or burns.

Only start-up and operate under the following conditions:

- The pump must be completely assembled. Pay particular attention to the following components:
  - the pump cover;
  - the muffler on inlet and discharge connections; and
  - the fan guard;
- The pipes/hoses must be connected to inlet and discharge connections.
- Inlet and discharge connections and the connected pipes/hoses may not be closed, clogged or soiled.
- Check the mounting elements, connections of the pipe/hose, lines, fittings and containers for strength, leaks and firm seating at regular intervals.

Preparation

DANGER: Pump can overheat causing damage to the drive motor winding if intake or discharge connections are closed/soiled. Before start-up, make sure the inlet and discharge connections are not closed, clogged or soiled.

WARNING: Before starting up after a longer standstill, measure the insulation resistance of the motor. With values $\leq$ 1 kΩ per volt of nominal voltage, the winding is too dry.

1. Check the direction of the rotation. The intended rotating direction of the shaft is marked with arrows on the motor.
2. The gas delivery direction is marked with arrows on the inlet connection.
3. Make sure the pipes/hoses on the inlet and discharge connections are properly connected.
4. Switch the pump on briefly and then off again.
5. Compare the actual rotating direction of the external fan with the intended shaft rotating direction indicated with the arrows shortly before the pump comes to a standstill.
6. If necessary, reverse the direction of the rotation of the motor.
7. Observe the operating speed specified on the rating plate. This may not be exceeded, as otherwise the noise radiation, vibration behavior, grease consumption duration and bearing change interval worsen. To prevent damage as a result of higher speeds, it may be necessary to inquire with Republic Manufacturing as to the maximum speed.

Start-Up

1. Open shut-off device in intake/discharge pipe.
2. Switch on power supply for drive motor.
3. Operate pump for an hour, and then check:
   - Ambient temperature - increased room temperatures may require stronger ventilation especially for larger pumps. Room temperature should not exceed 104°F (40°C).
   - Vacuum valves - adjust relief valve vacuum setting if needed.
   - Motor current - check that current supply matches recommended current rating on pump nameplate.
   - Electrical overload cutout - check that current matches rating on pump nameplate.

If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that the voltage is correct for the motor and that the motor is turning in the proper direction.

Before operation, the air inlet should be closed for 30 minutes until the internal temperature reaches 167°F (75°C), which will allow any moisture to evaporate. After use, run the motor another 30 minutes so that any condensation in the pump oil evaporates.

Shut-Down
1. Switch off power supply for drive motor.
2. Close shut-off device in intake/discharge pipe, if applicable.

Preparing for a Long-Term Stop
If the vacuum pump will not be used for over two months, close down all open ports and store in a dry location, away from dust. Before restarting after long term stop, complete the following steps:
1. Manually rotate vanes to ensure they are not stuck before starting the motor.
2. Change all the lubrication and run for 30 minutes.
3. Follow the before start steps listed above.

Commissioning After Longer Standstill:
Before recommissioning after a longer standstill, measure the insulation resistance of the drive motor. With values $\leq$ 1kΩ per volt of nominal voltage, the winding is too dry.

Operation

DANGER: Improper use of the unit can result in serious or even fatal injuries. Do not proceed without reading "Safety Instructions". The vacuum pump is designed for operation under the conditions described in this manual.

DANGER: Danger due to vacuum, sudden escape of vapors (skin and eye injuries), sudden drawing in of hair and clothing.

DANGER: Danger of overheating due to hot surface of pump. High temperatures of up to approximately 167°F (75°C) can occur on the surface of the pump. Risk of burns. Do not touch during operation. Allow to cool after shut-down. The vacuum pump shall be protected against contact during operation.

DANGER: Danger of overheating due to hot surface of pump. Temperature sensitive parts, such as lines or electronic components, may not come into contact with the surface of the pump.

DANGER: Danger of rusting due to collection of condensed water in drive motor area. On drive motors with closed condensed water openings, remove closures occasionally to allow any water which has collected to drain off.

DANGER: Danger of bearing damage. Heavy mechanical impacts must be avoided during operating and while at standstill.

DANGER: The discharged air contains small quantities of vacuum oil. Staying in vacuum oil contaminated air bears a risk of damage to health. If air is discharged into rooms where persons stay, sufficient ventilation must be provided.

DANGER: The vacuum pump emits noise of high intensity. Risk of damage to hearing. Persons staying in the vicinity of a non-noise insulated vacuum pump over extended periods shall wear ear protection.

- Make sure that all provided covers, guards, hoods etc. are mounted.
- Make sure that protective devices will not be disabled.
- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.
- Make sure that the installation prerequisites are complied with and will remain complied with, particularly that a sufficient cooling will be ensured.

Conveying Condensable Steams

DANGER: Residual condensates dilute the oil, deteriorate its lubricating properties, and can cause a jam of the rotor. Apply a suitable operating method to make sure that no condensates remain in the vacuum pump. In order to use the vacuum pump for the conveyance of condensable vapors, the vacuum pump must be equipped with shut-off valve in the suction line and with a gas ballast valve.

- Make sure that the ballast valve is open and will remain open during operation.
- Make sure that the solenoid valve is closed.

The solenoid valve is closed when the motor passes in phase delta and the vacuum can thus be obtained.

- Close the shut-off valve in the suction line.
- Operate the vacuum pump with the shut-off valve in the suction line closed for approximately 30 minutes, so that the operating temperature will rise to approximately 167°F (75°C).

At process start:

- Open the shut-off valve in the suction line.

At process end:

- Close the shut-off valve in the suction line.
- Operate the vacuum pump for another approximately 30 minutes.

Maintenance

DANGER: In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in filters. Danger to health during inspection, cleaning, or replacement of filters. Danger to the environment. Personal protective equipment must be worn during the handling of contaminated filters. Contaminated filters are special waste and must be disposed of separately in compliance with applicable regulations.

DANGER: During operation the surface of the vacuum pump may reach temperatures of more than 167°F (75°C). Risk of burns. Ue approved lockout/tagout system. Replace damaged parts immediately. Do not turn on a damaged pump.

- Prior to action that requires touching of the vacuum pump, let the vacuum pump cool down.
- In case of oil draining, let the vacuum pump cool down for no more than 20 minutes.
- Prior to disconnecting connections make sure that the connected pipes/lines are vented to atmospheric pressure.
- Conveying air with high moisture may shorten the pump's service life. Air with a high moisture content should be avoided. If unavoidable, inspect pump's parts periodically to prevent pump damage or injury caused by corrosion.
- Bearings, vanes, and filters are consumable parts with limited life. Please inspect and replace periodically, especially in operations beyond normal ambient operating conditions.
- The inlet filter and the exhaust filter must be cleaned at regular intervals, depending on the amount of dust in the air being pumped. Blow out the filter cartridges with compressed air gun from the inside outwards.
- If the filter cartridge is too dirty to be cleaned, it must be replaced. The cartridges can be taken out after the removal of the filter cover.
- Cooling fan, hood, and motor should be inspected regularly for dirt. Dirt prevents cool air intake and may lead to overheating of the vacuum pump.
- Bearings are pre-lubricated and require no maintenance.

Maintenance Schedule

NOTE: The maintenance intervals depend very much on the individual operating conditions. The intervals given below shall be considered as starting values which should be shortened or extended as appropriate. Particularly heavy duty operation, such as high dust loads in the environment or in the process gas, other contaminations or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

Daily Maintenance

- Check oil color. If the oil is black or shows sediment, change the oil before use.
- Clear the inlet air filter by using compressed air to blow from the inside to the outside.
- Check the pipeline.
- Check oil sightglass, disassemble and wash if needed.
- Check oil level, add more if needed.
- Clear dust from outside of the cooler and the inner pipeline.

Weekly Maintenance

- Make sure that the vacuum pump is shut down and locked against inadvertent start up.
- Check the level and the color of the oil.
- Check the vacuum pump for oil leaks - in case of leaks have the vacuum pump repaired.
- Check the function of the exhaust filters .
- In case an inlet air filter is installed, check the inlet air filter, if necessary clean (with compressed air) or replace.
- In case of operation in a dusty environment, make sure that the housing is free from dust and dirt, clean if necessary (see "Every 6 Months").

Every 6 Months

- Make sure that the vacuum pump is shut down and locked against inadvertent start up.
- Make sure that the housing is free from dust and dirt, clean if necessary.
- Clean the fan cowlings, fan wheels, ventilation protection screen and cooling fins.

Yearly

- Make sure that the vacuum pump is shut down and locked against inadvertent start up.
- Replace the exhaust filters (see "Maintenance, Exhaust Filter") .
- In case an inlet filter is installed, clean (with compressed air) or replace the inlet air filter.
- Check the inlet screen, clean if necessary.

Every 500 - 2000 Operating hours (see "Maintenance, Oil, Oil Life")

- Change the oil, replace the oil filter(s) and clean the float valve .

Every 16000 Operating hours, at the latest after 4 Years:

- Have a major overhaul on the vacuum pump.

Oil

Checking the oil level

1. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
2. Make sure that the oil has collected at the bottom of the oil separator.
3. Read the level on the sight glass.

In case the level has dropped underneath the MIN-marking, top off oil (see "Maintenance, Oil, Topping off Oil") .
In case the level exceeds the MAX-marking:

4. Check the dilution with condensates.
5. Change the oil (see "Maintenance, Oil, Oil and Oil Filter Change").

Topping off Oil

NOTE: Under normal conditions there should be no need to top off oil during the recommended oil change intervals. A significant level drop indicates a malfunction (see "Troubleshooting").
NOTE: During operation the exhaust filter gets saturated with oil. It is therefore normal that the oil level will drop slightly after replacement of the exhaust filter.

DANGER: Filling oil through the suction connection/gas inlet will result in breakage of the vanes and destruction of the vacuum pump. Oil may be filled only through the oil fill port.

DANGER: During operation the oil separator is filled with hot, pressurized oil mist. Risk of injury from hot oil mist with open oil inlet plug. Remove the oil inlet port, only when the vacuum pump is stopped. The vacuum pump must only be operated with the oil fill plug firmly inserted.

Checking the Color of the Oil

NOTE: The oil should be light, either transparent, a little foamy or a little tarnished. A milky discolouration that does not vanish after sedation of the oil indicates contamination with foreign material. Oil that is either contaminated with foreign material or burnt must be changed.

Changing the Oil

1. To maintain optimal performance of your pump, oil should be replaced on a regular schedule.
2. Run the vacuum pump to heat up the oil, which will help the oil drain faster.
3. Cut off power to the pump.
4. Slowly open the oil plug.
5. Check that no sealing rings are damaged or leaking.
6. Close the oil plug tightly.
7. Open oil plug, add oil up to the "Max" line and then tighten the plug.

Oil Life

The oil life depends very much on the operating conditions. A clean and dry air stream and operating temperatures below 212°F (100°C) are ideal. Under these conditions the oil and the oil filter shall be changed every 2000 operating hours or after half a year. Under very unfavourable operating conditions the oil life can be less than 500 operating hours. Extremely short life times indicate malfunctions (see "Troubleshooting") or unsuitable operating conditions.
If there is no experience available with regard to the oil life under the prevailing operation conditions, it is recommended to have an oil analysis carried out every 500 operating hours and establish the change interval accordingly.

Oil and Oil Filter Change

DANGER: In case the vacuum pump conveyed gas that was contaminated with harmful foreign material the oil will be contaminated with harmful material. Danger to health during the changing of contaminated oil. Danger to the environment. Personal protective equipment must be worn during the changing of contaminated oil. Contaminated oil is special waste and must be disposed of separately in compliance with applicable regulations.

Draining Used Oil

NOTE: After switching off the vacuum pump at normal operating temperature wait no more than 20 minutes before the oil is drained.

1. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
2. Make sure that the vacuum pump is vented to atmospheric pressure.
3. Put a drain tray underneath the oil drain port. Remove the oil drain plug.
4. Drain the oil.
5. When the oil stream dwindles, close the oil drain plug.
6. Switch the vacuum pump on for a few seconds.
7. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
8. Remove the oil drain plug.
9. Make sure that the sealing seat on the oil drain plug is undamaged. If necessary replace the oil drain plug.
10. Firmly reinsert the oil drain plug.
11. Dispose of the used oil in compliance with applicable regulations.

Flushing the Vacuum Pump

DANGER: Degraded oil can choke pipes and coolers. Risk of damage to the vacuum pump due to insufficient lubrication. Risk of explosion due to overheating. if there is a suspicion that deposits have gathered inside the vacuum pump the vacuum pump shall be flushed.

1. Make sure that all the used oil is drained.
2. Make sure that the used oil filter is still in place.
3. Refer to "Technical Data" to determine amount of flushing agent required. Flushing agent should be from 50 percent oil and 50 percent paraffin or diesel fuel/fuel oil.
4. Make sure that the oil drain plug is reinserted correctly.
5. Remove the oil fill plug.
6. Fill in the flushing agent.
7. Firmly reinsert the oil fill plug with its sealing seat.
8. Close the suction line.
9. Run the vacuum pump for at least 30 minutes.
10. Drain the flushing agent and dispose of it in compliance with applicable regulations.

NOTE: Due to the use of paraffin and even more in case of using diesel fuel/fuel oil, unpleasant odor can occur after recommissioning. If this is a problem, diesel fuel/fuel oil should be avoided and the vacuum pump be run at idle in a suitable place until the unpleasant odor vanishes.

Cleaning of the Float Valve

1. Make sure that all of the used oil is drained.
2. Unscrew the fixing screws of exhaust cover plate, take off the washers and remove the exhaust cover plate.
3. Check the seal and replace if necessary.
4. Unscrew the fixing screws and remove the float.
5. Check the o-ring and replace if necessary.
6. Check float for cleanliness and good operation. Blast clean with compressed air if necessary.
7. For reassembly, refit float to its support while taking care to fit it the correct way.

Replacing the Oil Filter

1. Make sure that all the used oil is drained.
2. Remove the oil filter.
3. Apply a drop of fresh oil on the seal ring of the new oil filter.
4. Mount the new oil filter and tighten it by hand.

NOTE: The amount given in these operating instructions is a guide. The oil sight glass indicates the actual amount to be filled.

5. Make sure that the oil outlet plug is firmly inserted.

DANGER: Filling oil through the suction connection/gas inlet will result in breakage of the vanes and destruction of the vacuum pump. Oil must be filled through the oil fill port only.

6. Remove the oil fill plug.
7. Fill oil.
8. Make sure that the level is between the MIN and the MAX-markings of the oil sight glass.
9. Make sure that the seal ring is inserted into the oil inlet plug and undamaged, replace if necessary.
10. Firmly reinsert the oil inlet plug together with the seal ring.

Exhaust Filter

Check During Operation

Republic Manufacturing recommends the use of a filter pressure gauge (available as accessory). Without filter pressure gauge the filter resistance shall be assessed on the basis of the drive motor current drawn.

1. Make sure that the vacuum pump is running.

Version with filter pressure gauge:

2. Check that the indication of the filter pressure gauge is in the usual range (< 0,6 bar).

Version without filter pressure gauge:

3. Check that the drive motor current drawn is in the usual range (see nameplate).
4. Check that the discharge air is free from oil.

Assessment

If the indication of the filter pressure gauge is in the red field, (> 17”Hg [0.6 bar]) or the drive motor draws too much current and/or the pump flow rate has dropped, then the exhaust filters are clogged and must be replaced.

NOTE: Exhaust filters cannot be cleaned successfully. Clogged exhaust filters must be replaced with new ones. If the discharge air contains oil, the exhaust filters can be clogged or broken through and, if applicable, must be replaced.

Change the Exhaust Filters

DANGER: In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in filters. Danger to health during inspection, cleaning or replacement of filters. Danger to the environment. Personal protective equipment must be worn during the handling of contaminated filters. Contaminated filters are special waste and must be disposed of separately in compliance with applicable regulations.

Removing the Exhaust Filters

1. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
2. Prior to disconnecting pipes/lines make sure that the connected pipes/lines are vented to atmospheric pressure.
3. Remove the discharge line, if necessary.
4. Remove the discharge cover from the oil separator.
5. Remove the seal for the separator cover, if necessary.
6. Release the spring elements by unscrewing the screws and remove them.
7. Remove the exhaust filters and the o-rings.

DANGER: The non-OEM spares market offers exhaust filters that are geometrically compatible with Republic Manufacturing vacuum pumps but do not feature the high retention capacity of genuine Republic Manufactuing exhaust filters and deteriorate the service life and the efficiency of the vacuum pump due to their increased back pressure. In order to keep the emissions at the lowest possible level and to preserve efficiency and service life only genuine Republic Manufacturing filters shall be used.

DANGER: Increased risk of damage to health. Adverse effect on efficiency and service lift.

8. Insert the new exhaust filters with the new o-rings into the oil separator. Be sure to fit the exhaust filters as indicated by the arrow at exhaust filters.
9. Mount spring elements and apply a tension to the spring elements by means of the tension screw.
10. Check the cover seal and replace it if necessary.
11. Mount the discharge cover.

NOTE: During operation the exhaust filters get saturated with oil. It is therefore normal that the oil level will drop slightly after replacement of the exhaust filters.

Replacing Exhaust Air Filter

We recommend changing the exhaust filter every other time you change the oil for optimal performance.

1. Stop the vacuum pump and check that there is no pressure in the system.
2. Remove the screw on the exhaust air lid.
3. Disassemble the top pieces.
4. Remove old filter.
5. Install new filter with new o-ring into oil separator, matching the direction of the arrow on the filter.
6. Reattach top pieces and lid.

The inlet air filter is a dry paper filter. It should be removed and cleaned every 1000 working hours. To clean the filter, blow low pressure air from the inside to the outside. The inlet valve cannot be used as a vacuum system check valve or the vane may rotate in the opposite direction after the machine is switched off.

Gas Ballast

Check the gas ballast inlet regularly. If the gas ballast doesn't work correctly, disassemble, clean, and blow it with compressed air.

Inlet flange

Check the inlet flange regularly. The maintenance interval of the inlet flange depends on the application.
To clean the mesh screen at the inlet:

1. Remove the upper parts of the inlet flange.
2. Remove the flange.
3. Remove the mesh screen and clean it with compressed air.
4. Check the different seals and replace them if necessary.
5. Refit the mesh screen and the inlet flange.

Replacing Air Inlet Filter

1. Stop the vacuum pump and check that there is no pressure in the system.
2. Remove the three clips on the inlet air filter and open the inlet filter lid.
3. Remove the old filter and replace with the new filter.
4. Close the air filter lid and reattach the three clips on the inlet air filter lid.

Fan Cover

Check the fan cover regularly. Poor maintenance of the fan cover will affect the vacuum pump cooling and may lead to overheating of the vacuum pump.

Motor Cover

Check the motor cover regularly. Poor maintenance of the motor cover will affect the vacuum pump cooling and may lead to overheating of the vacuum pump.

Overhaul

DANGER: In order to achieve best efficiency and a long life the vacuum pump was assembled and adjusted with precisely defined tolerances. The adjustment will be lost during dismantling of the vacuum pump. it is therefore strictly recommended that any dismantling of the vacuum pump that is beyond what is described in this manual shall be done by Republic Manufacturing.

DANGER: Improper work on the vacuum pump puts the operating safety at risk. Risk of explosion! Approval for operation will be void! Any dismantling of the vacuum pump that is beyond what is described in this manual must be done by y trained Republic Manufacturing service personnel only.

DANGER: In case the vacuum pump conveyed gas that was contaminated with foreign materials which are dangerous to health, harmful material can reside in oil and condensates. Danger to health during dismantling of the vacuum pump. Danger to the environment.

Removal from Service

Temporary Removal from Service

Prior to disconnecting pipes/lines make sure that all pipes/lines are vented to atmospheric pressure.

Recommissioning

DANGER: Vanes can stick after a long period of standstill. Risk of vane breakage if the vacuum pump is started with the drive motor. After longer periods of standstill the vacuum pump shall be turned by hand.

After longer periods of standstill:

1. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
2. Remove the cover around the fan of the drive motor.
3. Slowly rotate the fan wheel by hand several revolutions in the intended direction of rotation.
4. Mount the cover around the fan wheel of the drive motor.
5. If deposits could have gathered in the vacuum pump, flush the vacuum pump (see "Maintenance").
6. Observe the chapter "Installation and Commissioning".

In the Event of a Breakdown

1. Use a lockout/tagout procedure to ensure the pump may be worked on safely.
2. Refer to the "Troubleshooting" section of the manual to determine the cause of the breakdown and the appropriate action to take.
3. If further assistance is needed, please call Republic Manufacturing at 800-847-0380.

When to Ship the Pump Back to Republic

If you cannot fix or troubleshoot your pump system using this manual then a skilled Republic Manufacturing professional is required. Please ship your pump back to Republic Manufacturing.

Disabling, Dismantling, and Scrapping of Pump

DANGER: In case the vacuum pump conveyed gas that was contaminated with harmful foreign material the operating fluid and the exhaust filter(s) will be contaminated with harmful material. Harmful material can reside in pores, gaps, and internal spaces of the vacuum pump. Danger to health during dismantling of the vacuum pump. Danger to the environment. During dismantling of the vacuum pump personal protective equipment must be worn. The vacuum pump must be decontaminated prior to disposal. Dispose of the used oil and condensate according to applicable environmental protection regulations.

DANGER: Used oil, used exhaust filters and used oil filters are special waste and must be disposed of in compliance with applicable regulations.

1. Remove the exhaust filter (see "Maintenance, Exhaust Filter").
2. Drain the oil.
3. Remove the oil filter.
4. Make sure that materials and components to be treated as special waste have been separated from the vacuum pump.
5. Make sure that the vacuum pump is not contaminated with harmful foreign material.
6. Dispose of the used oil in compliance with applicable regulations.
7. Dispose of special waste in compliance with applicable regulations.
8. Dispose of the vacuum pump as scrap metal.

According to the best knowledge at the time of printing of this manual the materials used for the manufacture of the vacuum pump involve no risk.

Warranty Terms and Conditions

Republic Manufacturing warrants all finished Republic Manufacturing products to be free from functional defects in material and workmanship for a period of twelve (12) months from the date of installation, or no longer than eighteen (18) months from shipment.
Wear parts such as filter elements, hoses and piping are not covered by the 12 to 18 month warranty.

DISASSEMBLY OF PUMP MAY VOID WARRANTY.

To obtain service within the warranty period, first contact your authorized Republic Manufacturing dealer or Republic Manufacturing Service Department. Republic's responsibility under this warranty shall be to provide an analysis of the pump, which will determine course of action. Any product found to be defective within the warranty period will merit either:

a. A no charge repair of existing pump. Any freight charges will be the purchaser's responsibility.
b. A replacement pump*. Any freight charges will be the purchaser's responsibility.

*This option would be a chargeable replacement until the original pump is received by Republic Manufacturing, and warranty is approved.

Republic Manufacturing shall not be liable for incidental nor consequential damages resulting from the use of this product. There are no expressed nor implied warranties, which extend beyond the warranty of merchantability or fitness for a particular purpose to the equipment and/or its parts and components.

Troubleshooting

DANGER: Risk of electrical shock, risk of damage to equipment. Electrical installation work must only be executed by qualified personnel that knows and observes the following regulations: 1) IEC 364 or CENELEC HD 384 or DIN VDE 0100; 2) IEC-Report 664 or DIN VDE 0110; 3) BGV A2 (VBG 4) or equivalent national accident prevention regulation.

DANGER: During operation the surface of the vacuum pump may reach temperatures of more than 167°F (75°C). Risk of burns! Let the vacuum pump cool down prior to required contact or wear heat protection gloves.

Problem	Possible Cause	Remedy
The vacuum pump is blocked	Solid foreign matter has entered the vacuum pump.	Repair the vacuum pump. Make sure the suction line is equipped with a mesh screen. If necessary additionally provide a filter.
	Corrosion in the vacuum pump from remaining condensate.	Repair the vacuum pump. Check the process. Observe the chapter "Installation and Commissioning".
	The vacuum pump was run in the wrong direction.	Repair the vacuum pump. When connecting the vacuum pump make sure the vacuum pump will run in the correct direction (see "Installation and Commissioning").
	After shutting down the vacuum pump the vacuum system exerted underpressure onto the pump chamber which sucked back excessive oil from the oil separator into the pump chamber. When the vacuum pump was restarted too much oil was enclosed between the vanes. Oil could not be compressed and thus broke a vane.	Repair the vacuum pump. Make sure the vacuum system will not exert underpressure onto the shut-down vacuum pump, if necessary provide an additional shut-off valve or non-return valve.
	Condensate ran into the pump chamber. When the vacuum pump was restarted too much condensate was enclosed between the vanes. Condensate could not be compressed and thus broke a vane.	Repair the vacuum pump. Make sure no condensate will enter the vacuum pump, if necessary provide a drip leg and a drain cock. Drain condensate regularly.
Pump operation failure, but motor still operational	Broken oil pipe connector.	Replace oil pipe connector.
	One of the fuses has blown.	Check the fuses.

Problem	Possible Cause	Remedy
The vacuum pump does not reach the usual pressure Evacuation of the system takes too long. Ultimate pressure failure; current overload; long time for vacuum	The vacuum system or suction line is not leak-tight.	Check the hose or pipe connections for possible leak.
	Contaminated oil (the most common cause).	Drain the oil (see "Maintenance").
	No or not enough oil in the reservoir.	Top off oil (see "Maintenance").
	Blockage or leakage of inlet pipe or vacuum system.	Check pipe for blockage and remove blockages.
	Vacuum pump pollution.	Replace vacuum pump oil.
	Exhaust filter blocked.	Replace exhaust filter.
	Air inlet filter blocked.	Clean or replace air inlet filter.
	Blocked suction valve.	Clean suction valve and air inlet filter.
	The oil filter is partly clogged (the oil flows through the bypass only, the oil does not get filtered any more).	Replace the oil filter (see "Maintenance").
	In case a mesh screen is installed on the suction connection: The mesh screen on the suction connection is partly clogged.	Clean the mesh screen. If cleaning is required too frequently install a filter upstream.
	Limited air inlet/outlet pipe diameter.	Replace pipes.
	Leaking or broken oil pipe.	Tighten or replace oil pipe fitting.
	Broken or blocked exhaust valve.	Replace or clean exhaust valve.
	Partial clogging in the suction, discharge or pressure line.	Remove the clogging.
	Stuck or broken vane.	Clean rotor and vanes or replace vanes.
	Incorrect space between rotor and pump.	Adjust space between rotor and pump.
	Components broken, worn or damaged.	Repair vacuum pump.
	The valve disk of the inlet non-return valve is stuck in, closed, or partially open position.	Disassemble the inlet, clean the mesh screen and the valve as required and reassemble.
	The oil tubing is defective or leaking. The oil return line is broken.	Tighten the connections. Replace the connections and/or the tubing (replace with identically dimensioned parts only).
	A shaft seal is leaking.	Replace the shaft seal ring.
	The exhaust valve is not properly seated or stuck in partially open position.	Disassemble and reassemble the exhaust valve(s).
	The oil return line starts in an area vented to atmospheric pressure. Particularly on small model pumps, a fairly large amount of air is sucked through the oil return line, which may prevent the ultimate pressure from reaching 20 bar abs. In order to exclude this possible cause: squirt oil through the gas discharge/pressure connection into the oil return line. While oil is being sucked in, the ultimate pressure is not affected by the air normally sucked through the oil return line.	

Problem	Possible Cause	Remedy
Abnormal noise and overload	Lost phase of motor.	Inspect power supply and cord.
	Vanes rotating in the wrong direction.	Adjust to correct rotation.
	Long running time.	Shut air inlet and run vacuum pump to raise temperature.
	Excessively high oil temperature.	Adjust oil to raise viscosity.
	Excessively low oil temperature.	Adjust oil to lower viscosity.
	Oil viscosity is too high for the ambient temperature.	Use synthetic oil, if necessary use oil of the next lower viscosity class (CAUTION: operation with too low viscosity can cause chatter marks inside the cylinder). Warm up the oil with a heater prior to starting up the vacuum pump or make sure that the vacuum pump runs in intervals in order not to let it get too cold.
	Dirty oil.	Replace oil.
	Infrequent oil changes (oil dark in color) or blocked exhaust filter.	Clean vacuum pump and replace oil and exhaust filter.
	Foreign body inside pump.	Repair vacuum pump.
	Broken vane or bearing.	Repair vacuum pump.
	Stuck vanes.	Repair the vacuum pump. Use only approved oils (see "Oil") and change more frequently.
	Broken oil pipe connector.	Replace oil pipe connector.
	Connection(s) in the drive motor terminal box are defective. Not all drive motor coils are properly connected. The drive motor operates on two phases only.	Check the proper connection of the wires against the connection diagram. Tighten or replace loose connections.
	Standstill over several weeks or months.	Let the vacuum pump run warm with inlet closed.
	Improper oil quantity, unsuitable oil type.	Use the proper quantity of one of the recommended oils (see "Oil", Oil change see "Maintenance").
	No oil change over extended period of time.	Perform oil change including flushing (see "Maintenance").
	The exhaust filters are clogged and appear black from burnt oil.	Flush the vacuum pump. Replace the oil filter. Replace the exhaust filter. Fill in new oil (see "Maintenance"). In case the oil life is too short: use oil with better heat resistance (see "Oil") or retrofit cooling.
Oil dark in color or low viscosity	Infrequent oil changes, incorrect oil mixture.	Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Fill in new oil (see "Maintenance"). In case the oil life is too short: use oil with better heat resistance (see "Oil") or retrofit cooling.

Problem	Possible Cause	Remedy
Excessively high temperature of vacuum pump	Excessively high ambient air temperature at inlet.	Strengthen cooling aeration; clean vanes, cooler and vane cover.
	Partially blocked exhaust filter.	Replace filter.
	Bad aeration.	Strengthen cooling aeration; clean vanes, cooler, and vane cover.
	Insufficient lubrication.	Replenish lubrication.
	Unqualified lubrication.	Clean vacuum pump, change exhaust filter and lubrication.
	Limited air inlet/outlet pipe diameter.	Replace pipes.
	Incorrect voltage.	Correct power supply voltage.
	Blocked air inlet/outlet pipe or filters.	Clean air inlet/outlet pipe and change filters.
	Insufficient air ventilation.	Make sure that the cooling of the vacuum pump is not impeded by dust/dirt. Clean the fan cowlings, fan wheels, ventilation screens and cooling fins. Install the vacuum pump in a narrow space only if sufficient ventilation is ensured. On a vacuum pump with oil-cooler: clean the intermediate spaces of the finned tube.
	Ambient temperature too high.	Observe the permitted ambient temperatures.
	Temperature of the inlet gas too high.	Observe the permitted temperatures for the inlet gas.
	The exhaust filter is partially clogged.	Replace the exhaust filters.
	The oil filter is partially clogged (the oil flows through the bypass only, the oil does not get filtered any more).	Replace the oil filter.
	Not enough oil in the reservoir.	Top off oil.
	Oil burnt from overheating.	Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Fill in new oil (see “Maintenance”). In case the oil life is too short: use oil with better heat resistance (see “Oil”) or retrofit cooling.
	Mains frequency or voltage outside tolerance range.	Provide a more stable power supply.
The gas conveyed by the vacuum pump smells displeasing	Process components evaporating under vacuum. Readily volatile and thus gaseous components of the oil, e.g. additives, particularly right after an oil change. **NOTE:** This is no indication of a malfunction of the oil separator. The oil separator is able to retain droplets of oil, however no gaseous components of it.	Check the process, if applicable. Use a different type of oil, if applicable.

Problem	Possible Cause	Remedy
Motor failure	Low voltage or excessively long power cord.	Adopt suitable power cord and power supply.
	The drive motor is not supplied with the correct voltage or is overloaded.	Supply the drive motor with the correct voltage.
	Poor protection for motor overload.	Choose correct motor overload protector according to electric current rating.
	The drive motor starter overload protection is too small or trip level is too low.	Compare the trip level of the drive motor starter overload protection with the data on the nameplate. Correct if necessary. In case of high ambient temperature: Set the trip level of the drive motor starter overload protection 5% above the nominal drive motor current.
	Broken fuse.	Join fuse.
	Exceeding capacitance in single phase motor.	Repair motor.
	Blocked vacuum pump or motor.	Make sure the drive motor is disconnected from the power supply. Remove the fan cover. Try to turn the fan by hand. If the unit vacuum pump/drive motor is still frozen: Remove the drive motor and check the drive motor and the vacuum pump separately. If the vacuum pump is blocked: Repair the vacuum pump.
	Broken motor.	Repair or replace motor.
Broken vane	Foreign body inside pump.	Repair vacuum pump.
	Corrosive gas inhalation.	Repair vacuum pump and inspect flow.
	Too much oil or liquid intake.	Repair vacuum pump and inspect flow.
	Incorrect rotation.	Repair vacuum pump and correct rotation.
Abnormal oil consumption	Broken air tight ring or oil seal.	Replace air tight ring or oil seal.
	Exhaust filter blocked.	Reset or replace exhaust filter.
	Blocked floater valve or oil leaking from exhaust nozzle.	Clean or replace floater valve.
	Oil Leak.	Inspect and seal leak.
The oil is resinous and/or sticky	Improper oil type.	Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Fill in new oil (see “Maintenance”). Make sure the proper oil is used for the application.
The oil foams	Mixing of incompatible oils.	Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Fill in new oil (see “Maintenance”). Make sure the proper oil is used for the application.
Thin oil	Using incorrect oil or incorrectly mixing oil.	Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Flush the vacuum pump (see “Maintenance”). Modify the operational mode.
	The vacuum pump aspirated water or significant amounts of humidity.	

Problem	Possible Cause	Remedy
The vacuum pump fumes at the exhaust side or expels oil droplets through the outlet The oil level drops	The exhaust filters are not properly seated.	Check the proper position of the exhaust filters.
	The O-rings from the exhaust filters are missing or damaged.	Add or replace the O-rings.
	The exhaust filters show cracks.	Replace the exhaust filters.
	The exhaust filters are clogged with foreign matter. **NOTE**: The saturation of the exhaust filters with oil is no fault and does not impair the function of the exhaust filters! Oil dropping down from the exhaust filters is returned to the oil circulation.	Replace the exhaust filters.
	The oil return valve is clogged.	Clean the oil return valve.
	The oil return line is clogged or broken.	Repair the oil tubing. Replace a broken oil return line with an identically dimensioned line. Fill in new oil.
The drive motor is running, but the vacuum pump stands still	The coupling between the drive motor and the vacuum pump is defective.	Replace the coupling.
Exhaust nozzle smoking	Floater valve blocked.	Clean or replace floater valve.
	Exhaust filter blocked.	Reset or replace exhaust filter.

Replacement Vanes, Filters, & Oil

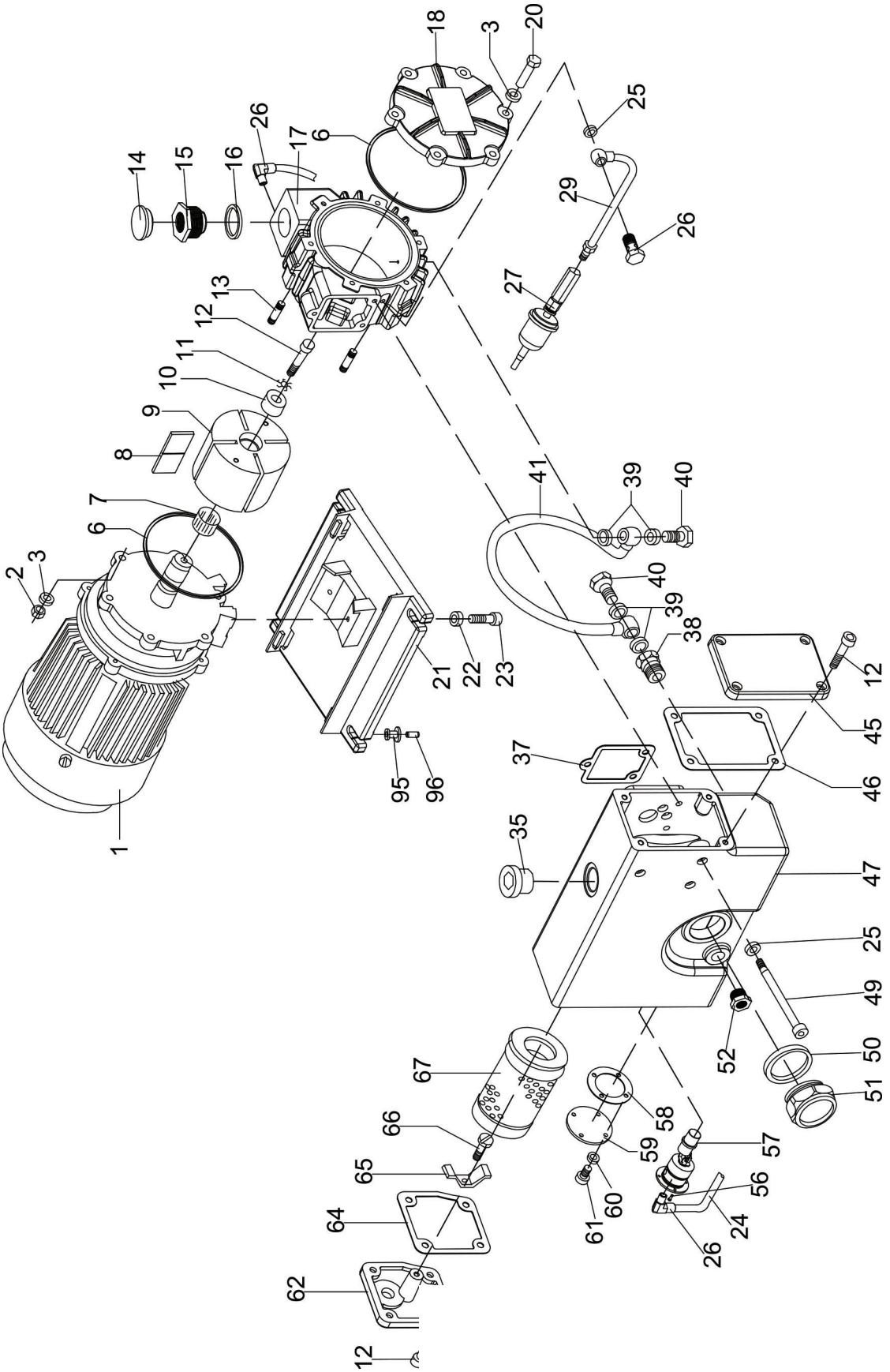
Model	Inlet Screen	Exhaust Filter Kit	Rebuild Kit	Vane (sold as a set)	Gasket Set	Bearing	Bearing Race	Oil Capacity (L)
16	4000137A	4010EFK	810010RK	4310000A	4010GS	4000013A	4000011A	0.75
20	4000137A	4021EFK	810021RK	4310000A	4021GS	4000013A	4000011A	0.75
25	4000137A	4140EFK	810025RK	4310001A	4040GS	4000013A	4000011A	1
40	4000137A	4140EFK	810040RK	4310002A	4040GS	4000050A	4000053A	1
63	4000137A	4140 EFK	810063RK	4310003A	4100GS	4000050A	4000053A	2
100	4000137A	4140 EFK	810100RK	4310007A	4100GS	4000050A	4000053A	2
140	4000137A	4140EF	810140RK	4310006A	4100GS	4000050A	4000053A	2
202	4000008A	4250EFK	810202RK	4310004A	4302GS	4000114A	4000110A	5
302	4000008A	4250EFK	810302RK	4310005A	4302GS	4000114A	4000110A	7
402	4000306A	4630EFK	810402RK	4310008A	4630GS	4000208A	4000205A	14
630	4000306A	4630EFK	810630RK	4310009A	4630GS	4000208A	4000205A	16

Oil

Oil needed is based on ambient temperature according to the following table:

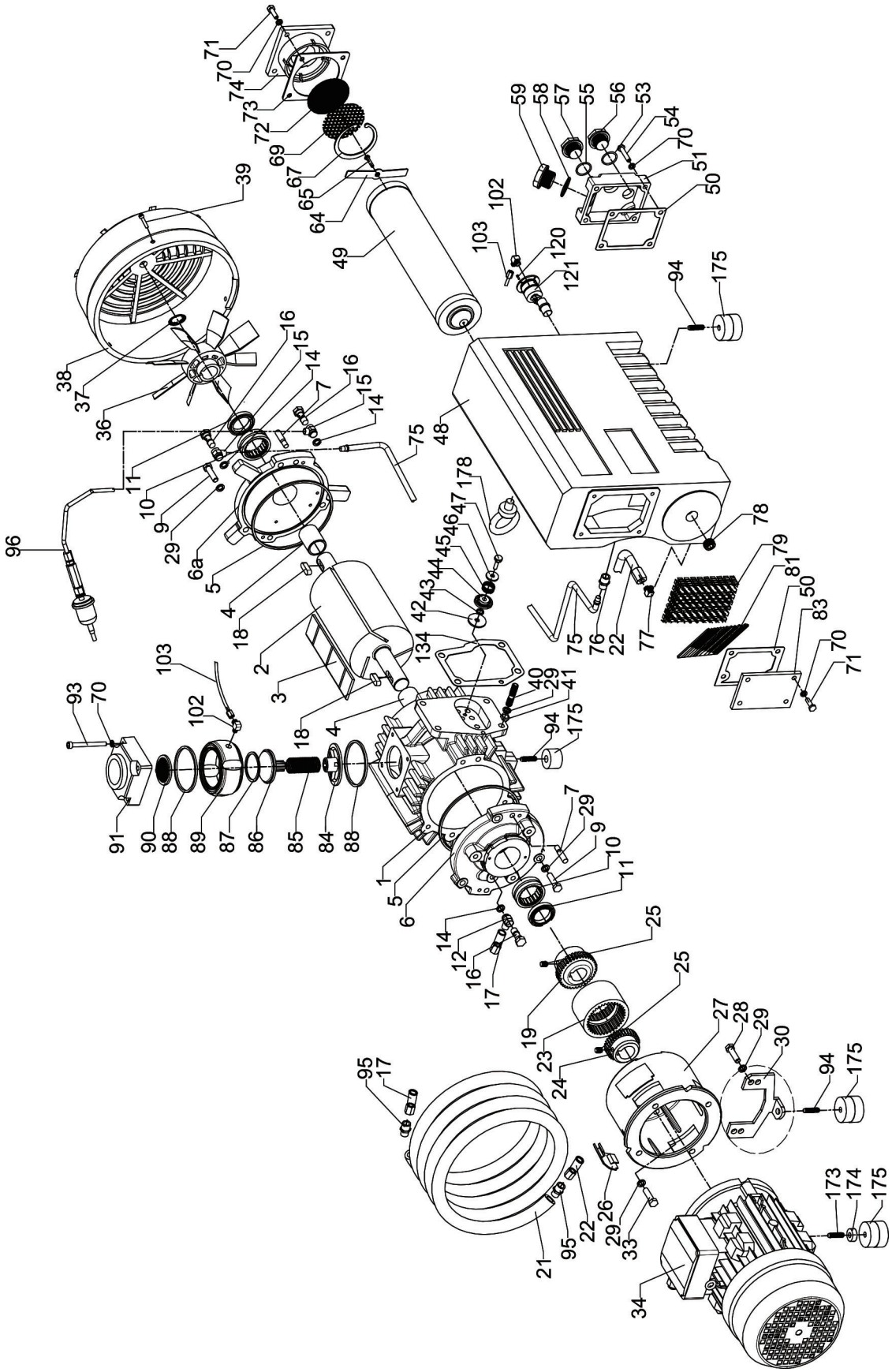
Ambient Temperature	Part Number (per quart)
28-100°F	SHV46QT
40-201°F	SHV100QT

RX 16-25 Parts Breakdown



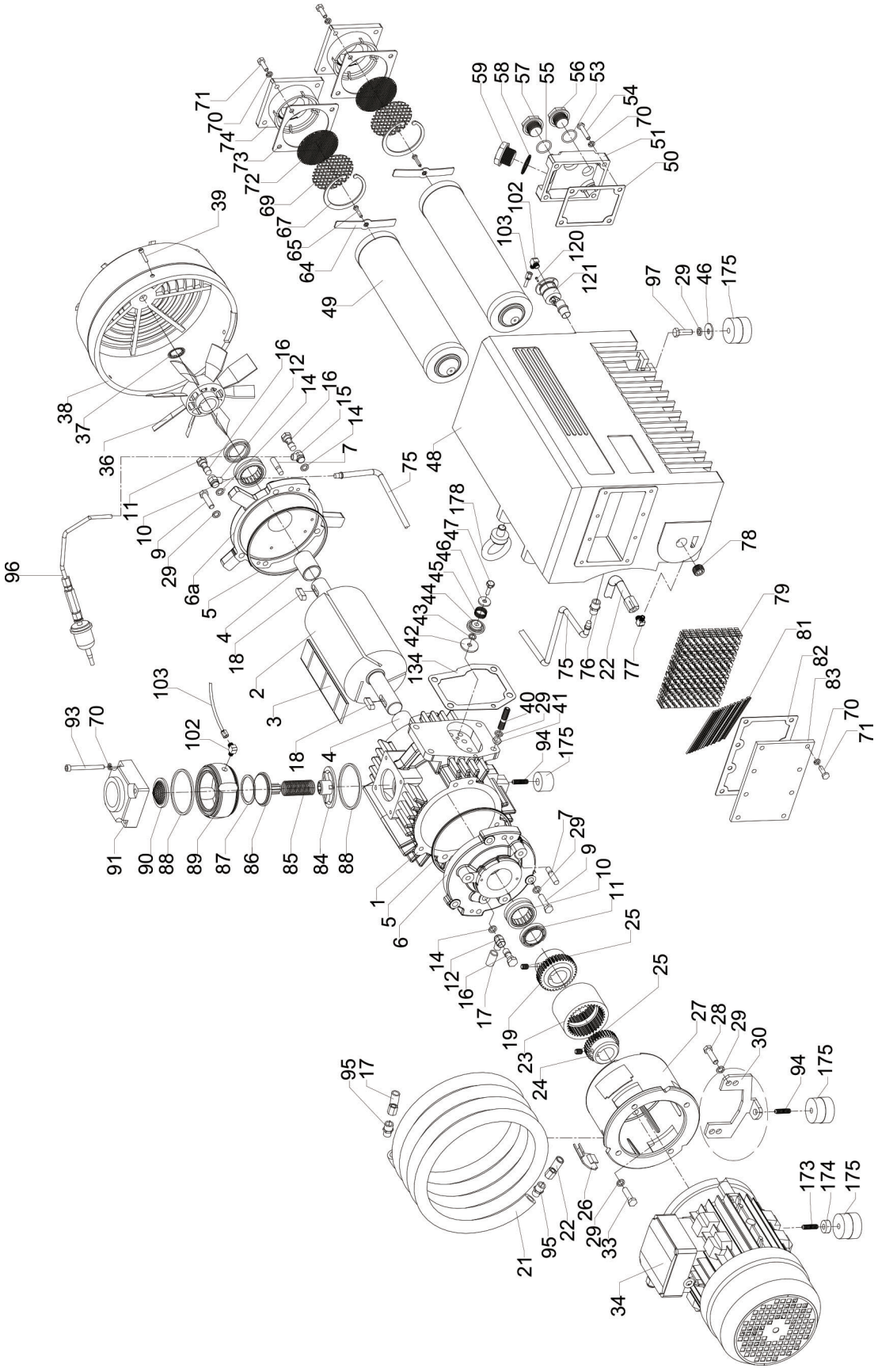
Position	Description	Position	Description
1	Motor	58	Gasket
2	Hex Head Nut	59	Cover Plate
3	Lock Washer	60	Lock Washer
6	O-Ring	61	Hex Head Screw
7	Bearing Sleeve	62	Exhaust Valve
8	Vanes	64	Gasket
9	Rotor	65	Spring
10	Washer	66	Screw
11	Back Stop Ring	67	Exhaust Filter
12	Hex Head Screw	95	Rubber Foot
13	Double Head Screw	96	Rubber Foot Pin
14	Inner Housing Cover		
15	Inlet Connection Nut		
16	O-Ring		
17	Cylinder		
18	End Plate		
20	Hex Head Screw		
21	Base Bracket		
22	Lock Washer		
23	Hex Head Screw		
24	Oil Tubing		
25	Lock Washer		
26	Hollow Screw		
27	Gas Ballast		
29	Oil Tubing		
35	Plug		
37	Gasket		
38	Connector Screw		
39	Lock Washer		
40	Hollow Screw		
41	Cooling Coil		
45	Cover Plate		
46	Gasket		
47	Exhaust Box		
49	Hex Head Cap Screw		
50	O-Ring		
51	Oil Sight Glass		
52	Connector Screw		
55	Connector Screw		
56	Hex Head Screw		
57	Oil Float		

RX 25-40 Parts Breakdown



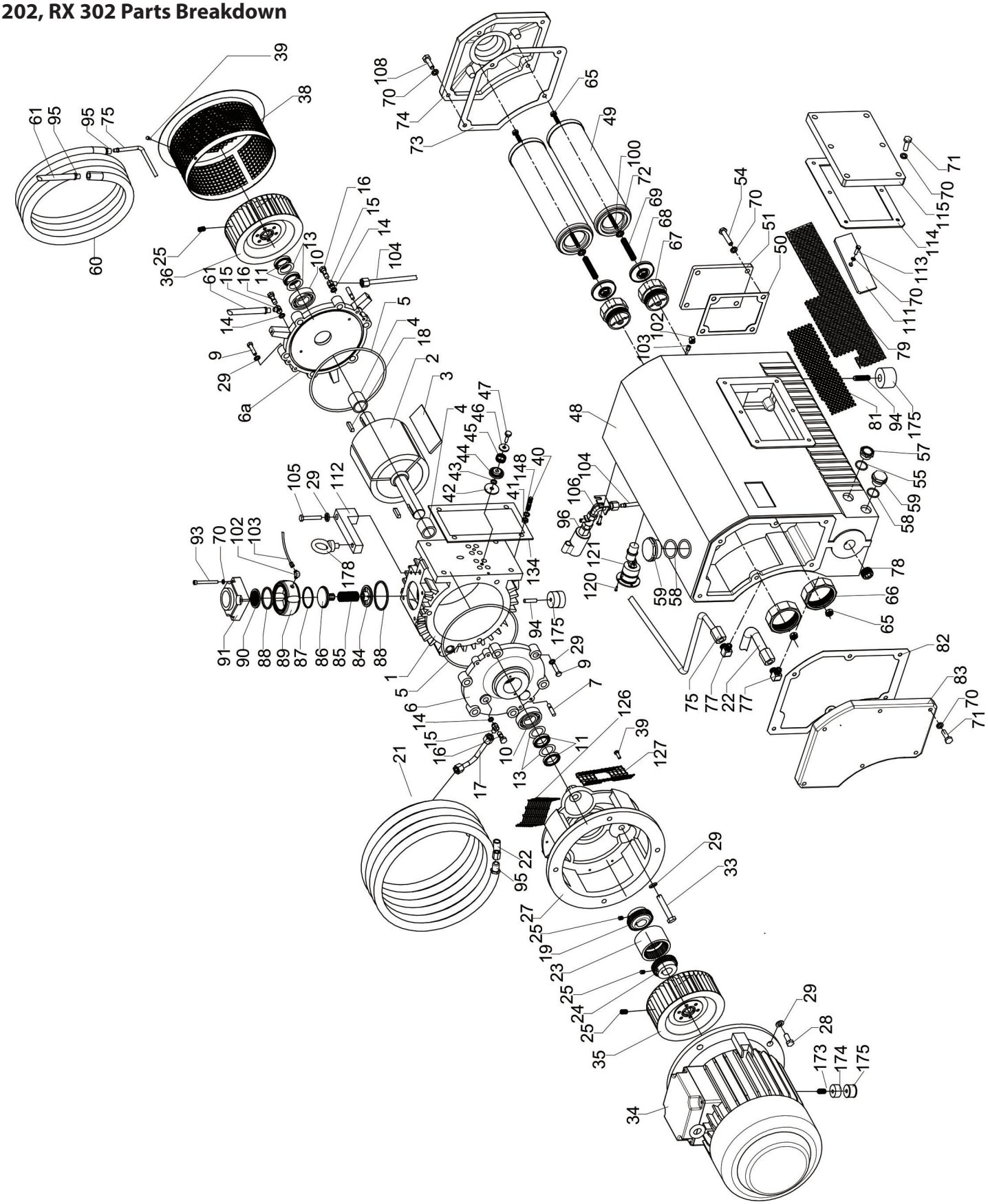
Position	Description	Position	Description
1	Cylinder	53	O-Ring
2	Rotor	56	Drain Plug
3	Vane	57	Oil Sight Glass
4	Bearing Race	58	O-Ring
5	O-Ring	59	Oil Refuel Plug
6	End Plate	64	Seperator Tensioner
6a	End Plate	65	Spring Plate
7	Taper Pin	67	Lock Washer
10	Bearing	69	Screen
11	Shaft Seal	70	Lock Washer
12	Support Ring	72	Screen
14	Hex Head Screw	73	Exhaust Cover Gasket
15	Screw	74	Exhaust Cover Silencer
16	Oil Valve	77	Hydraulic Fitting
17	Oil Tubing	78	Socket Head Screw
18	Key	79	Metal Screen
19	Coupling	83	Cover Plate
21	Cooling Coil	84	Valve Plate
23	Coupling	85	Suction Valve Spring
24	Coupling	86	Valve Plate
25	Set Screw	87	O-Ring
26	Cover	88	O-Ring
27	Flange	89	Inlet Flange Lower Housing
28	Banjo Fitting	90	Inlet Screen
29	Hydraulic Fitting	91	Inlet Flange
30	Bracket	95	Hydraulic Fitting
34	Motor	96	Gas Ballast
36	Rear Pump Fan	134	Housing Gasket
37	Retaining Ring	175	Rubber Foot
38	Fan Cover	178	Lifting Eye Bolt
40	Cylinder Separator Gasket		
42	Exhaust Valve		
43	Socket Set Screw		
44	Exhaust Valve		
45	Compressing Ring		
46	Hex Head Screw		
47	Cylinder Cover Screw		
48	Exhaust Box		
49	Exhaust Filter		
50	Gasket		
51	Inlet Screen		

RX 63-140 Parts Breakdown



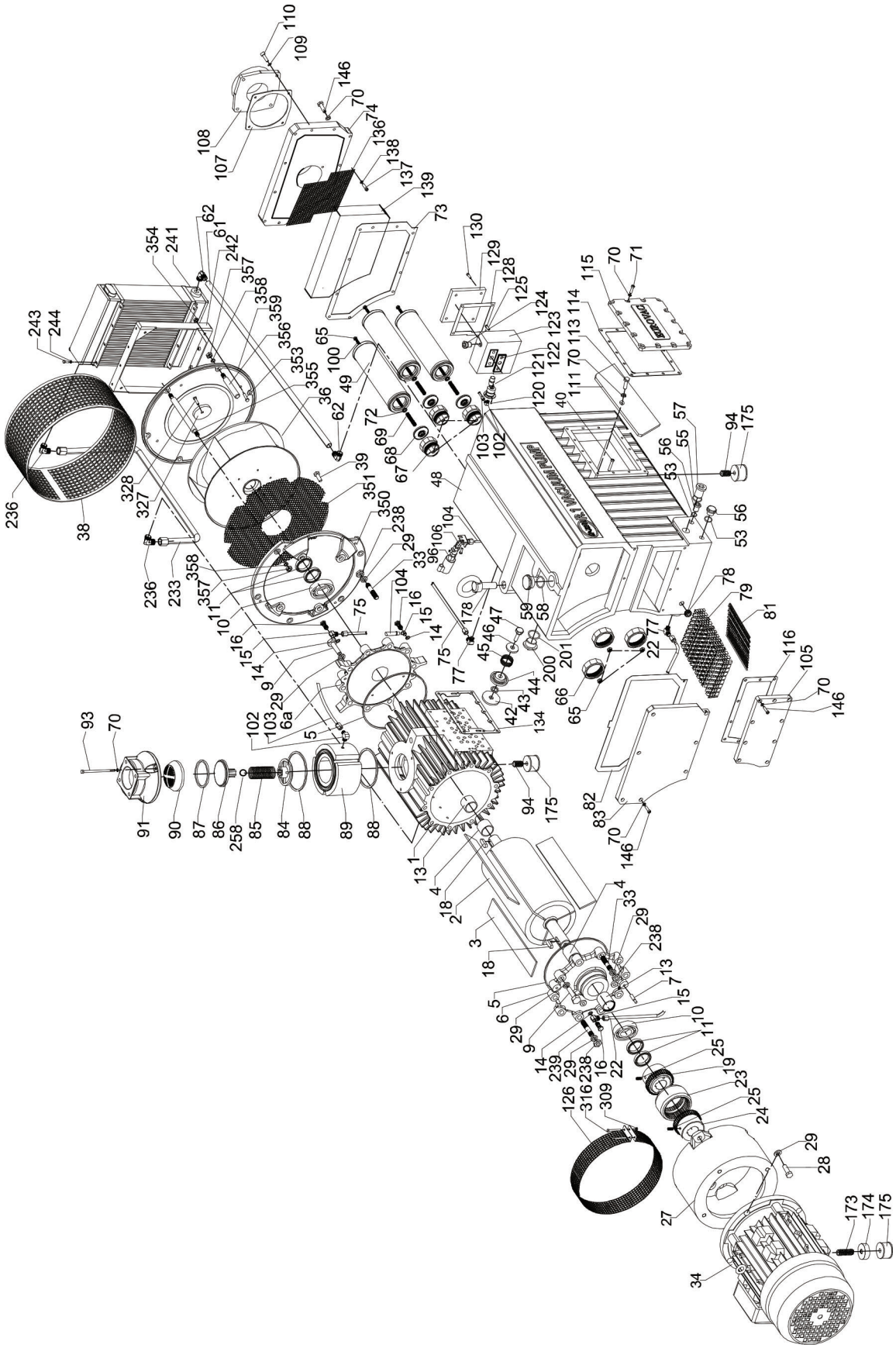
Position	Description	Position	Description
1	Cylinder	56	Drain Plug
2	Rotor	57	Oil Sight Glass
3	Vane	58	O-Ring
4	Bearing Race	59	Oil Refuel Plug
5	O-Ring	64	Seperator Tensioner
6	End Plate	65	Hex Head Cap Screw
6a	End Plate	67	Lock Washer
7	Taper Pin	69	Screen
10	Bearing	70	Lock Washer
11	Shaft Seal	72	Screen
12	Support Ring	73	Exhaust Cover Gasket
14	Washer	74	Exhaust Cover Silencer
15	Hex Head Screw	77	Hydraulic Fitting
16	Oil Valve	79	Metal Screen
17	Oil Tubing	82	Plate Gasket
18	Key	83	Cover Plate
19	Coupling	84	Valve Plate
21	Cooling Coil	85	Suction Valve Spring
23	Coupling	86	Valve Plate
24	Coupling	87	O-Ring
25	Set Screw	88	O-Ring
26	Cover	89	Inlet Flange Lower Housing
27	Flange	90	Inlet Screen
28	Banjo Fitting	91	Inlet Flange
30	Bracket	93	Socket Head Screw
34	Motor	94	Screw
36	Rear Pump Fan	95	Hydraulic Fitting
37	Retaining Ring	96	Gas Ballast
38	Fan Cover	97	Hex Head Screw
40	Cylinder Separator Gasket	121	Snap Ring
42	Exhaust Valve	134	Housing Gasket
43	Socket Set Screw	175	Rubber Foot
44	Exhaust Valve	178	Lifting Eye Bolt
45	Compressing Ring		
46	Gasket		
47	Cylinder Cover Screw		
48	Exhaust Box		
49	Exhaust Filter		
50	Gasket		
51	Inlet Screen		
53	O-Ring		

RX 202, RX 302 Parts Breakdown



Position	Description	Position	Description	Position	Description
1	Cylinder	56	Oil Refuel Plug	114	Bracket
2	Rotor	57	Oil Sight Glass	115	Cover Plate
3	Vane	58	O-Ring	120	Screw
4	Bearing Race	59	Oil Drain Plug	121	Float
5	O-Ring	60	Cooling Coil	126	Cover
6	End Plate	61	Fitting	127	Cover
6a	End Plate	65	Hex Head Cap Screw	134	Housing Gasket
7	Taper Pin	66	Gasket	175	Rubber Foot
10	Bearing	67	Exhaust Valve	178	Lifting Eye Bolt
11	Shaft Seal	68	Gasket		
12	Support Ring	69	Separator Tensioner		
15	Fitting	70	Lock Washer		
16	Screw	71	Screw		
17	Oil Tubing	73	Exhaust Cover Gasket		
18	Key	74	Exhaust Cover Silencer		
19	Coupling	75	Hydraulic Fitting		
21	Cooling Coil	77	Right Angle Fitting		
23	Coupling	79	Metal Screen		
24	Coupling	81	Metal Screen		
25	Set Screw	82	Plate Gasket		
27	Flange	83	Cover Plate		
28	Banjo Fitting	84	Valve Plate		
29	Washer	85	Suction Valve Spring		
33	Screw	86	Suction Valve		
34	Motor	87	O-Ring		
35	Front Fan	88	O-Ring		
36	Rear Pump Fan	89	Inlet Flange Lower Housing		
38	Fan Cover	90	Inlet Screen		
39	Hex Head Screw	91	Inlet Flange		
40	Cylinder Separator Gasket	93	Socket Head Screw		
42	Exhaust Valve	94	Screw		
43	Socket Set Screw	95	Hydraulic Fitting		
44	Exhaust Valve	96	Gas Ballast		
45	Compressing Ring	104	Oil Return Bush		
46	Gasket	106	Oil Tubing		
47	Cylinder Cover Screw	111	Plate		
48	Exhaust Box	112	Eye Bolt Bracket		
49	Exhaust Filter	113	Fitting		
50	Gasket	106	Oil Tubing		
51	Oil Sight Glass Bracket	111	Plate		
54	Screw	112	Eye Bolt Bracket		
55	O-Ring	113	Fitting		

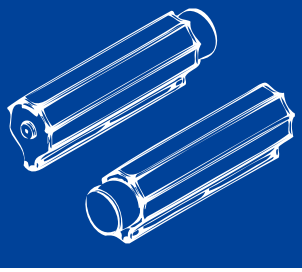
RX 402-630 Parts Breakdown



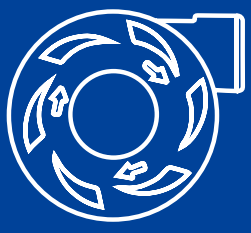
Position	Description	Position	Description	Position	Description
1	Cylinder	67	Exhaust Valve	114	Bracket
2	Rotor	68	Gasket	115	Cover Plate
3	Vane	69	Separator Tensioner	116	Bracket
4	Bearing Race	70	Lock Washer	120	Screw
5	O-Ring	71	Screw	121	Float
6	End Plate	73	Exhaust Cover Gasket	123	Float Valve Box Housing
6a	End Plate	74	Exhaust Cover Silencer	124	Bolt
7	Taper Pin	75	Screw	126	Sleeve
10	Bearing	77	Right Angle Fitting	128	Bracket
11	Shaft Seal	79	Metal Screen	129	Cover
18	Key	81	Metal Screen	130	Screw
19	Coupling	82	Plate Gasket	134	Cylinder Gasket
23	Coupling	83	Cover Plate	139	Bracket
24	Coupling	84	Valve Plate	175	Rubber Foot
25	Set Screw	85	Suction Valve Spring	178	Lifting Eye Bolt
27	Flange	86	Suction Valve	233	Oil Tubing
28	Banjo Fitting	87	O-Ring	236	Fitting
29	Washer	88	O-Ring	241	Heat Exchanger
33	Screw	89	Inlet Flange Lower Housing	258	Ball
34	Motor	90	Inlet Screen	327	Spring Lock Washer
36	Rear Pump Fan	91	Inlet Flange Upper Housing	350	Centering Ring Bracket
38	Fan Cover	93	Socket Head Screw	351	Centering Ring
39	Hex Head Screw	94	Screw		
42	Exhaust Valve	96	Gas Ballast		
43	Socket Set Screw	104	Oil Return Valve		
44	Exhaust Valve	106	Oil Tubing		
45	Compressing Ring	107	Gasket		
46	Gasket	108	Cover		
47	Cylinder Cover Screw	109	Washer		
48	Exhaust Box	110	Screw		
49	Exhaust Filter	111	Plate		
51	Oil Sight Glass Bracket	113	Screw		
53	O-Ring	94	Screw		
54	Screw	96	Gas Ballast		
55	O-Ring	104	Oil Return Valve		
56	Oil Drain Plug	106	Oil Tubing		
57	Oil Sight Glass	107	Gasket		
59	Oil Refuel Plug	108	Cover		
61	Oil Tubing	109	Washer		
62	Fitting	110	Screw		
65	Hex Head Cap Screw	111	Plate		
66	Gasket	113	Screw		

REPUBLIC MANUFACTURING

Air Knife Systems



Centrifugal Pumps



Regenerative Pumps

Vacuum Pumps

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