

# User Manual



## Twin Piston Vacuum Pumps:

### Oil-less WVP Series:

WVP12, WVP10, WVP5,

WVP4, WVP3, and WVP2



**Warning:** Not recommended for pumping acid, base, organic vapors or explosive gases.

Be sure to properly identify intake and discharge before using pump.

# TABLE OF CONTENTS

<b>Section A: SAFETY INFORMATION</b> .....	3
<b>A1 WARNINGS: TO PREVENT INJURY,</b> .....	3
<b>A2 WARNING: TO REDUCE RISK OF ELECTRICAL SHOCK</b> .....	3
<b>A3, WARNING: TO REDUCE RISK OF ELECTROCUTION</b> .....	4
<b>A4 WARNING: TO REDUCE RISK OF EXPLOSION OR FIRE</b> .....	4
<b>Section B: INSTALLATION</b> .....	4
<b>B1 INTRODUCTION</b> .....	4
<b>B2 UNPACKING</b> .....	4
<b>B3 PUMP MOUNTING</b> .....	4
<b>B4 WORK ENVIRONMENTAL CONDITIONS AND PUMP LOCATION</b> .....	4
<b>B5 INLET AND OUTLET PROVISIONS</b> .....	5
<b>B6 ELECTRICAL POWER SUPPLY</b> .....	5
<b>B7 VACUUM LINE</b> .....	6
<b>B8 VACUUM GAUGES</b> .....	6
<b>B9 TRAPS</b> .....	6
<b>Section C: OPERATION</b> .....	6
<b>C1 KNOW YOUR PUMP</b> .....	6
<b>C2 HOW TO START IT</b> .....	7
<b>C3 LEAK PROVING</b> .....	7
<b>C4 PRESSURE RANGE</b> .....	7
<b>C5 SHUTDOWN PROCEDURES</b> .....	7
<b>Section D: MAINTENANCE</b> .....	7
<b>D1 GENERAL MAINTENANCE</b> .....	7
<b>Section E: TROUBLESHOOTING</b> .....	8
<b>E1 VACUUM PROBLEMS</b> .....	8
<b>E2 TROUBLESHOOTING TABLE</b> .....	8
<b>Section F: SPECIFICATION</b> .....	9
<b>F1 SPECIFICATION CHART:</b> .....	9
<b>F2 PUMPING SPEED CURVE</b> .....	9
<b>Section G: WARRANTY</b> .....	10
<b>Section H: PARTS LIST AND OPERATIONS</b> .....	11
<b>H1 MODEL DIMENSIONAL</b> .....	11
<b>H3 COMPONENTS AND INFORMATION</b> .....	14
<b>H3.3.1 Adjustment of Vacuum Pressure (Optional)</b> .....	17

## Section A: SAFETY INFORMATION

### READ AND UNDERSTAND ALL WARNINGS AND CAUTION SIGNS BEFORE OPERATION

These vacuum pump units conform to the SI International system of units of measurement. JB/T53016-1999. As recommended in IEC1010, the following symbols of warning will be found in the content of this manual. While reading this manual, please pay close attention to the content labeled: WARNING and CAUTION. Ignoring these signs may cause personal injury and harm. The descriptions are below.



**WARNING:** Warnings are given where failure to observe instruction could result in injury or death. Refer to accompanying documents



**WARNING:** Warnings are given where failure to follow instruction could result in injury or death. Risk of electrical shock



**CAUTION:** Cautions are found where failure to observe the instruction could result in damage to the equipment, associated equipment and process. Hot surface, hazard for touching.



**WARNING:** The pump includes a self-resetting thermal cutout and the motor could restart without actuation under fault condition.

#### A1 WARNINGS: TO PREVENT INJURY,

**A1.1** Never operate this product if it has a damaged cord or plug. If it is not working properly, has been dropped, damaged or has fallen into water, please return the product to a VIOT service center for examination and repair.

**A1.2** Keep the cord away from heated surfaces. All electrical products generate heat. To avoid serious burns never touch unit during or immediately after operation.

**A1.3** Never block any air openings or place it on a soft surface where the openings may be blocked. The air openings are for ventilation of the motor inside the housing. Keep all air openings free of lint, dirt and other foreign objects.

**A1.4** Never drop or insert fingers or any other object into any openings.

**A1.5** Do not operate this product where oxygen is being administered.

**A1.6** This pump is thermally protected and can automatically restart when the protector resets. Always disconnect the power source before servicing.

**A1.7** Wear safety glasses and goggles when operating this product. Never point an air nozzle or air sprayer toward another person or any part of the body.

**A1.8** Use only in well ventilated areas. The motor on all pumps are totally enclosed and fan cooled

**A1.9** Do not use any tools or attachments without first determining maximum air pressure for that tool or attachment. Be sure to properly identify intake and discharge before using pump. See Section B50

#### A2



**WARNING: TO REDUCE RISK OF ELECTRICAL SHOCK...**

**A2.1** Do not disassemble. Disassembly or attempted repairs may be an electrical shock hazard. Servicing should be done by qualified service agencies only.

**A2.2** Unit is supplied with a three pronged plug. Be sure to connect pump to a properly grounded outlet.

**A3, WARNING: TO REDUCE RISK OF ELECTROCUTION...**

**A3.1** Do not use this product in or near areas where it can fall or be pulled into water or other liquids.

**A3.2** Do not reach for this product if it has fallen into liquid.

**A3.3** Never operate this product outdoors in the rain or in wet areas.

**A4 WARNING: TO REDUCE RISK OF EXPLOSION OR FIRE...**

**A4.1** Do not use this pump in or near explosive atmospheres or where aerosol (spray) products are being used.

**A4.2** Do not pump anything other than atmospheric air.

**A4.3**



**CAUTION:** Do not pump combustible liquids or vapors with this pump or use in or near an area where flammable or explosive liquids or vapors may exist.

**A4.4** Do not use this product near flames.



**WARNING:** Failure to observe the above safety precautions could result in severe bodily injury, including death in extreme cases.

## Section B: INSTALLATION

### B1 INTRODUCTION

**B1.1** This manual has been compiled not only for the care and maintenance of the VIOT Dry Vacuum Pump now in your possession, but as a helpful reference and guide to prevent problems which may occur if used improperly.

### B2 UNPACKING

**B2.1** Carefully remove the Vacuum Pump from the shipping case and remove the restraining materials. Preserve all paperwork for future reference. If damage has occurred from shipment, a claim must be filed with the carrier immediately; preserve the shipping carton for inspection by the carrier. If you are required to communicate with your dealer or VIOT Assistance, be sure to include your order numbers for quick identification. Do not return the pump to the factory without first calling for a return authorization.

### B3 PUMP MOUNTING

**B3.1** To reduce vibration and noise, rubber feet are built into the pump, which are excellent for fixed applications and moveable temporary use on any hard surfaces. For fixed applications, the Vacuum Pump should be mounted on a horizontal plane.

### B4 WORK ENVIRONMENTAL CONDITIONS AND PUMP LOCATION

**B4.1 Pump Environmental Conditions:** The pump is rated for indoor use only. Maximum altitude 2000 meters. Operating temperature range 5°C to 40°C (40 to 105°F). High relative humidity combine with high temperature will decrease pumping efficiency.



**WARNING:** Don't pump flammable or explosive gases or vapors or operate this pump in an environment containing flammable or explosive gases or vapors.

**B4.2 Pump Location:** The Vacuum Pump should be located preferably in a clean, dry, and well ventilated area. Do not block the ventilation located on the motor housing. The pump should be placed where the surrounding temperature remains below 40°C (104°F). Check to insure the location is protected from direct or indirect moisture. VIOT recommends that the pump be installed at the highest point within the system to prevent possible water condensate from contacting the pump. The pump should be located as close to the application as possible, the longer the line the less efficient the pump will be.

## **B5 INLET AND OUTLET PROVISIONS**

**B5.1** The intake fitting is ½ ID Barb, on a 1/4" female NPT. A mini-muffler is supplied for the exhaust.



**WARNING:** Bursting Hazard- Blocking the exhaust flow, may cause the vacuum to burst. Any exhaust pieces added to the outlet port should not exceed 10 PSI. The pumping rate is reduced if the pump experiences a back pressure.

## **B6 ELECTRICAL POWER SUPPLY**

### **B6.1 Power Source Review**

Review the power source and the motor rating to be sure they agree in voltage, phase, and frequency. Serious damage may occur to the motor if it is connected to an improper voltage. All VIOT pumps must be used with a properly grounded outlet. Grounding reduces the risk of electric shock in the event of an electrical short circuit. Consult your local electrical codes if you have doubts.

**B6.2 Overload Protection of the Motor:** A thermal protector is built-in at the motor, to minimize motor failure. Overload protection is a standard feature on both 50 and 60 Hz single phase-motors. Automatic reset protection is designed to reset itself after a predetermined cooling temperature. If the fault to the drive remains unaltered, the motor will cycle on and off until the fault is corrected.



**WARNING** The motor is thermally protected and will automatically restart when the overload device resets. Don't pump flammable or explosive gases or vapors or operate this pump near flammable or explosive gases or vapors.

### **B6.3 Identification Symbols: Power On Power Off**

### **B6.4 Grounding Instructions**

This product should be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord approved by UL that has a grounding wire with a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.



**DANGER** Improper installation of the grounding plug can result in risk of electrical shock

## **B7 VACUUM LINE**

**B7.1** All VIOT WVP Series Vacuum Pumps come with intake Port ½ inch hose barb which accept ½ inch ID rubber or vinyl pressure/vacuum hose. For best result, VIOT recommends the length of the tubing between the pump and the system be kept as short as possible.

## **B8 VACUUM GAUGES**

**B8.1** Typical in the rough vacuum range, an analog vacuum gauge is used to measure pressure in mm, Hg or Inches of Hg. The dial vacuum gauge gives negative pressure – that is pressure below atmosphere. The reference point for the vacuum gauge is atmospheric pressure.

## **B9 TRAPS**

**B9.1** The need of a Trap: The pumps will handle humid air. All wetted aluminum parts are treated for corrosion protection from moisture. All other wetted parts are stainless steel or rust proof. If there is a chance liquid may be drawn from the process under evacuation, VIOT recommends a liquid trap be placed between the application and the pump. A simple liquid trap is a filtering flask. Liquid traps can be purchased through VIOT separately.

If a heavy load of water vapor or other condensable vapor is emitted from the vacuum process, a cold trap is recommended to help prevent damage to the pump mechanism.

High water vapor load are caused by droplets coming out of the exhaust port. If you see droplets of water, VIOT recommends you use a cold trap to catch the water before entering the pump. Another option is to dilute the water vapor stream by adding dry nitrogen to the gas flow. Please email our customer support at [tech@viot.us](mailto:tech@viot.us) if you have any questions.

### **B9.2 Care of a Trap**

When using a cold trap the coolant should be maintained at a high level in the flask to keep the trap at a uniformly low temperature. If the trap is warm it may allow evaporation of the condensate. If the trap becomes saturated it should be disconnected from the system, drained, and cleaned. An increase in pressure in the vacuum system may indicate the trap has become saturated. To clean the trap, remove the trap from the system and allow the trap to warm up and rinse off the condensate with a suitable solvent under a fume hood. Clean and dry the trap before reinstalling it into the vacuum system.

# **Section C: OPERATION**

## **C1 KNOW YOUR PUMP**

**VIOT WVP Series** pumps are air pumps that remove air molecules from the atmosphere. Take every precaution to prevent foreign particulates from entering the pump. Particulates will speed the wearing process and shorten the life of the pump by damaging the pump's moving parts, adversely affecting the performance. While particulates are common components of working environment especially workshops, a particulate trap in the foreline is recommended. A simple, inexpensive trap may be made by placing glass wool in a glass or plastic tube. Screens must be inserted to hold the glass wool in place. VIOT has liquid and dust traps available.

VIOT's new portable oil-free pumps provide a continuous, reliable vacuum for your vacuum chamber, glove box, annular space and transfer line, or other lab and workshop applications. The pumping mechanism is an economical twin head oil-free Wob-L<sup>®</sup> known for reliability and durability. These rugged pumps handle 20,000 plus cycles at the vacuum level 600 Torr (mm Hg) before needing seal maintenance. VIOT recommends investing in your system by installing an inlet liquid trap to help prevent fluids from getting into the pump, a dial gauge for continuous vacuum level monitoring, and a vacuum switch set to the required vacuum level to extend the life of the pump.

## C2 HOW TO START IT

### C2.1 Starting a VIOT Vacuum Pump

Before attaching the pump to a vacuum system, familiarize yourself with the function of your system, requirements and what is expected of the VIOT pump. Know what the pump can and cannot do. Review the power requirements as described in Section B6. VIOT recommends running the pump for a few minutes to warm up, before using it on the system. A warmed-up pump handles better with humid air than a cold pump.

**C2.2 Cleaness:** As stated above, clean intake air is important. Add a liquid trap, dust trap and filter to extend the lifetime of your pump.



**WARNING:** The pump is not recommended for pumping acid, base, organic vapors or gases. Serious damage to the pump will shorten the pump's service life. In addition, pumping flammable vapors or gases can lead to serious safety hazards such as fire or explosion.

## C3 LEAK PROOFING

Leaks in the vacuum system will decrease the efficiency of the vacuum pump. Ensure that any leaks are fixed immediately. A simple way to find the source of the leak is by using soapy water: Remove the pump and slightly pressurize the system. Brushing the suspected area with a thick soap solution, a small blowing air bubble indicates a leak. A supersonic leak detector is the best way to check for leaks in vacuum and pressurized systems.

## C4 PRESSURE RANGE



**WARNING:** Vacuum pumps are designed to be run from slightly below atmospheric pressure to the maximum vacuum level indicated on the pump. The pumps may also be run from atmospheric pressure to their maximum rated pressure. **CAUTION:** Prevent hooking up a vacuum pump to a pressurized system, such as a charged AC system. Any pumps which have blown up will be treated as abuse and void the warranty.

## C5 SHUTDOWN PROCEDURES

After use, VIOT recommends running the pump for about 2 minutes after disconnecting from the vacuum process to purge water vapor or droplets of water condensate that may have formed on the inside of the pump. Purging the pump helps prevent corrosion. This practice is recommended especially for lab users.

# Section D: MAINTENANCE

## D1 GENERAL MAINTENANCE

VIOT dry vacuum pumps are 100% oil-free. The pump employs a non-lube piston and cylinder. No maintenance is necessary for the bearings. All bearings are sealed and permanently lubricated. Lubrication should not be attempted. The units are built for continuous duty operation with the quietness and durability of a diaphragm, but with piston performance. All repair jobs should be done by an authorized VIOT technician.

## Section E: TROUBLESHOOTING

### E1 VACUUM PROBLEMS

VIOT dry vacuum pumps are 100% oil-free. The pump employs a non-lube piston and cylinder. Potential issues that may require maintenance include leakage, contamination and unusual outgassing. To operate at maximum efficiency a system must be thoroughly clean. If the system is completely clean and free of leaks, and unwarranted vacuum problems still exist, the pump should be checked. A simple criterion for the condition of the pump is by determining the maximum vacuum capability. This can be done by blocking the intake and reading the vacuum level on the gauge (See Section B8).

### E2 TROUBLESHOOTING TABLE

#### Common Problems, Possible Causes, and Solutions:

Symptoms	Possible Causes	Solutions
Difficult to start or fails to start	<ol style="list-style-type: none"> <li>1. No power supply</li> <li>2. Machine parts damage</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm power to motor</li> <li>2. Replace worn part(s).</li> </ol>
Suddenly stopped working, and the Pump/motor are hot to the touch.	<ol style="list-style-type: none"> <li>1. Thermal protector kicked in /unit over heated</li> <li>2. Work environment temperature is too hot</li> <li>3. Power supply fuse blown</li> </ol>	<ol style="list-style-type: none"> <li>1. Allow the motor to cool down for at least 10 min then reset the thermal protector.</li> <li>2. Ensure the space is properly ventilated or air conditioned</li> <li>3. Unplug the power plug and check the circuit and its controls.</li> </ol>
Reduced air flow	<ol style="list-style-type: none"> <li>1. Dust filter too dirty</li> <li>2. System leak</li> <li>3. Part(s) worn-out/damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Take apart filter assembly and clear it or replace it.</li> <li>2. Leak proof the system</li> <li>3. Replace the worn/damaged part(s).</li> </ol>



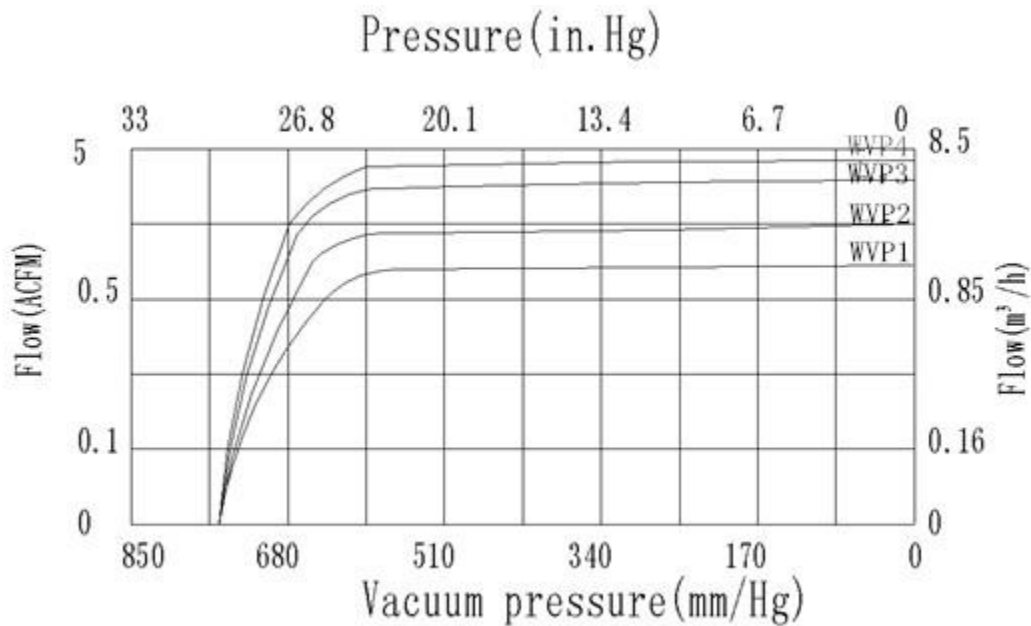
# Section F: SPECIFICATION

## F1 SPECIFICATION CHART:

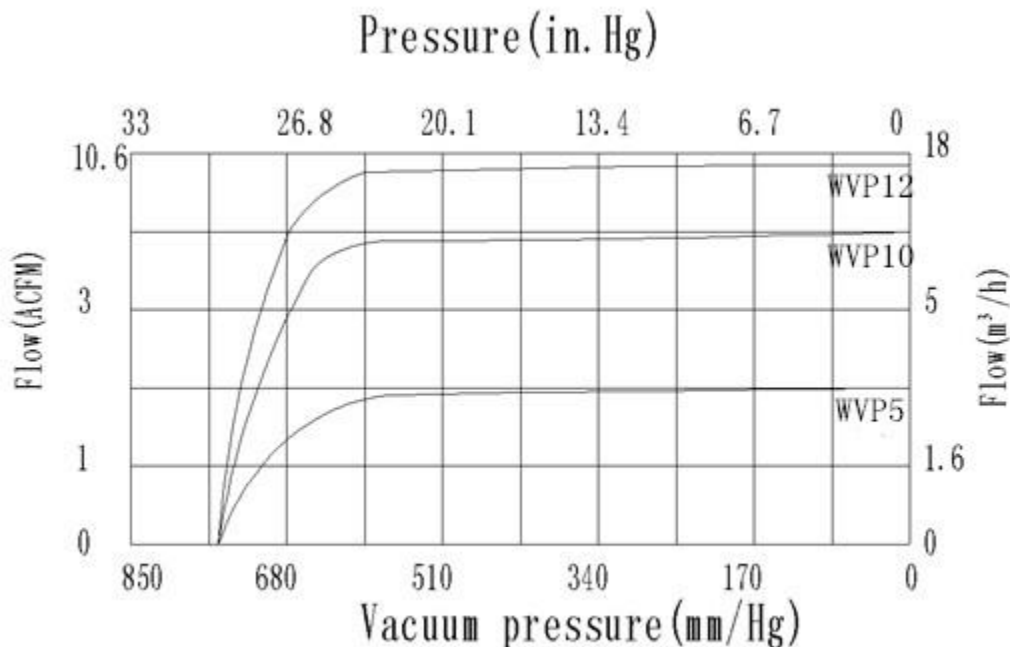
Model	Voltage (VAC)	Power (Watt)	Flow Rate CFM/L/min	Max Vacuum	Noise dB(A)	Speed (rpm)	Weight (Kg)	Dimension (L X W X H, mm)
<b>WVP12</b>	110	850	10 / 320	730	58	1700	17.5	305 X 156 X 288
<b>WVP10</b>	110	750	9.0 / 270	730	58	1700	17.0	305 X 156 X 288
<b>WVP5</b>	110	520	5.0 / 150	730	51	1700	9.5	271 X 128 X 216
<b>WVP4</b>	110	410	4.0/120	730	50	1700	8.5	271 X 128 X 194
<b>WVP3</b>	110	310	3.5 / 110	730	50	1700	7.5	251 X 128 X 194
<b>WVP2</b>	110	210	3.0 /90	730	48	1700	6.5	232 X 101 X 164
<b>WVP1</b>	110	90	1.5/50	720	48	1700	3.5	174 X 90 X 143

## F2 PUMPING SPEED CURVE

### WVP1-WVP4 PERFORMANCE CURVES (60Hz)



## WVP5-WVP12 PERFORMANCE CURVES (60Hz)



## Section G: WARRANTY

**UNPACKING** Inspect the pump carefully. If any damage has occurred during shipping and handling, save the packing materials, file the claim with the carrier immediately, and let the shipper know. Save the shipping container for the carrier to inspect.

**OPERATING PUMP** Refer to the enclosed Instructions/Operation Manual for all information to properly operate and maintain the pump.

**WARRANTY** This VIOT product is warranted to be free from defects in material and workmanship. The liability of VIOT under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of VIOT Pump has not been misused, abused or altered in any way causing impaired performance or rendering it inoperative.

The warranty is effective for one year from the date of original purchase when:

1. The product warranty is completed and registered online at: [www.viot.us/warranty](http://www.viot.us/warranty)
2. The product is returned to the factory or other designated service centers, freight prepaid.
3. The subject product is defective through no action or fault of the user.

The method of executing this warranty: servicing, adjusting, repairing or replacing shall be at the discretion of VIOT. Vacuum pumps that have been used within the one year warranty will be repaired rather than replaced.

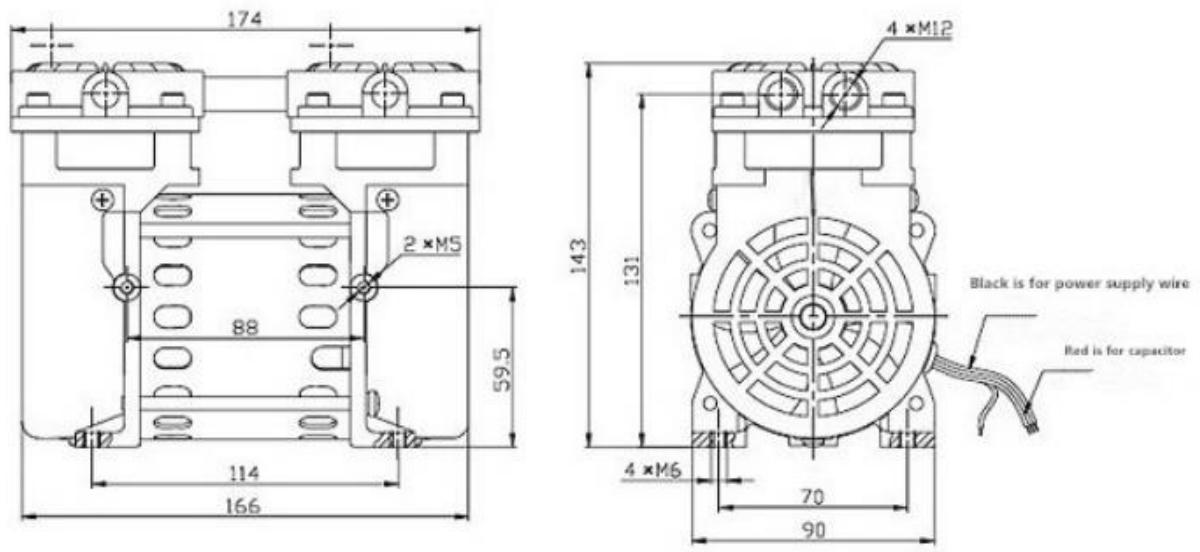
If the product has become defective through misuse, abuse, or alteration, repairs will be billed regardless of the age of the product. In this event, an estimate of the repair costs will be submitted and authorization of these charges will be required before the product is repaired and returned.

To reduce additional charges and delays either within or outside of the warranty period, contact VIOT for a return authorization number. Products without a return authorization number will be refused by our receiving department. Before shipping, properly pack the pump, insure it against loss or damage, and on the outside of the pump packaging and the packing slip write in the return authorization number. Pumps damaged due to improper packaging are the customer's responsibility. No other warranties are expressed or implied.

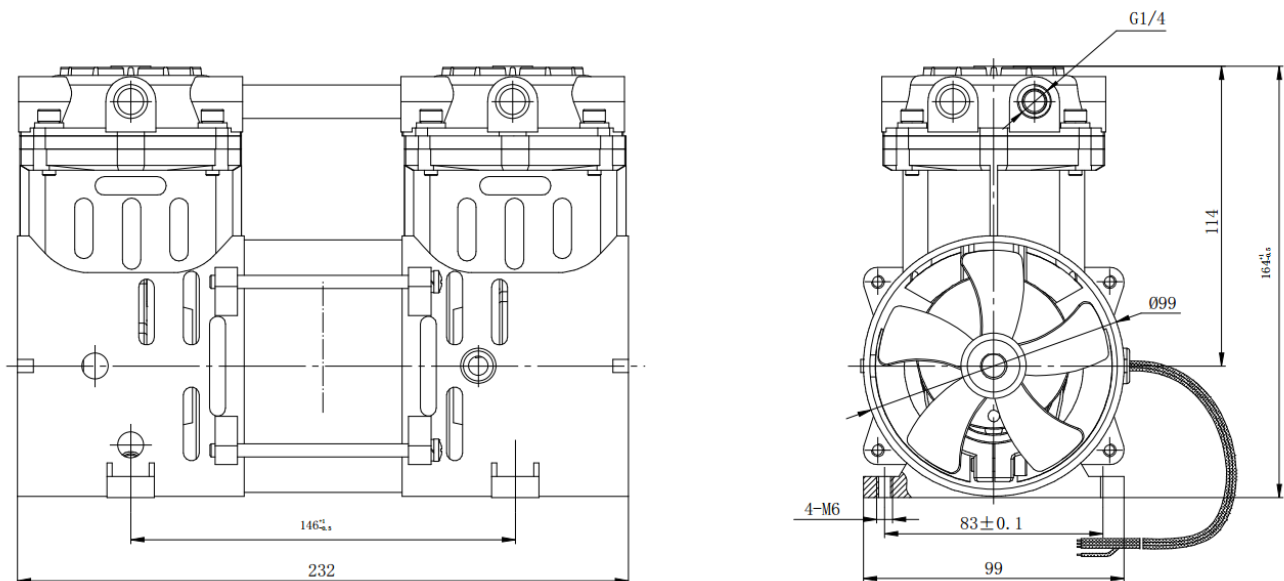
## Section H: PARTS LIST AND OPERATIONS

### H1 MODEL DIMENSIONAL

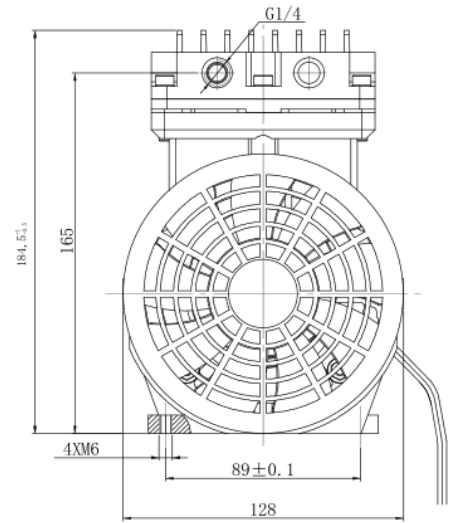
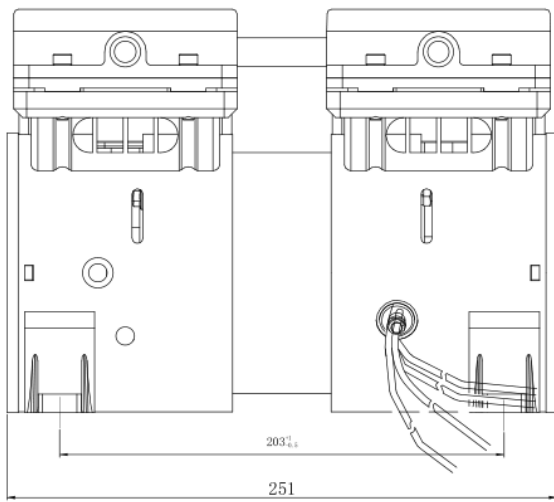
#### H1.1: Model: WVP1



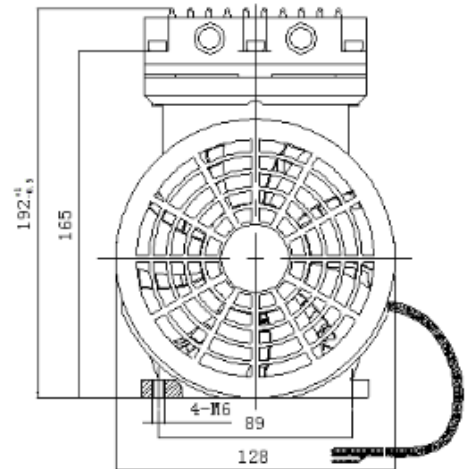
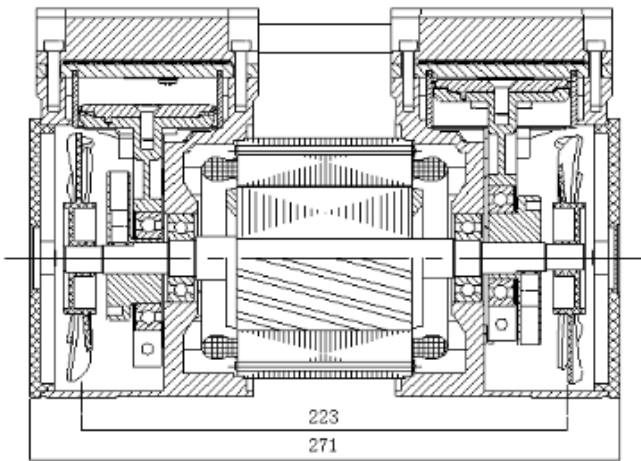
#### H1.2: Model: WVP2



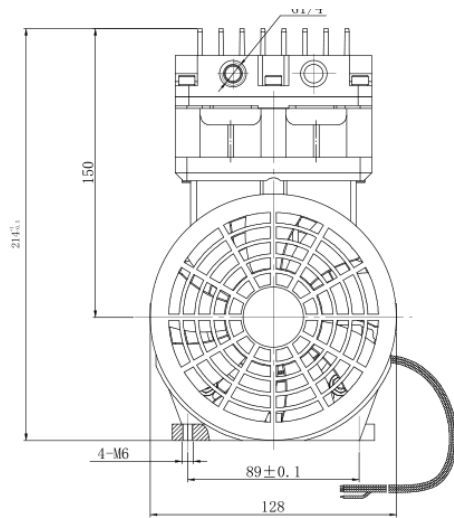
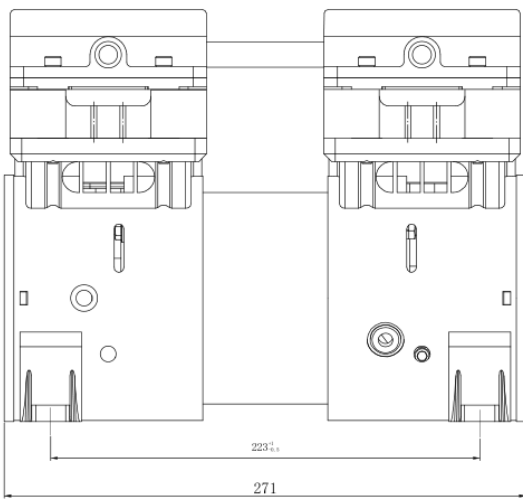
**H1.3: Model: WVP3**



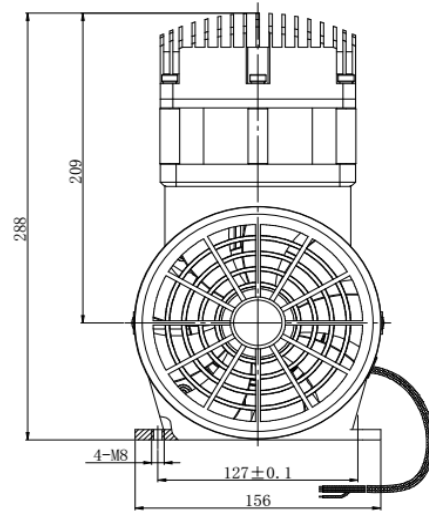
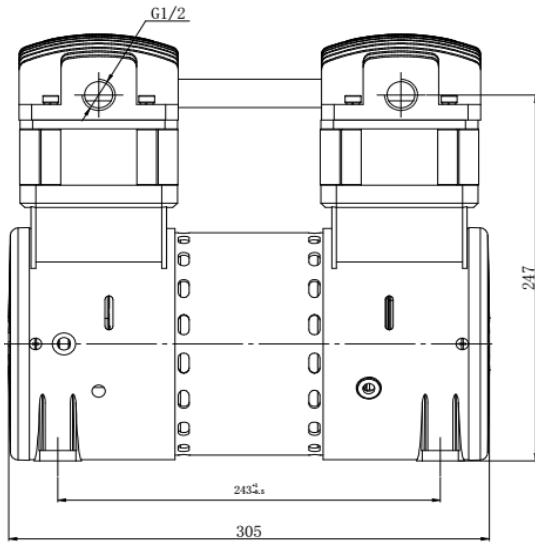
**H1.4: Model: WVP4**



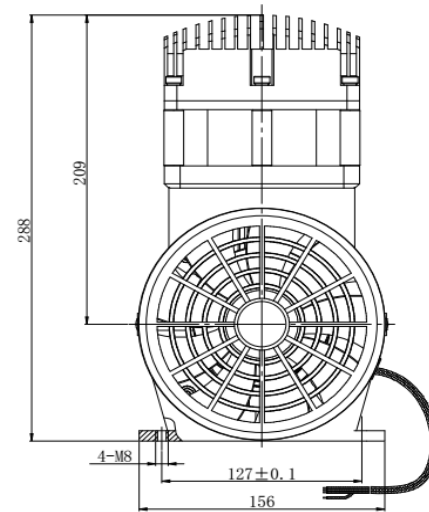
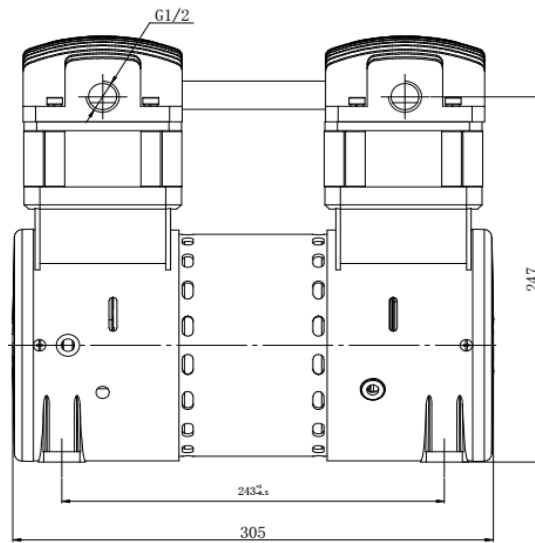
**H1.5: Model: WVP5**



**H1.6: Model: WVP10**



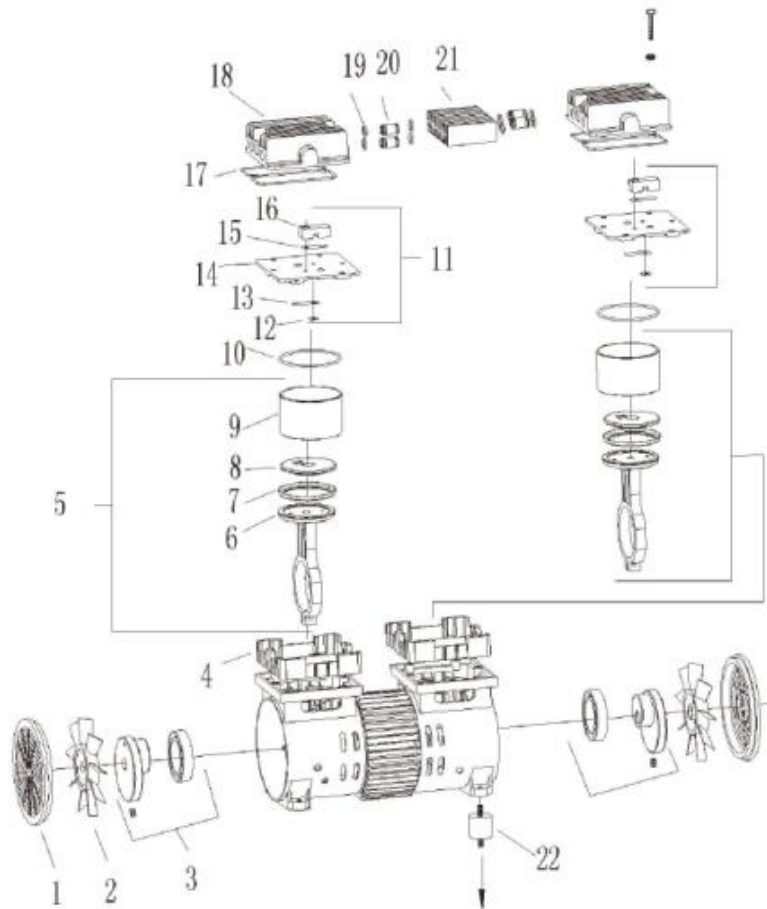
**H1.7: Model: WVP12**



## H2 REPLACEMENT PARTS LIST AND EXPLODED VIEW



## H3 COMPONENTS AND INFORMATION



### H3.1: MAIN COMPONENTS:

No	Part No *	DESCRIPTION	QTY
1	350109	SIDE COVER	2
2	250106	MOTOR FAN	2
3	350201	ECC.&BEARING ASS'Y	2
4	350110	MOUNT FRAME	2
5	350301	CONNECT ROD ASS'Y	2
6	350301	CONNECT ROD	2
7	350302	PISTON RING	2
8	350303	FASTEN PLATE	2
9	350303	CYLINDER	2
10	350505	CYLINDER SEAL RING	2
11	350400	VALVE PLATE ASSEMBLY	2
12	350404	METAL CUSHION	2
13	350402	INTAKE VALVE	2
14	350401	VALVE PLATE	2
15	350402.2	EXHAUST VALVE	2
16	350407	FASTEN PART	2
17	350505	O-RING GASKET-HEAD	2
18	350501	CYLINDER COVER	2
19	350507	'O' RING SEAL	8
20	350504	CONNECT PIPE	4
21	350506	AIR COOL	1
22	350103	RUBBER FEET	4

\* Make sure to mention the pump model when you order the parts by part number.

**Note:** Not all parts are interchangeable among different models of pumps.

### H3.2: ADD-ON COMPONENTS



NO	Part No	DESCRIPTION	QTY
1	350106	Adapter: ½ Barb	2
2	350509	Filter -separator	1
3	350104	UL Plug on 5 feet cord	1
4	350105	Rubber feet	4
5	350107	Exhaust Muffler	1
6	350106	Handle	2



### H3.3: ADD-ON COMPONENTS (OPTIONAL)



NO	Part No	DESCRIPTION	QTY
1	350107	Vacuum Pump	1
2	350509	Exhaust Muffler	1
3	350108	Filter -separator	1
4	350109	Solenoid Valve	1
5	360101	Tank	1
6	360102	Drain Valve	1
7	360107	Vacuum Gauge/Port	1
8	360108	capacitor	1
9	360109	Vacuum switch	1

#### H3.3.1 Adjustment of Vacuum Pressure (Optional)

The Vacuum Switch is set at factory to turn off (kick-out) the system motor at 25 inch Hg and kick in at 20 inch Hg. This system comes with a vacuum gauge and a control switch. The system vacuum level can be automatically turned off and on by adjusting the Pressure Screw and Differential Screw (Diff, as marked). Turn Pressure Screw clockwise to lower the system pressure (higher vacuum level) in the system, counterclockwise to increase the pressure (lower vacuum level). The kick-in point is controlled by a combination of the kick-out system pressure and a differential pressure. Turn Diff Screw clockwise to increase, anticlockwise to decrease the kick-in pressure. The pressure difference between kick-out and kick-in is also called Dead Band, meaning at this pressure range, the system is non-responsive. The Diff Screw controls the size of the Dead Band. Use these 2 adjusting screws together while observing the vacuum level in the system to achieve vacuum system automation.