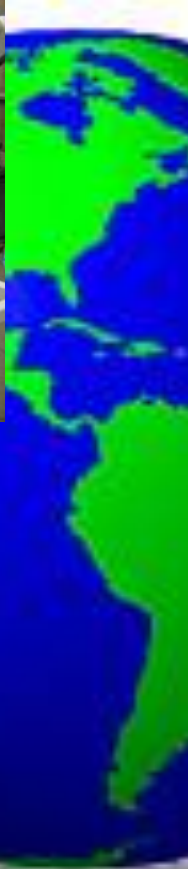


IVAC

OPERATING MANUAL



Maintenance And Operating Manual

IVAC



PV500 Vacuum Unit



The Industrial vacuum unit performs very well in a variety of material handling. It is a cost effective, safe solution for oil, rock, slimes, sludges, sand, gravel & other difficult materials in many mine, mill, & factory applications.

Keep all equipment in good working order.



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Vacuum Operation

The vacuum unit operates on compressed air. Compressed air is required to create the vacuum to operate the unit as well as provide discharge air to clear the tank and lines.



Be sure all lines and fittings are tight. Install whip checks on all air hoses.



Wear ear protection whenever the equipment is operating.

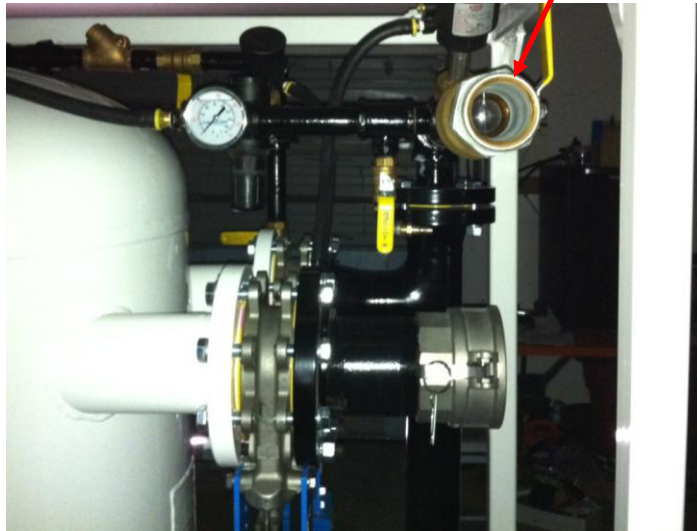


Air Inlet- The air inlet is 2", this can be NPT, victualic or other secure means. We do not recommend using "quick type" couplings unless you can be sure that there can be no disconnection or vibrating loose! Be sure all lines are clean and tight before turning air on to the unit. **Whip checks must be installed on all hoses leading to the unit.**

Be sure to always wear your PPE – Safety glasses, Hardhat, Gloves, Coveralls (oilers), & hearing protection should be considered as minimum standards.



Main Air Inlet
Hook up



Operator Controls

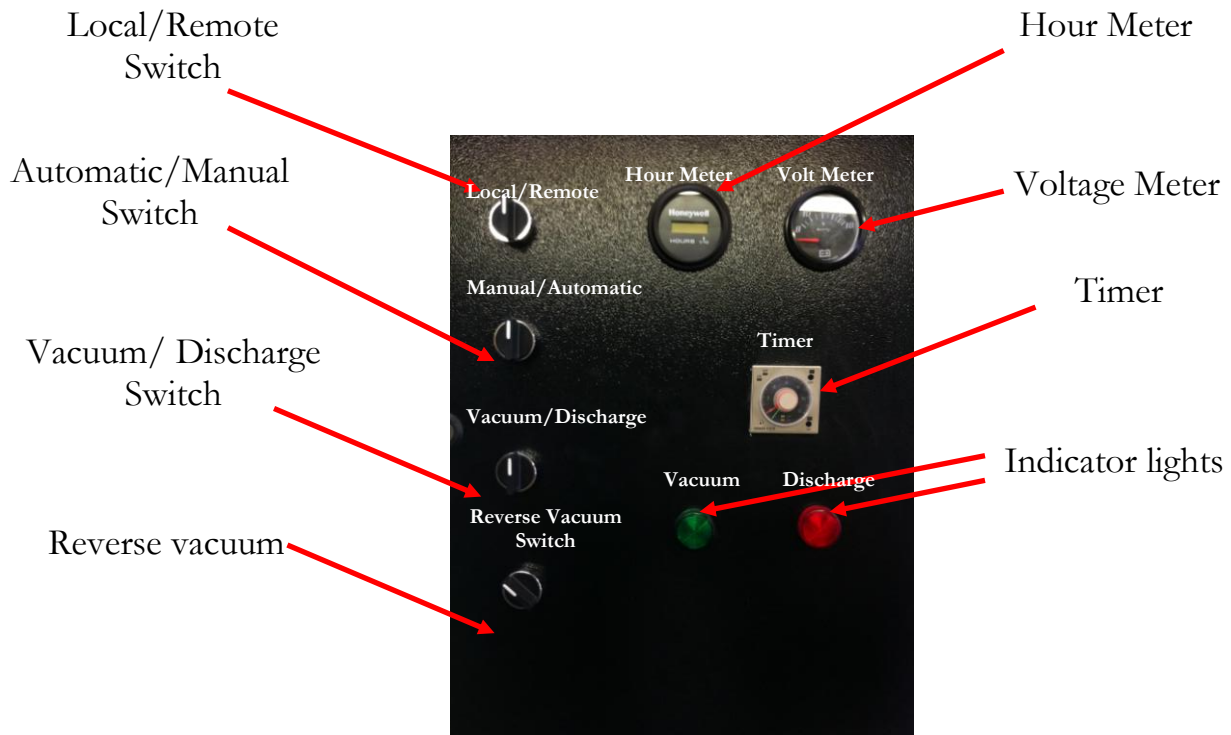
Operator Controls- The vacuum unit is operated from the control panel located on the unit.

Remote controls are available for automatic pumping operations.

With the control switch located in the manual position the operator moves the discharge/vacuum switch to control discharge and vacuum.

With the control switch located in Automatic the timer controls vacuum and discharge times and operation.

This is set by the operator depending on the types of material being transferred.



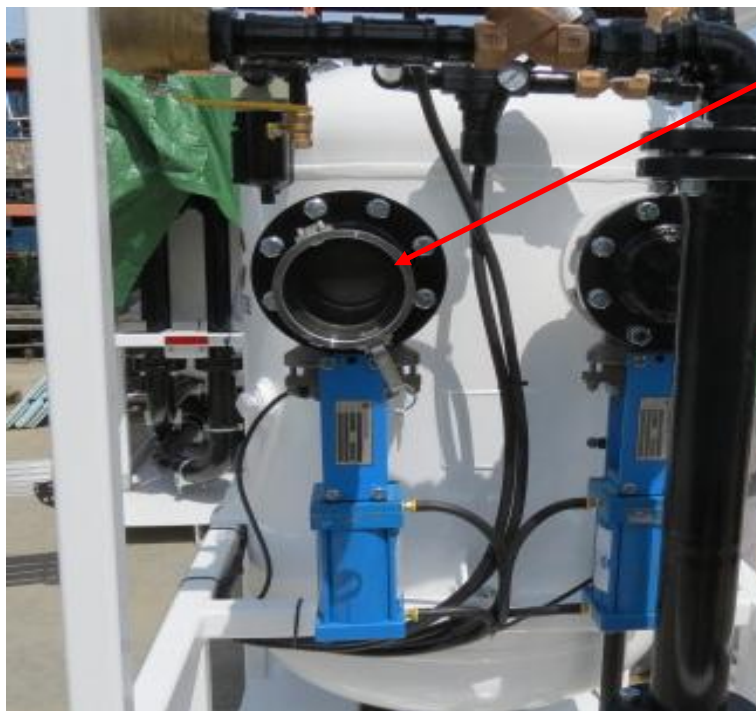
Material Inlet

Suction Inlet



Suction Inlet- The suction inlet is 4" cam lock. It is desirable to have the unit located as close as possible to the material being picked up.

Line sizes may be smaller to reduce the weight for operator comfort as well as provide proper suction velocity for different types of materials. Adapters are available at your IVAC certified dealer.



Suction
Inlet

Material Discharge

Discharge Outlet



Discharge Outlet-. Be sure all lines are tight and secured before operating the unit. Whip checks must be installed on all portable piping leading from the unit.

Be sure the area at the discharge pipe end is clear and cannot be accessed by any personnel. Materials can exit in high velocity and without warning! Portable piping and hoses MUST be secured.



4" Discharge outlet

Discharge Valves

Discharge air- there are two 1" manual ball valves located on the pressure vessel.

These valves help control the amount of air entering the tank during discharge mode.

The valves may be adjusted to control the discharge depending on the operation or material being moved.

There is a pressure regulator valve located on the discharge lines; this PR valve enables the operator to set the flow rate (pressure) of material through the discharge line. If discharging into a car, skip etc it can be adjusted lower to prevent material splashing or fly rock.

Important: If a Discharge line is plugged your tank pressure will be up and stay up. If so, put your switch to manual and on vacuum after you turn/hold your reverse switch (*this will prevent the intake gate from opening*) on for about 5 seconds, it is spring loaded and will return back to the off position. Using this function will turn your discharge line into a vacuum line for a few seconds and should dislodge the plug, repeat this process if required until the discharge line runs free again! Do not take apart any lines or clamps unless you have verified that the line does not contain any pressure. A One Inch valve (pictured next page) is installed to manually purge the pressure vessel of air. NOTE: If the reverse vacuum switch is not held, air may escape from the inlet line! IMPORTANT NOTE: This valve will purge the pressure vessel only.

2-1" ball valves Tank pressure gauge



Reverse vacuum switch

Pressure-regulator valve (screwing in, clockwise, increases the pressure)



Pressure Vessel/Tank Bleed

Before disconnecting the main airline that powers the unit this line must be bled. There is a 1/4" purge valve that needs to be opened this 1/4" purge valve will drain the main air hose pressure and the vacuum system, you must shut off the main air from the source or by turning the vacuum on with main air shut off. Do not remove any lines or clamps unless you are absolutely sure that there is no pressure in lines or hoses.



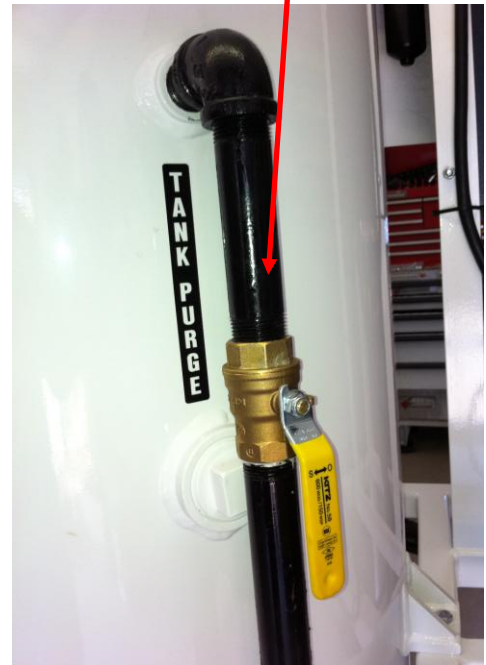
IT IS IMPORTANT THAT ALL LINES, HOSES AND VESSELS CONTAIN ZERO AIR PRESSURE BEFORE REMOVAL. COMPRESSED AIR MAY CAUSE SEVERE INJURY OR DEATH!



Control 1/4" Purge Valve



Tank Relief Valve



One Inch purge valve

Getting Started

IMPORTANT

Read Operators Manual
Before Operating
This Equipment

www.industrialvacuumunit.com

Clean out (blow) 2" airline before hooking up.

Hook up 2" airline to air inlet with whip-checks to all airline connections.

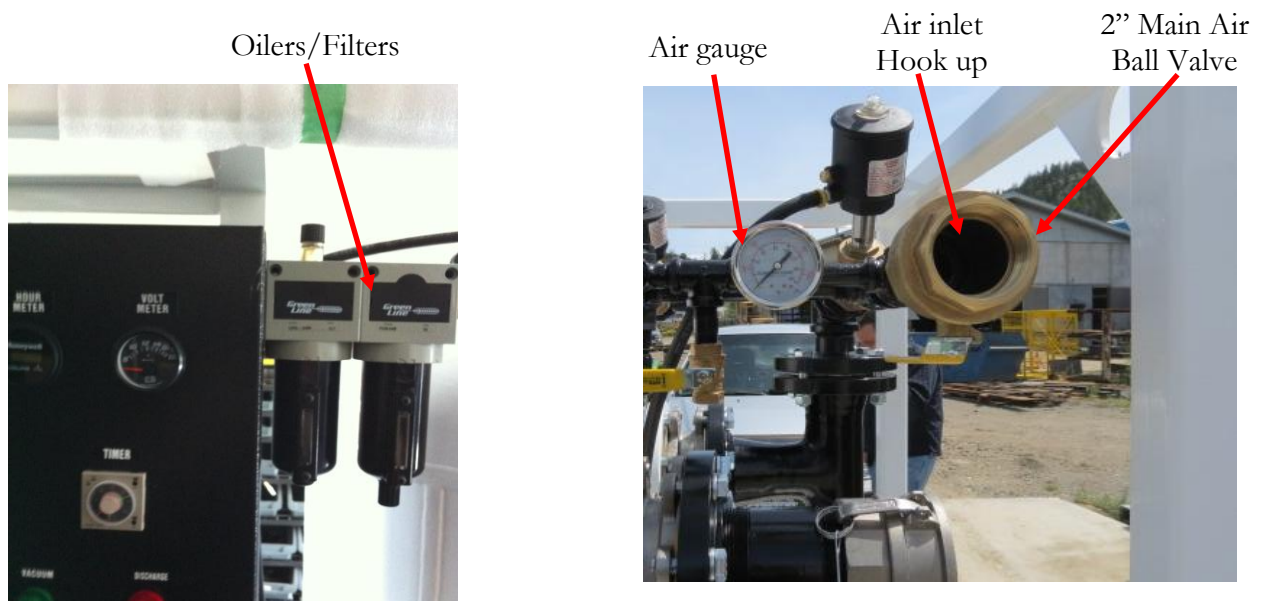
Make sure all switches are turned to the off position.

Make sure battery is hooked up and fully charged.

Hook up all vacuum hoses with cam-locks.

Hook up all discharge hoses make sure all discharge hoses are tied down & secured.

Slowly turn on main air valve make sure air gauge is around 80 to 120 PSI.

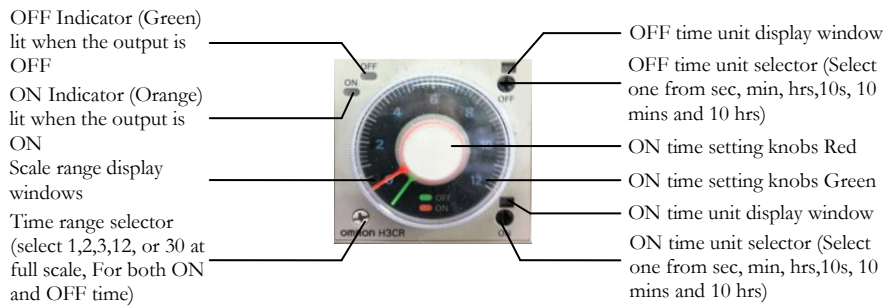
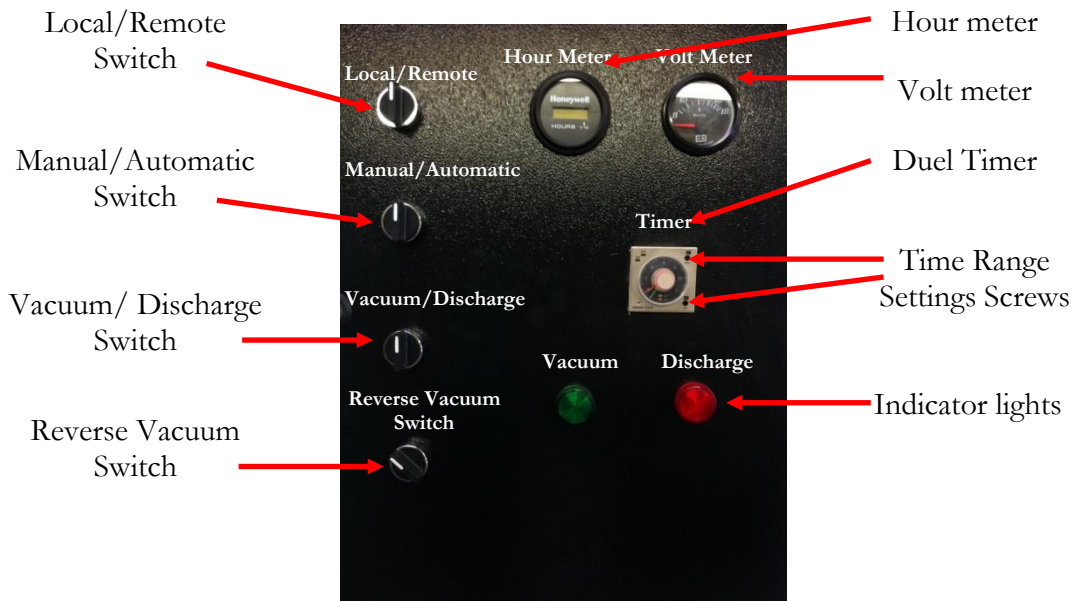


The PV500 is fitted with a lubricator and a filter to lubricate and also protect the controls from any debris in the control air. The filter also separates water from the air stream and should be drained daily by turning the bottom valve clock-wise. Since humidity in the air changes daily it is a good idea to check this often to determine the actual emptying intervals. The oiler is controlled by a valve in the top cover, counter-clock-wise allows more oil into the system. A quarter turn or a drop a minute is sufficient to operate. Use clean air tool or pneumatic oil to fill the oiler daily.

Getting Started

Continued:

Turn the Automatic/Manual switch to the manual position, turn the Vacuum/Discharge switch to the discharge position for a few seconds, and then to the vacuum position for a few seconds to make sure everything is working; don't worry you can't damage anything by running it dry. Then put the switch to the automatic position, it will start on discharge. To start, put your duel timer 30secs to vacuum and 30secs to discharge. You set the timer range settings by adjusting the time range screws as shown, this can be seen in the indicator window in hrs, mins, 10s and secs. Put your nozzle in your material and start pumping you will be able to hear when your tank is full and when your tank is empty, set your timers and again, don't worry you can't damage anything by over filling your tank, the more you run it the more you will get to know the machine and how to set it, this should only take a few trials.

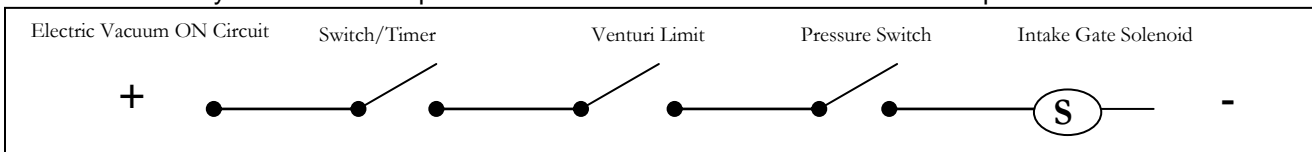


Pressure Switch

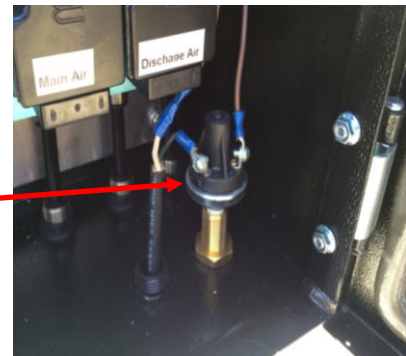
The pressure switch is an important part of the PV500's safety system, it is wired in series with the venturi gate limit switch to ensure that the intake gate will not open with the tank pressurized. Do not disengage these important systems.

How it works

- The pressure switch senses the tank pressure and in conjunction with the venturi limit switch makes sure that there is no pressure in the tank before the intake gate opens. When the vacuum unit goes into vacuum mode, power is allowed to operate solenoid valves that control the opening of the gate valves. The venturi gate opens first and that lets the tank become open to atmosphere before the intake gate will open. When the venturi gate opens it activates the venturi gate limit switch, which in turn with the pressure switch allow the intake gate to open. If the intake gate fails to open during vacuum cycle the limit and pressure switch should be checked for correct operation.



Pressure Switch



Care and Maintenance

The limit switch should be checked to be sure that when the venturi gate opens, the actuator rod on the knife-gate closes the limit switch when the venturi gate is fully opened.

The line to the pressure switch must be checked to be sure that the line is clear to the pressure switch located in the panel. The pressure switch makes sure that if the pressure is too high the gate will not open, the values should be determined by qualified operators and no material changes should be made to these systems or parts of this safety system without consulting IVAC. Adjusting pressure is accomplished by removing the rubber plug in the end of the pressure switch (PS) and with a hex head wrench turning it in (clockwise) to raise the pressure and out (counter-clockwise) to lower the pressure. An alternative pressure switch is available for low pressure systems and a complete vacuum) can be used for sensing a vacuum before the intake gate will open. The PV500 Unit comes equipped with the regular pressure switch that is used for general applications. Discuss this with IVAC technical support for additional information.

Discharge Air Angle Seat Valve

The discharge air angle seat valve allows air to energize the discharge air to evacuate the tank of your picked up materials. The valve is operated via the intake limit switch and the control circuit by ensuring that the intake gate is closed before discharge air is allowed to turn on. This prevents any pressure from reaching the operators line/hose. If the unit fails to discharge when on “discharge” mode, check the intake gate limit switch for its’ correct operation.

How It Works

When the PV500 is in discharge mode, electric power energizes the intake gate limit switch.

When the intake gate is closed and therefore closes the intake gate limit switch (ILS) circuit- energizing solenoid #5 (Discharge Mode) turning on air into the pilot line leading to the discharge air angle seat valve(The pilot pressure in turn opens the discharge air angle seat valve allowing air to flow into the vessel/tank by going through the discharge air regulator and the two X 1” ball valves that control the discharge air pressure and volume.

This procedure ensures that the intake line will not receive any pressure to the operators pick up line.

Discharge Angle Seat Valve

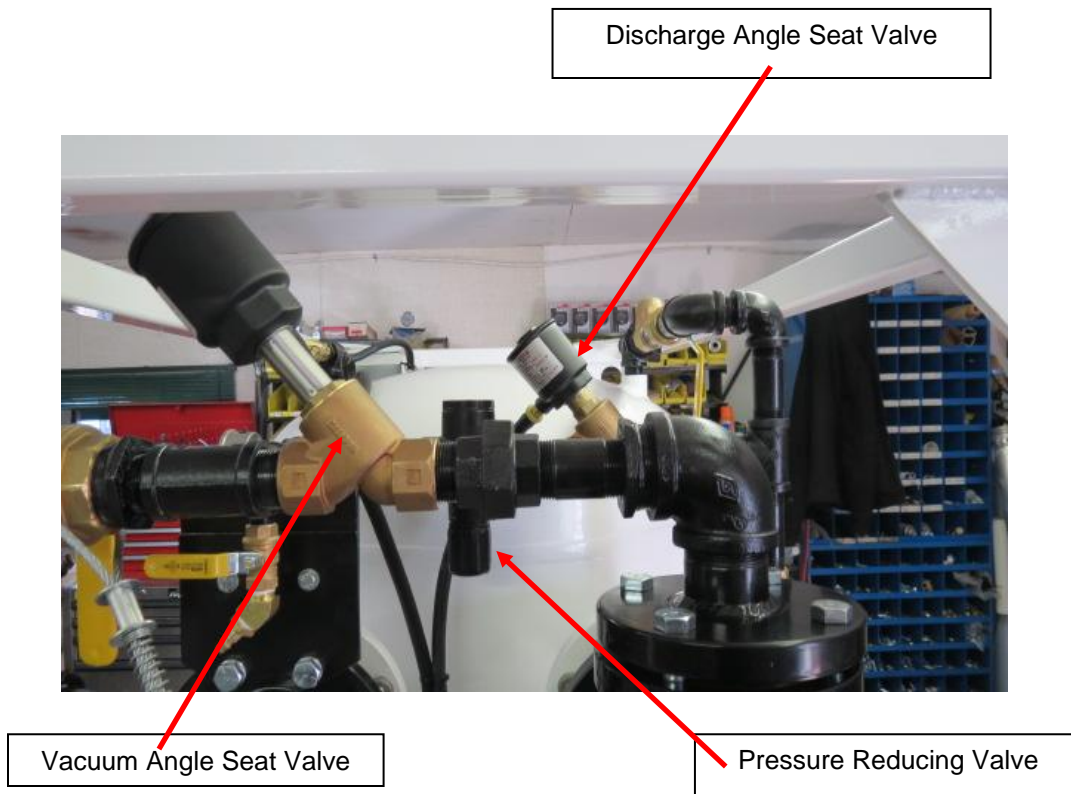


Care and Maintenance

The angle seat valve is a pilot operated pneumatic solenoid. When the pilot line is charged (on) it turns on the larger discharge angle seat valve. The pilot airline should be checked for wear and ensure that the connections are tight and there are no leaks. Air pipes leading to and from the valve should be tight and have no leaks.

Main Air Angle Seat Valve

The main air angle seat valve allows air to travel through the venturi to create a low pressure area in the vessel. Atmospheric pressure pushes material into the vessel through pipelines and/or hoses connected to the intake cam-lock fitting. The main-air/vacuum-air angle seat valve is activated by the control solenoids in the main control panel.



Discharge Pressure Reducing Valve

The pressure reducing valve on the discharge line allows the operator to set the discharge air pressure from zero to compressor system pressure while maintaining the volume of air needed to evacuate the material from the tank. The pressure reducing valve should be set at a pressure to move the material from the tank and through the hoses and pipes as required. The pressure should be kept as needed and not too high so as not to create fly rock or splashing of material or cause premature wear on discharge piping parts. Too high of pressure can create a safety issue and all lines leading from the unit on the discharge line must be of good construction and rated for the pressures. Discharge piping and hoses need to be securely anchored.

Limit Switches

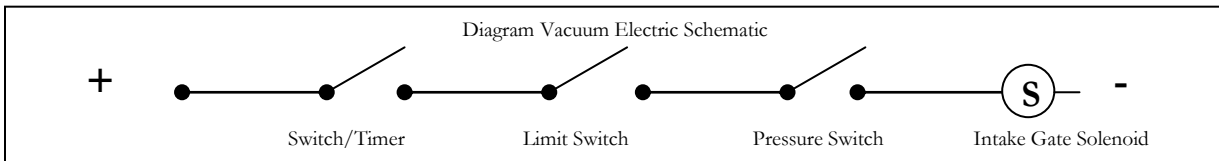
There are two limit switches located on the IVAC PV500 unit. The limit switches are an integral part of the unit's safety system and must not be by-passed. The limit switches ensure that the intake and discharge gate positions are in the proper position before opening of the intake gate or turning on of discharge air are allowed to continue.

How they Work

In order to ensure that the pressure vessel contains low/zero pressure before the intake gate is permitted to open. The venturi limit switch works in series with the pressure switch located in the electric panel.

When the vacuum unit goes into vacuum mode, electric power is used to operate the MAC solenoid valves that control the opening of the inlet and venturi gate valves and the closing of the discharge knife-gate valve. When in vacuum mode the venturi gate opens first & therefore opening the tank to atmosphere that causes low tank pressure before the intake gate will open. This is meant to bleed off any remaining pressure in the tank. When the venturi gate opens it closes the venturi gate limit switch which is connected in series to the pressure switch. Once the pressure switch senses low tank pressure it allows the intake gate to open. If the intake gate opens and allows air into the inlet hose prematurely, the discharge line could be plugged or the pressure switch requires adjustment.

On Discharge Mode, to operate the discharge air solenoid and subsequently pressurizing the holding vessel/tank, the intake gate limit switch is closed/activated indicating that the intake gate valve is closed. When the intake gate is closed, discharge air is allowed to enter the tank by turning on the discharge air angle seat (DASV) valve to discharge the picked up materials.



Care and Maintenance The limit switch should be checked for tight mounting bolts. The arm/lever checked for proper setting and actuation point. The strain relief should be tight on the cable to ensure that no water can enter the switch and that the cable is held tight.

Safety Timer Inside Panel

On 2015 and later models

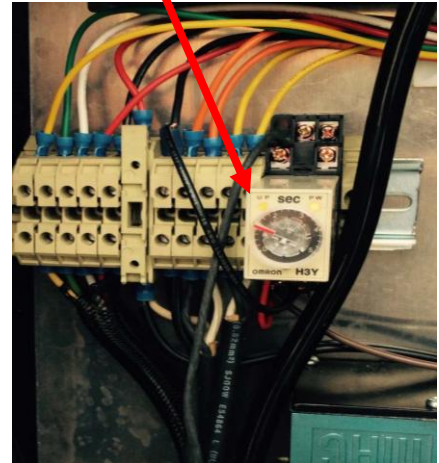
The panel timer is part of the controls that open the vacuum gate when going from discharge to vacuum mode.

Our equipment is always evolving with best practises and new items added as required. Kits are available for older equipment to be upgraded and IVAC recommends that you keep your units upgraded.

There will be additions for safety or better operating experience.

The PV500,s safety system will ensure that the vacuum gate (Intake Gate) will not open and allow pressure to escape back to the operator. It is the operators responsibility to ensure that the equipment is in good working order and that all the safety systems are working and in use. DO NOT by-pass any safety devices unless for special circumstances like testing or maintenance.

Timer



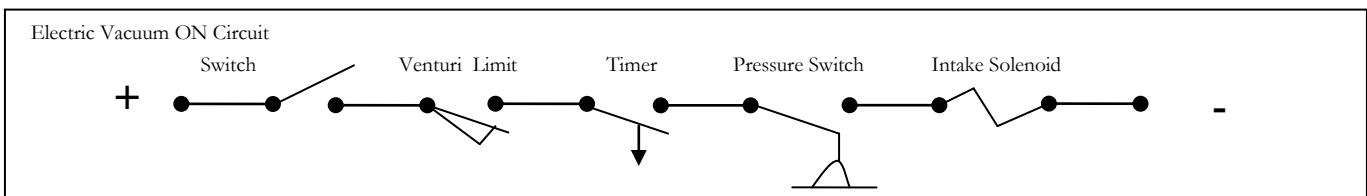
Pressure Switch



The Vacuum Gate (Intake Gate) timer allows setting the time for air to escape from the tank through the venturi port when changing from discharge to vacuum cycle. A pressure switch on the circuit and this redundancy (timer) adds another level of safety.

The timer should be set as required for operation. For typical operation the time should be about 1.5 seconds. This is not a setting that needs to be changed after its initial setting it is located inside the panel.

The venturi gate opens and activates the venturi limit switch, once the limit switch is activated the timer starts the vacuum opening time. When the timer receives signal power the light will go on the top left of the timer & when the set time has passed the light on the top right on the timer will go on that indicates that the power is available for valve opening, the light on #1 MAC valve will go on and the intake gate will open.



Trouble Shooting Guide

The vacuum gate does not open when in vacuum mode

Low Battery Voltage
Venturi gate limit switch is not activated
The Pressure Switch detects pressure in the vessel
Loose wire or broken wire on pressure switch circuit
Low air pressure

Poor Suction

Plug in suction line
Discharge air is on during vacuum cycle (valve malfunction)
Inadequate air pressure or volume
Air leak in the suction hose
The tank purge valve is open

Does not discharge

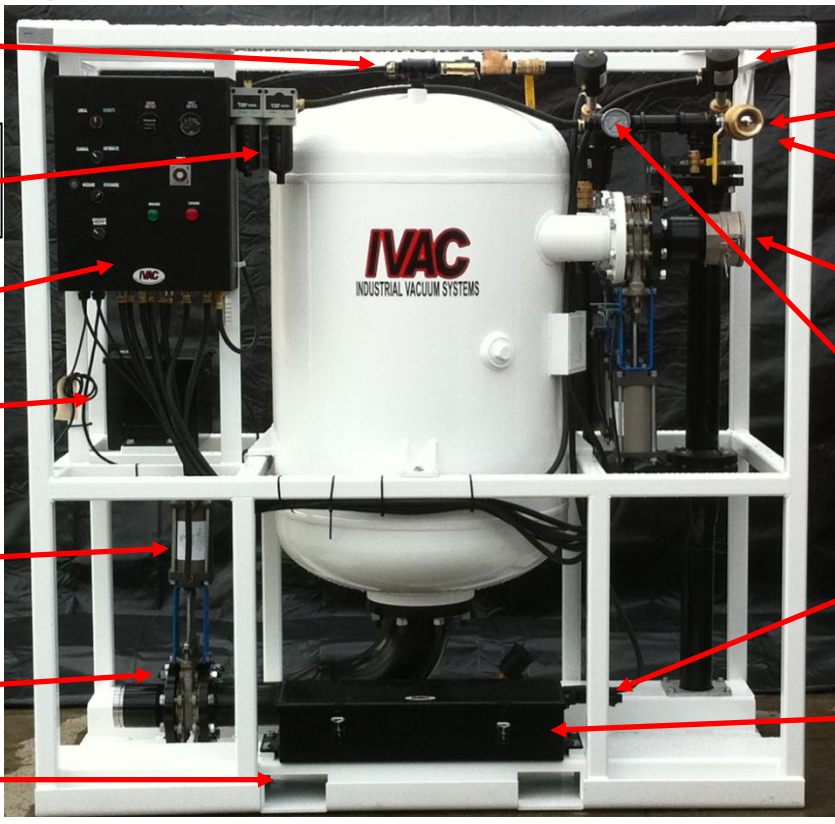
Plugged discharge line
Vacuum gate limit switch not activated
Discharge Air Regulator is not set properly
The 2 - 1" ball valves on the discharge line are off or plugged
Plugged check valve(s)

Air discharge from Vacuum/inlet Line

Discharge line/hose plugged
Pressure switch setting or malfunction
Pressure switch line plugged
Venturi gate limit switch not set properly

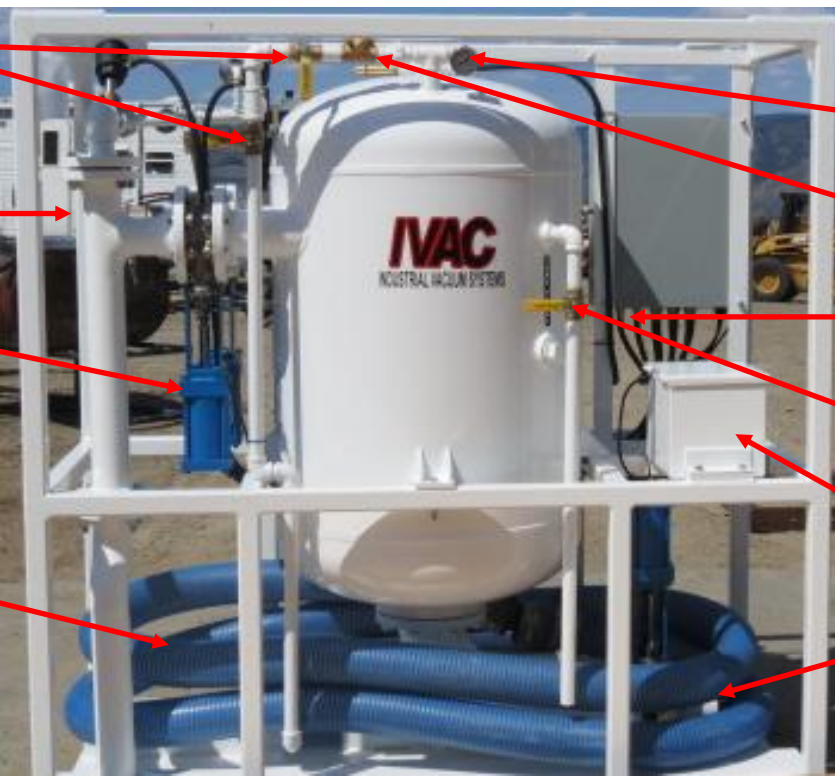
OPERATING MANUAL

- Tank Pressure Gauge
- Control Instruments Air-Filter
- Control Panel
- Plug In Battery Charger
- Discharge Knife-gate
- Discharge Outlet
- Forklift Eyes

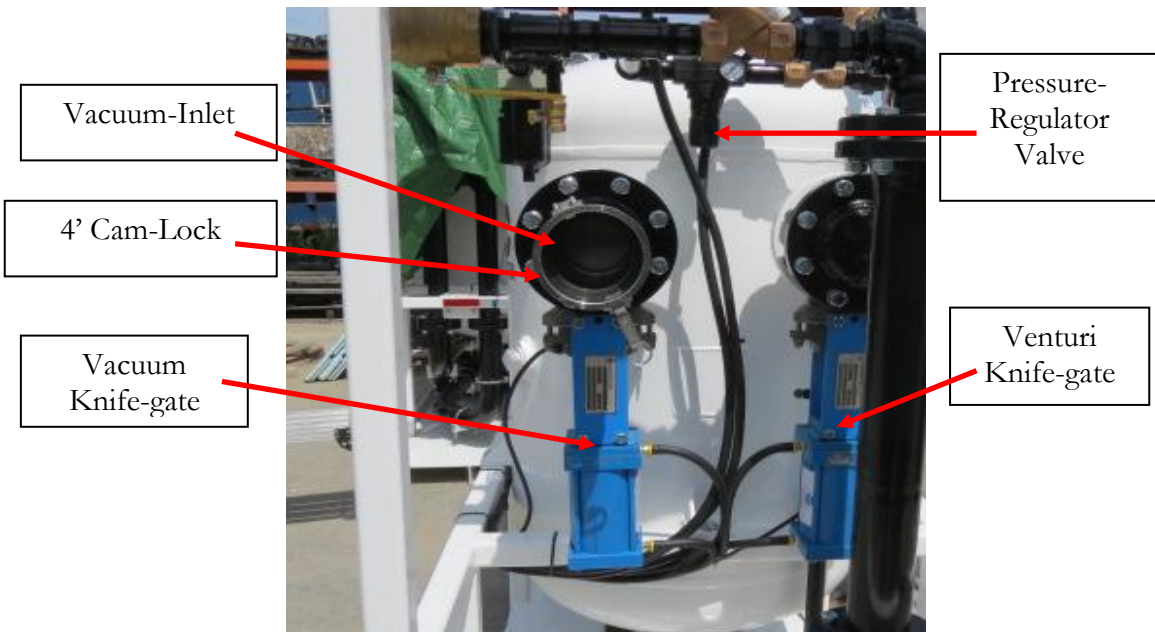
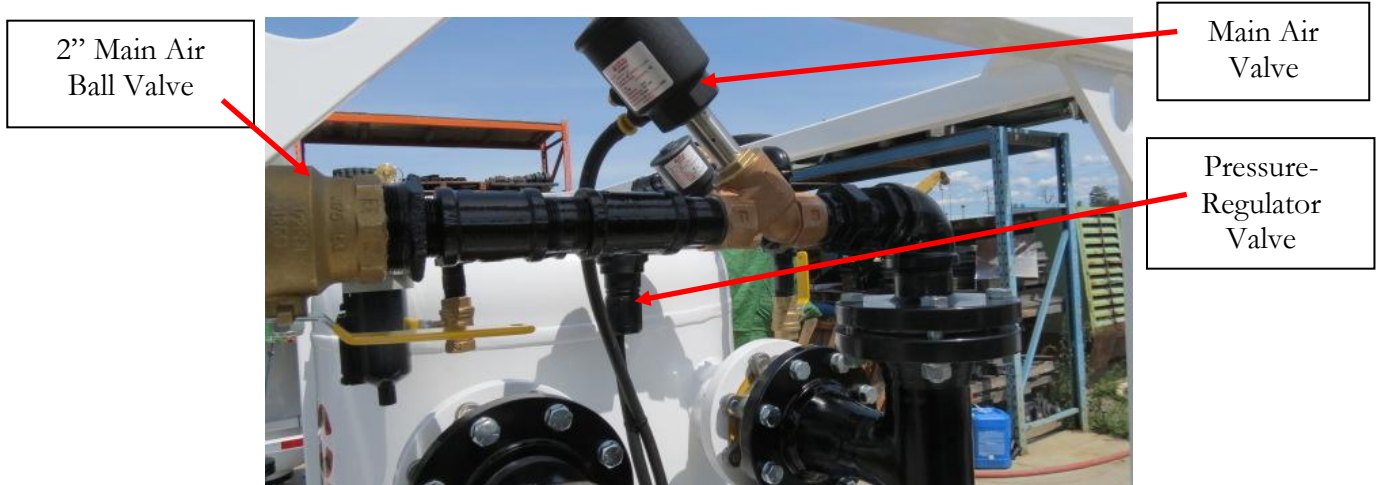


- Main Air Valve
- Air-Inlet
- Main Air 2" Ball Valve
- Vacuum-Inlet
- Main Pressure Gauge
- 1" Clean out plug
- Toolbox

- 2-1" Discharge Air Ball Valves
- Venturi
- Venturi Knife-Gate
- Vacuum Hose



- Tank Pressure Gauge
- 1" Check Valve
- Air Control Muffler
- One Inch purge valve
- Battery Box
- Discharge Outlet

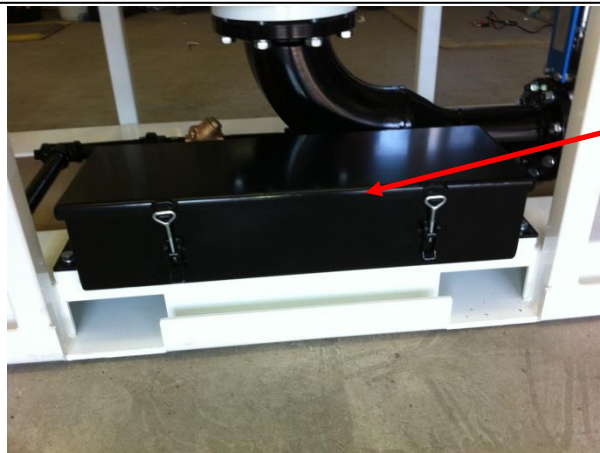


Limit Switch



Limit Switch

Limit switches play a key part of the PV500's safety system. When on discharge mode the vacuum gate limit switch is activated when the vacuum gate closes before discharge air is allowed to turn on. This is to ensure that the operator cannot receive any air pressure. The vacuum gate will not open unless the venture gate is open and activates the limit switch, this ensures that the operator cannot receive any air pressure by opening the gate under pressure.



Toolbox

1" Angle seat Valve



Optional PV500 Remote Control



Addition of the PV500 Remote Control.

The remote control allows the operator to manage the main functions on the PV500 Vacuum-Delivery unit. The system can be operated in automatic and manual while using the pennant station provided. Cable extensions allow the operator to manage all the functions from long distances from the unit, even at different mining levels if it is being used to muck raise bore cuttings for example. Additional extensions are available in 50 foot sections from your IVAC dealer. Commonly used so that the driller can operate the equipment from the operator station without needing to be near the main unit. For raise bore cutting mucking the operator can even be on another level of the mine.

Remote/Local Switch

The remote/local switch indicates where the timing for the Pv500 will come from. The timer with its' setting on the main control panel will operate the equipment when "Remote" is selected. When selected (remote) the equipment will first discharge the unit and then go into vacuum mode. The times are controlled by the timer located on the main control panel.

If "local" is selected the vacuum/discharge switch on the pennant station will control the vacuum unit. Therefore selecting "Vacuum" the unit will go into vacuum mode. When the switch is in the "Discharge" position the unit will operate in discharge mode.

*Warning: All safety and set-up provisions must be adhered to as per the operator's manual information. This includes the use of good quality piping or hose and making sure that the discharge pipe or hose is firmly secured. **DO NOT HAND HOLD THE DISCHARGE HOSE- SERIOUS INJURY CAN RESULT!** Discharge can be very violent and shutting the switch to "OFF" **WILL NOT** STOP the flow as any pressure or build-up of pressure is already in the hoses or pipeline and will not be controlled. To stop the unit you are required to shut off the air directly at the unit and manually bleeding the line(s) and is the only sure method of making sure that the line is not charged. Be certain that No Persons can access the area where the unit is discharging.*

Look For Other IVAC Products

P.V. 250 Pressure Vessel Vacuum



Double Tank Pressure Vessel Vacuum



Barrel Material Drop Vacuum



The PV 500 and PV 250 Vacuum



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