

# TRP

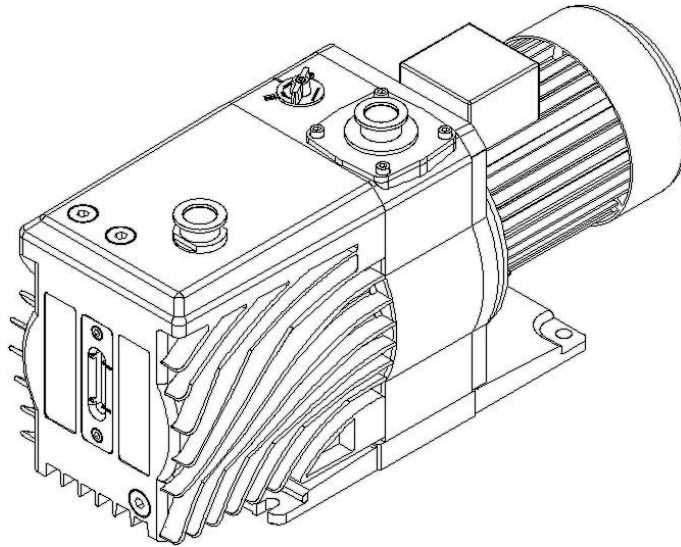
## VACUUM PUMP SERIES



HIGH SPEED ROTARY VANE VACUUM PUMPS

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### **1. Inspection**

Check the following upon receipt of the product:

- Is the product consistent with what you ordered?
- Is there any damage to the product due to any loosened screws in transportation?
- Does the product meet the requirements of order for goods?
- Please contact the Company in time if you find any damages, defects or any loss of parts.

### **2. Transportation**

During transportation, any neglect may cause damages to the pump. Please handle with care.

### **3. Purpose and Range of Use**

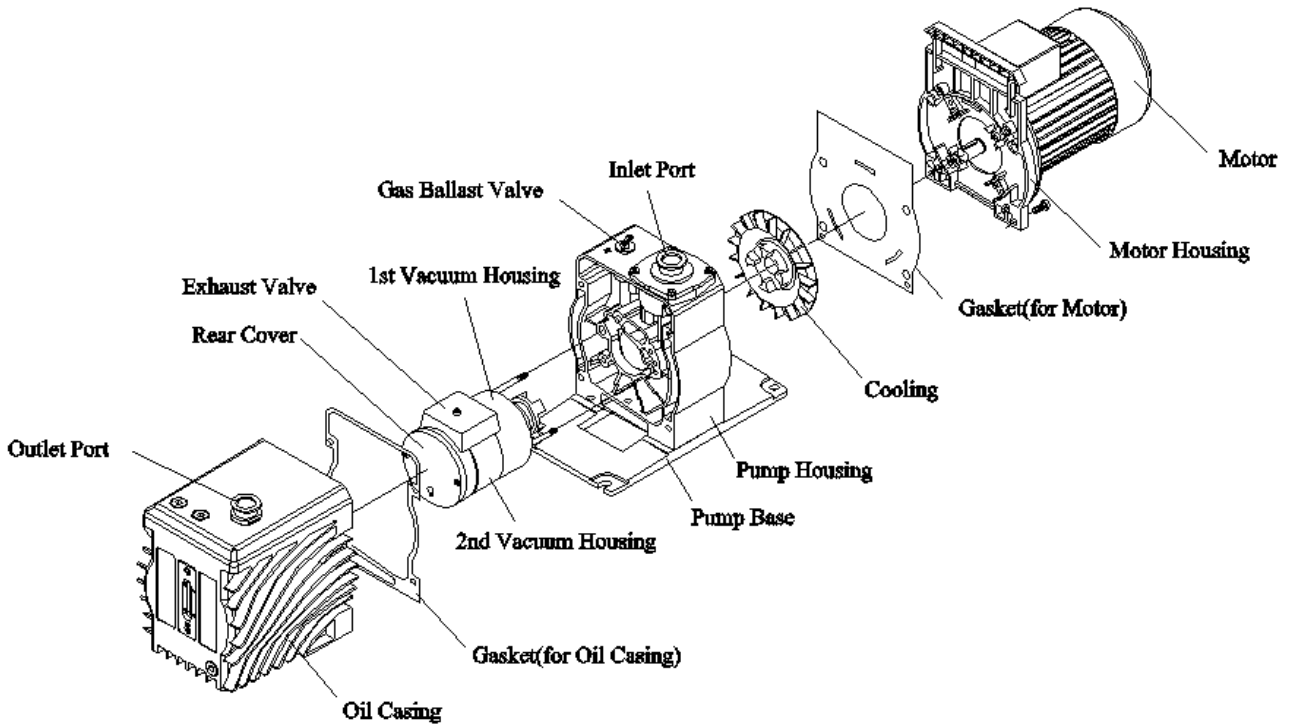
With a complete range of state-of-the-art production technology, process, modern machining center, CNC equipment imported from South Korea, the Company produces seven types of high speed rotary vane vacuum pump of TRP series (the “Pump” below). The pump is one of the fundamental vacuum acquiring equipment in vacuum applications, which is widely used in scientific research and teaching the require high or low-vacuum environment, as well as in operation fields requiring an vacuum environment, such as auxiliaries to vacuum application equipment, auxiliaries to production lines in electronic and semiconductor industries, color kinescope exhaust production line, vacuum freeze drying, production of analytic instruments and electric light sources.

Not only can the pump be used independently, but it can serve as a backing pump in such high and ultra high vacuum systems as molecular pump, diffusion pump and rooster pump, used in a matching manner.

The pump can not be used for dust removal and for any gases which are corrosive, explosive or have chemical reaction with metals or vacuum pump oils, nor can it be used as a compression pump or transmission pump.

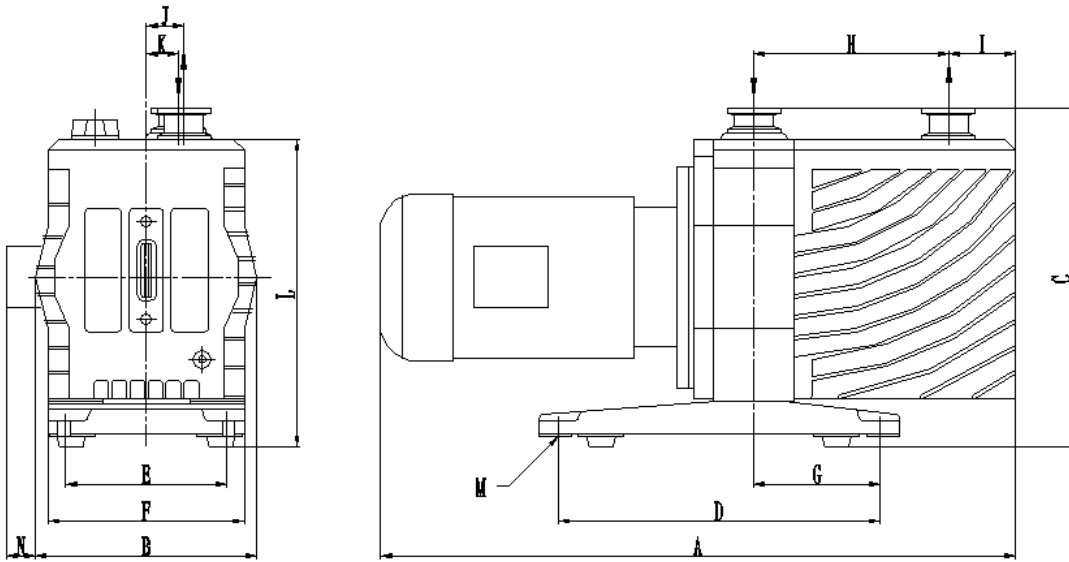
Consisting of an oil-return preventing check valve system, a pressure oil circulating system, a convenient gas ballast valve control, etc., this pump is characterized by, among others, high ultimate vacuum, low noise, and no oil leakage and injection, providing excellent services for the users with its advanced performance and reliable quality.

#### 4. External Pump Sketch



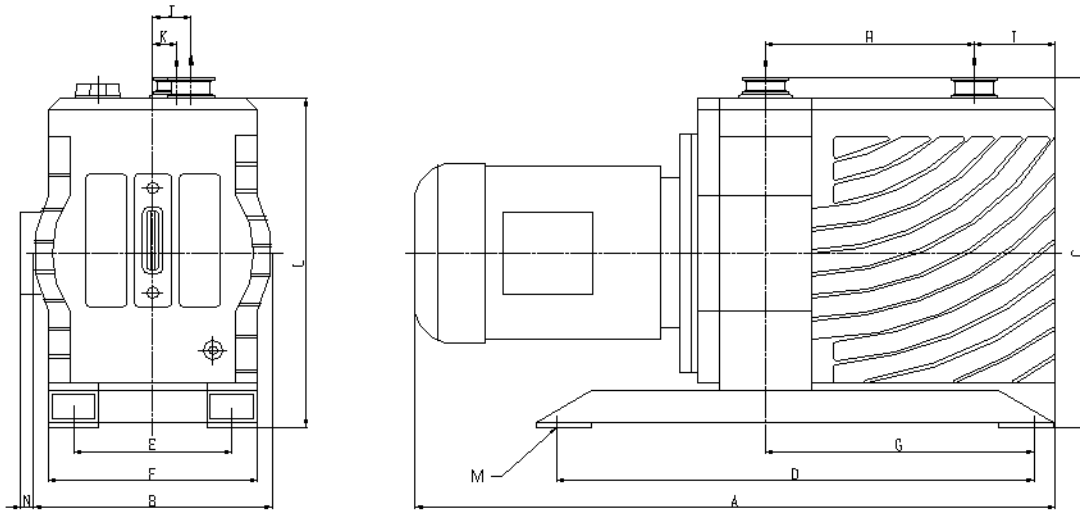
#### 5. Outside Dimension

Model: TRP-6, TRP-12, TRP-24, TRP-36



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
TRP-6	470	165	252	240	120	146	94	120	50	24	28	229	Ø9	53
TRP-12	495	165	252	240	120	146	94	145	50	24	28	229	Ø 9	53
TRP-24	535	205	288	310	140	180	147	156	75	40	34	262	Ø 12	48
TRP-36	565	205	288/296	310	140	180	147	186	75	40	34	262	Ø 12	48

**Model: TRP-48, TRP-60, TRP-90**



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
TRP-48	680	250	335	485	155	215	290	235	80	28	45	310	Ø 14	20
TRP-60	730	280	410	550	185	245	310	245	95	28	45	385	Ø 14	0
TRP-90	801(780)	280	410	600	185	245	360	295	95	28	45	385	Ø 14	0

**6. Technical Data**

**TRP-6, TRP-12, TRP-24, TRP-36**

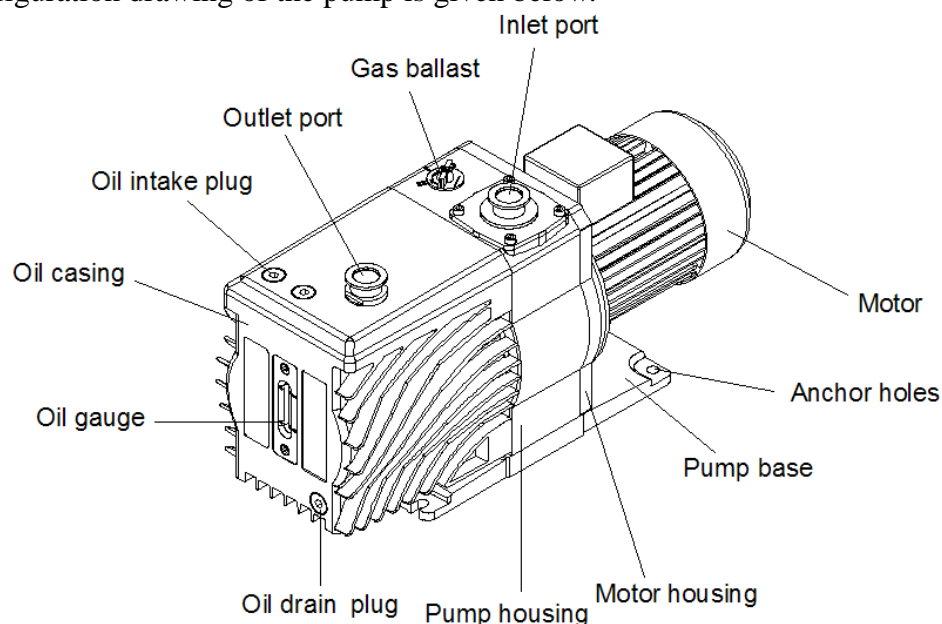
		Unit	TRP-6	TRP-12	TRP-24	TRP-36
Displacement speed (50Hz)		L/s	1.5	3	6	9
Ultimate pressure (without gas ballast)	Partial pressure	Pa	$4 \times 10^{-2}$	$4 \times 10^{-2}$	$4 \times 10^{-2}$	$4 \times 10^{-2}$
	Total pressure		$4 \times 10^{-1}$	$4 \times 10^{-1}$	$4 \times 10^{-1}$	$4 \times 10^{-1}$
Water vapour tolerance		Pa	5000	5000	3300	3300
Oil filling		L	1.3	1.1	1.4	1.8
Inlet port		DN	25KF	25KF	25KF	25KF/40KF
Outlet port		DN	25KF	25KF	25KF	25KF
Motor power (3-Ph/Single)		kW	0.4/0.5	0.4/0.55	0.75/0.7	0.75/ -
Rotational speed of pump (50Hz)		rpm	1450	1450	1450	1450
Noise level (without gas ballast)		dB	50	50	52	52
Weight (3-Ph/Single)		kg	23/27	25/29	~37	~39

## TRP-48, TRP-60, TRP-90

		Unit	TRP-48	TRP-60	TRP-90
Displacement speed (50Hz)		L/s	14	18	25
Ultimate pressure (without gas ballast)	Partial pressure	Pa	$4 \times 10^{-2}$	$4 \times 10^{-2}$	$4 \times 10^{-2}$
	Total pressure		$4 \times 10^{-1}$	$4 \times 10^{-1}$	$4 \times 10^{-1}$
Water vapour tolerance		Pa	5000	5000	5000
Oil filling		L	3.8	5.5	6.5
Inlet port		DN	40KF	40KF	40KF
Outlet port		DN	40KF	40KF	40KF
Motor power (3-Ph)		kW	1.5	2.2	2.2(3)
Rotational speed of pump (50Hz)		rpm	1450	1450	1450
Noise level (without gas ballast)		dB	56	56	56
Weight (3-Ph)		kg	~64	~83	~88

### 7. Installation

- 1) Unstable installation may lead to increased noise and damage to the pump. Therefore, it must be installed in a level place.
- 2) Location selection for the pump should consider the following:
  - Convenience for connection and operation;
  - Good ventilation;
  - Convenience for wiring.
- 3) Use anchor holes of the pump when connecting it to the system.
- 4) The pump operating ambient temperature is  $+10^{\circ}\text{C} \sim +40^{\circ}\text{C}$ .
- 5) A figuration drawing of the pump is given below.



## **8. Vacuum System Connection**

Employ international standard “quick release flanges” to link the pump’s air inlet to the vacuum system, and its air outlet to the exhaust duct.

- 1) Check the cleanness of the joint of duct and flange.
  - When polluted, the duct and flange could have a severe impact on performance of the pump. Therefore the joint should be kept clean as much as possible.
- 2) The length and diameter of the duct connecting the pump and vacuum system should be as short and big as possible, respectively.
- 3) Dimensions of the connecting duct shall be at least consistent with those of the air inlet and outlet.
  - If the diameter of the duct is smaller than that of the pump’s air inlet, its pumping rate will decrease.
  - If the diameter of the duct is smaller than that of the pump’s air outlet, pressure in the oil tank of the pump will rise and make the degree of vacuum unstable.
- 4) Perform leak detection for the joint between duct and flange.

## **9. Wiring**

- 1) Check and ensure that the power supply has been cut off prior to wiring.
- 2) Wiring should be performed by a professional electrician according to the label of motor.
- 3) Wiring should be conducted in accordance with rated values indicated on the trademark of motor.
- 4) It’s critical to ensure that the motor rotates correctly after it’s powered on.
- 5) Check the direction of rotation of the motor with the air inlet cover. Open the air inlet and outlet and place the cover on the air inlet. Power on for a test run for an instant, and at the same time, observe the air inlet cover which will be caught up when the motor is rotating correctly.

## **10. Inspection prior to Operation**

- 1) The air outlet of pump must be clear. It’s strictly forbidden to start up the pump when the air outlet is blocked.
- 2) Check the amount of oil through the pointer of the oil tank.
- 3) Check the rotation direction of motor after wiring change.
- 4) In the case of oil change or restart the pump after a long stoppage, it should be started up with its air inlet covered so as to exhaust air in pump oil.

## **11. Operation**

- 1) Without condensable gas
  - When the pump is used to eject permanent gas, the gas ballast control nut should point at the “Off” position.
- 2) With condensable gas
  - The air inlet of pump cannot be exposed to steam prior to its operating temperature.
  - If the pump operates at a lower temperature, steam may dissolve in pump oil.
  - When steam dissolves in pump oil, oil may change with regard to its performance

and consequently may cause corrosion to the pump body. After the work is over therefore, don't stop the pump immediately, but block the air inlet with the gas ballast valve opened, in order to allow the pump to continue operation till steam is separated from pump oil.

- In continuous operation of the pump, condensable steam can be ejected from the subject system when the gas ballast valve is opened. When the pressure of the subject system decreases to a certain value, close the gas ballast valve, and then proceed with pumping.

3) Operating temperature of the pump

-  $+40^{\circ}\text{C} \sim +80^{\circ}\text{C}$

4) Pump stoppage and storage

- The pump may be closed directly when an assignment is completed under normal conditions.

- When the pump will not be used for a long time, its air inlet and outlet should be sealed off to prevent dust and dirt from polluting the pump body.

- When the pump is not used for a long time, gases would adhere to the pump and its sealing elements. When it's used again, time for air extraction may be extended appropriately, and as long as the adsorbate is desorbed and removed, the pump can be restored to its normal operation.

- The pressure within the pump should be the same to the atmospheric pressure after stoppage.

## 12. Maintenance

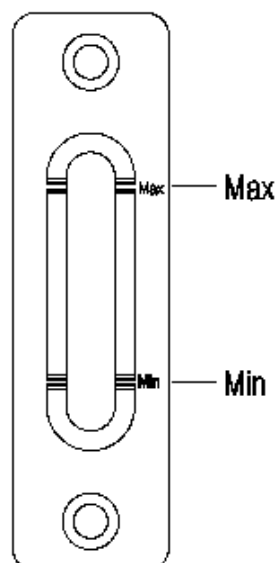
1) The power supply should be first cut off before the pump is removed from the vacuum system.

2) Check oil capacity

- The level of pump oil should be within the corresponding interval of the pointer in operation.

- In the case of oil starvation, the pump should be stopped for filling oil.

- See the figure below.





- 3) Check oil quality
  - Visual inspection
    - \* Normal pump oil should be clean and transparent.
    - \* If the color of oil darkens, change oil.
    - \* Time for oil change is subject to oil use conditions. Make inspection records and change oil on a periodical basis.
- 4) Oil change
  - To ensure functions of the pump and its service life, be sure that oil is clean and there's an appropriate amount of oil.
  - Period for oil change.
    - \* If oil is contaminated, it's should be changed in time.
    - \* In initial use of a new pump, time for oil change may be shortened properly.
    - \* When the level of vacuum of the pump decreases with time, oil change is required.
  - Oil change method
    - \*When change oil, stop the pump and do the work in a warm environment.
    - \*Open the drain plug and let contaminated oil in the oil tank flow into a proper container.
    - \*To empty residual oil in the pump chamber, open the air inlet and make the pump run at most for 10s.
    - \*Prior to oil change, open the pump, inject clean oil from the air inlet to drain dirt out of the pump, and then place waste oil from the oil drain hole in a container.
    - \*Open the oil-fill plug, inject new oil, and then tighten the oil-fill plug.
  - Please use high vacuum pump fluid in order to ensure performance of the pump.
- 5) Clean the filter screen at the air inlet
  - The filter screen can prevent particles from entering the pump chamber.
  - To prevent decrease in pumping speed, cleanness should be kept.
  - When cleaning the filter screen, separate the filter screen and the air inlet, place it in a container for cleaning, and then have it dried with compressed air before reinstallation for use.
  - If there's any damage to the filter screen, change it.
  - Perform cleaning on a periodical basis, subject to use conditions.

### 13. Troubleshooting

Failure	Cause	Solution	Remark
Hard to start	<ol style="list-style-type: none"> <li>High viscosity of oil</li> <li>Problem with motor voltage</li> <li>Error in wiring</li> <li>Motor problem</li> </ol>	<ol style="list-style-type: none"> <li>Keep ambient temperature above 10°C, or change oil</li> <li>Change the motor</li> <li>Check and repair wiring</li> <li>Contact the supplier</li> </ol>	
Failure to arrive at limit pressure	<ol style="list-style-type: none"> <li>The gas ballast valve is open</li> <li>The admission pipe is attached to the air outlet</li> <li>The admission pipe is too thin</li> <li>The diameter of the admission pipe is smaller than that of the air outlet</li> <li>Air leakage in the vacuum system</li> <li>Problem with oil return preventing device</li> <li>Error in use of oil</li> <li>Oil contaminated or inadequate amount of oil</li> <li>Oil-way blockage</li> <li>Damage to oil seal</li> <li>False installation of vane</li> <li>Damage to exhaust valve plate</li> <li>Damage to vacuum gauge</li> </ol>	<ol style="list-style-type: none"> <li>Close the gas ballast valve</li> <li>Connect the admission pipe to the air inlet correctly</li> <li>Replace it with one with larger diameter</li> <li>Replace it with a suitable one</li> <li>Removal leakage points from the vacuum system</li> <li>Disassemble it for repair</li> <li>Employ high vacuum pump fluid</li> <li>Change or fill oil</li> <li>Disassemble the pump for repair</li> <li>Replace oil seal</li> <li>Reinstallation</li> <li>Replace exhaust valve plate</li> <li>Repair the vacuum gauge</li> </ol>	
Slow pumping speed	<ol style="list-style-type: none"> <li>Too small diameter of air inlet and outlet or too long duct</li> <li>Oil contaminated</li> <li>Damage to oil return preventing valve</li> <li>Blockage of the inlet filter</li> <li>Error in use of oil</li> <li>Air leakage in the vacuum system</li> <li>Too small pumping speed</li> </ol>	<ol style="list-style-type: none"> <li>Replace them with suitable air inlet and outlet ducts</li> <li>Replace pump oil</li> <li>Repair the valve</li> <li>Clean the inlet filter</li> <li>Employ high vacuum pump fluid</li> <li>Repair air leaking component</li> <li>Select a pump with appropriate pumping speed</li> </ol>	
Oil darkens and is turbid	<ol style="list-style-type: none"> <li>Oil contaminated</li> <li>Error in use of oil</li> <li>Inadequate amount of oil in operation of the pump</li> <li>Vacuum leakage</li> </ol>	<ol style="list-style-type: none"> <li>Change oil or purify it</li> <li>Employ high vacuum pump fluid after cleaning the pump</li> <li>Provide adequate oil</li> <li>Remove the leaking points</li> </ol>	

<b>Failure</b>	<b>Cause</b>	<b>Solution</b>	<b>Remark</b>
The vacuum system returns to atmospheric condition immediately after stoppage of the pump	<ol style="list-style-type: none"> <li>1. Air leakage in the vacuum system</li> <li>2. Damage to the oil return preventing valve</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair air leaking components</li> <li>2. Repair the valve</li> </ol>	
Abnormal sound of operation	<ol style="list-style-type: none"> <li>1. Damage to the coupling</li> <li>2. Oil shortage</li> <li>3. Pump oil used up, or damage to the oil pump</li> <li>4. Damage to vanes</li> <li>5. Problem with motor bearing</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the coupling</li> <li>2. Add oil</li> <li>3. Repair or replace the oil pump</li> <li>4. Disassemble the pump and replace damaged vanes</li> <li>5. Repair the motor</li> </ol>	
Overhigh consumption of oil	<ol style="list-style-type: none"> <li>1. Damage to the O-ring of drain plug</li> <li>2. False installation of or damage to oil seal</li> <li>3. The oil seal sleeve damaged or corroded</li> <li>4. Air leakage in the air inlet and outlet</li> <li>5. Oil leakage from the gasket between the oil casing and pump housing</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the O-ring</li> <li>2. Replace the oil seal, while giving attention to the direction of oil seal</li> <li>3. Replace the oil seal sleeve</li> <li>4. Replace O-rings</li> <li>5. Replace the oil casing gasket</li> </ol>	
Vacuum system contaminated by oil	<ol style="list-style-type: none"> <li>1. Steam flow back to the inside of the vacuum duct</li> <li>2. Error in steam pressure of oil</li> <li>3. Oil return in the case of pump stoppage</li> <li>4. Damage to components of the back streaming preventing valve plate</li> <li>5. Damage to or corrosion of the sealing components at the bottom of the air inlet</li> </ol>	<ol style="list-style-type: none"> <li>1. Change to use high vacuum pump fluid after cleaning the pump</li> <li>2. Change to use high vacuum pump fluid after cleaning</li> <li>3. Check and repair the oil return preventing system</li> <li>4. Change the valve plate</li> <li>5. Replace sealing components of the air inlet</li> </ol>	

Failure	Cause	Solution	Remark
Overhigh pump temperature	<ol style="list-style-type: none"> <li>1. Oil shortage</li> <li>2. The air inlet duct attached to the air outlet</li> <li>3. Blockage of oil supply pipe</li> <li>4. Problem with oil pump</li> <li>5. Ambient temperature above 40°C</li> <li>6. Overhigh temperature of working gas</li> </ol>	<ol style="list-style-type: none"> <li>1. Add high vacuum pump fluid</li> <li>2. Connect the air inlet duct to the air inlet correctly</li> <li>3. Disassemble the pump, clean it, and change oil</li> <li>4. Repair or change the oil pump</li> <li>5. Decrease the ambient temperature</li> <li>6. Change the work procedure</li> </ol>	
Smoke generation from the air outlet	<ol style="list-style-type: none"> <li>1. Too much oil filled</li> <li>2. The gas ballast valve opened</li> <li>3. Air leakage in the vacuum system</li> <li>4. Damage to exhaust valve plate of the pump</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the amount of oil</li> <li>2. Close the gas ballast valve</li> <li>3. Remove leaking points of the vacuum system</li> <li>4. Replace damaged valve plate</li> </ol>	

**Note: 1. The Company will improve the product on a continual basis, its design and specification are subject to change without prior notice.**

**2. The right to final interpretation remains with Beijing Beiyi Woosung Vacuum Technology Co., Ltd**