KYKY
中科科仪

RV Series Directly-Connected High Speed
Rotary Vane Vacuum Pump

Operation Manual

KYKY Technology Co., Ltd.

Table of Contents

1. Inspection 2

2. Transportation 2

3. Purpose and Range of Application 2

4. Outline Dimensional Drawing 3

5. Technical Date 3

6. Installation 4

7. Vacuum System Connection 5

8. Wiring 5

9.Inspection prior to Operation 5

10. Operation 6

11. Maintenance 6

12. Troubleshooting 8

13.Test Report 11

1. Inspection

Please check the following matters when you buy the product:

- Is it consistent with the product you've ordered?
- Is there any damage caused by loose screw during transport?
- Does this product meet your order requirements?
- If you find any damage, defe2ct or missing parts, please contact us in time.

2. Transportation

Any negligence in transit may cause damage to the pump, so please handle with care.

3. Purpose and Range of Application

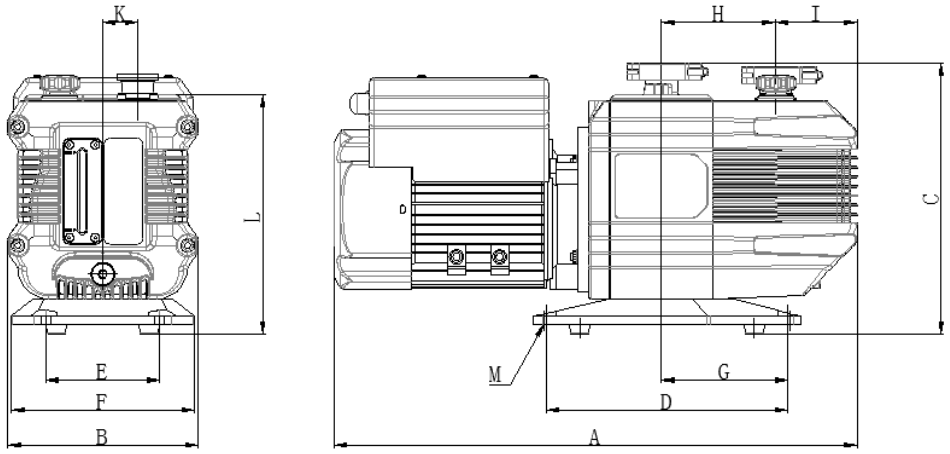
The RV series directly-connected high speed vane vacuum pump (seven specifications available) manufactured by our company is one of the most basic vacuum pumping equipment in the field of vacuum application, and is widely used in the fields that need vacuum environment, e.g. supporting equipment for scientific research, teaching and vacuum applications that need high and low vacuum environment, supporting production line of electronic and semiconductor industries, exhaust production line of color picture tube, vacuum freeze drying, analytical instrument, production of electric light source, etc. This pump can be used separately, or used as backing pump, e.g. diffusion pump, roots pump, molecular pump, etc.

This pump shall not be used to pump out the dust and corrosive and explosive gases, and shall not be used as compression or delivery pump, and shall not be suitable for continuous operation near atmospheric pressure.

This pump has such characteristics as high ultimate vacuum degree, low noise, no leakage, no oil injection and attractive appearance, and adopts the anti-oil return check valve system, pressure oil circulation system and convenient gas ballast valve control structures to provide quality services for users with advanced performance and reliable quality.

4. Outline Dimensional Drawing

MODEL：RV2，RV4



Unit：mm

Model	A	B	C	D	E	F	G	H	I	K	L	M
RV2	510	185	263	235	110	178	123	110	80	34	232	Φ9
RV4	535	185	263	235	110	178	123	110	105	34	232	Φ9

5. Technical Date

MODEL：RV2,RV4

			Unit	RV2	RV4
Displacement speed		50Hz	L/S	2	4
			L/min	120	240
		60Hz	L/S	2.4	4.8
			L/min	144	288
Ultimate pressure	Close gas ballast valve	Partial pressure	Pa	$4X10^{-2}$	
		Full pressure		$4X10^{-1}$	
	Open gas ballast valve	Partial pressure		1.3	
		Full pressure		4	
Oil capacity			L	1.1	1.2
Diameter of air inlet			DN	25KF	25KF
Diameter of air outlet			DN	25KF	25KF
Motor power (three-phase/single-phase)			kw	0.37/0.55	0.37/0.55
Rotating speed		50Hz	Rpm	1420	
		60Hz		1710	
Nose (close gas ballast valve)			dB	50	50
Weight			kg	27	28

Note：The displacement speed in the form is nominal displacement speed.

6. Installation

1) Unstable installation may cause the increase in pump noise and damage. Therefore, the pump must be installed in a horizontal position.

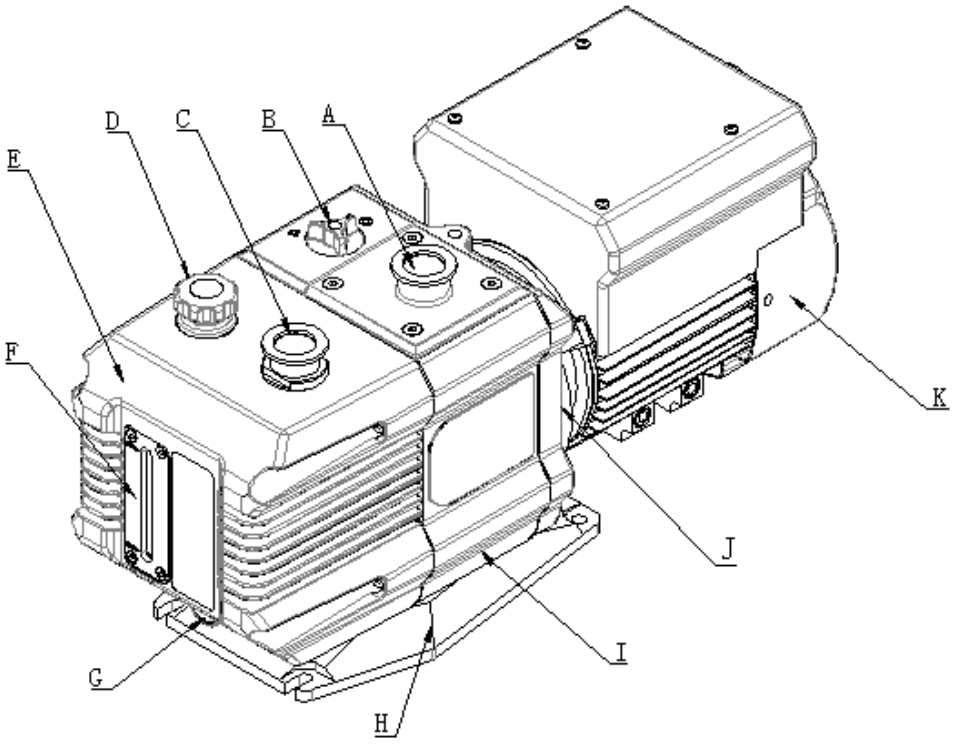
2) The selection of pump installation site should consider the following matters:

- Convenient connection and operation;
- Good ventilation environment;
- Convenient wiring.

3) When the pump is connected to the system, please use the anchor hole of pump.

4) The operating ambient temperature of pump is 10~40℃.

5) Outline drawing is as follows:



A. Inlet port
B. Gas ballast valve
C. Outlet port
D. Oil intake plug
E. Oil casing
F. Oil gauge
G. Oil drain plug
H. Pump base
I. Pump housing
J. Motor housing
K. Motor

7. Vacuum System Connection

Air inlet of the pump and various interfaces and pipelines of vacuum system are connected with international standard“quick release flange”.

1) The cleanliness at the joint of pipeline and flange is checked.

- The contaminated joint of pipeline and flange will have a serious effect on the performance of the pump, so they must be as clean as possible.

2) The length and diameter of the pipeline connecting pump and vacuum system should be as short and thick as possible.

3) The dimension of connecting pipe should be at least the same as that of air inlet and outlet.

- If the diameter of the pipeline is less than that of air inlet, the pumping rate of the pump will decrease.

- If the diameter of the pipeline is less than that of air outlet of the pump, the pressure in the oil tank of the pump will increase, and the vacuum degree of the pump will be unstable.

4) The leakage of the joint of pipeline and flange is checked.

8. Wiring

1) It’s required to check and confirm whether the power supply is cut off before wiring.

2) The wiring must be completed by professional electrician according to the motor identification.

3) The wiring shall be based on the rating on the motor trademark.

4) It is very important that the correct rotation direction of the motor must be confirmed after the power is on.

5) The rotation direction of the motor is checked via inlet cover: first, air inlet and outlet are opened, and then inlet cover is placed on the air inlet and powered instantly, and inlet cover is observed simultaneously. If the cover is sucked by air inlet, it means the rotation direction of the motor is correct.

9.Inspection prior to Operation

1) The exhaust port of the pump must be unobstructed. The pump must not be started when the exhaust port is blocked.

2) The oil mass is checked with oil dipstick in the oil tank.

3) After the wiring changes, it must first check the motor rotation of the pump.

4) When restarting the pump after replacing the oil or stopping the pump for a long time, the suction port of the pump shall be covered to start the pump so that the gas in the pump oil can be drained out.

10. Operation

1) Nonexistence of condensable gas

- When it is used to pump out the permanent gas, the hand knob of gas ballast valve shall point to OFF state.

2) Existence of condensable gas

- The air inlet of the pump shall not be exposed to the steam until the operating temperature is reached.
- If the pump works at a lower temperature, the gas may be dissolved in the pump oil.
- If the gas is dissolved in the pump oil, the performance of the oil may be changed, and the pump body may be corroded. Thus, after the end of the work, the pump shall not be closed immediately, and air inlet shall be blocked when the gas ballast valve is opened to ensure the pump continues to work until the steam in the pump oil is separated.
- In the continuous operation of the pump, gas ballast valve is opened to pump out the condensable steam from the pumped system, and then closed for air exhaust when the pressure of the pumped system is reduced to a certain value.

3) Operating temperature of the pump

- The maximum operating temperature of the pump is not more than 80 ℃.

4) ump shutdown and storage

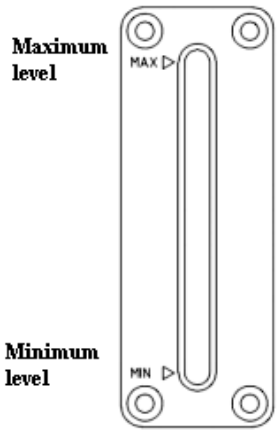
- The pump can be closed directly when the work is completed under normal circumstance.
- When the pump is not used for a long time, air inlet and outlet of the pump should be sealed to prevent the dust and dirt from contaminating the pump body.
- When the pump is not used for a long time, the gas will be absorbed onto the pump and sealing parts, and when the pump is used again, the pumping time can be extended appropriately, and the normal use of the pump can be restored after the adsorbed gas is analyzed and discharged.
- After stopping the pump, the pressure in the pump shall be the same as the atmospheric pressure.

11. Maintenance

1) The power supply must be cut off in the first place before removing the pump from the vacuum system.

2) Check of oil capacity

- The oil level of the pump shall be within the corresponding range of oil dipstick during the operation of the pump.
- In case of oil shortage, the pump shall be stopped to fill oil.
- See the diagram below.



3) Check of oil quality

- Visual check

- The normal pump oil should be clean and transparent.
- If the color of oil turns dark, please replace the oil.
- The oil replacement time varies with the usage. Please keep check records and replace the oil regularly.

4) Oil replacement

- To ensure the function and life of the pump, it is necessary to ensure that the oil is clean and the amount of oil is appropriate.
- Replacement cycle

- The contaminated oil must be replaced in a timely manner.
- When the new pump is used for the first time, the oil replacement time can be shortened appropriately.
- When the vacuum degree of the pump decreases continuously with time, the oil must be replaced.

- Oil replacement method

- The pump shall be closed when the oil is replaced in a warm environment.
- The oil drain plug is opened to drain the contaminated oil in the oil tank into the proper container.
- To drain out the remaining oil in the pump cavity, the air inlet is opened to rotate the pump for up to 10 seconds.
- Before the oil replacement, it’s required to open the pump, inject clean oil via air inlet to drain out the dirt in the pump, and then drain the waste oil into the container via oil drain.

- The oil filler plug is screwed down after the new oil is injected from the opened oil filler plug.
- It is recommended to use the special high speed vacuum pump oil to ensure the performance of the pump.

5) Cleaning of filter screen of air inlet

- The filter screen can prevent the particulate matters from entering the pump cavity.
- The pump must be kept clean to prevent the decrease in pumping speed.
- The filter screen and air inlet are separated and then put in the container to clean, and can be re-installed for use after they are dried with compressed air.
- The damaged pump shall be replaced.
- The pump shall be cleaned regularly depending on the usage.

12. Troubleshooting

Fault Phenomenon	Fault Cause	Methods	Remarks
Difficulty in starting	1. High viscosity of oil 2. There is a problem with motor voltage 3. The wiring is incorrect 4. There is a problem with motor	1. Maintain the ambient temperature above 10 ℃ or replace the oil 2. Replace the motor 3. Check and repair the wiring 4. Contact the supplier	
Ultimate pressure cannot be reached	1. Gas ballast valve is ON 2. Inlet pipe is connected onto the outlet pipe 3. Inlet pipe is too thin 4. The diameter of outlet pipe is smaller than that of air outlet 5. Vacuum system is leaking 6. There is a problem with anti-oil return device 7. Oil is used incorrectly 8. Oil is contaminated and insufficient 9. Oil line is blocked	1. Close the gas ballast valve 2. Connect the inlet pipe to the air inlet correctly 3. Replace with the inlet pipe with large diameter 4. Replace with appropriate outlet pipe 5. Eliminate leakage points of vacuum system 6. Remove and repair the anti-oil return device 7. Use the special high speed vacuum pump oil	

	10. Oil seal of the shaft is damaged 11. Rotary vane is installed incorrectly 12. Exhaust valve is damaged 13. Vacuometer is damaged	8. Replace with new oil or fill the oil 9. Remove the pump components for repair 10. Replace oil seal ring and seal cartridge 11. Re-install correctly 12. Replace exhaust valve plate 13. Use after repair	
Pumping speed is slow	1. The diameter of inlet pipe and outlet pipe is too small or the pipe is too long 2. Oil is contaminated 3. Anti-oil return valve is damaged 4. Filter screen of air inlet is blocked 5. Oil is used incorrectly 6. Vacuum system is leaking 7. Pumping speed is too slow	1. Replace with appropriate inlet and outlet pipes 2. Replace the pump oil 3. Repair the anti-oil return cut-off valve 4. Clean the filter screen 5. Use the special oil 6. Repair the leaky components 7. Select the pump with appropriate pumping speed	
Oil color is dark and muddy	1. Oil is contaminated 2. Oil is used incorrectly 3. Oil is insufficient when the pump works 4. There is vacuum leakage	1. Replace or purify the oil 2. Use the special pump oil after the pump is cleaned 3. Provide sufficient pump oil 4. Eliminate leakage points	
The vacuum system restores to the atmospheric condition immediately after the pump is stopped	1. Vacuum system is leaking 2. Anti-oil return valve is damaged	1. Repair the leaky components 2. Repair the anti-oil return valve	

Operation sound is abnormal	1. Coupler is damaged 2. There is oil shortage 3. Oil pump is damaged 4. Rotary vane is damaged 5. There is a problem with motor bearing	1. Replace with new coupler 2. Add oil 3. Repair or replace the oil pump 4. Dismantle the pump and replace the rotary vane 5. Repair the motor	
Oil consumption is extremely high	1. O-ring of oil drain plug is damaged 2. Oil seal is installed incorrectly or damaged 3. Oil seal sleeve is damaged or corroded 4. Air inlet or outlet is leaking 5. The gasket between oil tank and shell is leaking oil	1. Replace with new O-ring 2. Replace with new oil seal and pay attention to oil supply pipeline 3. Replace with new oil seal sleeve 4. Replace with new O-ring 5. Replace the gasket	
Pump temperature is extremely high	1. There is oil shortage 2. Inlet pipe is connected to the air outlet 3. Oil supply pipeline is blocked 4. There is a problem with oil pump 5. Ambient temperature exceeds40 ° 6. Operating gas temperature is too high	1. Add oil 2. Connect the inlet pipe to the air inlet correctly 3. Dismantle and clean the pump, and then replace the oil 4. Repair or replace the oil pump 5. Reduce the ambient temperature 6. Change the working procedure	
Air outlet is smoking	1. There is too much oil 2. Gas ballast valve is opened 3. Vacuum system is leaking 4. Exhaust valve plate of the pump is damaged	1. Reduce the oil mass 2. Close the gas ballast valve 3. Eliminate leakage points of vacuum system 4. Replace with new exhaust valve plate	

13.Test Report

北京东方计量测试研究所

Beijing Orient Institute of Measurement and Test

检 测 报 告

Test Report

报告编号 *Cert.No.* **CD18-0003**

客户 *Client*	成都中科唯实仪器有限责任公司		
地址 *Address*	四川省成都市		
检测项目名称 *IUT*	直联高速旋片式真空泵		
型号/规格 *Type*	WVP-2	编号 *S/N*	2018-1#
控制单元型号 *Type*	/	编号 *S/N*	/
制造商 *Manufacturer*	成都中科唯实仪器有限责任公司/北京中科科仪股份有限公司		
检测依据的文件 *Reference Document*	《旋片泵性能参数测试大纲》 《JB/T 6533-2005 旋片真空泵》		

检测日期：2018 年 03 月 21 日至 03 月 28 日
Testing Date: Year Month Day

检测时环境条件：温度 (21.5~22.8)℃ 相对湿度 10%~45%
Environment Condition at Test: Temperature Relative Humidity

检测：
Operator:
审核：
Checked by:
主管：
Approved by:

北京东方计量测试研究所 检测专用章 C5

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北京东方计量测试研究所 证书

检测结果
Testing Results

一、检测所用设备：

名称	型号/规格	制造商	编号	证书号	有效期至
电容薄膜真空规	CDG045D	INFICON	540016643	ZG17-9599	2018.05.29
电容薄膜真空规	CDG045D	INFICON	540016600	ZG17-9600	2018.05.29
磁悬浮转子真空规	SRG-SH700	MKS	90669	ZG17-9602	2018.05.29
质量流量计	CS200	北京七星华创流量计有限公司	0NCSA00856	CB17-9009	2018.03.29
质量流量计	CS200		0SCSD00006	CB17-9010	2018.03.29
质量流量计	CS200		0SCSD00007	CB17-9011	2018.03.29
质量流量计	CS200		0SCSD00005	CB17-9008	2018.03.29
质量流量计	D07-60B		/	CB17-9016	2018.03.29
测振仪	/	/	9000-006	VA17-0419	2018.10.19
声级计	1350A	/	161100467	GFJGJL100117 0800549	2018.08.15
功率分析仪	1736	FLUKE	37793607	DP17-9011	2018.07.02

二、检验结果

（1）检测气体

N_2气

（2）主要参数

序号	测试内容	测试数据	
1	最低工作压力/Pa	4.5E-2	
2	噪声（ dB）	53	
3	能耗	入口压力/Pa	功率/kW
		7.6E-01	0.50
		2.4E+00	0.50
		5.6E+00	0.50
		9.2E+00	0.50
		2.5E+01	0.50
		5.9E+01	0.50
		8.9E+01	0.50
		3.0E+02	0.50
		5.2E+02	0.50
		8.9E+02	0.50
		3.0E+03	0.50
		5.2E+03	0.50
		8.5E+03	0.50

检测结果
Testing Results

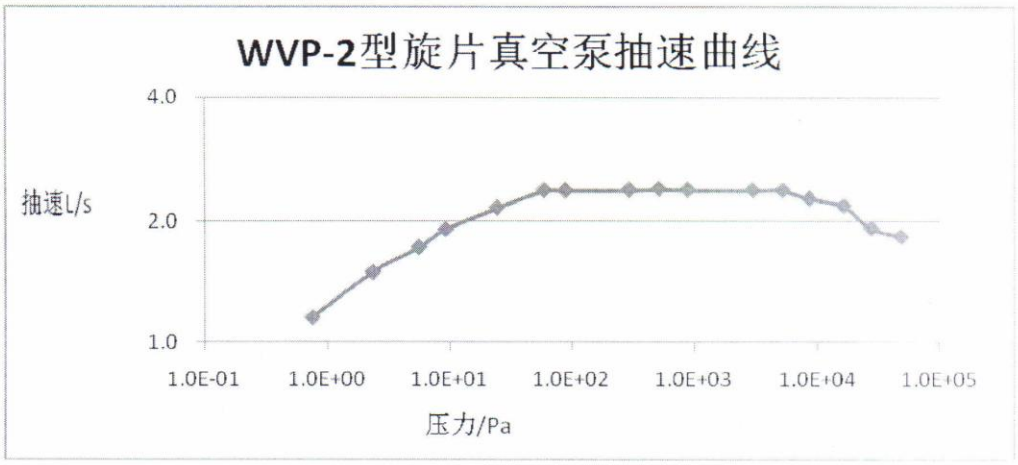
		1.6E+04		0.52	
		2.8E+04		0.52	
		4.8E+04		0.52	
4	振动		x	y	z
		出气口	0.8um	0.4um	1.8um
		油箱	1.0um	0.4um	1.4um
		轴承座	0.6um	0.4um	0.6um

（3）抽速数据

测试气体:N_2 气

序号	压力 Pa	抽速 L/s	序号	压力 Pa	抽速 L/s
1	7.6E-01	1.2	10	8.9E+02	2.4
2	2.4E+00	1.5	11	3.0E+03	2.4
3	5.6E+00	1.7	12	5.2E+03	2.4
4	9.2E+00	1.9	13	8.5E+03	2.3
5	2.5E+01	2.2	14	1.6E+04	2.2
6	5.9E+01	2.4	15	2.8E+04	1.9
7	8.9E+01	2.4	16	4.8E+04	1.8
8	3.0E+02	2.4	17	/	/
9	5.2E+02	2.4	18	/	/

抽速曲线



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