

# US VACUUM

## Oil Lubricated Rotary Vane Vacuum Pumps

**Models** CPS-5B & USV-9B

### INSTALLATION OPERATION **MANUAL**



### ***WARNING***

**DO NOT OPERATE BEFORE  
READING MANUAL**



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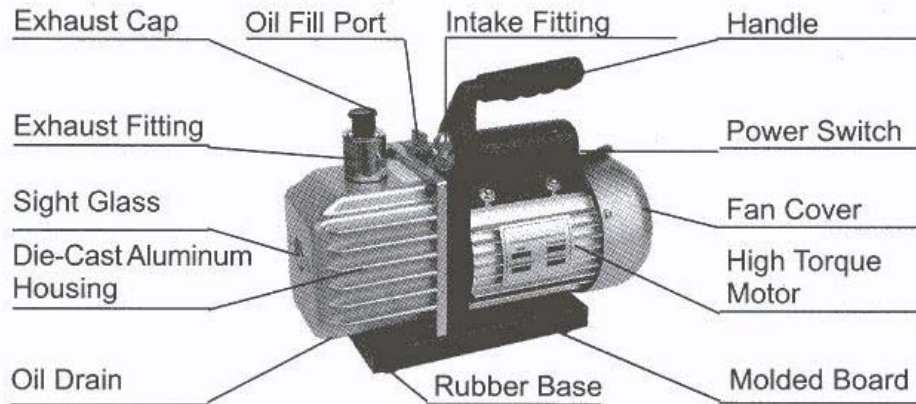
Thank you for purchasing our CP-5B/USV-9B rotary vane oil lubricated vacuum pump.

Please read this manual carefully before using the product to prevent damage and possible injury.

## **Catalog**

- I、 Pump components
- II、 Operating Manual
- III、 Vacuum pump Maintenance
- IV、 Troubleshooting Guide
- V、 Technical Parameter
- VI、 Exploded Drawing

# PUMP COMPONENTS



## II. Operating manual

### (1) Before using your vacuum pump

The motors are designed for operating voltages plus or minus 10% of the normal rating. Single voltage motors are supplied fully connected and ready to operate.

1. The motor is rated for 115V/60 Hz 1 phase. Check to be sure the voltage and frequency at the outlet match these specifications. Check the ON-OFF switch to be sure it is in the OFF Position before you plug the pump into the outlet.
2. The pump is shipped without oil in its reservoir. Before starting the pump, fill it with oil. Remove the EXHAUST baffle (fitting) and add oil until oil just shows  $\frac{1}{2}$  way up the sight glass. The approximate oil capacity of the pump is 220~600ml depending on the model purchased.
3. Replace the exhaust fitting and remove the cap from the inlet port. Turn the motor switch to ON. When the pump runs smoothly, replace the cap on the inlet port. This may take from two to 30 seconds depending on the ambient temperature. After the pump runs for approximately one minute, check the sight glass for proper oil level should be even with the sight glass OIL LEVEL line. Add oil if necessary.

**Note:** When the pump is running, the oil level should be between the two (2) hash marks on the pump cover. Underfilling will result in poor vacuum performance. Over filling can result in oil blowing from the exhaust port. Oil may be added to the vacuum pump either through the oil fill port or exhaust fitting. The exhaust fitting is a larger opening than the oil fill port and is thus easier to fill the pump in this manner. The oil fill port is an alternative filling port if the exhaust port is being utilized (installed filter or tubing) thus making oil filling difficult.

(2) **SHUTDOWN:**

(I) To shut down your pump after use

To help prolong pump life and promote easy starting, follow these procedures for shutdown.

1. Close the isolation valve between the pump and the system.
2. Remove the pump from the system while leaving isolation valve connected to the pump. Keep isolation valve closed to prevent any contamination or loose particles from entering the port.

II、 To maintain your high vacuum pump

1. Vacuum pump oil:

The condition and type of oil used in any high vacuum pump are extremely important in determining the ultimate attainable vacuum. We recommend the use of High Vacuum pump Oil (Type US350SS). This oil has been specifically blended to maintain maximum viscosity at normal running temperatures and to improve cold weather starts.

2. Oil Change Procedure

(1) Be sure the pump is warmed up.

(2) Remove the OIL DRAIN screw. Drain contaminated oil into a suitable container and dispose of properly.

(3) When the flow of oil has stopped, tilt the pump forward to drain residual oil.

(4) Replace the oil drain screw (DO NOT OVER TIGHTEN OR DAMAGE TO OIL HOUSING WILL OCCUR). Remove the OIL FILL cap and fill the reservoir with new vacuum pump oil until the oil shows  $\frac{1}{2}$  way up the sight glass. The approximate oil capacity of the pump is 220~250ml (CPS-5B) & 600 ml (USV-9B)

(5) Be sure the inlet ports are capped, then turn on the pump. Allow it to run for one minute, then check the oil level. If the oil is below the sight glass OIL LEVEL line, add oil slowly (with the pump running) until the oil reaches the OIL LEVEL line. Replace the OIL FILL cap, making sure the inlet is capped and the drain cap is tight.

(6) a) If the oil is badly contaminated with sludge that forms when water is allowed to collect in the oil, you may need to remove the oil reservoir cover and wipe it out.

b) Another method of dealing with heavily contaminated oil is to force the oil from the pump reservoir. To do this, allow the pump to run until it is warmed up. While the pump is still running, remove the oil drain cap. Slightly restrict the exhaust. This will back-pressure the oil reservoir and force the oil from it, carrying more contaminants. When the oil ceases to flow, turn off the pump.

Repeat this procedure as required until the contamination is removed

Replace the OIL DRAIN cap and refill the reservoir to the proper level with fresh pump oil.

#### IV、 Troubleshooting Guide

Your pump has been designed for dependable use and long life. If something should go wrong, however, the following guide will help you get pump back into service as quickly as possible.

If disassembly of the pump is required, please check your warranty. The warranty may be voided by misuse or customer tampering which results in the pump being inoperable.

##### 1. Failure To Start

Check the line voltage. The pumps are designed to start at  $\pm 10\%$  line voltage (loaded) at 32<sup>0</sup>F. Check on/off switch, Check that power cord is securely placed into power outlet, Check circuit breaker is not "tripped".

##### 2. Oil leakage

- ① Be sure the oil is not a residual accumulation from spillage, etc.
- ② If leakage exists, the module cover gasket or the shaft seal may need replacing. If leakage exists in the area of the oil drain plug, you may need to reseal the plug using a commercial pipe thread sealer.

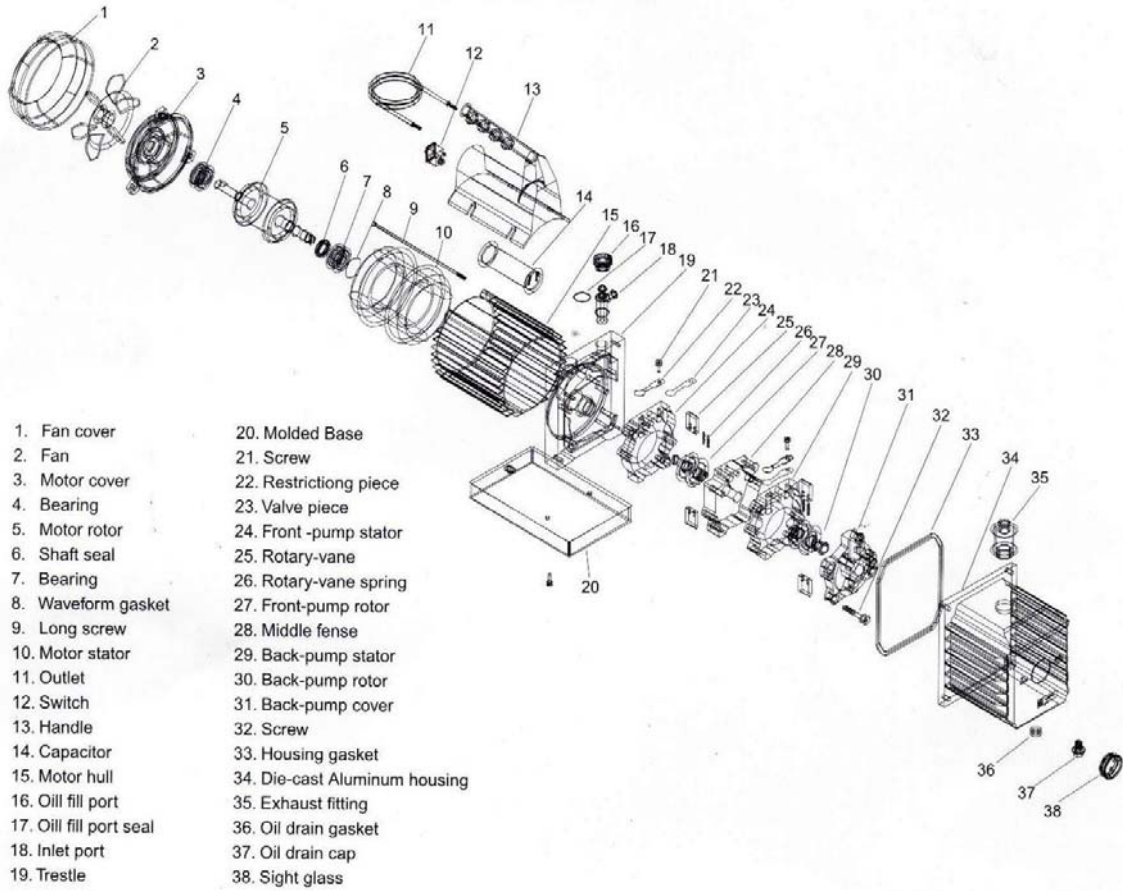
##### 3. Failure To Pull A Good Vacuum

- ③ Be sure the vacuum gauge and all connections are in good condition and leak-free. You can confirm leakage by monitoring the vacuum with a thermocouple gauge while applying vacuum pump oil at connections or suspected leak points. The vacuum will improve briefly while the oil is sealing the leak.
- ④ Be sure the pump oil is clean. A badly contaminated pump may require several oil flushes.
- ⑤ Isolate vacuum pump from system and measure vacuum. If the vacuum is good, problem may be in the vacuum chamber
- ⑥ Be sure the oil is at the proper level. For maximum pump operation, the oil must be even with the OIL LEVEL line on the sight glass when the pump is running. Do not overfill-operating temperatures will cause the oil to expand so it will appear at a higher level than when the pump is not running. To check the oil level, start the pump with the inlet capped, Check the oil level in the sight glass. Add oil if necessary.

## Technical Data

MODEL		CPS-5B	USV-9B
Displacement	CFM	4.5	9
Ultimate Vacuum	Microns	250	250
Noise Level	DbA	54	56
Motor	Hp	1/3	<sup>3</sup> / <sub>4</sub>
Pump Speed	RPM	1750	1750
Oil Capacity	MI	250	600
Inlet Connection	Mm	Nozzel	
Dimensions	L x W x H	14 x 6.77 x 11.41	14 x 7 x 11.81
Pump Weight	Lbs.	23	44

## Exploded Drawing Dual Stage Vacuum Pumps

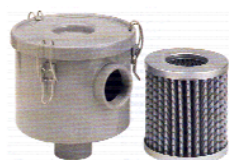


- |                        |                               |
|------------------------|-------------------------------|
| 1. Fan cover           | 20. Molded Base               |
| 2. Fan                 | 21. Screw                     |
| 3. Motor cover         | 22. Restrictiong piece        |
| 4. Bearing             | 23. Valve piece               |
| 5. Motor rotor         | 24. Front -pump stator        |
| 6. Shaft seal          | 25. Rotary-vane               |
| 7. Bearing             | 26. Rotary-vane spring        |
| 8. Waveform gasket     | 27. Front-pump rotor          |
| 9. Long screw          | 28. Middle fense              |
| 10. Motor stator       | 29. Back-pump stator          |
| 11. Outlet             | 30. Back-pump rotor           |
| 12. Switch             | 31. Back-pump cover           |
| 13. Handle             | 32. Screw                     |
| 14. Capacitor          | 33. Housing gasket            |
| 15. Motor hull         | 34. Die-cast Aluminum housing |
| 16. Oil fill port      | 35. Exhaust fitting           |
| 17. Oil fill port seal | 36. Oil drain gasket          |
| 18. Inlet port         | 37. Oil drain cap             |
| 19. Trestle            | 38. Sight glass               |

# CPS SERIES ACCESSORIES



0-30" Hg VACUUM GAUGE			
		CATALOG NUMBER	
USE WITH PUMP MODEL	CONNECTION SIZE	BRASS	STAINLESS
CPS-5B, USV-9B, CPS-7D/15D	1/4"	VGBB-25	VGBS-25



INLET PARTICULATE FILTER			
		CATALOG NUMBER	
USE WITH PUMP MODEL	CONNECTION SIZE	FILTER	REPLACEMENT ELEMENT
CPS-5B	3/8"	VFISL824038	824
USV-9B, CPS-7D/15D	1/2"	VFISL824050	824



PVC VACUUM HOSE (wire reinforced)		
USE WITH PUMP MODEL	HOSE SIZE	Catalog #
CPS-5B, USV-9B	1/4" ID	USVH25-PVC
CPS-5B, USV-9B	1/2" ID	USVH50-PVC
CPS-7D/15D	5/8" ID	USVH62-PVC



VACUUM PUMP OIL			
		CATALOG NUMBER	
USE WITH PUMP MODEL	TYPE	1 QUART	1 GALLON
CPS-5B, USV-9B	HYDROCARBON	US350SS-QT	US350SS-GL
CPS-7D/15D	HYDROCARBON	US350SS-QT	US350SS-GL



PREMIUM EXHAUST FILTER			
		CATALOG NUMBER	
USE WITH PUMP MODEL	TYPE	FILTER	REPLACEMENT ELEMENT
CPS-5B, USV-9B	COALESCER	EE-GL915	GL915

\* CPS-7D/15D has integral exhaust filter as standard. Replacement element (pt# EFPCP)



# **WARRANTY– VACUUM PRODUCTS**

Subject to terms and conditions hereinafter set forth and set forth in General Terms of Sale, US Vacuum Pumps LLC (the seller) warrants products of its manufacturer, when shipped, and its work (including installation & start-up) when performed, will be of good quality and will be free from defects in material and workmanship. This warranty applies only to sellers equipment, under use and service in accordance with seller's written instructions, recommendations and ratings for installation, operating, maintenance and service of products for a period of 12 months. Because of varying conditions of installation and operation, all guarantees of performance are subject to plus or minus 5% variation.

**THIS WARRANTY EXTENDS ONLY TO BUYER AND/OR ORIGINAL END USER, AND IN NO EVENT SHALL THE SELLER BE LIABLE FOR PROPERTY DAMAGE SUSTAINED BY A PERSON DESIGNATED BY THE LAW OF ANY JURISDICTION AS A THIRD PARTY BENEFICIARY OF THIS WARRANTY OR ANY OTHER WARRANTY HELD TO SURVIVE SELLER'S DISCLAIMER.**

All accessories furnished by seller but manufactured by others (motor) will bear only that manufacturer's standard warranty.

All claims for defective products, parts, or work under this warranty must be made in writing immediately upon discovery and, in any event within one (1) year from date of shipment of the applicable item by seller. Unless done with prior written consent of seller, any repairs, alterations or disassembly of sellers equipment shall void warranty. Installation and transportation costs are not included and defective items must be held for seller's inspection and returned to sellers Ex-works point upon request.

**THERE ARE NO WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY WHICH EXTENDS BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE.**

After buyers submission of a claim as provided above and its approval, seller shall at its option either repair or replace its product, part, or work at the original Ex-works point of shipment, or refund an equitable portion of the purchase price.

The products and parts sold hereunder are not warranted for operation with erosive or corrosive materials or those which may lead to a build-up of material within the product supplied, nor those which are incompatible with the materials of construction. The buyer shall have no claim whatsoever and no product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action nor for problems resulting from build-up of material within the unit nor for problems due to incompatibility with the materials of construction.

Any improper use, operation beyond capacity, substitution of parts not approved by seller, or any alteration or repairs by others in such manner as in sellers judgment affects the product materially and adversely shall void this warranty.

No employee or representative of seller other than an officer of US Vacuum Pumps LLC is authorized to change this warranty in any way or grant any other warranty. Any such change by an officer of the company must be in writing.

In no event shall buyer be entitled to incidental or consequential damages. Any action for breach of this agreement must commence within (1) year after the cause of action has occurred.



## VACUUM CONVERSION TABLE

Torr	mbar	"HgV	"HgA	psia	% Vacuum
760	1013	0	29.921	14.69	0
750	999.67	0.39	29.527	14.5	1.32
700	993.03	2.36	27.559	13.54	7.89
600	799.74	6.29	23.622	11.6	21.05
500	666.45	10.23	19.68	9.67	34.21
400	533.18	14.17	15.74	7.73	47.37
380	506.5	14.96	14.96	7.35	50
300	399.87	18.11	11.81	5.8	60.53
200	266.58	22.04	7.87	3.87	73.68
150	199.93	24.01	5.91	2.9	80.26
100	133.29	25.98	3.94	1.93	86.84
90	119.96	26.37	3.54	1.74	88.16
80	106.63	26.77	3.15	1.54	89.47
70	93.3	27.16	2.76	1.35	90.79
60	79.97	27.56	2.36	1.16	92.11
50	66.64	27.95	1.97	0.97	93.42
40	53.32	28.34	1.58	0.77	94.74
30	39.99	28.74	1.18	0.58	96.05
25.4	33.86	28.92	1	0.49	96.66
20	26.66	29.13	0.78	0.39	97.37
10	13.33	29.53	0.39	0.19	98.68
7.6	10.13	29.62	0.29	0.14	99
1	1.33	29.88	0.04	0.02	99.87
0.75	0.99	29.89	0.03	0.01	99.9
0.5	0.66	29.9	0.02	0.009	99.93
0.1	0.13	29.91	0.004	0.002	99.98
0.01	0.01	29.92	0.0004	0.0002	99.99
0	0	29.921	0	0	100

# NOTES