



Single – Stage Rotary Vane Pump

OPERATING MANUAL

(Please read the operating manual carefully before using)



ASV SERIES

Forward

I Use information

- Thanks for trusting and using our products, we will try our best to supply you with good products and service.
- Please check the product received is same as you ordered and also the accessories, operating manual are attached. Please check the product if there is any damage during transportation. Contact with local distributor if the above problem is found.
- Please read the operating manual carefully before operating and use the pump according to the product operating procedures.
- We reserve the right to modify the design and specified data including operating manual without notice.
- Add vacuum oil before starting up for the first time.

Warning

In order to prolong the usage of the vacuum pump, please read the operating manual carefully before installation, operation, repair and maintenance, which can help you to fully understand the safety, specification as well as operating procedure of the vacuum pump.

II Safety indication

Only operating vacuum pump in a proper way according to operating manual can ensure the safety and efficient operation. In order to enable you to fully understand the operating manual and the content of warning, we list following safety indications.

Warning

Indicates procedures that must be strictly observed to prevent hazards to persons.

Attentions

Indicates procedures that must be strictly observed to prevent damage or destruction of 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 proper cover of junction box before running.



This warning label indicates when opening the pump, do not touch the pump, until it has cooled.

1 Description

ASV series vacuum pump is a single-stage rotary vane pump. It is a basic vacuum acquisition equipment, which can be used to extract inactive gas and a small amount of condensable gas in the coarse and low vacuum range. The pump is especially suitable for packaging machinery.

Fig.1 is the outline drawing of the pump. Its structural design is reasonable. It adopts the oil circulation air cooling structure. It runs without fault for a long time, and has large pumping speed, high limit vacuum, low noise, low vibration, no oil injection, no oil leakage and convenient maintenance.

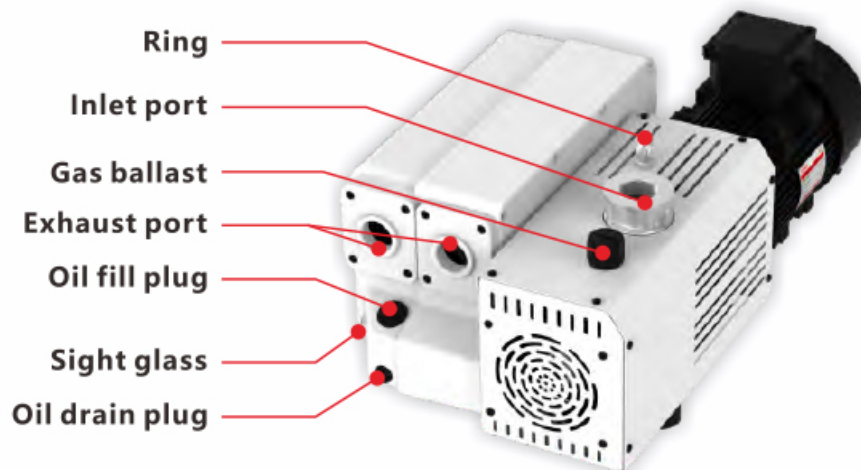


Fig.1

1.1 Working principle:

As shown in Fig.2, the pump rotor is eccentrically installed in the pump cylinder, and the pump cavity is divided into several cavities through three rotating blades that are always close to the cylinder wall. When the motor drives the pump rotor to rotate, the cavity changes periodically. The gas is sucked in from the air inlet and enters the pump cavity through the filter screen and anti backflow valve. The sealed cavity formed by the rotating plate and the pump rotor is inhaled, compressed, and then pushed open the exhaust valve plate for exhaust, and then discharged to the outside of the oil tank through the oil mist filter. The pump is constantly aspirating, compressing and exhausting, so as to achieve the purpose of pumping air to the container.

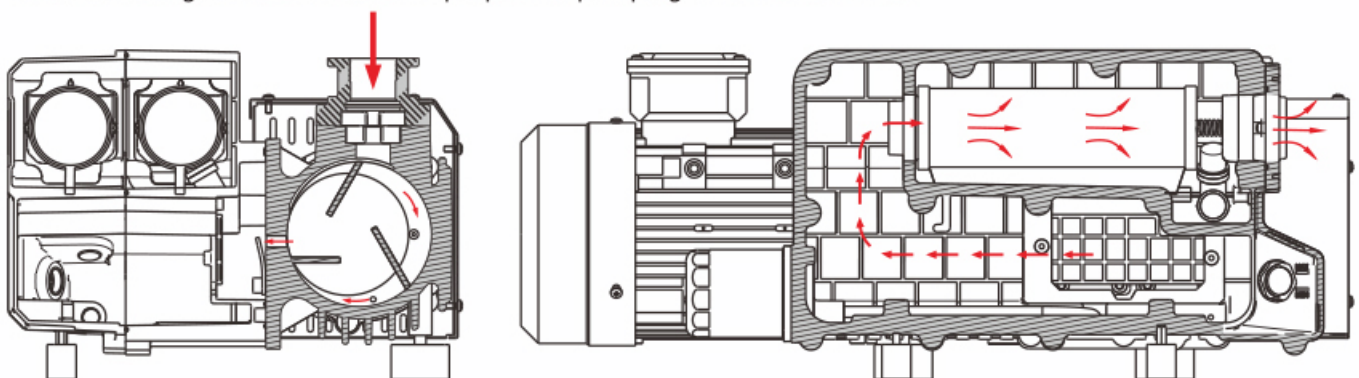


Fig.2

1.2 Principle of gas ballast:

The controllable air flow (usually room temperature dry air) enters the compression chamber of the pump through the air ballast hole, and is mixed with the extracted steam during the compression of the gas in the pump chamber. When the mixed gas is compressed to the exhaust pressure, the vapor partial pressure can be maintained below the saturated vapor pressure of the pump temperature state, so the vapor will not condense. At this time, open the exhaust valve, and the steam is discharged out of the pump together with other gases. The more vapor in the extracted gas, the more dry gas needs to be added.

2 Technical parameters

Model		ASV-20	ASV-40	ASV-65	ASV-100	ASV-160	ASV-200	ASV-300
Flow Rate m ³ /h		20	40	65	100	160	200	300
Ultimate pressure(mbar)		2	0.3	0.3	0.3	0.1	0.1	0.1
Ultimate pressure	gas ballast I(mbar)	2	0.5	0.5	0.5	0.5	0.5	0.5
	gas ballast II(mbar)	/	1.5	1.5	1.5	1.5	1.5	1.5
Power supply		single/3-phase	3-phase	3-phase	3-phase	3-phase	3-phase	3-phase
Rated Powe(kW)		0.75	1.1	1.5	2.2	5	5	7.5
Water Vapor Tolerance	gas ballast I(mbar)	15	15	15	15	30	30	30
	gas ballast II(mbar)	/	30	30	30	50	50	50
Inlet and Exhaust port		G1/2" / G3/4"	G1-1/4"	G1-1/4"	G1-1/4"	G2"	G2"	G2"
Oil capacity(L)		0.5	2	2	2.5	5	5	6.5
Motor Speed (rpm)	50Hz	3000	1440	1440	1440	1440	1440	1440
	60Hz	3600	1720	1720	1720	1720	1720	1720
Operation Temp(°C)		10-40	10-40	10-40	10-40	10-40	10-40	10-40
Noise Level(dB)		≤65	≤59	≤61	≤62	≤70	≤70	≤71
Weight(kg)		20	45	56	70	125	150	210

Table.1

2.1 Pumping rate curve (as shown in Fig.3)

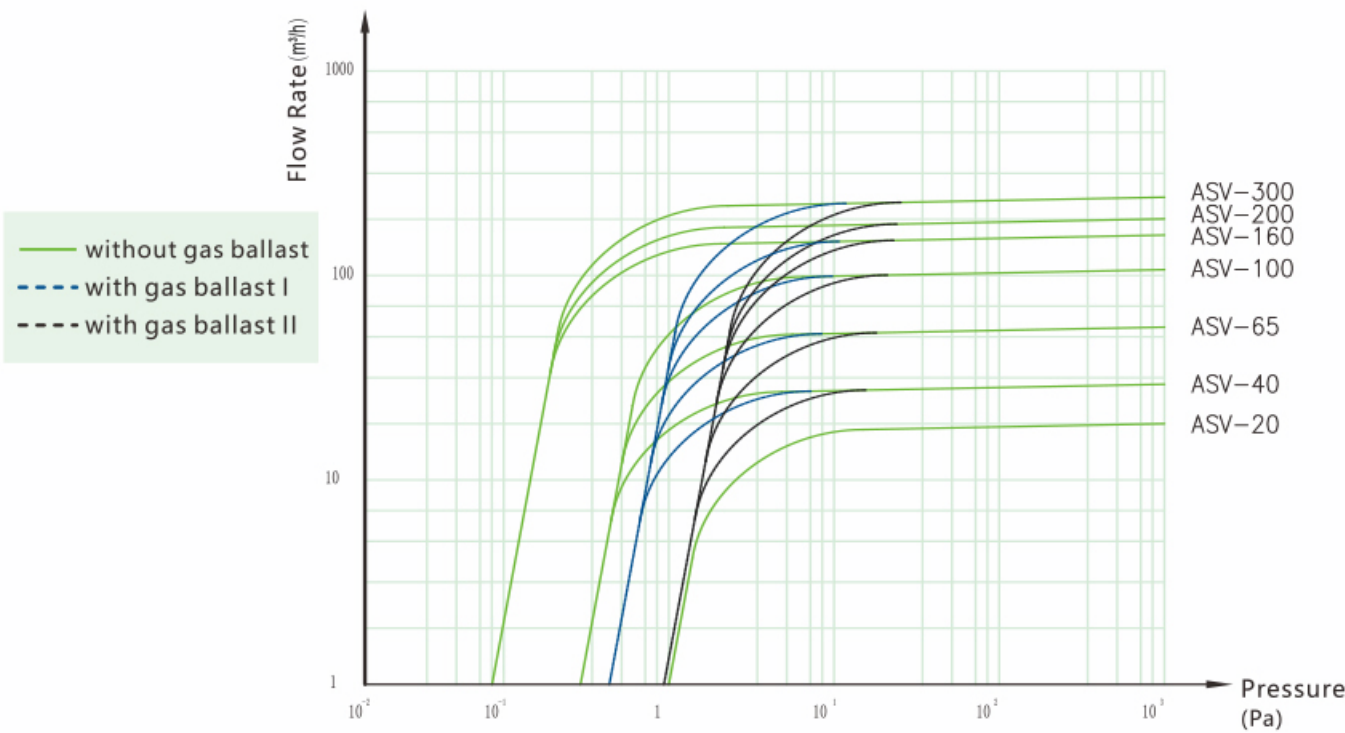


Fig.3

3 Installation and connection

The pump can only be moved when it stops running, the pump cools down and the power supply is disconnected. Any minor negligence during handling may cause damage to the pump. Please handle with care. Please move the pump with full oil vertically and horizontally to avoid oil overflow.

3.1 Installation dimensions

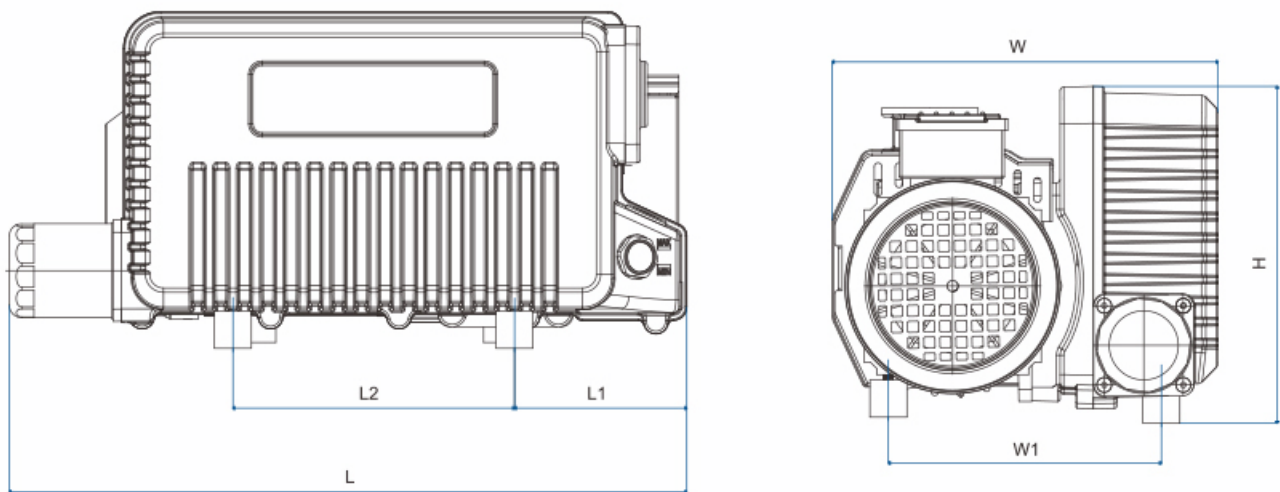


Fig.4

Model	L	W	H	L1	L2	W1
ASV-20	330	248	212	32	178	170
ASV-40	549	312	273	140	228	221
ASV-65	549	312	273	140	228	221
ASV-100	703	406	286	165	225	320
ASV-160	930	533	436	263	252	394
ASV-200	930	533	436	263	252	394
ASV-300	1035	540	434	326	313	394

3.2 Connection with system

Warning

It is forbidden to use the pump in places with explosion hazards and inflammables to avoid explosion or fire.

Warning

Never use blocked or narrow exhaust pipes, and ensure that the exhaust pipes are not blocked by sediments before the pump is started; The exhaust pressure shall not be lower than the absolute pressure of 1.15bar (relative pressure of 0.15bar), nor lower than the atmospheric pressure.

Warning

The selection of pump installation site should consider: convenient installation, maintenance, disassembly and other operations; Good ventilation conditions; Convenient wiring.

When the pump is connected to the vacuum system, the pump foot can be placed horizontally on a stable and firm ground, or the pump foot can be connected and fixed with bolts, and the inclination angle of the pump shall not exceed 10 °; The pipeline connecting the pump and the vacuum system shall be as short as possible, and shall be consistent with the diameter of the air inlet as far as possible. When installing the exhaust pipe, the slope shall be downward to prevent the condensate from flowing back to the pump and polluting the oil, and pay attention to regularly discharge the oil accumulated in the exhaust pipe for a long time to prevent the exhaust pipe from being blocked. If the gradient of the exhaust pipe is upward, a condensate trap must be installed to detect the leakage at the connection between the pipe and the flange. Good vacuum tightness is very important for the pump to reach the limit pressure.

Warning

The power supply used must be consistent with the power supply identified by the product. The power connection must be correctly operated by electricians according to the technical standards of power equipment and Wiring Regulations. For three-phase motor, please open the junction box cover and connect as shown in Fig.5. There is no electrical connection accessories. The rated current value of the selected cable and motor protection switch must match the rated current value on the motor nameplate.

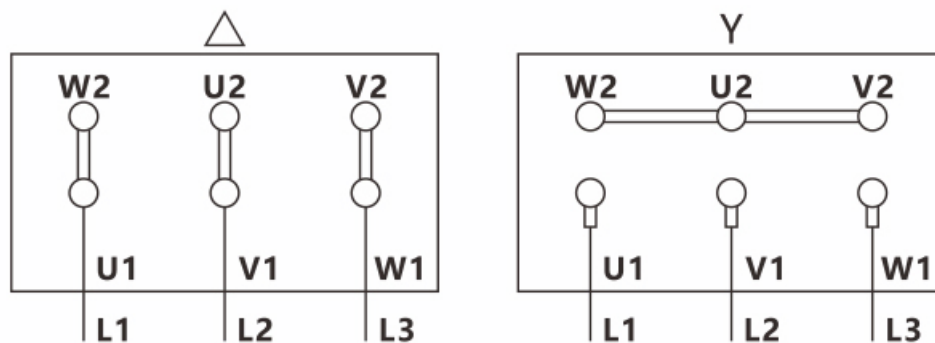


Fig.5 Three-phase motor connection

Confirmation of three-phase motor rotation direction: observe whether the rotation direction of the motor is consistent with the direction of the motor arrow; If the rotation direction of the motor is opposite, cut off the power supply immediately and exchange any two (any two of W1, U1 and V1) to correct the rotation direction of the motor.

4 Initial startup and operation

4.1 Startup

Recommended
oil level



Fig.6

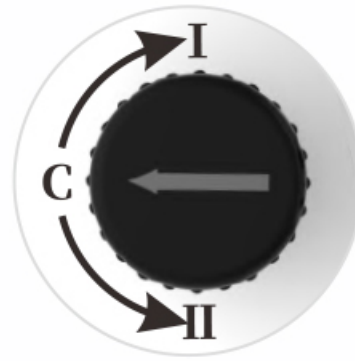


Fig.7

! Warning

The exhaust port of the pump must be unblocked, and the pump shall not be started when the exhaust port is blocked.

! Warning

Please control the oil level of the vacuum pump within the range of Min -- Max in the oil level window. If the oil is too much or insufficient, the performance of the pump may decline or even fail. The pump must be stopped before oil filling, and the final oil level of the pump needs to be observed and confirmed 5 seconds after the pump runs.

! Attentions

The working environment temperature of the pump is 10-40 °C, and the humidity is no more than 85%. The minimum starting temperature of the pump is 10 °C.

4.2 Operating

! Attentions

During the operation and termination after one hour, the pump surface temperature will be very high. Do not touch the motor and pump in case of scald.

Pumping condensable gas

When pumping condensable gas, the knob of gas ballast valve shall be closed (as shown in Fig.7, the arrow of gas ballast knob points to C). If the gas ballast is opened, it will cause the limit pressure to rise (vacuum degree to decrease).

Remove condensable gas and steam

When the vacuum system contains a small amount of condensable gas, open the gas ballast valve (as shown in Fig.7, the arrow of the gas ballast knob points to I or II). After the pump operates for more than half an hour,

pump out the condensable gas in the vacuum system. When the pressure of the vacuum system decreases to a certain value, close the gas ballast valve for normal pumping. If the pump works at a low temperature, the condensable gas may dissolve in the oil, and the pump oil may emulsify or deteriorate, which may affect the performance of the pump and corrode the pump body.

The oil level of the pump rises during operation, which is an indication of condensable gas in the system. Do not stop the pump immediately after the end of the pumping process. The pump must continue to operate with the air ballast valve open and the air inlet closed until the condensable gas dissolved in the pump oil is fully separated.

5 Maintenance

Warning

All inspection and maintenance must be carried out in accordance with various safety regulations, and all work must be completed by professionally trained personnel.

Warning

When there are hazardous substances, first determine the nature of the hazard and follow the appropriate safety procedures. If the potential danger still exists, the pump must be decontaminated before any maintenance work.

5.1 Daily maintenance table

Maintenance content	Maintenance cycle	Note
Check the oil level	Maintenance cycle	5.2.1
Check the sound of the pump	Every day	5.2.2
First oil change	Every day	5.2.3
Oil change interval	After 150h of operation	
Replace the oil mist filter	After 500-1500h operation in clean environment or after the oil turns brown Oil mist may appear after 1500-3000h operation in non corrosive environment	5.2.4
Check the floating ball regularly	6 months or abnormal vacuum	5.2.5
Replace the air ballast filter element	After 500-1500h operation in clean environment or after being blocked	5.2.6
Check the anti return valve	6 months	5.2.7
Clean the intake screen	6 months	5.2.7
Replace oil filter	After 500-1500h operation in clean environment or after oil change	5.2.8
Clean the fan cover	6 months	5.2.9
Wiring inspection	6 months	

Table.2

5.2 Routine maintenance method

5.2.1 Check oil level.

(1) When the pump is working, the pump oil level shall always be kept between the minimum oil level line and the maximum oil level line (see Fig.6). If the liquid level is lower than the minimum oil level line, oil shall be added in time. If the liquid level is higher than the maximum oil level line, unscrew the oil plug (Fig. 1) to drain the excess pump oil.

(2) Observe the color of the pump oil. The normal pump oil is clean and transparent; If the pump oil turns brown or emulsified, the oil needs to be changed.

5.2.2 Check the sound of the pump

When the pump works, the sound shall be continuous and stable without other abnormal noises. If there is abnormal noise, see Table 3 fault analysis for treatment methods.

5.2.3 Oil change

(1) After stopping the pump, change the oil after the pump cools down to avoid scalding.

(2) When changing the oil, open the oil plug (Fig. 1) and drain the used oil into a suitable container. When the oil flow stops, screw on the oil drain plug. Start the pump briefly (about 10 seconds) to drain the remaining oil in the pump chamber, then disconnect the power supply, open the oil drain plug again, empty the remaining oil, and screw on the oil drain plug (check the O-ring and replace it if damaged). Unscrew the filler plug (Fig. 1) and inject new oil. The specified pump oil must be used.

(3) After oil change, please put the treated pump oil into the designated container and handle it in accordance with relevant environmental regulations.

5.2.4 Regularly check and replace the oil mist filter

(1) If oil mist is found at the exhaust port of the pump during operation, it indicates that the safety valve of the oil mist filter is opened or the filter fails and needs to be replaced.

(2) When replacing the oil mist filter, please stop the pump and wait until the pump cools down.

(3) Open the vent cover, take out the oil mist filter and replace it. Check the O-ring on the filter and replace it if necessary.

5.2.5 Check the floating ball regularly

Please check the floating ball while checking the oil mist filter. First pull out the floating ball plug rod, and then pull out the floating ball. Check whether the rubber of the floating ball is damaged, whether the oil return hole is unobstructed, whether the floating ball swings up and down and whether it is suspended. In addition, check whether the floating ball chamber is clean and clean it in time.

5.2.6 Regularly check and replace the air ballast filter element

Regularly remove the rubber cap of the gas ballast, observe whether there is more dust in the filter element of the gas ballast, and clean it with compressed air or replace it.

5.2.7 Regularly check the air inlet filter screen and anti oil return valve

Regularly remove the air inlet nozzle and clean the filter screen with compressed air to keep it clean; At the same time, check whether the sealing surface of the oil return valve is clean, damaged or hardened, and whether the height meets the requirements. If so, it needs to be cleaned, replaced or adjusted.

5.2.8 Regularly check and replace the oil filter

After the oil is drained, screw out the old oil filter, take a new oil filter, apply a little pump oil on the surface of the sealing ring of the oil filter, and then tighten it by hand.

5.2.9 Regularly clean the fan housing and motor fan

Please remove the fan cover and motor fan cover regularly and clean them with compressed air. Before the pump runs, the fan cover and motor fan cover must be installed.

5.2.10 Regularly check the electrical connection

Qualified personnel shall regularly check whether all terminals are fastened and clean them.

6 Routine faults and troubleshooting

Fault	Cause of failure	Troubleshooting
Pump cannot be started	1. Incorrect wiring	1. Check and correct wiring
	2. Abnormal input power supply voltage	2. Ensure that the voltage is within $\pm 10\%$ of the rated voltage
	3. Motor failure	3. Replace the motor
	4. Overload protector protection startup	4. Set the motor protector correctly
	5. The pump oil temperature is lower than 10 °C	5. Increase the ambient temperature
	6. There is foreign matter in the pump, causing jamming	6. Repair the pump
	7. Pump shutdown time is too long	7. Repair the pump
	8. The oil is deteriorated and viscous	8. Replace the pump oil
	9. Exhaust blockage	9. Replace the oil mist filter or make the exhaust pipe unobstructed
	10. The internal parts of the pump body are damaged	10. Repair the pump
Pump cannot reach the maximum pressure	1. Unreasonable vacuum system configuration	1. Re select the appropriate pump
	2. Leakage of vacuum system	2. Check the system
	3. Unreasonable measurement method	3. Measure the vacuum directly at the air inlet of the pump
	4. Poor lubrication	
	4.1 Oil filter blocked	4.1 Replace oil filter
	4.2 Improper or deteriorated pump oil	4.2 Add qualified oil products
	4.3 Oil circuit blockage	4.3 Clean the oil circuit
	4.4 Insufficient oil	4.4 Add oil to the specified level
	5. Anti return valve failure	5. Repair the anti return valve
	6. Vacuum pipeline pollution	6. Clean the vacuum pipeline
	7. Float ball oil return valve failure	7. Oil return valve

Fault	Cause of failure	Troubleshooting
The pumping speed of the pump is too slow	1. The air inlet pipe is blocked	1. Clean the air inlet pipe
	2. The air inlet pipe is too small or too long	2. Use a short and thick air inlet pipe as far as possible
	3. The exhaust pipe is not smooth	3. Keep the exhaust pipe unobstructed
	4. The oil mist filter is blocked	4. Replace the oil mist filter
	5. Anti return valve failure	5. Repair the anti return valve
The vacuum degree of the system drops too fast after the pump is stopped	1. Leakage of vacuum system	1. Check the system
	2. Anti return valve failure	2. Repair the anti return valve
Abnormal pump sound	1. Abnormal input power supply voltage	1.1 Check the connection of power supply, switch and line
		1.2 Ensure that the voltage is within $\pm 10\%$ of the rated voltage
	2. Foreign matters enter the pump	2. Repair the pump
	3. The oil level in the pump body is too low	3. Add the specified amount of oil
	4. The internal parts of the pump body are damaged	4. Disassemble, repair and replace parts
Pump temperature rise too high	1. Poor installation ventilation	1. Improve ventilation environment
	2. The pump blades are damaged	2. Replace the pump blades
	3. The temperature of the extracted gas is too high	3. Add a cold trap at the air inlet
	4. Poor lubrication	
	4.1 The oil filter or exhaust pipeline is blocked	4.1 Replace the oil filter or clean the exhaust pipeline
	4.2 Improper or deteriorated pump oil	4.2 Add qualified oil products
	4.3 Oil circuit blockage	4.3 Clean the oil circuit
	4.4 Insufficient oil	4.4 Add oil to the specified level
	5. The condenser is dirty	5. Clean the condenser
	6. The ambient temperature is too high	6. Reduce the ambient temperature
There is pump oil in the pump inlet pipe	1. Oil from vacuum system	1. Check the vacuum system
	2. Anti backflow valve spring failure	2. Replace the anti backflow valve spring
	3. The sealing surface of anti backflow valve plate is dirty or damaged	3. Clean or replace the anti backflow valve plate
	4. The oil level is too high	4. Drain the excess pump oil
The system pressure rises too fast after stopping the pump	1. There is too much oil in the pump	1. Check and repair the vacuum system
	2. The sealing surface of anti backflow valve is dirty or invalid	2. Clean or repair the anti backflow valve

Fault	Cause of failure	Troubleshooting
The pumping speed of the pump is too slow	1. There is too much oil in the pump	1. Drain excess pump oil
	2. The float ball oil return valve is blocked	2. Check the valve and clean the oil return valve
	3. Oil mist filter failure	3. Replace the oil mist filter
The pumping speed of the pump is too slow	1. The oil seal is worn and damaged	1. Replace the oil seal with a new one
	2. The sealing ring is deformed and damaged	2. Replace the sealing ring with a new one

Table.3

7 warranty terms

The warranty period of ASV series vacuum pump is one year from purchase. During the warranty period, the company will provide maintenance services free of charge for faults under normal use conditions as required by the operation manual. If the fault is caused by the following conditions, the company needs to repair it with compensation:

- (1) Faults caused by natural disasters or human factors.
- (2) Faults caused by special use environment.
- (3) Damage of seals and wearing parts (see Table 4, 5 and 6).
- (4) Identified by the technicians of the company, it is a fault caused by abnormal operation or improper use.
- (5) If the pump is sent back to our company for maintenance, it must be explained whether the pump is polluted or does not contain substances harmful to people. If the pump has been contaminated, please specify exactly what pollutants it contains. If there is no pollution declaration, we will return the pump to the shipper according to the address.

8 Routine maintenance methods

8.1 Standard equipment

The pump with single-phase AC motor shall be supplied with standard pump, switch, power cable, plug and inlet and exhaust dust cover.

The pump with three-phase AC motor is supplied with standard pump and air inlet and exhaust dust cover, excluding switch, power cable and plug.

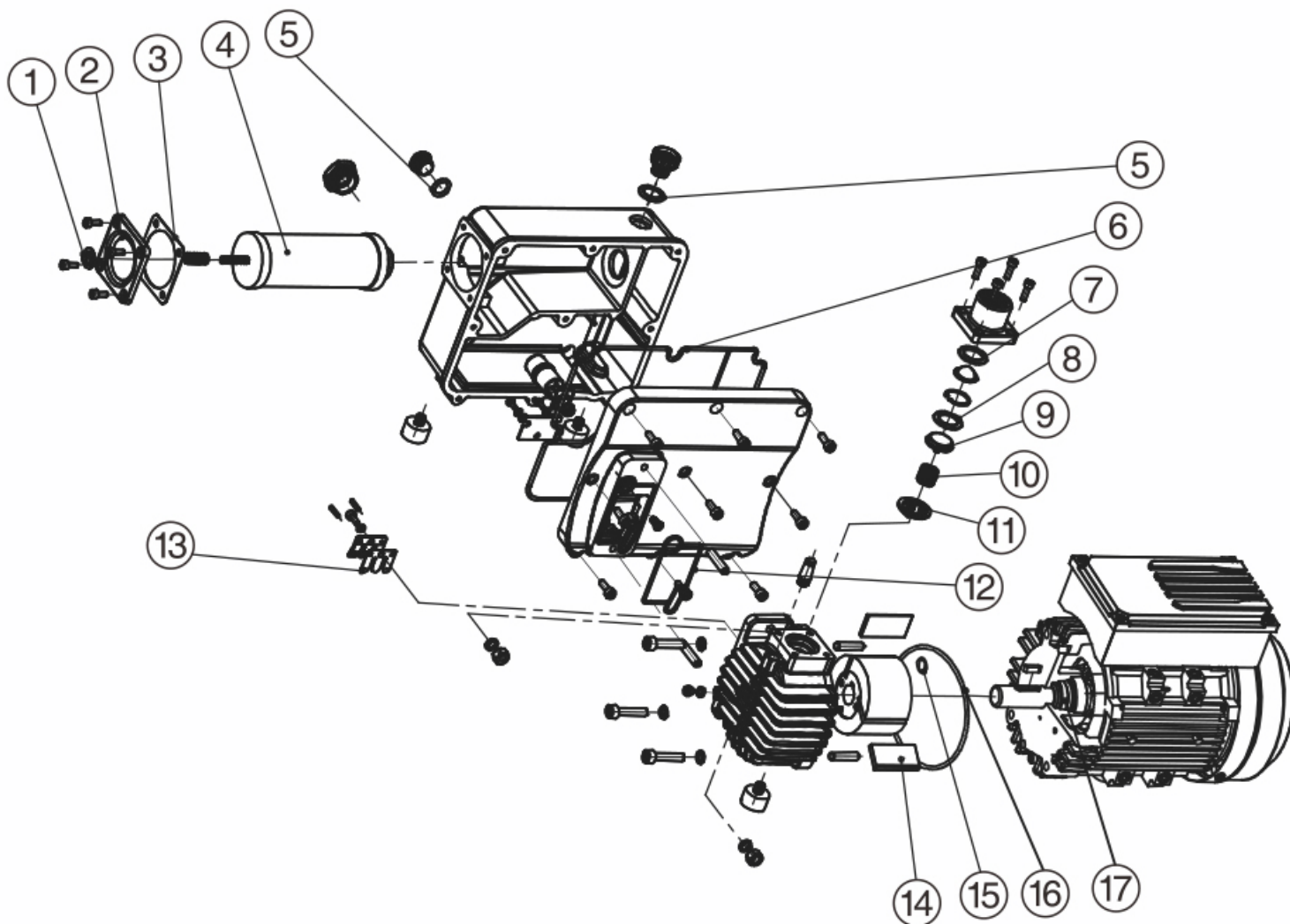
8.2 Accessories

In order to ensure the reliability of the pump, please choose the accessories provided by our company, and please provide the model of the pump when ordering.

1. Inlet vacuum filter
2. Air inlet / exhaust interface
3. Other accessories

Note: accessories are optional. If you have other needs for accessories, please contact us.

9.1 ASV-20 Parts diagram



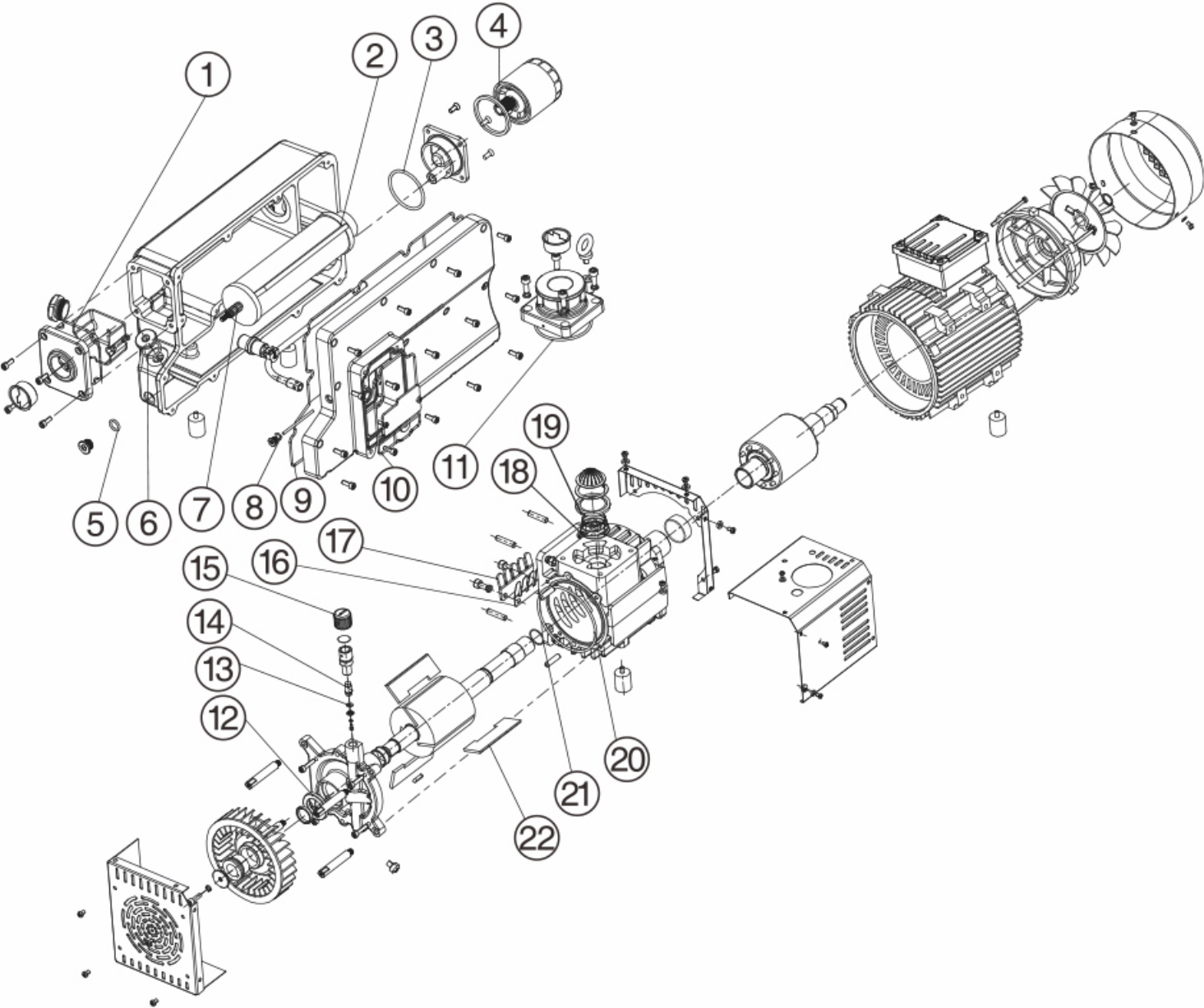
9.1 ASV-20 Wearing Parts List

NO	Parts
1	Retaining ring
2	Shim
3	Shim
4	Oil mist filter
5	O-ring
6	O-ring
7	O-ring

NO	Parts
8	O-ring
9	Backflow valve
10	Spring
11	Backflow valve seat
12	O-ring
13	Valve plate
14	Rotary vane

NO	Parts
15	O-ring
16	O-ring
17	oil seal

9.2 ASV-40/65 Parts diagram



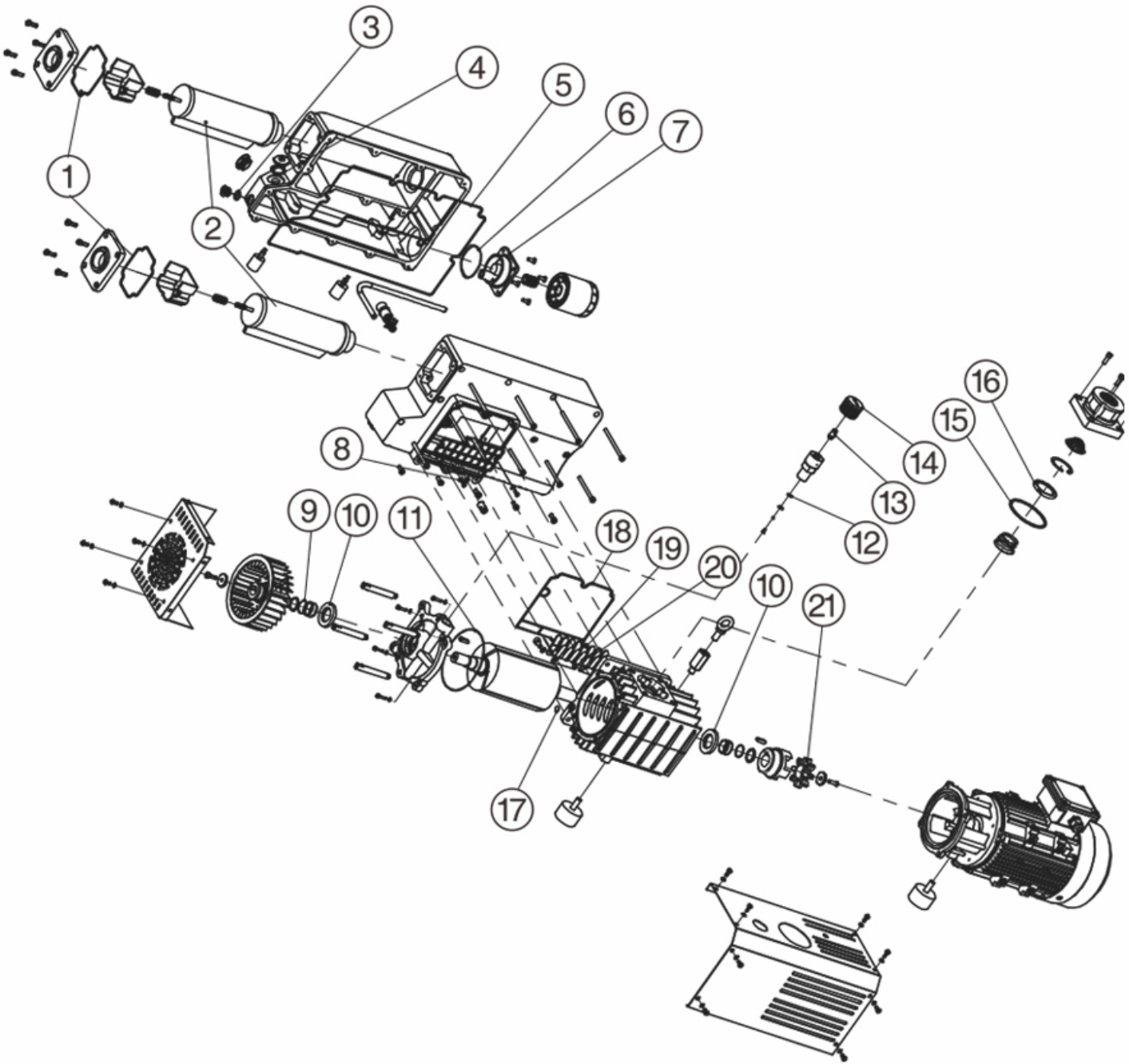
9.2 ASV-40/65 Wearing Parts List

NO	Parts
1	O-ring
2	Oil mist filter
3	O-ring
4	Filter
5	O-ring
6	O-ring
7	Spring

NO	Parts
8	O-ring
9	O-ring
10	O-ring
11	O-ring
12	Oil seal
13	Shim
14	Muffler

NO	Parts
15	Gas ballast cap
16	Valve plate
17	Plate
18	Spring
19	Backflow valve
20	O-ring
21	O-ring
22	Rotary vane

9.3 ASV-100 Parts diagram



9.3 ASV-100 Wearing Parts List

NO	Parts
1	O-ring
2	Oil mist filter
3	O-ring
4	O-ring
5	O-ring
6	O-ring
7	Tank seat

NO	Parts
8	O-ring
9	O-ring
10	oil seal
11	O-ring
12	Shim
13	Gas ballast filter
14	Gas ballast cap

NO	Parts
15	O-ring
16	Backflow valve
17	O-ring
18	Seal ring
19	Plate
20	Valve plate
21	Washer



TEL: +90 212 656 29 08

MOBİL: +90 552 556 97 24

E-POSTA: info@zerovakum.com.tr

WEB SİTE: www.zerovakum.com.tr