



VAPOR PRESSURE CONTROLLER

OPERATION MANUAL



YOU MUST READ THIS MANUAL BEFORE USE

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SECTION 1: OVERVIEW

The DigiVac Vapor Pressure Controller (VPC), is a rugged, modern vacuum measurement and control instrument designed to make vacuum measurement and regulation easy through the use of a simple LED readout and large tactile buttons. Electronically, it is a highly accurate digital vacuum gauge utilizing field-proven isolated vacuum sensor technology coupled with reliable valve and plumbing parts. This regulator was specifically designed for chemistry distillations that can be aided by precise pressure control. The VPC facilitates separating chemicals that have vapor pressures as close as 10 Torr to one another. It can also be used to prevent bumping by gradually changing the pressure. The VPC can also help save your pump, widen the choices of pumps you can use for low temperature distillation, and keep vacuum pump oil out of your system.

RUGGED

- All metal case protects flow components & electronics
- Field-proven isolated vacuum sensing technology to avoid sensor failure

PRECISE

- 775i sensor designed to be used in chemistry and industrial environments
- Calibrated at the factory against a NIST standard

RELIABLE

- Very simple electronics
- Easy to understand

FEATURES:

- Larger diameter valve than commonly available – makes pump downs faster
- Fine Grained Vacuum Control
- Simultaneous display of both current vacuum and set point
- Direct one touch set point setting
- Remote control via USB

OPTIONS:

- Replacement Sensor – SEN-775i-NPT-OEM

SECTION 2: QUICK START

For the VPC distillation vacuum regulator.

Unpack and Confirm: Verify you've received everything you ordered

The vacuum instrument contains the following components:

1. Vacuum distillation regulator with an international power supply
2. Quick Start guide or [this] User Manual

Easy to use steps:

1. Plug in the system to wall power and make sure LEDs light up
2. Mount VPC in desired location
3. Connect a hose from the vacuum pump to the port on the VPC labeled "Vacuum Pump"
4. Connect a hose from the system to the port on the VPC labeled "System to be controlled"
5. Use up and down arrows to set the target vacuum pressure
6. Read and control vacuum!



SECTION 3: INSTALLATION

Beyond the Quick Start installation instructions, care should be taken to insure clean leak free connections using high quality components. Below are some best practices for installation:

- Use high quality chemically resistant hose that won't breakdown and degrade with your process
- Use hose clamps or another way to minimize leakage at vacuum interfaces
- Use Teflon tape on all NPT fittings. Consult our [guide](#) on best practices for NPT connections.

SECTION 4: CONNECTIONS

The only required connections for operation are power, vacuum pump and system. A USB port also exists for the purpose of connecting to the VPC remotely to enable remote control and logging.

SECTION 5: SET POINTS

This VPC is equipped with a set point that defines the vacuum pressure that will be achieved.

To set the set point:

Step 1. Note the current set point indicated by the Green LED display.

Step 2. Press up or down to set the new set point. Note once the up or down button is depressed, the unit will immediately control to the new set point. Also note that the up and down arrows are “typomatic” such that the numbers will move faster the longer they are pressed.

SECTION 6: REMOTE COMMUNICATION

The unit can be communicated with remotely using simple ASCII commands. Below is a summary of those commands:

- S=320 set current setpoint to 320 Torr
- S? queries current set point
- Vac? queries current vacuum level
- M? get mode setting
- M=A set mode to automatic, where current vacuum reading and set point are sent over the wire at a rate of once per second
- M=M sets mode to manual, where the unit will wait for a query
- U? gets the current units
- U=0 sets the units to Torr
- U=1 sets the units to mbar
- U=2 sets the units to kPa

SECTION 7: FIELD CALIBRATION

The VPC family of products can be calibrated in the field provided that an accurate vacuum instrument standard exists. Typically, that instrument standard should be 4x as accurate, or at the very least much more accurate than the VPC. The standard should resolve to better than +/- 0.25 Torr.

Calibration Procedure

1. Plug in A/C adapter, connect cable to vacuum sensor. Maintain system at 2 Torr +/- 0.25 Torr. Turn "Vac" pot so the vacuum on the VPC reads 2 Torr
2. Raise pressure to 760 Torr. Adjust "SPAN" so VPC indicates 760 Torr

SECTION 8: TROUBLESHOOTING

Here are a few trouble shooting steps:

Observation	Possible Causes
System does not light up	Verify the system is plugged in, and all the cords are tight
System takes too long between set points	<ul style="list-style-type: none"> • Take VPC out of the configuration • Time how long it takes for system without VPC to get from the first vacuum level to the second vacuum level • Re-install the VPC and run same test • Rerun the same test with a tuned orifice of 0.150" • If the last 2 test are close, that means the VPC is performing as it should. If the last 2 tests are different, it means the VPC is not performing optimally. Please consult your vendor for technical assistance.
My readings are erratic	Check reading with another gauge to see if the readings are indeed erratic. If the other gauge does not show erratic readings, consult your vendor.
When I turn on my unit and turn on my vacuum pump, the vacuum reading doesn't go down.	Verify the switch on the right is in the "regulate" setting, and the vacuum pump is running.
My VPC is really noisy	The VPC valve is a bit noisy, but more of a finger tapping loudness. If you hear a loud metallic sound, then something is wrong. Consult your vendor.

SECTION 9: SERVICING AND MAINTENANCE

Sensor and Plumbing

In many cases, a sensor may become fouled with oil or other foreign matter. It is often possible to restore the functionality of contaminated probes with cleaning. If the contaminant is known, the VPC plumbing should be filled with a fluid that is known to be a solvent to that contaminant. As an example, ether is often effective in removing residues of some oils. Commercial carburetor cleaners are very powerful solvents and are highly effective against some contaminants.

After cleaning with solvents, the plumbing should be completely dried or flushed with a volatile solvent to assure that it is dry prior to reinstalling it. *If this is not done, contamination of the system may result.*

Maintenance

Your vacuum instrument should give you many years of trouble-free service. There are no regularly scheduled maintenance intervals. If consistent accuracy is required, it is recommended that the VPC and power supply be returned for a [yearly calibration check](#).

Notes on calibration

There is inherent drift in all sensors including the DigiVac 775i piezo resistive sensor. Drift is specified in the datasheet, but the specification is typically a worst case scenario as drift is not easily predicted and depends on operating environment. Depending on your accuracy requirements, it makes sense to set up a calibration interval to obtain as found data, and get a fresh calibration. Having this information will allow you to determine the optimal calibration interval. The accepted interval is 1 year, but depends on what accuracy you require and what you've defined in your standard operating procedures.

Note the sensors have excellent accuracy by themselves. Additional accuracy is gained by calibrating the sensor controller (the thing with the display and cable coming out of it) to the sensor. The sensor itself is cannot be calibrated, but the sensor-controller pair is. See our blog on sensor interchangeability effects on accuracy for the Bullseye Precision Gauge Piezo for more information.

Note that the 775i sensors accuracy applies to any type of measurable gases. Readings will be correct regardless of the type of gas you are trying to measure.

SECTION 10: ACCURACY

Instrument Repeatable Accuracy

Range	Accuracy
Accuracy:	+/- 2 Torr
Control band	+/- 2 Torr

SECTION 11: SPECIFICATIONS

Vacuum Reference:	Absolute
Sensor:	SEN-775i-NPT-OEM
Resolution:	+/- 0.1 Torr
Units:	Torr, mbar
Accuracy:	+/- 2 Torr
Range	1-775 Torr
Control band	+/- 2 Torr
Mount	Desktop or laboratory pole mount
Display	0.56 inch Purple LED for Pressure, 0.36 inch Green LED for SP
Product Dimensions	5"w x 6.25"d x 4"h
Power	110 Volt standard wall receptacle
Compliance	CE compliant
Wetted Materials	316 SS, 304 SS, Nickel, chemically resistant rubber
Effective Orifice	0.150 in
Connectivity	USB
Vacuum Interface	1/8" FNPT (if you remove the nipple), 1/8"MNPT, 1/4" ID hose with a barb, 3/8" ID hose fits over the nipple
LED Heights	.56" .35"

SECTION 12: UNDERSTANDING TORR

This instrument and many similar instruments are calibrated in microns or "milliTorr." It is appropriate to discuss what microns are and to relate microns to other measures of pressure and vacuum. Microns are not really a measure of vacuum at all, but rather of absolute pressure.

The pressure of the atmosphere is 14.696 or approximately 14.7 pounds per square inch at sea level. One TORR is an absolute pressure of one millimeter of mercury. A milliTorr is equal to one thousandth of a TORR. A MICRON is the same as a milliTorr.

This pressure is due to the weight of all of the air in the earth's atmosphere above any particular square inch. This 14.696 PSI is equivalent to the pressure produced by a mercury column of approximately 29.92 inches high or .76 meters (~ 3/4 of a yard) or 760 millimeters of mercury.

Atmospheric pressure varies greatly with altitude. It decreases approximately 1 inch of mercury per thousand feet of altitude. It also varies widely with local weather conditions. (Variations of one half inch in a single day are common.) The word "**vacuum**" means pressure lower than atmosphere or "**suction**." However, in describing negative pressure, the atmosphere is only a satisfactory reference if we are dealing with values of vacuum down to about 27 inches of mercury. Below that, it is much more useful to talk in terms of **absolute pressure**, starting from absolute zero. The **Vacuum Gauge** does just this.

SECTION 13: TERMS OF USE, LIMITED WARRANTY & LIABILITY WAIVER

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