JVR INDUSTRIES, INC.

Specializing in Vacuum Packaging,
SINCE 1972

RVS Series Operating Manual | v1.0

SINGLE-STAGE OIL-SEALED ROTARY VANE VACUUM PUMP

JVR INDUSTRIES, INC.

Contents

1. Use information

Dear distinguished customers,thanks for your trust on our vacuum pumps of high reliability (Hereinafter refereed to as “the pump”). Please carefully check whether the product you received matches the item you ordered and confirm that all accessories, spare parts, and the operating manual are included. Please also check if there’s any damage occurred during the transportation. If needed, contact your local distributor or JVR Industries.

In order to prolong its stable performance, please read the operating manual carefully before installation, operation, repair and maintenance of the pump, which could help you to fully understand the safety instruction as well as its technical data and operating procedure.

Warning

The terms must be strictly followed, as failure to do so may endanger personal safety.

Notice

Terms need to be paid extra special attention to, in order to avoid any damage on the pump.

This warning label indicates the possibility of electrical shock. Disconnect the pump from the power supply in the process of electrical connection, repair and maintenance. Make sure the cover of junction box is installed before running.

This warning label indicates that the pump may reach high temperatures during operation. Do not touch the pump while it is running.

Notice

Please read the operating manual carefully and follow the operating procedure.We reserve the right to modify the design and technical data of the pump without notice which might lead to discrepancies in the operating manual. Add vacuum oil as requested before starting the new pump.

2. Attention

In order to ensure personal safety, please read the operating manual carefully before installation , operation, repair and maintenance.

Warning

According to the technical norm and wiring regulations for electrical equipment, power supply must be in line with the product marking and electrical connection must be carried out by a skilled electrician.

Warning

In order to prevent electrical hazard or sudden running of the pump which might result in casualties, disconnect the power supply while checking or repairing the pump.

Warning

Before starting the pump, the motor must be effectively grounded and properly connected with rated motor protection switch.

Warning

RVS Series vacuum pumps are strictly forbidden to pump dusty, active toxic, corrosive, flammable and explosive gas.

Warning

Do not place obstacles which will influence the ventilation around the motor in order to avoid scald or fire.

Warning

The exhaust passage must be unimpeded before operating. Make sure that the gas flow from the exhaust port is not blocked or restricted in any way.

Notice

The pump must be operated at ambient temperature between 40°F-100°F.

Notice

Check the oil level before running. Do not operate the pump without oil or short of oil. Otherwise it will result in pump failure.

Notice

Solid particles are not allowed to enter into the inner of the pump.

Notice

Running without oil or wrong motor direction may lead to pump failure.

Notice

The intake port of the pump can not be connected to the overpressure device, and please ensure the size of the exhaust passage with absolute pressure no more than 1.35 bar (relative pressure is no more than 0.35 bar).

Notice

While handling waste oil and other parts, please comply with the relevant environmental protection laws and regulations.

Notice

While pumping condensable gases, please use the pump attached with gas ballast.

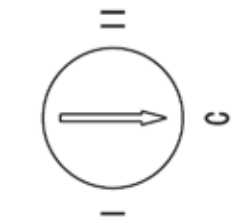
Notice

When handling even small amounts of dust or condensible gases, the pump must be equipped with the appropriate accessories. Otherwise, it may experience failure or a significant decline in performance.

3. Description

The vacuum pump is an oil-sealed, single-stage rotary vane pump designed for low-vacuum applications. It is suitable for evacuating inert gases and small amounts of non-condensible gases. This pump is particularly well-suited for use in packaging machinery, freeze drying, vacuum conveying, medical equipment, vacuum melting, analytical instruments, and laboratory applications.

Featuring an advanced structural design, the pump incorporates an oil-circulating, air-cooled system that ensures stable and reliable operation over extended periods. It delivers high pumping speed, excellent ultimate vacuum performance, low noise levels, and clean operation without oil spray or leakage. In addition, its user-friendly design allows for convenient and straightforward maintenance.



Gas Ballast Valve

Fig.1

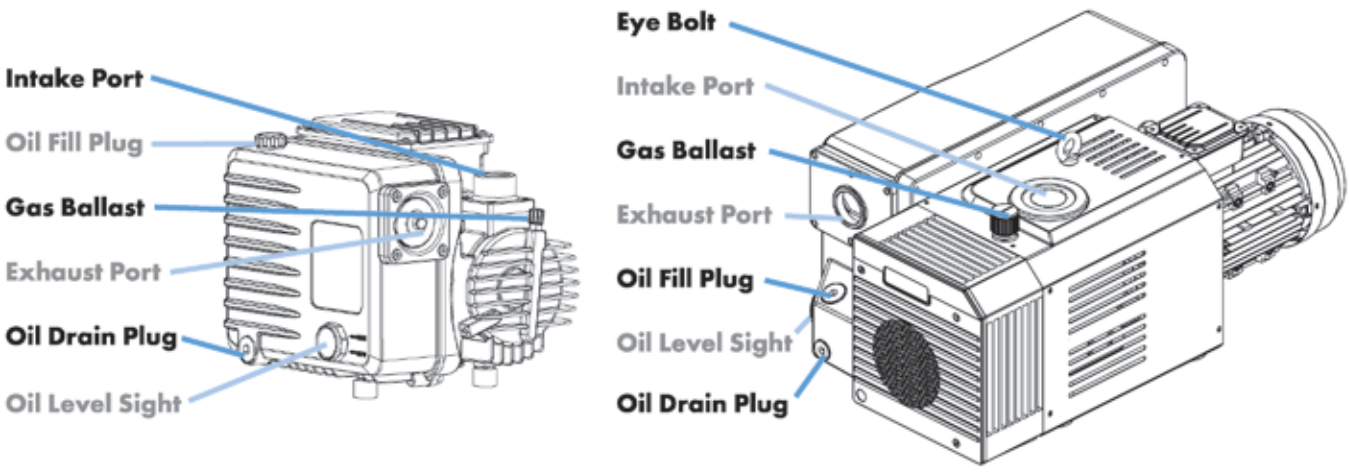


Fig.2

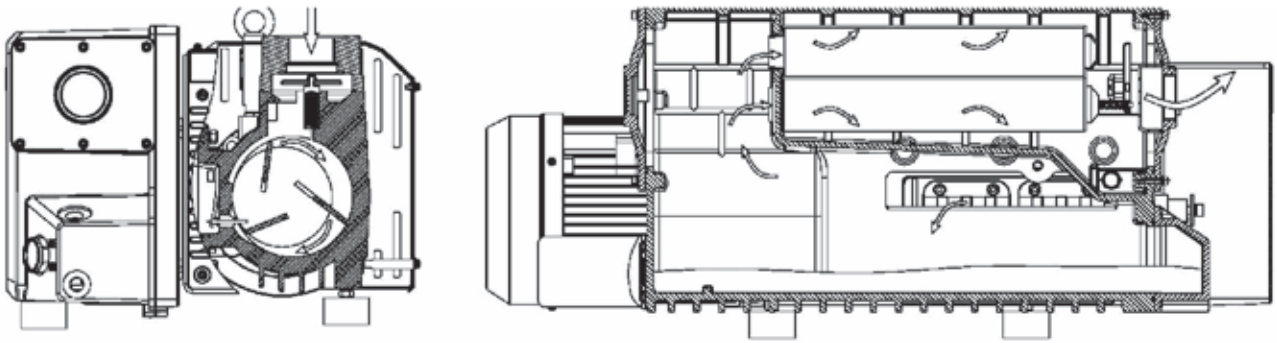


Fig.3

3.1 Principle of Operation

As shown in Fig. 3, the rotor is mounted eccentrically within the pump cylinder and is equipped with three vanes, which divide the pump chamber into several separate compartments. When the motor drives the rotor to rotate, the volume of these chambers changes periodically.

Gas is drawn in through the inlet port, passes through the filter and anti-suck-back valve, and enters the pump chamber. It is then trapped in the sealed spaces formed by the rotor and vanes. As the rotor continues to turn, the gas is compressed and discharged through the exhaust valve. The exhaust gas passes through the oil mist filter before exiting the oil casing.

By continuously repeating the processes of suction, compression, and exhaust, the pump generates and maintains the required vacuum level in the system.

3.2 Principle of Gas Ballast

During operation, a controlled amount of gas—typically dry air at room temperature—is introduced through the gas ballast port into the compression chamber. This gas mixes with the pumped vapor during the compression process.

As the mixed gases are compressed to the exhaust pressure, the partial pressure of the vapor is kept below its saturated vapor pressure, preventing condensation inside the pump. When the exhaust valve opens, the vapor and other gases are expelled from the pump.

The greater the amount of vapor in the pumped gas, the more dry ballast gas is required. (See Fig. 1: Gas Ballast Valve.)

4. Technical Parameters

	UNIT	RVS20	RVS65	RVS100	RVS200	RVS300
Nominal Pumping Speed	cfm (m^3/h)	14.1 (24)	38.3 (65)	70.6 (120)	141.3 (240)	176.6 (300)
Ultimate Pressure without Gas Ballast	Torr		≤ 0.25	≤ 0.25	≤ 0.075	≤ 0.075
Ultimate Pressure with Gas Ballast I	Torr	≤ 1.5	≤ 0.5	≤ 0.5	≤ 0.375	≤ 0.375
Ultimate Pressure with Gas Ballast II	Torr		≤ 1.5	≤ 1.5	≤ 1.125	≤ 1.125
Noise (Lw)	dB	≤ 65	≤ 65	≤ 65	≤ 74	≤ 77
Power Supply		1 PH	3 PH	3 PH	3 PH	3 PH
Nominal Motor Rating	hp	1.0	2.0	4.0	7.5	10.0
Motor Speed	rpm	3440	1720	1720	1720	1720
Oil Capacity	quarts	0.5	2.1	2.6	7.4	8.5
Protection Class		IP54	IP54	IP54	IP54	IP54
Inlet Thread		G1/2"	G1 1/4"	G1 1/4"	G2"	G2"
Approximate Weight	lbs	43	94	159	362	474
Dimensions (LxWxH)	in	12.5 x 9.8 x 8.6	21.9 x 12.2 x 10.6	27.7 x 16 x 11.3	36.6 x 20.9 x 17.2	40.7 x 21.3 x 17.1

Table 1

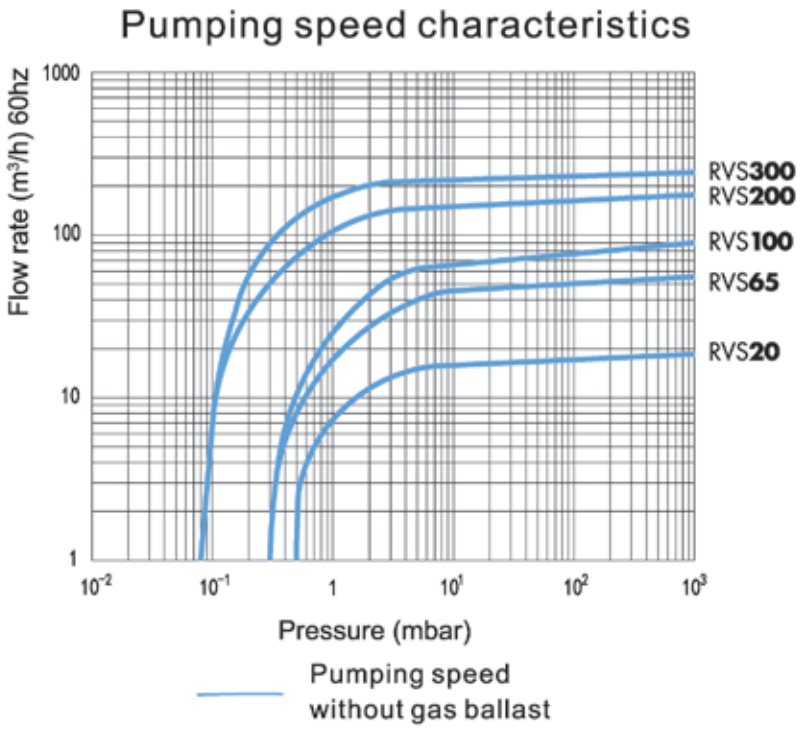


Fig.4

5. Transport and Store

Warning

The pump may only be removed after it has been completely shut down and the power supply has been disconnected.

Warning

Make sure the eye bolt is tight before lifting the pump. (Not equipped on the RVS20.)

Notice

Check the packaging to see if there is any transport damage.

Notice

Any negligence will lead to the pump's damage during transport, please be careful to move the pump. In order to avoid oil spill, pumps filled with oil should be moved horizontally.

Notice

Please deal with the packing materials according to the environmental protection laws and regulations.

Notice

Before long-term storage, ensure the pump is in its original dispatch condition, completely drained of oil, and stored in a dry, room-temperature environment.

6. Installation and Connection

6.1 Installation Dimensions

NOTE:
All measurements are in millimeters.

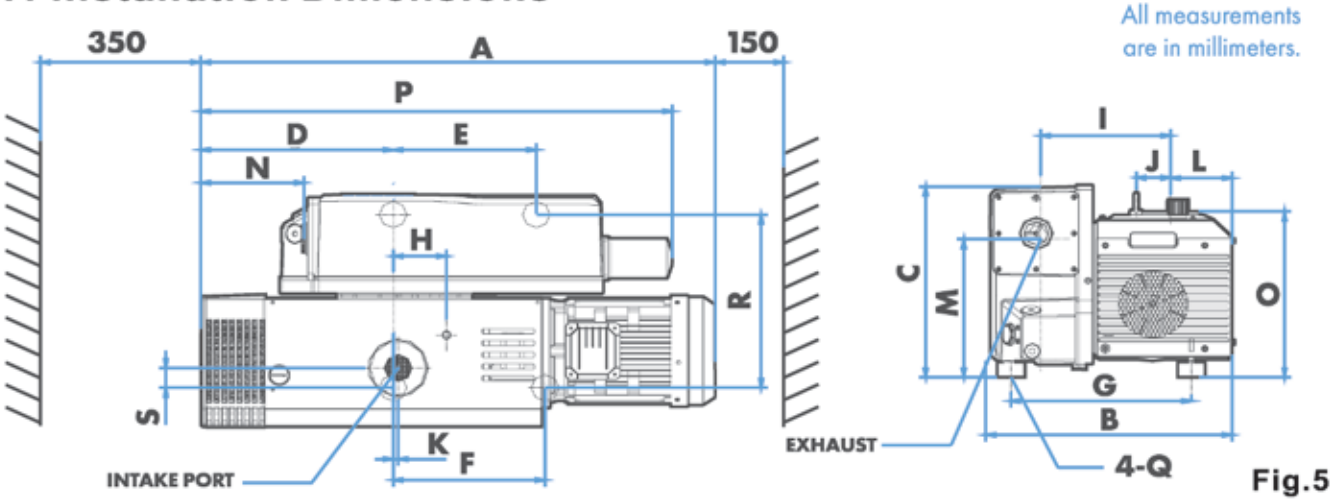


Fig.5

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	INTAKE PORT	EXHAUST PORT
RVS20	318	249	219	75.5	140	110.5	131	/	127.5	/	14	72	157	21	184	299	M8	122.3	5.3	G1/2"	/
RVS65	555	311	268	149	215	200	254	58	189	51	5	72	203	33	252	464	M8	242	33	G1 1/4"	G1 1/4"
RVS100	703	406	286	165	225	225	320	131	226	42	27	91	220	61	280	578	M10	258	41	G1 1/4"	G1 1/4"
RVS200	932	533	412	263	252	305	394	113	298	66	32	135	305	134	382	918	M10	394	45	G2"	G2"
RVS300	1035	540	434	326	313	332	394	159	284	75	11	135	314	132	377	966	M10	394	45	G2"	G2"

6.2 Connection To System

Warning

The pump is strictly prohibited from operating in areas with explosive hazards or flammable materials to avoid the risk of explosion or fire.

Warning

On no account may the pump be operated with a blocked or constricted exhaust line. Make sure before start-up that exhaust lines are not obstructed by deposits.

Warning

The exhaust pressure should not be higher than the absolute pressure 1.35 bar , (Relative pressure 0.35bar) , and not be lower than atmospheric pressure.

Notice

When selecting the pump installation site, consider the following factors: ease of installation, maintenance, and disassembly; adequate ventilation; and convenient access for electrical connections.

Notice

When connecting the pump to the vacuum system, ensure the pump feet are positioned horizontally or securely fastened with bolts.

Notice

Improper (tilted) installation may cause vibration, excessive noise, or damage. Install the pump on a flat, stable surface within 10° of horizontal.

Notice

Between vacuum pump and vacuum system, the connecting passage should be as short as possible, and the passage drift diameter is the same as the intake port's.

Notice

The suction flange can be connected to either a vacuum hose or a standard vacuum pipe. During installation, ensure that the pipeline does not exert any pressure or mechanical load on the suction flange.

Notice

The exhaust line should be installed with a downward slope to prevent condensate from flowing back into the pump and contaminating the oil. Periodically drain any accumulated condensate from the exhaust pipe to prevent blockage.

If the exhaust line must slope upward, install a condensate trap. Check for leaks at the connections between the trap and the pipe, as well as at the trap flange.

Ensure all pump connections are vacuum-tight to allow the pump to achieve its ultimate vacuum.

6.3 Power Supply and Motor Rotary Direction

Warning

Ensure that the power supply matches the required specifications. All electrical connections must be performed by a licensed electrician in accordance with applicable electrical equipment standards and wiring regulations.

For a three-phase motor, open the junction box cover and connect the pump according to Fig. 6. The pump is supplied without electrical connection accessories. The setting on the motor protection switch must correspond to the current rating indicated on the motor nameplate.

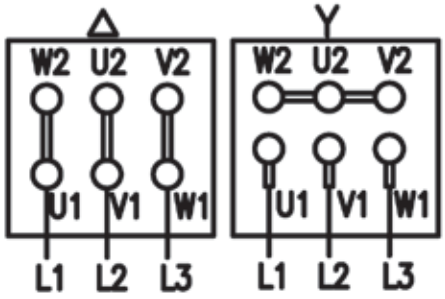


Fig.6 3-phase motor connection

The pump with three-phase motor direction: Check whether the motor direction is same as the arrow symbol on the motor. Please cut off the power immediately and interchange two phases of the connection (any 2 from L1, L2, L3) if the motor direction is reversed.

7. Initial Start and Operation

7.1 Start

Warning

The exhaust line must be unblocked. On no account may the pump be operated with a blocked exhaust line.

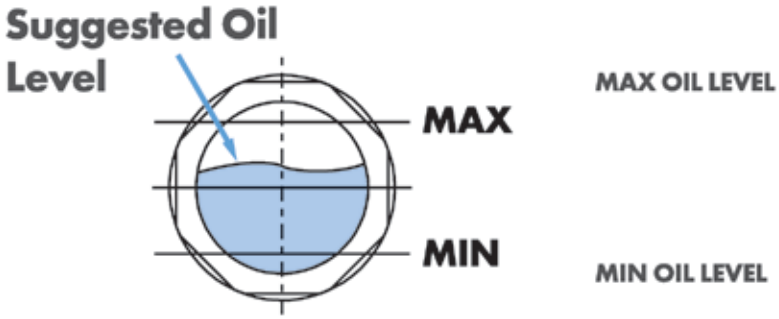


Fig.7

Warning

Ensure that the oil level remains between the **MIN** and **MAX** marks. If the oil level is too high or too low, the pump's performance may decrease and could even lead to failure. Always stop the pump before adding oil.

Notice

The operating ambient temperature is 40°F-100°F, and the humidity should be less than 85%.

7.2 Operation

Notice

After extended operation, the surface temperature of the pump may become very high. Do not touch the motor to avoid the risk of burns.

Pumping non-condensable gases

While pumping non-condensible gases, the gas ballast valve knob should be shut down (Fig. 1 the knob point at C). Opening the gas ballast valve will increase the ultimate pressure, resulting in a loss of vacuum.

Pumping condensable gases and vapor

When the vacuum system contains a small amount of condensible gas, open the gas ballast valve (refer to Fig. 1, Gas Ballast Valve, Arrow I). Allow the pump to run for at least 30 minutes to effectively remove the condensible gases. Once the system pressure has decreased to a certain level, close the gas ballast valve.

If the pump operates at low temperatures, condensible gases may dissolve in the pump oil. This can cause the oil to emulsify and deteriorate, resulting in decreased pump performance and indicating the presence of condensible gases in the vacuum system.

After completing the pumping process, do not stop the pump immediately. Instead, close the intake port and keep the gas ballast valve open, allowing the pump to continue operating until the condensible gases are completely separated from the oil.

8. Inspection and Maintenance

Warning

All the checking and maintainance must be operated according to all the safety rules, and all the work should be finished by trained people.

Warning

The operating process may present hazards due to oil decomposition or the contaminants being pumped. Identify the type of hazard and ensure that all necessary safety precautions are taken.

Warning

In the case of hazardous substances make sure the kind of hazard first and observe the applicable safety regulations. If the potential hazard still persists, the pump must be decontaminated before starting with any maintenance work.

8.1 Inspection

INSPECTION	INSPECTION	REMARKS
Oil Level	Everyday	8.2.1
Pump's Noise	Everyday	8.2.2
First oil change	After operating for 150 hours	8.2.3
Change vacuum pump exhaust filter	Operating for 1,500-3,000 hours or emerging oil fog.	8.2.4
Regular checking floating ball components	Six months	8.2.5
Change gas ballast filter cartridge	After operating for 500-1,500 hours or obstructed	8.2.6
Check anti-suckback oil valve	Six months or loss of vacuum	8.2.7
Clean intake filter	Six months	8.2.7
Change oil filter	After operating 500-1,500 hours or changing the oil	8.2.8
Clean fan cover	Six months	8.2.9
Check connecting wires	Six months	
Drain oil period	Every 1,000 hours of operation or six months. Whichever comes first.	

8 2 Maintenance

8.2.1 Check the Oil level

(1) During the operation the oil level of pump must always be visible between the Max and Min mark (refer to Fig.7). Add oil if the oil level is lower than Min mark and discharge oil(refer to Fig.2) if the oil level is higher than Max mark.

(2) Normally the oil is clear and transparent. If the oil darkens, it should be changed.

8.2.2 Check the pump's noise

The noise should be continuous and stable, without any abnormal noise. If there is any abnormal noise, refer to Table 2 Troubleshooting.

8.2.3 Oil change

(1) Change the oil after the pump has been shut off and cooled.
(2) Remove the oil drain plug (Fig. 2), and let the used oil drain into a suitable receptacle. When the flow of oil stops, screw the oil drain plug back in, briefly start the pump (10 seconds) and switch it off. It can remove the residual oil from the pump chamber. Remove the oil-drain plug again and drain off the remaining oil. Screw the oil-drain plug back in (check the o-ring and replace it if necessary). Remove the oil fill plug (Fig. 2), and fill with new oil. The pump oil shall be specified or provided by the manufacturer.
(3) After changing the oil, please put the used oil into the regulated container to deal with according to related environmental regulations.

8.2.4 Regular checking oil mist filter

(1) If there is oil fog coming out from exhaust port during operation, the safety valve of oil mist filter must be opened or the filter is failed, and it need to be replaced.
(2) Only the pump stopped operating and cooled, could the oil mist filter be replaced.
(3) Open the cover of exhaust port, take out the oil mist filter, and check the O ring and replace it if needed.

8.2.5 Regular checking floating ball components

Check the float ball assembly together with the oil mist filter. First, pull up the float ball assembly rod, then remove the float ball assembly. Inspect the rubber component for any damage, and clean the parts if necessary. Remove any debris promptly to ensure proper operation.

8.2.6 Regular checking changing gas ballast filter cartridge

Regularly remove the gas ballast rubber cab, observe if there is much dust inside the filter cartidge, use a wrench or other useful tool to take the filter cartridge out.

8.2.7 Regular checking intake filter and anti-suckback oil valve

Regularly remove the intake port and use compressed air to clean the filter to keep it free of debris. Also check whether the sealing surface of the anti-suckback valve is clean, and inspect it for any damage, hardening, or improper height to ensure it meets the required specifications.

8.2.8 Regularly check and replace of oil filter

Drain off the oil in the oil filter, screw out the oil filter for a new one, then coat some oil on the seal surface of the filter, finally turn on by hand.

8.2.9 Regularly check fan cover and motor fan

Regularly remove the fan cover and motor fan for cleaning. Use compressed air to remove dust and debris. After cleaning, reinstall the components securely before operating the pump.

9. Troubleshooting

FAILURE	POTENTIAL REASON	SOLUTION
Pump will not start	Wiring malfunction	Check & repair wiring
	Operation voltage is abnormal	Make sure the voltage is within rated range ±10%
	Motor is malfunctioning	Replace the motor
	Overload protector start up	Check the environment / pumped gas temperature
	Oil temperature is below 40°F	Improve the environment temperature
	Pump is jammed	Repair the pump
	Out of operation for too long	Repair the pump
	Oil is too viscous	Change the oil
	Exhaust filter or exhaust line is clogged	Replace the filter or clean the exhaust line
	Inner parts of the pump are damaged	Repair the pump
Pump will not reach ultimate pressure	Vacuum system configuration is incorrect	Reselect suitable pumps
	Vacuum system leak	Check the system
	Measuring technique or gauge is unsuitable	Use the correct measuring technique & gauge. Measure the pressure from pump's intake port
	Poor lubrication	
	Oil filter is obstructed	Change the oil filter
	Oil is unsuitable	Change the oil
	Oil channel is obstructed	Clean the channel
	Oil is insufficient	Add oil to the level as requested
	Anti-suckback oil valve is malfunctioning	Repair anti-suckback oil valve
	Intake line is dirty	Clean vacuum lines
	Floating ball components return oil valve is malfunctioning	Repair floating ball components in the return oil valve
Pumping speed is too low	Intake port line is clogged	Clean the intake port line
	Connecting lines are too narrow or too long	Use adequately wide & short connecting lines
	Exhaust line is clogged	Keep exhaust port line unobstructed
	Oil mist filter is clogged	change the oil mist filter
	Anti-suckback oil valve is malfunctioning	Repair anti-suckback oil valve
Noise is abnormal	Operation voltage is abnormal	Check the power supply, switches, & wiring connection
		Make sure the voltage is within rated range ±10%
	Foreign matters entering into the pump	Repair the pump
	The oil level of the pump is too low	Add oil to the proper levels
	The inner parts of the pump are damaged	Disassemble and replace corresponding parts

FAILURE	POTENTIAL REASON	SOLUTION
Pump gets hotter than usually observed	Poor ventilation	Improve ventilation environment
	Damaged fan	Change the fan
	Pumped gas temp is too high	Add cold trap at intake port
	Poor lubrication	
	The oil filter or exhaust line is clogged	Replace oil filter or clean the exhaust line
	Oil is unsuitable	Change the oil
	Oil channel is obstructed	Clean the channel
	Insufficient oil	Add the oil to the level as requested
	The condensator is dirty	Clean the condensator
	Ambient temperature is too high	Reduce ambient temperature
Oil in the intake line or in vacuum vessel	Oil comes from the vacuum system	Check the vacuum system
	Anti-suckback valve spring is obstructed	Replace anti-suckback valve spring
	Anti-suckback valve plate is obstructed	Replace anti-suckback valve plate
	Oil level is high	Drain the excess oil
After switching off pump under vacuum, pressure in system rises too fast	Vacuum system leak	Check the system
	Anti-suckback valve is malfunctioning	Repair the anti-suckback oil valve
Too much oil in the exhaust port	Too much oil in the pump	Drain some oil
	Continuous operation under high pressure in the intake port	Shorten exhaust time as soon as possible
	Oil mist filter is obstructed	Replace oil mist filter
Sealing surface leak	the seal is damaged	Replace new seal
	Seal ring is damaged	Replace new seal ring

Table 2

10. Accessories

To ensure the stability of the pump, please use the accessories we provided. Please offer the pump item number and code of spare parts while purchasing. Below is the diagram for optional accessories. If you have any other request, please contact us.
What we provide as accessories is as following:

1. Spare parts (see spare parts list)
2. Other type of intake port /exhaust port
3. Dust filter

Correct Disposal of this product:

This marking indicates that this product should not be disposed with other household wastes. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

10.1 RVS20 Exploded View

ACCESS DIGITAL EXPLODED VIEW OR PARTS LIST

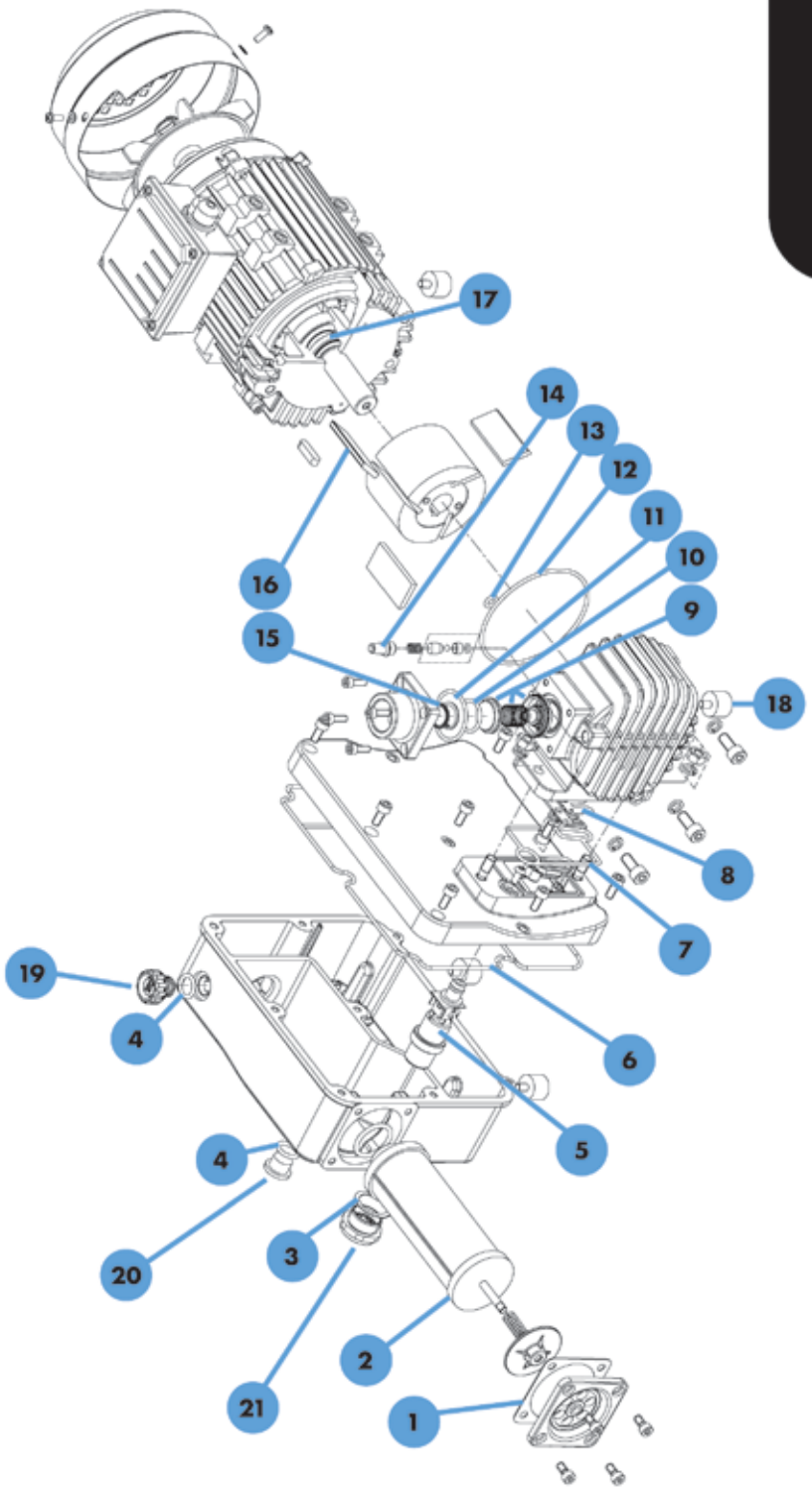


Fig.8

10.2 RVS65 Exploded View

ACCESS DIGITAL EXPLODED VIEW OR PARTS LIST

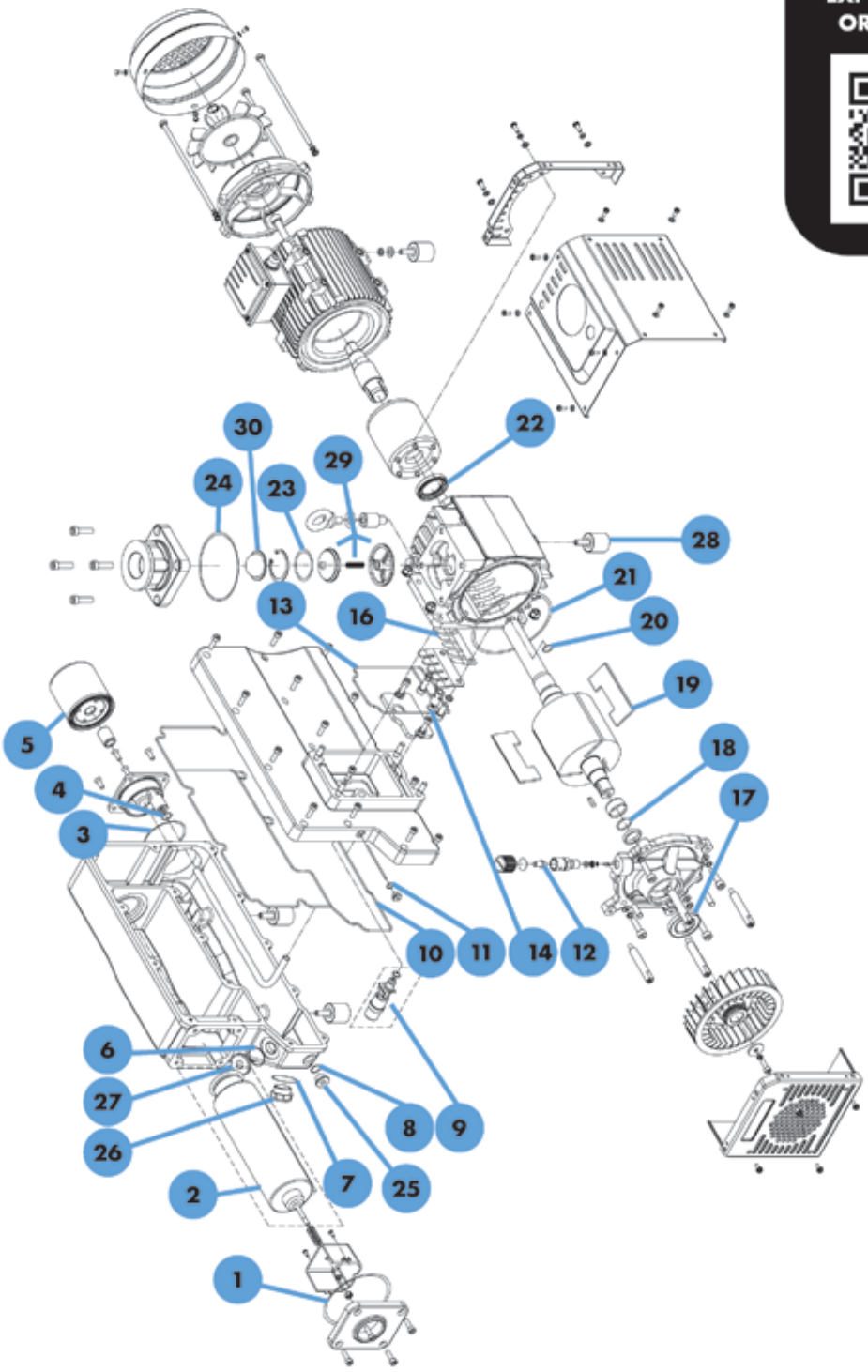


Fig.10

10.3 RVS100 Exploded View

ACCESS DIGITAL EXPLODED VIEW OR PARTS LIST

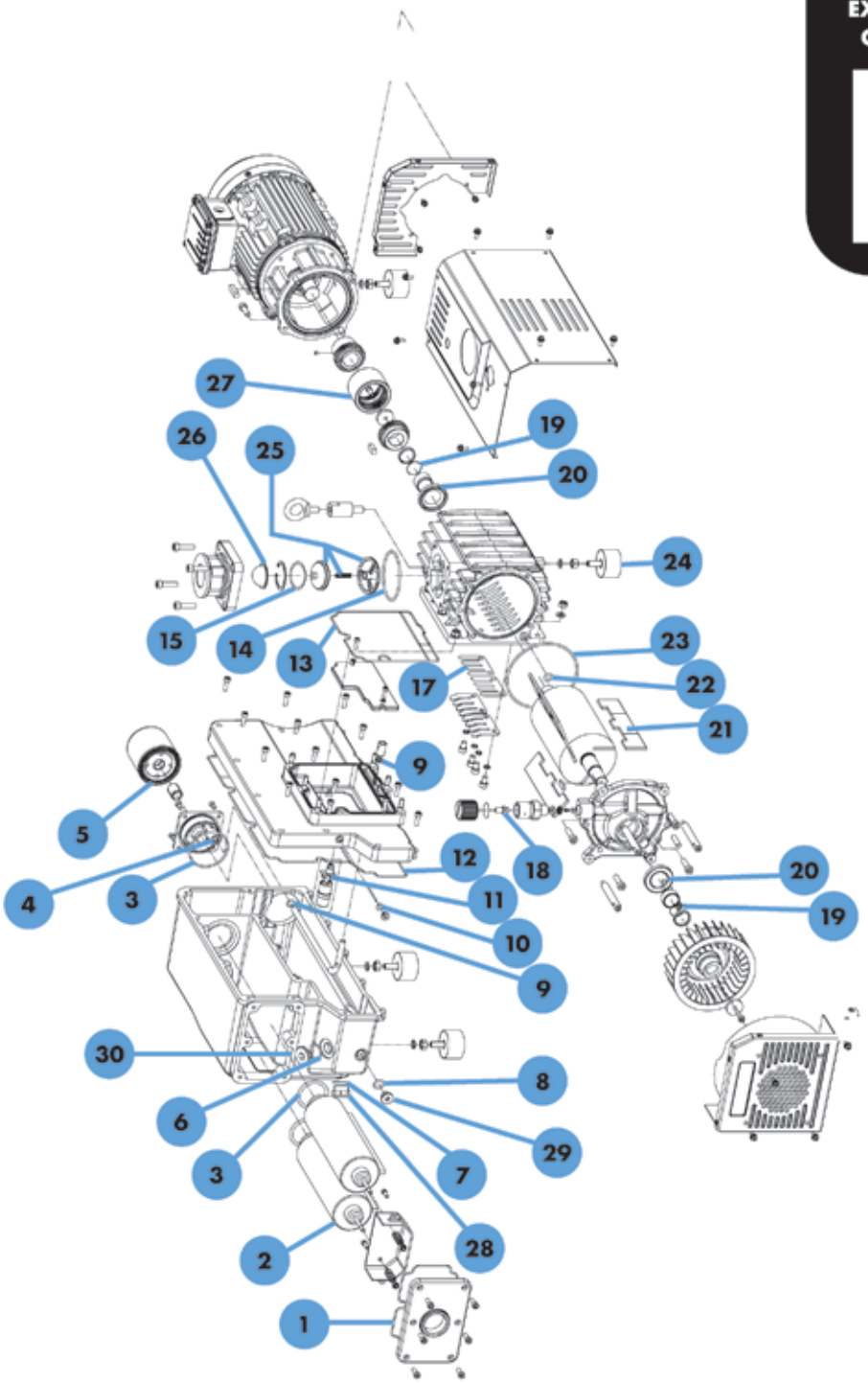


Fig.11

10.4 RVS200 Exploded View

ACCESS DIGITAL EXPLODED VIEW OR PARTS LIST

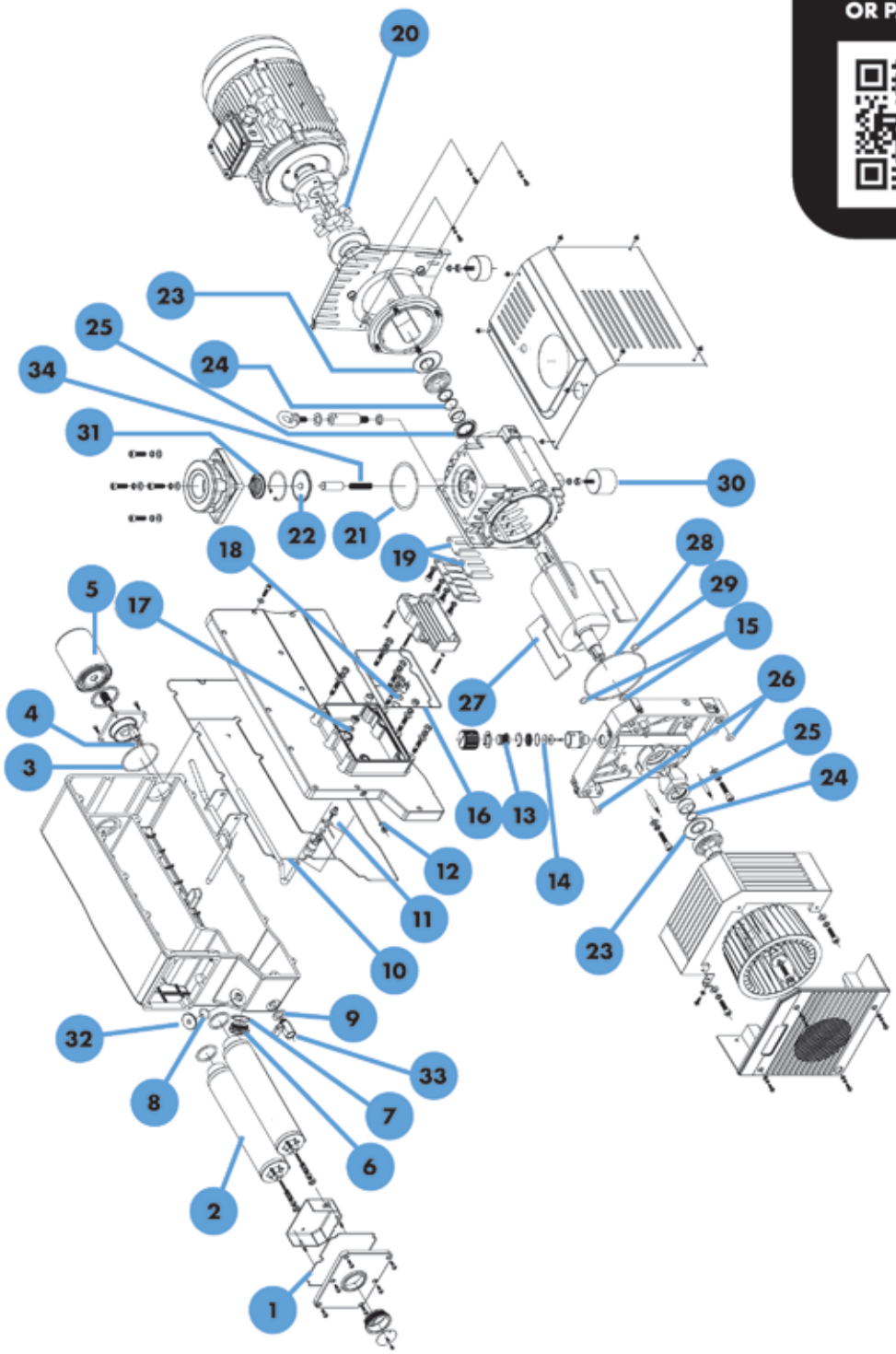


Fig.12

10.5 RVS300 Exploded View

ACCESS DIGITAL EXPLODED VIEW OR PARTS LIST

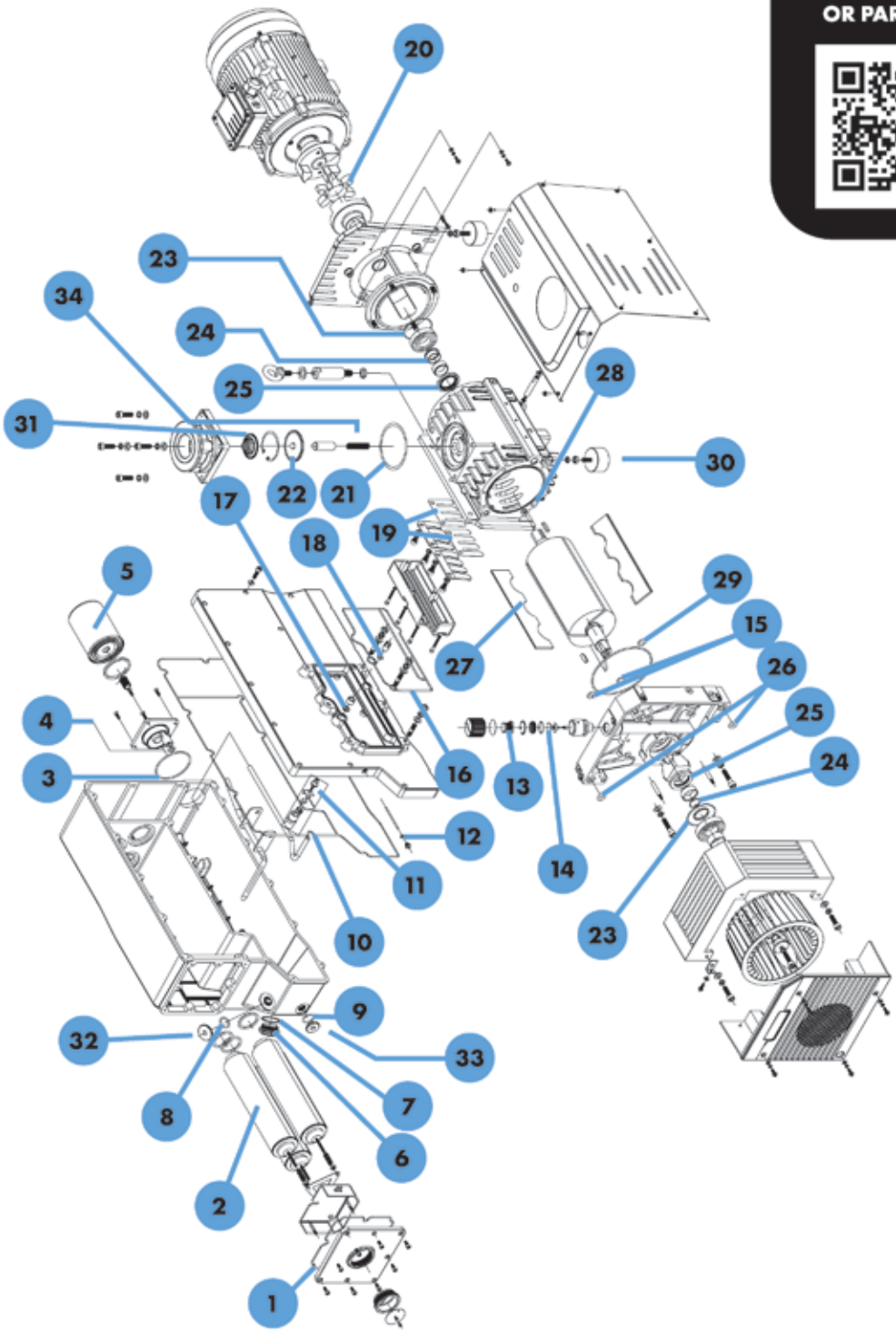


Fig.13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