BLACKMAX®

cps®

# VPBM4V, VPBM6V, VPBM8V, VPBM12V

## Variable Speed, Two Stage, Ignition Proof Vacuum Pumps


***Custom Designed For HVACR Professionals***

**OWNER'S MANUAL** (English)

Latest updates: www.cpsproducts.com

(100-240VAC @ 50/60 Hz)

TO BE OPERATED BY QUALIFIED PERSONNEL ONLY

## CONTENTS

## GENERAL SAFETY INSTRUCTIONS

Please read, follow and understand the contents of this entire manual, with special attention given to Danger, Warning and Caution statements.

| WARNING SYMBOLS AND DEFINITIONS | |
|---|---|
| ⚠ | This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death. |
| ⚠ DANGER | Indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
| ⚠ WARNING | Indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
| ⚠ CAUTION | Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
| NOTICE<br>CAUTION | Addresses practices not related to personal injury. |

**THESE VACUUM PUMPS ARE FOR USE BY PROFESSIONALLY TRAINED AND CERTIFIED OPERATORS ONLY. MOST STATES, COUNTRIES, ETC., MAY REQUIRE USERS TO BE LICENSED. PLEASE CHECK WITH YOUR LOCAL GOVERNMENT AGENCY.**

### ⚠ DANGER

**EXPLOSION RISK!** This unit is not certified as 'explosion proof' for explosive rated environments. It is only to be used in normal environments.

**ELECTRICAL SHOCK HAZARD:** Always disconnect power source when servicing this equipment.

To reduce the risk of electric shock, do not expose to rain. Store indoors.

**DANGER-EXPLOSION RISK:** Do not mix Class A2L, A2 or A3 refrigerants with air. All precautions must be taken to eliminate mixing of air with flammable refrigerants.

**The following are additional safety recommendations when servicing equipment that contains Class A2L, A2 or A3 refrigerants. These instructions do not replace existing occupational hazard procedures or other regulations that may be required by local, state or federal agencies.**

Technicians working on Class A2L, A2 and A3 systems should have detailed knowledge of and skills in handling flammable refrigerants, personal protective equipment, refrigerant leakage prevention, handling of cylinders, charging, leak detection and proper disposal. Additional knowledge of legislation, regulations and standards relating to flammable refrigerants may also be required.

**Special Certification or licensing may be required for Class A2, A2L or A3 and refrigerant handling. Check your local occupational safety codes.** The area of service should be marked as **Temporary Flammable Zone**. There should be a 10 foot (9.8

**⚠ DANGER**

meter) perimeter around the refrigeration equipment being serviced and should have NO SMOKING and other hazardous signs posted. Local supervisor should be notified of the zone's existence.

**ASHRAE STANDARD 34 REFRIGERANT SAFETY CLASSIFICATION**

| | **Lower Toxicity Refrigerants*** |
|---|---|
| ***Higher* Flammability** | A3 |
| ***Lower* Flammability** | A2 |
| | A2L |
| ***No Flame* Propagation** | A1 |
| | *No identified toxicity at concentrations less than or equal to 400 PPM |

**⚠ WARNING**

Do not use equipment in the vicinity of spilled or open containers of gasoline or other flammable substances.

All hoses may contain liquid refrigerant under pressure. Contact with refrigerant may cause frostbite or other related injuries. Wear proper personal protective equipment such as safety goggles and gloves. When disconnecting any hose, please use extreme caution.

Do not restrict airflow to this machine. Provide at least 3 feet (1 meter) of clearance around the air intake while in operation.

This machine generates a deep vacuum that can be harmful to human tissue. Do not expose any part of the human body to the vacuum.

**TO REDUCE RISK OF FIRE:** Avoid use of an extension cord because extension cord may overheat. If you must use an extension cord, use 14 awg minimum.

Avoid breathing refrigerant vapors and lubricant vapor or mist. Breathing high concentration levels may cause heart arrhythmia, loss of consciousness, or even cause suffocation. Exposure may irritate eyes, nose, throat and skin. Please read manufacturer's Material Safety Data Sheet for further safety information on refrigerants and lubricants.

Pump may produce harmful substances caused by the breakdown of pump lubricants or fluid remaining in the pump.

Make certain all safety devices are functioning properly before operating equipment.

**⚠ CAUTION**

Hot surfaces may be present. To reduce the risk of burns, do not touch.

## AGENCY APPROVALS, STANDARDS

**CE & UKCA** - Tested to UL 12.12.01 Methods For Ignition Proof Requirements Per UL1963 Supplement SB.

**EMC (Electro-Magnetic Compatibility):** EN IEC 55014-1:2021; EN IEC 55014-2:2021; EN IEC 61000-6-1:2019; EN IEC 61000-6-3:2021

## OVERVIEW

In an AC or refrigeration system, moisture with oil forms sludge, while moisture mixed with refrigerant forms hydrofluoric and hydrochloric acids all of which can permanently damage a system.

**The BLACKMAX VPBM Series Vacuum Pumps** have been custom designed for HVACR professionals to make AC and refrigeration system evacuation fast and easy! These pumps are the most powerful, lightweight, variable speed vacuum pumps in their class. All have a brushless DC motor, ignition-proof starting components, and 15 micron ultimate vacuum and **are for use on HVACR systems where Class A1 (lower toxicity, nonflammable); Class A2L (lower toxicity, low flammability); Class A2 (lower toxicity, flammable) and Class A3 (lower toxicity, higher flammability) refrigerants have already been recovered.**

**Once refrigerant has been recovered from an HVACR system (with a Recovery Machine), any of the vacuum pumps in this BLACKMAX series can be re used for evacuating (degassing trace amounts of refrigerants and dehydrating) an AC or refrigeration system- before these systems are charged with refrigerant.** A system that has been properly "evacuated" assures that non-condensibles and moisture won't later harm the refrigerant or refrigerant oil in the system, which in turn may harm the system itself.

## KEY FEATURES / BENEFITS

| FEATURE | BENEFIT |
|---|---|
| • Variable speed, brushless, DC motor | • Low power start up, lower weight, longer pump life |
| • Two stage | • Deeper ultimate vacuum vs. single stage units |
| • Ignition proof design | • Safer operation |
| • Auto shut-off solennoid valve | • Prevents oil siphoning and locks in vacuum when shutting off the unit |
| • For systems where ASHRAE Class A1, A2, A2L & A3 lower toxicity refrigerants have been recovered. | • Adaptable for a variety of systems |
| • Gas ballast valve | • Reduces moisture level in oil and extends oil life. Provides deeper vacuum by drying out the 2nd stage |
| • 15 Micron ultimate vacuuum | • Helps to remove greatest amount of condensables that can damage AC or refrigeration components |
| • Built-In vacuum gauge | • Quick, convenient monitoring of vacuum level |
| • Thermal overload protection | • Automatically protects pump from over-heating |
| • 1/4", 3/8", 1/2" fittings and a non-restric-tive internal intake manifold | • Compatible with a variety of stock hose sizes and for fastest evacuation |
| • Universal voltage (no voltage selector switch). Simply plug in and run | • Motor and electronics are fully protected to ensure unit adjusts to the proper input voltage |
| • Extra low temperature start up by utilizing a DC motor with ramp start up | • Starts at temperatures as low as 5°F (-15°C) with no inrush current |
| • Large vertical sight glass | • Easier to view oil level and oil purity |
| • Exhaust oil fill cap (mist-free) | • Special cap design returns oil mist into pump for better air quality |
| • In-line hose connection ports | • Greater spacing between in-line ports allows for faster, easier hose connections (vs. "tree mounted"ports) |

# SPECIFICATIONS

| BLACKMAX Model # | VPBM4V | VPBM6V | VPBM8V | VPBM12V |
|---|---|---|---|---|
| **Maximum Free Air Displacement (@ 3200 RPM)** | 4 CFM | 6 CFM | 8 CFM | 12 CFM |
| **Stages** | 2 | | | |
| **Ultimate Vacuum** | 15 Microns | | | |
| **Refrigerant Class** | Compatible With Residual A1, A2L, A2, A3 Refrigerants (Not A Recovery Machine) | | | |
| **Ignition Proof Construction** | Tested To UL12.12.01 Methods For Ignition Proof Requirements Per UL1963 Supplement SB | | | |
| **Voltage** | Universal Voltage 100V Min- 240V Max, @ 50/60Hz | | | |
| **Motor Type** | "BLDC" (Brushless DC Motor With Variable Speed Start Up) | | | |
| **Maximum RPM** | 3200 | | | |
| **Motor Size (HP)** | 1/2 HP | | 1 HP | |
| **Watts** | 300 | | 500 | |
| **Low Energy Sealed On/Off Switch** | Flashing Green LED in Standby; Solid Green when Running. | | | |
| **Power Cord** | Locking 90° IEC Type, 10 Ft (9.8m) Length | | | |
| **Vacuum Pump Oil Capacity (Max)** | 15.0 Oz (0.44L) | 14.0 Oz (0.41L) | 24.4 Oz (0.72L) | 23.0 Oz (0.68L) |
| **Exhaust/Oil Fill** | Mist free | | | |
| **In-line Vacuum Intake Ports** | 1/4", 3/8" and 1/2" SAE | | | |
| **Analog Vacuum Gauge** | Units: kPa, InHg (+/- 2% Accuracy) | | | |
| **Gas Ballast Valve** | (Drys Out The 2nd Stage). Plated Brass | | | |
| **Solenoid Valve** | Normally Closed. Open When Vacuum Pump Is Energized | | | |
| **Operating Temperature Range** | 5°F to 130°F (-15°C to 55°C) | | | |
| **Storage Temperature Range** | 0°F to 150°F (-17.7°C to 65.5°C) | | | |
| **Thermal Overload Protection** | ✓ | | | |
| **Pump Weight (W/O Pkg)** | 18.2 Lb (8.25 Kg) | 19.1 Lb (8.6 Kg) | 22.4 Lb (10.1 Kg) | 23.2 Lb (10.8 Kg) |
| **Pump Weight (W/ Pkg)** | 20.6 Lb (9.34 Kg) | 21.32 Lb (9.67 Kg) | 25.2 Lb (11.4 Kg) | 26.0 Lb (11.7 Kg) |
| **Pump Dimensions, Inches (mm)** | 10"H x 5.8"W x 13.8" L (254 H x 147 W x 352 L mm) | | 10.5"H x "6.06" W X 15.5" L (267 x 164 x 394mm) | |
| **Color Box Size, Inches (mm)** | 11.25" H x 8.5" W x "15.3" L (286 x 216 x 391mm) | | 13.8" H x 8.6" W x 17.1" L (352 x 219 x 436 mm) | |
| **Approvals** | CE and UKCA (Tested to UL 12.12.01 Methods For Ignition Proof Requirements Per UL1963 Supplement SB) EMC (Electro-Magnetic Compatibility): EN IEC 55014-1:2021; EN IEC 55014-2:2021; EN IEC 61000-6-1:2019; EN IEC 61000-6-3:2021 | | | |
| **Individual Packaging** | Printed 4 Color | | | |
| **Warranty** | 2 Year | | | |

# VACUUM PUMP LAYOUT

Analog Vacuum Gauge


Specifications Label

**Intake Ports:**
1/4˝
3/8˝
1/2˝

Stainless Steel Chain

Power Cord with Plug Clip At End

Closed, Hoist Type Handle

**Ignition Proof ON/OFF Switch.**
Flashing Green: Connected To Power
Solid Green: Pump & Fan Running

Locking 90° IEC Type Detachable Power Cord

Air Intake

Hard Rubber Feet


Knurled 2nd Stage Gas Ballast Valve (Plated Brass)

Oil Reservoir (Aluminum)

Air Exhaust

Convenient, Built In “Cord Wrap” (Cord Storage)

Exhaust/Oil Fill Cap

Oil Exhaust

Oil Level **Maximum** Mark

Oil Level **Minimum** Mark

Large, Vertical Oil Sightglass

Knurled Oil Drain Valve (Plated Brass)

## INITIAL PREPARATION

**IMPORTANT! If recovering Class A2, A2L, or A3 refrigerants, with a recovery machine read ADDITIONAL SAFETY INSTRUCTIONS ON PAGE 3 & 4 OF THIS MANUAL.**

1. Thoroughly read this manual on the additional safety procedures required **when servicing AC or refrigeration systems using Class A2L through A3 refrigerants.**
2. **These vacuum pumps are shipped without oil in the reservoir. Remove the Exhaust/ Oil Fill Cap and add oil until it is between the MAX and MIN lines on the pump housing. Re-secure cap.**

**⚠ CAUTION**

**CAUTION: DO NOT RUN THIS EQUIPMENT WITH LOW OR NO OIL. RUNNING THIS EQUIPMENT WITH NO LUBRICATION WILL CAUSE PREMATURE FAILURE AND VOID THE WARRANTY.**

3. To promote initial, internal lubrication, **ensure all service ports are closed (capped).** Then, turn on vacuum pump for 15 seconds.
4. Re-check vacuum pump oil level (sight glass).
5. To achieve good final vacuum levels, add or remove oil if necessary so that oil level is between the MAX and MIN lines on the pump housing.
6. **Vacuum Pump is now ready to use. Proceed to Quick Start Guide.**

- A flammable gas detector should be used to monitor air in the **Temporary Flammable Zone**.
- A dry powder or $CO_2$ fire extinguisher must be available at service location.
- A suitable ventilation fan should be used in the work space to maintain a minimum of 5 air changeovers per hour.
- Ensure that electrical power has been turned off to the equipment being serviced.
- All potential ignition sources within temporary flammable zone must be disabled.
- When connecting service equipment (such as vacuum pumps, scales, recovery units) to a power source, the connection must be made outside the Temporary Hazardous Zone.
- Check the system to ensure the refrigerant has been properly removed from the refrigeration system being serviced.
- **Before evacuating a Class A2 or A3 system, the system should be purged with 100% Nitrogen. DO NOT USE AIR.**
- **NOT FOR USE ON AMMONIA SYSTEMS.**

**⚠ WARNING**

**WARNING: DO NOT OPERATE A VACUUM PUMP ON SYSTEMS UNDER PRESSURE. DAMAGE TO THE PUMP MAY OCCUR.**

1. Before using, read, understand and follow the instructions in this Owner's Manual.

   **DO NOT RUN PUMP UNTIL THE PROPER TYPE AND AMOUNT OF VACUUM PUMP OIL HAS BEEN ADDED.**

2. **Ensure oil level is between the "Max" and "Min" lines on the pump housing.** (See page 8 for markings). CPS recomends using CPS brand Pro-Set Premium Vacuum Pump Oil (available in pints, quarts and gallons).

3. To achieve a desired vacuum level more quickly, CPS recommends:

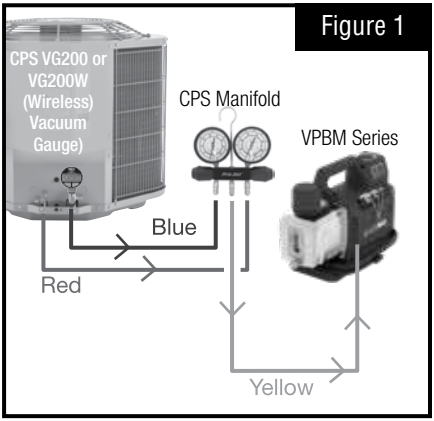
   a. Remove Schrader valves from the AC or refrigeration system service ports using a valve core removal tool (purchased separately).

   b. Use the shortest vacuum rated hoses with the largest diameter available.

   c. Inspect rubber seals at both ends of hoses for damage that may result in leakage.

   d. Avoid using hoses with low loss fittings when evacuating a system.

Figure 1




4. **Ensure Gas Ballast Valve is CLOSED (turn clockwise by hand until snug) for the START of Evacuation.**

5. Connect vacuum pump and any accessory items per **Figure 1** (a CPS brand Vacuum Gauge such as the VG200W is recommended).

6. Connect the supplied power cord from vacuum pump to a power supply (see rating on pump nameplate.) **LED** on housing will FLASH **GREEN**.

| LED LEGEND (For Pump On/Off Switch) | |
|---|---|
| **Flashing Green** | Pump connected to power and *in standby mode*. |
| **Solid Green** | Pump operating |

7. If pressure is above 2 PSIG, run recovery operation first (Use a CPS Pro-Set Recovery Machine for fastest results).

8. Press the Tactile **Power Switch** on pump housing to turn pump **ON** (**LED** will **become CONSTANT GREEN**) and the pump motor (and fan) will turn ON.

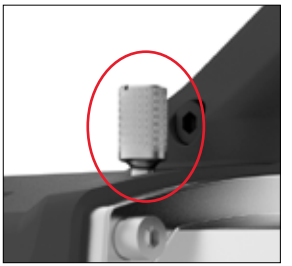
9. If pump has been running for an extended time, (or to ensure a dehydrated 2nd stage), slightly open the Gas Ballast Valve (GBV) for one minute. After pump quiets down from initial volume of air, CLOSE the GBV and continue evacuation (failure to close the GBV will result in poor pump performance).

10. After desired vacuum or time limit reached, close manifold valves.

11. Turn pump **OFF BY PRESSING AND HOLDING THE GREEN LIT ON/OFF SWITCH ON THE HOUSING**.
12. If removed, replace Schrader valves on AC system service ports using a valve core tool before disconnecting service hoses.

**SECOND STAGE GAS BALLAST VALVE OPERATION:**

The included Gas Ballast Valve helps remove moisture and other condensable vapors that have been drawn into the 2nd stage pump mechanism. Opening the Gas Ballast Valve (turn counter-clockwise by hand) during the first part of the evacuation allows fresh air to enter the 2nd stage mechanism which will reduce the moisture level and allow for deeper final vacuums. Most air and moisture in a system will be withdrawn before reaching 3000 microns.



## APPENDIX

### DECAY TEST

Technicians can test how well a vacuum level holds on a system by performing a **DECAY TEST**.

This routine will determine if Vacuum Pressure holds between **PRESET LOW** and **HIGH VALUES** for a **PRESET TIME**. We recommend that technicians use a CPS brand vacuum gauge such as the VG200, or the VG200W (wireless).

### TIME/TARGET TESTS

Technicians can also test the vacuum level on a system by using one of these VPBM Series BLACKMAX Vacuum Pumps to operate by **ONE of the following routines** (while used with the CPS VG200W Wireless Vacuum Gauge and a mobile device) or a CPS VG200.

1. **Time Test** - Run for a **PRESET TIME**, then stop.
   or
2. **Target Test** - Run until a **PRESET VACUUM LEVEL** is achieved, then stop.
   or
3. **Time - Target Test** - Run for a **PRESET TIME** after achieving a **PRESET VACUUM LEVEL**, then stop.

## OIL CHANGE FREQUENCY

- After the pump runs for a total of 4 hours (on one or more jobs), CPS recommends replacing the oil with fresh CPS brand Premium Vacuum Pump Oil or when:
- Oil becomes contaminated (condensation, particles) or is discolored.
- A 100 hour run time break-in period has been reached.
- Before and after storing the pump for an extended time.
- Vacuum pump level is significantly higher than the rated blank-off vacuum (best tested with a high vacuum gauge mounted directly on the inlet port).
- When pump no longer reaches a desired vacuum level (test with a vacuum gauge attached directly on the pump).
- Depending on the compressor oil type, application, and possible contaminants acquired when servicing AC or refrigeration systems, oil change frequency may range from daily to monthly.

**⚠ CAUTION**

**CAUTION: DO NOT RUN THESE VACUUM PUMPS WITH LOW OR NO OIL. RUNNING THESE VACUUM PUMPS WITH NO OR IMPROPER OIL WILL CAUSE PREMATURE FAILURE AND VOILD THE WARRANTY.**

## OIL CHANGE PROCEDURE

1. Before draining a VPBM series model, ensure oil is warmed up. If not, run pump for 10 minutes. **Then allow oil to reach room temperature**. If in doubt as to the temperature, use an infrared thermometer to check the housing temperature.
2. Turn pump OFF then **REMOVE POWER CORD FROM OUTLET.**
3. Place pump over a suitable container for draining oil.
4. Remove Oil Drain CAP, then loosen Oil Drain VALVE (turn counter-clockwise) on front of housing. **AVOID CONTACT WITH HOT OIL. HOUSING COMPONENTS MAY BE HOT.** Let contaminated oil drain from hole in bottom of reservoir, into suitable container under the pump.
5. Turn Oil Drain Valve CLOCKWISE to close the Oil Drain.

## OIL CHANGE PROCEDURE (CONT'D)

6. **Add fresh Pro-Set Premium Vacuum Pump Oil (by CPS) until level is between the MAX and MIN lines on the pump housing. See page 7 in this Owner's Manual for the correct amount of oil for the model(s) you own.**
7. **CPS (Pro-Set) brand Vacuum Pump Oil is available in single bottles as VPOP** (Pint), **VPOQ** (Quart) **or VPOG** (Gallon).

   **Pro-Set Vacuum Pump Oil Is is also available in CASE quantities as VPOP12** (12 Pints per box), **VPOQ12** (12 Quarts per box) **and VPOG6** (6 Gallons per box).

   Pro-Set Vacuum Pump Oil is specially blended to maintain maximum viscosity at normal running temperatures and during cold weather starts.
8. Please recycle or properly dispose of used oil.
9. Reinstall Exhaust/Oil Fill Cap.

## TROUBLESHOOTING GUIDE

| Condition | Possible Solution |
|---|---|
| **Machine Unusually Noisy** | |
| 1. Loose motor bolts | Tighten bolts |
| 2. Dirty, low, or improper oil | Replace oil (Pro-Set brand by CPS) |
| 3. Air leaks in connections | Fix leaks |
| **High Temperature** | |
| 1. Low or improper voltage | Check power source voltage |
| 2. Low oil level | Add or replace oil (Pro-Set brand by CPS) |
| **Poor Vacuum** | |
| 1. System leaks | Fix leaks (and test system with CPS Vacuum Gauge) |
| 2. Low oil level | Add or replace oil (Pro-Set brand by CPS) |
| 3. Dirty oil | Flush and replace oil (Pro-Set brand by CPS) |
| 4. Air leaks at connection | Fix leaks (and test system with CPS Vacuum Gauge) |
| 5. Air leaks at port caps | Ensure all cap seals are in place and caps are tight. |
| **Oil Leaks** | |
| 1. Oil leaks through exhaust | Oil level too high |
| 2. Oil leaks through reservoir | Tighten bolts or replace gasket |
| 3. System vented pressure | Check oil level |
| 4. Pump tipped over | Check oil level |
| 5. Oil leaks from sight glass | Contact CPS about repair or replacement |
| 6. How often should the oil be changed? | Every 3 to 4 residential jobs (about every 4 hours) |

| | |
|---|---|
| **Pump Doesn't Start** | |
| 1. No power to motor | Ensure power cord plugged in and press pump switch to turn pump on |
| 2. No Green LED light on after pump plugged into outlet. | Ensure outlet is receiving adequate power |
| **Pump Motor Speed** | |
| 1. Motor starts out slow then speeds up | VPBM series motors are variable speed, designed to operate this way |
| **Thermal Cutout** | |
| 1. Low or incorrect voltage | Check voltage supply |
| 2. Cold weather | Warm up oil- Start and run vacuum pump with the intake fitting open for 1 minute |
| 3. Dirty oil | Drain and replace oil (Pro-Set brand by CPS) |

## STORAGE

Ideal storage is dry and well ventilated in a climate controlled building. Humidity should be less than 80%. Temperature should range between 0°F to 150°F (-17.7°C to 65.5°C). Drastic changes in moisture and temperature should be avoided.

## END OF LIFE DISPOSAL

**Vacuum Pump Oil**
Properly drain oil from the vacuum pump (see page 11). Take oil to a certified collection center (CCC). Many communities have curbside recycling programs that allow you to leave oil at the curb (properly packaged). Or you can have the oil changed by a service station that recycles the oil.

**Vacuum Pump**
If the vacuum pump is still in good working order, consider donating it to another HVAC technician. Or, contact your municipal recycling center to learn how to dispose of a vacuum pump safely in your community. Another option is to contact the store from which you purchased the pump and determine if they will accept it.

## WARRANTY

CPS® Products, Inc. guarantees that all products are free of manufacturing and material defects to the original owner for **TWO YEARS from date of purchase**. If equipment should fail during guarantee period it will be repaired or replaced (at our option) at no charge. This guarantee does not apply to equipment that has been altered, misused or solely in need of field service maintenance. All repaired equipment will carry an independent 90 day warranty. This repair policy does not include equipment that is determined to be beyond economical repair. **WARRANTY DISCLAIMER**: Use this device to evacuate air, moisture and contaminants from sealed HVAC/R systems. **WARRANTY VOIDED IF USED FOR ANY OTHER PURPOSE.**

## REGISTRATION

To register this vacuum pump please visit ***www.cpsproducts.com/hvac-warranty-registration/***. Please contact us, if you have any technical issues during registration of your product.

**VPBM Serial # (See Underside Of Pump Base)** _____

**Date Of Purchase (Month, Day, Year)**_____

## LOCATIONS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