



FDEV Series Rotary Vane Vacuum Pump

Models: FDEV-24 / FDEV-30 / FDEV-40 / FDEV-60 / FDEV-90



Operating Manual



It is imperative to read the operating manual prior to commissioning!



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CONTENT

1. Basic information	- 2 -
1.1 Introduction	- 2 -
1.2 Statement	- 2 -
1.3 Warranty	- 2 -
1.4 Notice	- 3 -
1.5 Safety	- 4 -
2. Performance specification	- 6 -
2.1 Technical data	- 6 -
2.2 Installation size (Unit: mm)	- 7 -
3. Description	- 12 -
3.1 Pump description	- 12 -
3.2 Working environment	- 12 -
3.3 Pump features	- 12 -
3.4 Pump structure	- 13 -
4. Installation	- 14 -
4.1 Locate the pump	- 14 -
4.2 Fill the pump with oil	- 14 -
4.3 Electrical installation	- 15 -
4.4 Inlet	- 15 -
4.5 Outlet	- 16 -
5. Operation	- 17 -
6. Gas ballast function	- 18 -
7. Maintenance	- 19 -
7.1 Regular check	- 19 -
7.2 Vacuum pump oil check	- 19 -
7.3 Change the pump oil	- 20 -
7.4 Abnormal noise and vibration check	- 21 -
7.5 Checking the metal mesh at the inlet port	- 22 -
7.6 Pump stopping and storage	- 22 -
7.7 Transport	- 22 -
8. Troubleshooting	- 23 -
9. Warranty	- 25 -
10. After-sales service	- 26 -
11. FDEV contact information	- 27 -

1. Basic information

1.1 Introduction

FDEV is committed to the production and sales of different kinds of vacuum pumps, vacuum valves and vacuum fittings, provides first-class vacuum equipment solutions for global customers. The inspiration for the creation of FDEV brand comes from the mission "deliver Eastern Vacuum Products to all over the world", emphasizing the confidence and vitality from the East.

The name FDEV comes from FDEV Double-stage rotary Vane vacuum pump. It embodies the wisdom of the East, its design and color matching with oriental aesthetics, which continues to win the reputation of "Created in China".

FDEV series rotary vane vacuum pump is direct-drive, high efficiency, oil sealed. It is two stage pump, which can get better vacuum degree than single stage rotary vane vacuum pump.

1.2 Statement

This operating manual is a part of the technical documentation of the system, and is addressed to the person in charge of the plant, who is obliged to provide them to the staff responsible for the system's set-up, connection, operation and maintenance.

He must ensure that all information included in the operating instructions and the enclosed documents have been read and understood.

These operating manual is the exclusive copyright of

Any company or person can not duplicate, transfer it to third party, or make illegal business use. Any operation on the pump should be in accordance with the instruction.

1.3 Warranty

The purpose of this instruction is to introduce you the oil lubricated rotary vane vacuum pumps.

Here you will find the description of the operating principle and the pump components.

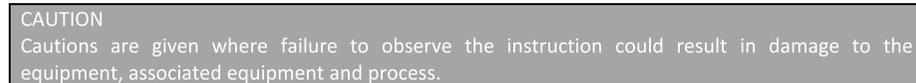
By means of this manual, you'll learn how to select the suitable pump type, according to the type of system the pump will have to be installed in. The manual will be helpful to meet your requirements and to avoid any unpleasant misunderstanding after the sale has been completed. When our vacuum pumps have to be installed in new applications or anytime there is a doubt on the good result of the installation, please ask for the technical advice of our vacuum experts.

1.4 Notice

This manual provides installation, operation and maintenance instructions for the FDEV-24, FDEV-30, FDEV-40, FDEV-60, FDEV-90 rotary vane vacuum pumps. You must use your pump as specified in this manual. Read this manual before you install and operate pump.

You are requested to install and operate the product in compliance with the laws and regulations relating to the safety, e.g. Fire Defense Law, Electric wiring regulation and so on in the country and region you use the product. Operators shall need to attend related training and have special knowledge, skill and title regarding the electricity, machinery, cargo, vacuum and so on.

Important safety information is highlighted as WARNING and CAUTION instructions; you must obey these instructions. The use of WARNING and CAUTION is defined below.



The units used throughout this manual conform to the SI international system of units of measurement. The following symbol is on the pump.

 Warning - refer to accompanying documentation.

 Warning – risk of electric shock.

 Warning – hot surfaces.

 CONFORMITE EUROPEENNE - Comply with the EU "technical coordination and standardization of new method" basic requirements of the directive.

 WEEE - When the end user is going to discard the product must be sent to the appropriate facilities, for recovery and recycling.

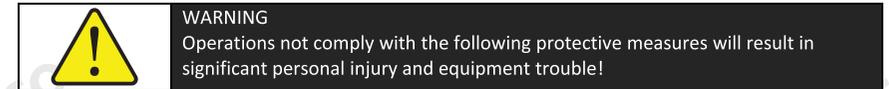
 The direction of motor - Ensure that the pump-motor rotates in the correct direction.

Read carefully and understand this instruction manual before using vacuum pump.
Forbid operating the vacuum pump without vacuum oil or lack of vacuum oil.
Forbid entering the liquid or any other solid particle into vacuum pump.
Replace vacuum oil periodically.
Operated by professional person.
Replace the wearing parts periodically.

1.5 Safety

This vacuum pump is produced according to the latest technical standards and safety specification. There will occur dangerous situation in improper installation and usage.

This vacuum pump is used in low vacuum field. Suitable for pumping air and dry gas, not used to pump corrosive, toxic, explosive gas or transport the other object.



- ◆ Be sure to turn off the power supply to execute the wiring and maintenance work. You are recommended to install a dedicated Leak breaker. You have a risk of getting electrical shock in case of failure or electric leakage.
- ◆ Do not run the pump on blocking the exhaust outlet or putting any device that might hamper gas passage onto the outlet. There is a risk that the pressure inside the vacuum pump will rise up to cause break of the casing or the oil level gauge, resulting in overload of the motor. When utilizing the oil mist trap perform the periodic maintenance so that no-resistance can be realized in passage of gas.
- ◆ Ensured pressure value of the pump is not over 0.03MPa (0.3kg/cm²) (gauge pressure). Check the exhaust side pressure of the pump. If it was over 0.03MPa, take away anything in and around the exhaust outlet that hampers gas passage.
- ◆ Do not exhaust any hazardous gas such as explosive, combustible and toxic. If any toxic gas was evacuated, not only the pump itself but also vacuum pump oil get toxic. Keep this in mind when perform maintenance, ask the special agency to do the detoxification process.
- ◆ Do not exhaust any gas which oxygen content is greater than atmospheric oxygen (the oxygen content > 21%) or other strong reactive gas.
- ◆ The motor and pump become hot (temperature increase under non-load operation: 40°C, temperature increase under high-load 80°C) during operation, there is a risk of burns. Do not touch the motor and pump during operation or soon after pump stopping. Apply an appropriate protection to avoid touching the surface as necessary.
- ◆ Never place combustible materials around the motor or pump. There is a risk of fire. Also, do not place objects that block ventilation around the motor. Abnormal heat generation may result in burns.
- ◆ Do not operate the pump in hazardous area (where there is a risk of creating hazardous atmosphere by explosive gas). It might cause injury and fire.
- ◆ Any non-professional person shall be restricted from disassembling, repairing or modifying the product. It might cause a fire, be injured, or pump trouble.
- ◆ Be sure there is no debris or powder and lots of condensed gas generated or accumulated in system, the pump will be damaged because of oil being deteriorated.
- ◆ You should check the oil level regularly.

- ◆ Do not operate the pump without pump oil or in an oil-less condition, the pump will be damaged.
- ◆ Ambient temperature for operation should be 5 to 40°C. When the pump is installed in a closed system, be sure the ambient temperature not more than 40°C.
- ◆ It is imperative to put the overload protection device. Otherwise it would cause the motor burn out and/or fire.

2. Performance specification

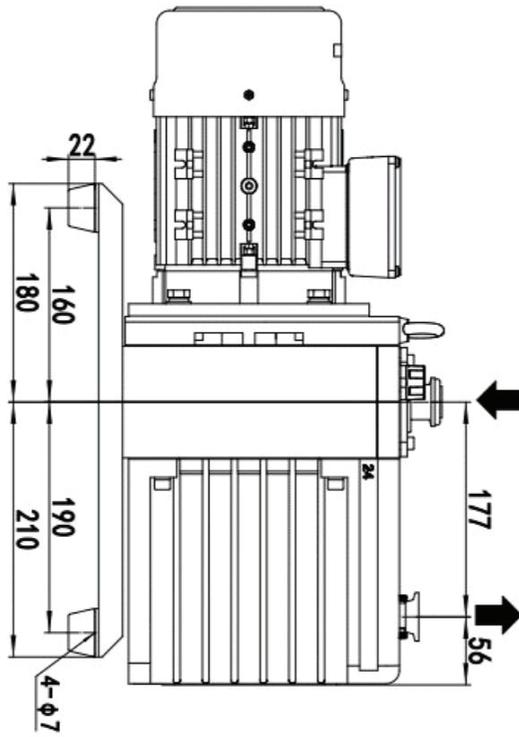
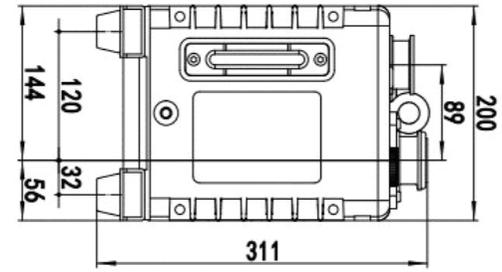
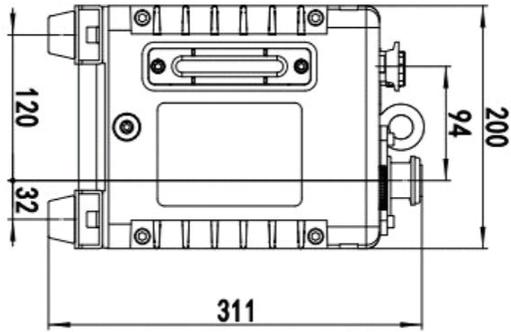
2.1 Technical data

Model		FDEV-3	FDEV-5	FDEV-10	FDEV-16	FDEV-24	FDEV-30
Flow rate (m ³ /h) / (L/min)	50 Hz	3.6 / 60	5.4 / 90	9.9 / 165	14.4 / 240	24 / 336	30 / 500
	60 Hz	4.3 / 72	6.5 / 108	12 / 200	17.4 / 290	28 / 403	36 / 600
Ultimate vacuum (Pa)	Gas ballast off	≤5×10 ⁻¹					
	Gas ballast on	≤5	≤5	≤5	≤5	≤4	≤4
Motor power (kW)		0.4	0.4	0.4	0.55	0.75	1.1
Voltage (V)		220/380					
DIA (mm)	I.D.	KF25 / KF16	KF25 / KF16	KF25 / KF16	KF25 / KF16	KF25 / KF40	KF40 / KF25
	O.D.	KF25	KF25	KF25	KF25	KF25	KF25
Noise dB (A)		63	63	63	63	63	63
Oil volume (L)		0.7	0.7	1.1	1.2	1.7	1.9
Weight (kg)		22.5	22.5	25	27	38	43
Model		FDEV-40	FDEV-60	FDEV-90	FDEV-175	FDEV-275	
Flow rate (m ³ /h) / (L/min)	50 Hz	40 / 667	60 / 1000	90 / 1500	160 / 2656	255 / 4233	
	60 Hz	48 / 800	70 / 1200	108 / 1800	196 / 3254	306 / 5080	
Ultimate vacuum (Pa)	Gas ballast off	≤5×10 ⁻¹					
	Gas ballast on	≤4	≤4	≤4	≤2	≤2	
Motor power (kW)		1.5	2.2	2.2	5.5	7.5	
Voltage (V)		220/380	220/380	380	380	380	
DIA (mm)	I.D.	KF40 / KF25	KF40	KF40	VG80	VG80	
	O.D.	KF40	KF40	KF40	VG50	VG50	
Noise dB (A)		63	65	65	75	75	
Oil volume (L)		2.1	5	5.5	20-25	23-28	
Weight (kg)		50	87	91	210	236	

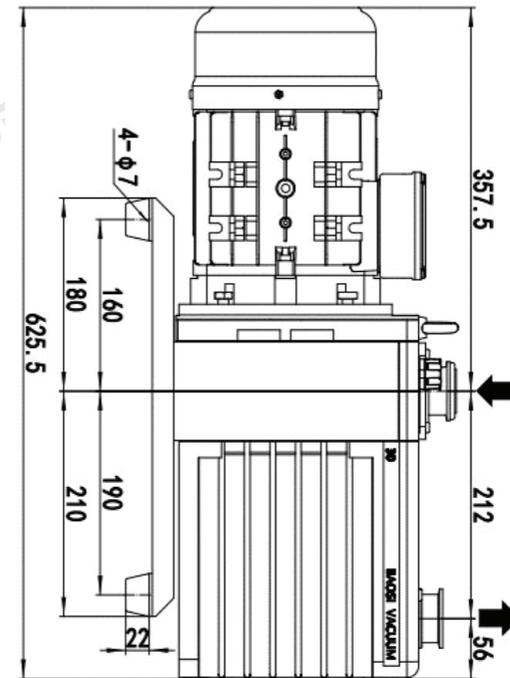
Notes:

- 1/ The value of ultimate vacuum in the sheet is measured by Pirani gauge when FDEV special pump oil is used, and the value should be 5X10⁻² if Mcleod gauge is used.
- 2/ EVP special pump oil is recommended to guarantee the pump performance.

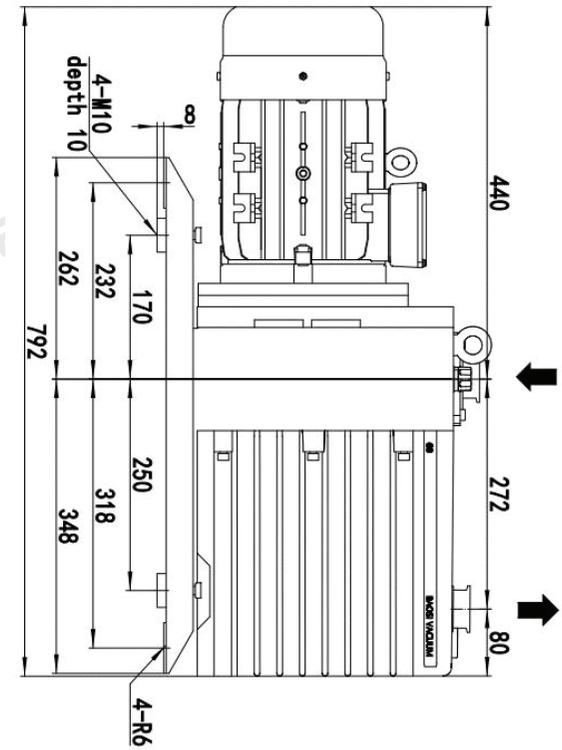
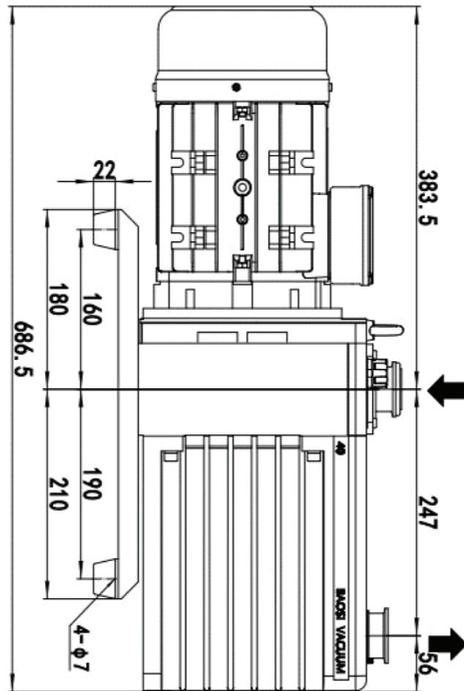
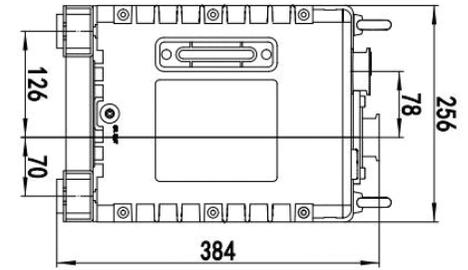
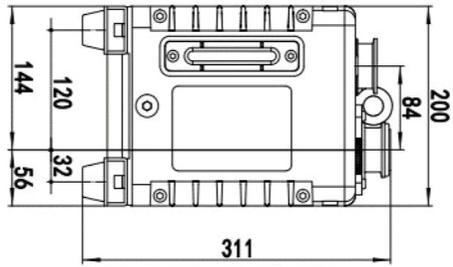
2.2 Installation size (Unit: mm)



FDEV-24 Dimensional drawing

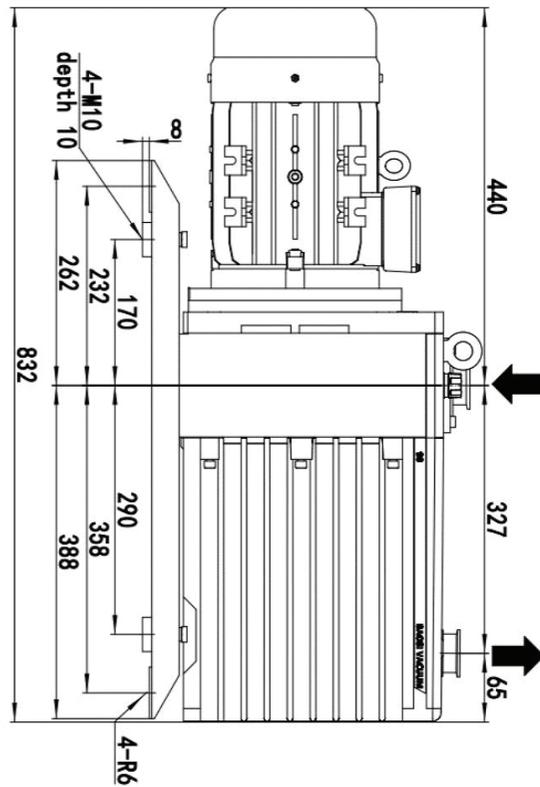
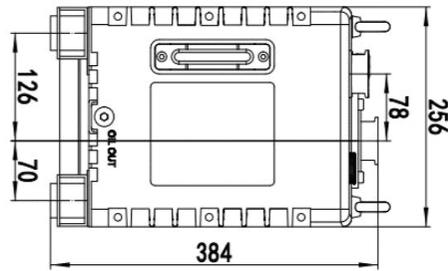


FDEV-30 Dimensional drawing



FDEV-40 Dimension drawing

FDEV-60 Dimensional drawing



FDEV-90 Dimensional drawing

3. Description

3.1 Pump description

The FDEV series pumps are compact, low noise, two-stage, oil-sealed, high-vacuum pumps designed for reliable, long-term operation in both laboratory and industrial environments. A four-pole three-phase motor provides direct-drive through a flexible coupling.

The pump body is easy to disassemble without special tools.

The pump cavity is divided into several spaces by a rotor eccentrically installed in the pump cylinder and two rotary vanes in the rotor groove, and the volume of each space changes periodically with the rotation of the rotor. When the rotor drives the vanes to rotate, the rotary vane sticks to the cavity wall by centrifugal force and the elastic force of the air spring, separates the intake and exhaust ports, and makes the volume of the intake cavity periodically expand and inhale, and the volume of the exhaust cavity is periodically shrink and compress the gas, and use the compressed gas pressure and oil to push the exhaust valve plate to exhaust, thereby obtaining a vacuum.

The pump is equipped with a gas ballast valve. Its function is to fill a certain amount of air into the exhaust cavity to reduce the partial pressure of vapor in the exhaust pressure. When it is lower than the saturated vapor pressure at the pump temperature, it can be discharged out of the pump with the charged air to avoid condensation in the pump oil. It can prolong the service time of the pump oil.

3.2 Working environment

The temperature is in the range of 5°C~40°C.

The relative humidity is not more than 80%RH (no condensation). When the relative humidity of the gas is greater than 80%RH, the gas ballast valve should be opened.

If inlet pressure is less than 10 Torr (about 1300Pa), long-term continuous operation is allowed.

The pump is not suitable for pumping gas with high oxygen content, explosiveness, corrosiveness to metal, chemical reaction with pump oil, and particulate dust.

This pump should not be used as a compression pump or delivery pump.

3.3 Pump features

The pump has the advantages of high speed, low noise, compact structure and convenient starting. In addition, this product has the following features:

1) Spring less rotary vane.

Avoid pump shutdowns caused by broken springs.

2) Forced lubrication pump system.

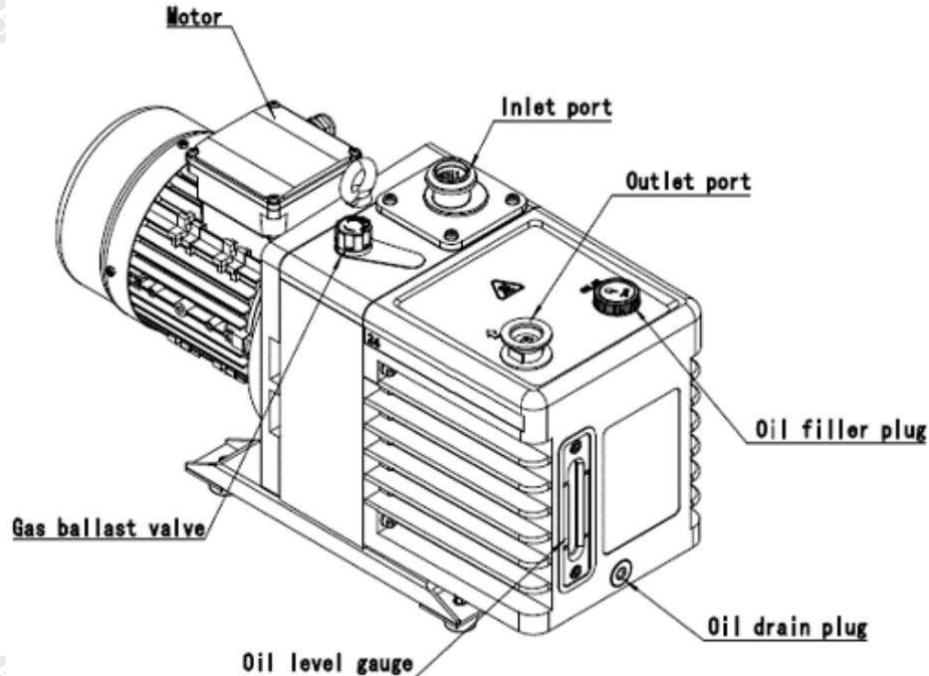
3) Hydraulic oil anti-sucking system.

If the power fails or the pump is stopped for a long time without venting the inlet side to atmospheric pressure, the pump oil will flow back to the cylinder, making restart difficult. This pump is equipped with the oil anti-sucking feature to minimize the amount of oil flowing back to the cylinder and to reduce the load, pump can restart easily.

4) Variable oil level system.

This pump has a wide oil level indicating range to allow easy control of oil level. The pump is operable if the oil level is between the two-level lines of the oil level gauge during operation.

3.4 Pump structure



4. Installation

4.1 Locate the pump

Install the pump horizontally to a place where there is less dust and humidity. Ambient temperature for operation shall be 5 to 40°C. The layout arrangement should be considered for setting up, overhaul, checking or cleaning the pump.

The pump is equipped with a handle and rubber isolators as standard. If it's equipped in a precision instrument, be sure to install it flatly and no gaps between the pump and installation surface, tighten bolts to fix it.

CAUTION

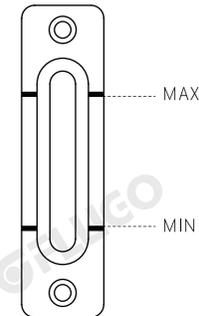
In stable installation will increase noise level or result in pump damaged, make sure to install the pump on a flat place.

4.2 Fill the pump with oil

It is recommended that you use the 46# vacuum pump oil. The ultimate vacuum of the pump with other oils may be higher than the ultimate vacuum with the recommended oil. Filling the pump with oil as described below.

Remove the filler-plug.

Pour oil into the pump until the oil-level between the MAX and MIN mark indicated on the sight-glass. If the oil-level goes above the MAX mark, open the oil drain-tap the excess oil from the pump. After a few minutes, recheck the oil-level is below the MIN mark, pour more oil into the pump. Refit the oil filler-plug. Tighten the plug firmly by hand. Do not over-tighten.



Warning



Please use safety tools such as rubber gloves and safety glasses when refueling. After the pump is running, the oil level will drop by about 1cm. Please do not start the pump when the oil level is lower than the MIN limit of the oil level. Do not run the pump until it is filled with oil, otherwise the pump will be damaged. Do not run the pump with insufficient oil, which will easily cause wear of the pump and affect its performance and service life. Different types of vacuum pump oil have different vapor pressure, viscosity and oiliness. Therefore, in order to avoid affecting the performance and service life of the pump, please use a dedicated vacuum pump oil. Do not use vacuum oil mixed with different type and brand.

4.3 Electrical installation

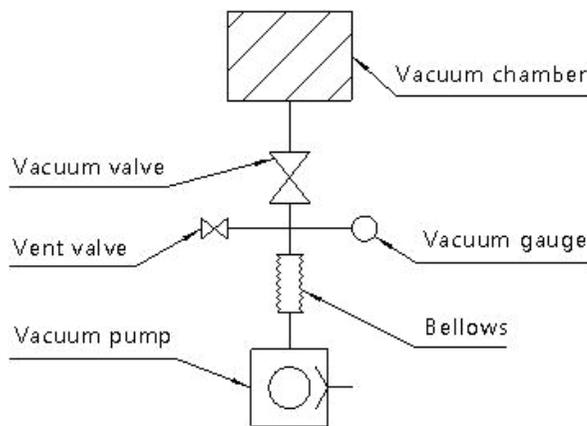
Connect the wires according to indication on the motor nameplate. The rotation direction of the motor should be consistent with the direction of the arrow on the motor fan cover, it is counterclockwise when viewed from one end of the motor fan. After the wiring of the motor power supply is completed, you can start and stop the motor to judge whether the rotation of the motor is correct. If it is reversed, interchange K1 and K2 for single phase motor and interchange two of the three wires for three phase motor.

 Warning	Before connecting wires, you must be turn off the power switch. If not, an electric shock will occur. Connect the earth wire correctly. Install a suitable overload protector for capacity of the motor, otherwise the motor will be damaged leading to fire.
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 Warning	The direction of rotation is as indicated by the arrow mark cast on the motor fan cover. Ensure that the pump-motor rotates in the correct direction. If it does not, the pump and your vacuum system can become pressurized.
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4.4 Inlet

Before connecting the vacuum tube, be sure to clean the inner wall of the vacuum chamber and pipeline, to ensure that impurities such as moisture, dust and metal rust are completely removed. The diameter of the pipeline connecting the vacuum chamber should not be smaller than the diameter of the air inlet of the pump, and the pipeline should be short and elbows should be less to reduce the loss of pumping speed. Pipes, vacuum chambers and connections should be sealed without leakage. In order to prevent the vibration of the pump from being transmitted to the vacuum chamber, it is recommended to install a bellows.



CAUTION

Vent valve is to prevent pump oil or oil vapor anti-sucking to vacuum chamber when the pump stopping. Install it closer as possible to the vacuum chamber Install it on the inlet port of the mechanical booster pump if the pump is used together with booster pump.

If the pump sucked the water or substance such as dust, powder and soon, it would impair the ultimate pressure and further cause trouble.

Metal mesh on the inlet port is to keep foreign substances away from the pump unit. Be sure not to take it out unless necessitated so to check it.

4.5 Outlet

The exhaust port of the pump adopts GB/T4982 (equivalent to ISO2861-1) KF clamping type vacuum quick-release flange, which is convenient for installation and disassembly. The diameter of the pipe connecting the exhaust port should not be smaller than the diameter of the exhaust port, otherwise the internal pressure of the pump will rise, causing the motor to be overloaded, and there is a risk of rupture of the pump casing and the oil level window.

	WARNING The pump is not made as the withstand pressure structure. Ensured pressure value of the pump is not over 0.03MPa (gauge pressure). Ensure exhaust side keeps clear when the pump running.
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Oil mist would appear through the exhaust side when the pump running around high pressure range, discharge it to outdoor or an oil removing device through exhaust piping. It is recommended to use an oil mist trap to reduce oil consumption and to trap oil mist. In order to reduce fuel consumption, eliminate oil mist and reduce noise, it is recommended to install oil mist filter.

When using the oil mist filter, there are some restrictions as follows;

If the mesh of the filter is clogged, please replace it in time. The maximum limit that the pump body can withstand is 0.03MPa (0.3kg/cm²).

If the pressure on the measured exhaust side exceeds the maximum limit, replace the filter immediately.

 Warning	After continuous operation for 1 hour under high pressure above 1kPa, the amount of oil will be insufficient due to the increase in the discharge of oil fume. Please check the oil level frequently and replenish the oil in time to avoid the rapid loss and burning of parts caused by dry friction. It is recommended to install an oil recovery device.
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 Warning	There is a risk of rupture. Be sure to observe the operation restrictions for installing the oil mist filter. If the mesh of the filter becomes clogged, replace the filter immediately.
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5. Operation

The pump becomes hot during operation (40 to 80°C). Do not touch the motor, pump body and pipeline during or just after stopped operation while the pump unit remains very hot. Apply an appropriate protection to avoid touching the surface as necessary.

Warning 	There is a risk of burn. The pump may generate a high temperature above 80°C during operation. Therefore, please do not touch the motor and the pump body until they have cooled down to normal temperatures while the pump is running or after it has stopped.
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The pump can be difficult to start when used in cold regions or in winter. This is due to the motor overload phenomenon caused by the physical properties of the pump oil. For the sake of prudence, after confirming that the pump itself has no abnormality and the capacity of overload protection matches the rated value of the motor, heat the pump oil, or replace the special oil with low pour point suitable for low temperature environment.

Warning 	When the ambient temperature is low, the pump will be difficult to start. After heating the pump oil to 15°C, jog the pump several times (connect the power for a short time). If it stops after running for a few seconds, you can open the vent valve, start the pump, and slowly release air. The pump can be operated normally. After the pump temperature rises, close the air release valve and return to normal operation.
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6. Gas ballast function

This product is installed with the gas ballast function(G3/8 plug screw in the gas ballast port) as standard. It can be used with connecting needle valve or pipes. The gas ballast function is applicable to exhaust the condensed gas such as water vapor or solvent vapor.

Import the air or dry nitrogen through the gas ballast port just before the pump compression process, the condensed gas(such as water vapor or solvent vapor) is not liquefied but exhausted with the air through the exhaust valve, it called gas ballast function.

To use the gas ballast, breathe in the air through the gas ballast port before sucking in condensed gas and operate the pump around twenty minutes, this is because the “gas ballast effect” becomes larger as the pump temperature is higher Wait until the pump temperature rises around 70°C to open the vacuum valve to operate the pump. The “gas ballast effect” under lower temperature shall be lower than the specified process performance.

You also have to note that the condensed gas might remain in the pump oil after you have exhausted a lot of condensed gas or exhausted the condensed gas without opening the gas ballast port since the process capacity of the condensed gas by the gas ballast port is limited. In such case, close the vacuum valve, breathe in the air through the gas ballast port and idle operate the pump. Then the oil temperature shall rise up and the oil will be cleaned by means of the gas ballast effect. Keep on idle operating the pump with opening the gas ballast port until the specified ultimate pressure is attained. You need to replace the pump oil if it was not cleaned(the specified ultimate pressure can't obtain) after operating along time.

CAUTION

The vacuum pump gets high temperature during operation. As the gas ballast port also gets high temperature, be sure to wear protective gear such as a pair of gloves.
Ensure close the gas ballast port to start operating the pump. The oil might jet out of the gas ballast port during the operation around high pressure range.

CAUTION

Keep the gas ballast port closed when not exhausting the condensed gas.
If you kept opening the gas ballast port when not exhausting the condensed gas, it might cause the oil splash, power loss or ultimate pressure rise.
Also, Opening the gas ballast port will increase the temperature rise, noise level and oil mist volume.

7. Maintenance

7.1 Regular check

You should check following points at least once per three days during operation. Check the machine much more frequently during high overload operation(continuous operation 1kPa or more, repeated exhaust atmospheric pressure-vacuum).

- 1.Whether the pump oil volume is between two level lines or not.
- 2.Whether the pump oil is discolored or not.
- 3.Whether there is no abnormal noise.
- 4.Whether there is anything strange in the motor current value.
- 5.Whether there is no oil leak from the pump.

7.2 Vacuum pump oil check

The pump oil will be gradually deteriorated not only by contamination with sucked gas, but also by temperature rise during pump operation. If pump is operated using pump oil containing much content, the ultimate pressure will rise, leading to poor function of the mechanical friction parts of the pump. In the worst case, the pump will seize up and cannot be rotated. Check the oil for contamination, viscosity and discoloring periodically.

CAUTION

The oil level gauge is for checking the pump oil level. Since the oil is not circulating between the pump case and the oil level gauge, contamination or discoloring of the oil may not be observed on the oil level gauge. Periodically drain approx. 50ml oil through the drain port and check the oil for contamination and discoloring.

Visual inspection

The pump oil should be clean and transparent.

If the oil color gets reddish brown, dark brown and cloudy white, please replace the oil. There placement cycle depends on the application, keep the check records and change the oil regularly.

Pump oil level check

The pump oil should be between the two level lines on the oil level gauge when pump operating. If oil level is under the MINline, exhaust valve can't be sealed so that ultimate pressure can't obtain. If oil level exceeds the MAXline, a lot of oil will splash out from the outlet port when pump running at atmospheric pressure.

CAUTION

Continuous operation one hour or more at high pressure (1kPa or more) would decrease the oil volume that are discharged as the oil mist and cause parts wear rapidly or cause trouble such as burning.

You are recommended to control the oil level on regularly supplying the pump oil. It is recommended to install the oil recovery mechanism (Option).

Continuous operation at high pressure; the oil temperature becomes very high. As a result, the oil rapidly deteriorates, and the attained pressure and the exhaust speed go bad, and it causes the rapid abrasion of the parts or burns.

Frequently perform replacement of the pump oil and shorten the maintenance cycle.

7.3 Change the pump oil



WARNING

Wear protective gear such as rubber gloves, protective goggles and the like. There might be some hazardous substances in pump oil because of oil decomposition or hazardous gas sucked in, confirm the nature of the hazard and take necessary safety gear.

The oil level comes down approximately 1cm after pump being started. Do not operate the pump with the minimum oil level. Do not operate the pump before filling pump oil, the pump will be damaged.

To ensure the pump function and the service life, the pump oil must clean and keep in appropriate oil level.

Because of improper storage or use, there might be water or other volatile substances mixed in pump oil and the ultimate pressure cannot attain. Close the air inlet, open the gas ballast port and run pump continuously for 30 minutes to exhaust the gas. If the pump oil was deteriorated by mechanical impurities or chemical contamination, replace the pump oil. To change the pump oil as follows.

Shut down the pump and open the oil drain port to drain the oil in the pump case. Up on completion of draining the oil, close the drain port again and ran the pump under no load for approx. 5 seconds to drain the oil from the cylinder.

Close the drain port and fill fresh oil through the oil filling port. Pour oil until the oil level comes between the two level lines of the oil level gauge.

If the oil is severely contaminated, fill fresh oil and run the pump for several minutes under no load to clean the pump interior. Repeat this operation several times depending on the degree of oil contamination.

After changing the oil with fresh oil, run the pump to warm it up and then check the ultimate pressure. If substances of low boiling point(water, organic solvent, etc.)are mixed with pump oil or sludge collects on the bottom of the pump case, the ultimate pressure cannot recovered by one oil change, the pump oil must be changed several times. If the specified ultimate pressure cannot be attained by oil change, sludge or other deposit may have collected on the bottom of the pump case. In that event, overhaul is required. Contact with us.

CAUTION

The pump oil might deteriorate in a shorter time depending on the use. It is recommended to replace the first pump oil within ten days after operation start and see how it got dirty to determine the oil replacement cycle.

If the pump breathes in a lot of water or the like, you should replace the oil more frequently. If kept operation without getting rid of breathed water, it would deteriorate lubrication of the oil and accelerate corrosion of the pump inside, then result in a failure. Do not store the pump keeping sucked the water.

You should replace the oil if breathed in the solution to deteriorate lubrication of the oil as it would also cause biting inside. There is a risk if breathed in the solution in operation even you replaced the oil. When using the pump in suction of solvents, it is out of range of warranty.

If the pump breathed in chemical material such as acid, immediately replace the oil as it would cause the rust during the stop in one night to make the system not applicable to operate. When using the pump in suction of chemical material, it is out of range of warranty.

Starting the pump operation might become difficult in winter season or in the cold district. This is the overload phenomenon caused by increased viscosity of the pump oil. To make sure, you should confirm that the capacity of the motor over load protective device conforms to the motor rated value, the pump is not damaged and the cable does not have abnormality. Then, warm up the pump oil or replace the vacuum pump oil with BS046 which having lower viscosity.

CAUTION

When temperature is low and pump does not run, warm the pump oil up to 15°C and turn the pump on and off several times in short intervals.

When the pump stops after run for several seconds, try to move it while putting slow leak in it, there is the thing that the pump can run consecutively.

As the pump warmed, close the slow leak valve and return it to regular running.

<p>Caution</p> 	<p>The vacuum pump oil is not only polluted by the adsorbed gas, but also deteriorates with the temperature rise during operation.</p> <p>In order to ensure the function and service life of the pump, it is necessary to ensure that the pump oil is clean and the oil quantity is appropriate.</p>
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<p>Caution</p> 	<p>There is oily foreign matter (sludge) in the vacuum pump oil or at the bottom of the pump body. One oil change may not restore the ultimate pressure, and multiple oil changes are required.</p>
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<p>Caution</p> 	<p>Due to the decomposition of the oil or the pumped medium, there are hazardous substances in the pump oil. The nature of the hazard must be determined, and necessary safety precautions must be taken.</p>
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Oil change interval

Application	Interval
Vacuum drying, Blender, Food packing	1 week
Vacuum drying, Vacuum impregnation, Vacuum forming, Vacuum packing	1 month
Heat treatment, Vacuum melting	1 month
Big vacuum coating equipment	3 months
Vacuum coating	3~6 months
Lab vacuum equipment	6~12 months

Note: for reference only and depends on actual usage.

7.4 Abnormal noise and vibration check

Checking around the pump

1. Whether bolts and nuts and the like fixing the pump are loose or not.
2. Whether pipes connected to the inlet and outlet are loose or not.
3. Check and ensure that there is no leakage from the piping and valves. Please refer to the table 7 "Trouble Check List" to check the pump.

7.5 Checking the metal mesh at the inlet port

The suction inlet might be clogged by the dust contained in the gas breathed in from the vacuum chamber and thus the pump performance might be impaired. If the metal mesh is dirty, please wash it. If it is damaged, replace it.

There will be welding spatter drops off in the pipe particularly at the beginning of the system start. Be fully caution.

7.6 Pump stopping and storage

CAUTION

Ensure first close the vacuum valve then open the leak valve last stop the pump. If failed in following this procedure, the pump cylinder will fill with the oil in several minutes, which might make difficult to restart operation or pump damaged.

Further the oil might accidentally flow back to the vacuum tank.

If failed in closing the vacuum valve, the vacuum might leak from the exhaust side through the pump unit.

When operation finished, first close the vacuum valve which is on the inlet, then stop the pump.

After pump stopped, open the vent valve to restore pump pressure to atmospheric pressure.

Ambient temperature, humidity and height for storage: -10 to 50°C, less than 95%RH(no freeze, no condensation), lower than el. 1000 m. It shall be in house, no direct sun beam. The pump shall not be stacked, inverted or rollover.

There shall be no corrosive or explosive gas around the pump, and keep clean to prevent debris into the pump. If the pump does not operate for a long time, seal the inlet and outlet port to prevent dust, dirt into the pump.

If the pump does not operate for a long time, condensable gas will be adsorbed in the pump cylinder or sealing parts. You can extend pumping time to exhaust the gas before the pump returning to regular running.

Long term storage of the vacuum pump without operation might possibly cause trouble in operation because of rust. If you kept the pump long time without operating it, ask a closest service center or contact with us for the check.

7.7 Transport

When transporting, please handle with care to avoid damage to the pump due to falling or rolling over. Please try to use a hoist for hoisting operation to ensure the safety of the operation.

<p>Warning</p> 	<p>When carrying out hoisting operation, qualified personnel should carry out the operation.</p> <p>Operation beyond the capacity range and operation without equipment protection is likely to cause the pump to fall or turn over. Do not stand under the pump.</p>
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8. Troubleshooting

Problem	Problem Cause	Remedy
The pump can't start	Power fuse burned	Replace the power fuse
	Supplied voltage not match motor rating voltage	Check the electrical source and connection
	Breakdown of motor	Overhaul or replace the motor
	Ambient temperature is too low, the viscosity of oil increased	Raise the temperature or replace the low viscosity oil
	Pump oil is contaminated and it's viscosity increase	Replace the clean oil
	Exhaust filter or pipe blocked	Clean the filter and pipe
	The pump jammed	Overhaul the pump
The pump can't reach ultimate vacuum	The error of motor rotary direction	Check the rotary direction
	The gas ballast valve is open	Close the gas ballast
	Intake pipe diameter is too small or too long.	Make the correct configuration of the air inlet pipe
	The leakage of vacuum system and pipes	Block the leakage
	Air inlet filter blocked	Clean the air inlet
	Air inlet pipe or filter blocked	Clean air inlet pipe or filter
	Oil is contaminated or inappropriate	Replace the oil
	The quantity of oil is insufficient	Replenish pump oil timely
	Low the pumping rate	Adopt the pump with proper pumping rate
	Measurement technique or instrument is not suitable	Use the correct measuring instrument and calibration
Pump oil circuit blocked	Disassemble the pump and clean the circuit.	
Low pumping rate	The air inlet is too small or too long	Correct configuration of air inlet pipe
	Air inlet pipe or filter blocked	Clean air inlet pipe or filter
	Air inlet filter blocked	Clean air inlet filter
	Leakage of vacuum system or filter	Block the leakage
	Pumping rate is relatively low	Adopt the pump with proper pumping rate
Oil is contaminated or inappropriate	Replace the oil	
Abnormal noise	"KA TA" noise when start or halt	Transient irregular motion of the vanes
	The loose of motor coupling	Check the coupling
	Breakdown of the motor	Overhaul or replace the motor
	Oil is contaminated by solid particles	Replace the clean oil
	The vanes jammed or damaged	Check and replace the vanes
Spare parts inside of pump broken	Check and replace the broken spare parts	
High temperature of pump	High ambient temperature	Lower the temperature
	Insufficient flow of cooling water	Supply sufficient cooling water
	High power voltage	Correct the power configuration
	Oil is contaminated or inappropriate	Replace the pump oil
	Insufficient oil quantity	Replenish pump oil
	Discharge filter or pipe blocked	Clean discharge filter or pipe
	High temperature of inhaled gas	Lower the temperature of inhaled gas
Continuous operation under high pressure	Larger the flow of cooling water	

External leakage of pump	Seal wear or aging	Replace the seal
	Oil tank seal gasket damaged	Replace the seal gasket
	The leakage of gas ballast controller	Replace the gas ballast filter
	Loose of sealing plug	Tighten sealing plug
	O-ring of sealing plug aging	Replace O-ring
Fail to completely keep the vacuum	Gas ballast open	Close gas ballast controller then halt the pump
	seal components broken or lost	Check seal components
	Broken Anti suction valve	Replace anti suction valve
	Seal broken	Replace seal
	Exhaust valve broken	Replace exhaust valve

9. Warranty

Products manufactured by Seller are warranted against defects in materials and workmanship for twelve (12) months from date of shipping under non-human reasons.

Seller's liability under valid warranty claims is limited, to repair, to replace are covered by this warranty. Damageable parts are not covered by this warranty. All obligations of Seller under this warranty shall cease in the event of below:

- ◆ Damage created by misuse, abuse, accident or neglect.
- ◆ Damage created by alteration
- ◆ Damage created by natural disaster

Other equipment' damage created by this pump is not covered by this warranty.

10. After-sales service

In case any quality problem occurs, please give below information to the Seller.

Product model.		Serial No.	
Delivery date.		Customer company name.	
Contact person.		Contact mobile.	
Problem description in detail.			
Repair records.			
User request.			

Customer company stamp:

Date: