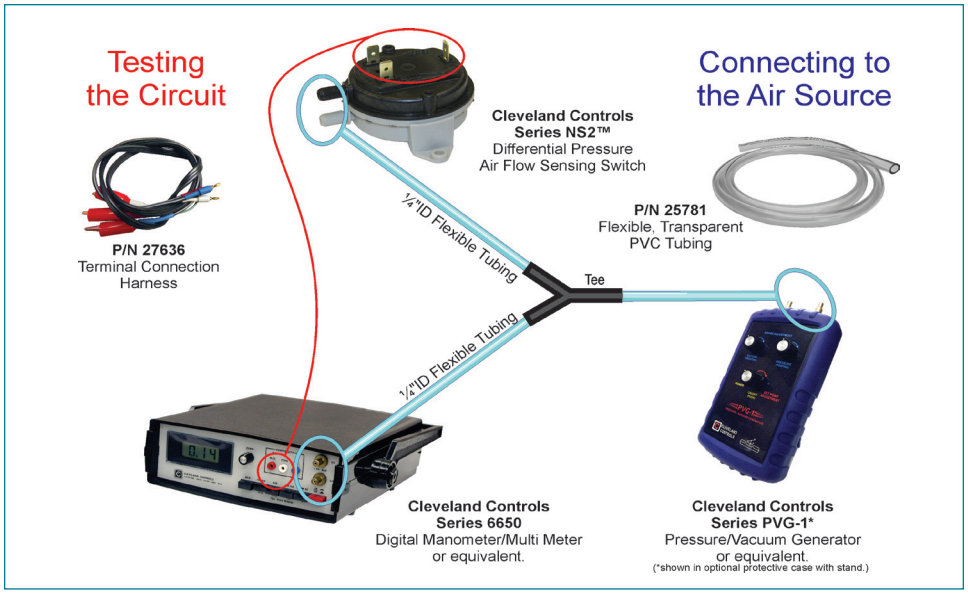
Technical Tips & Notes

1. While it's not *too* difficult to watch the manometer display (for the set point indication) and the continuity meter (for the change of position of the snap switch contacts), expect it to take some practice.
2. Every mechanical air switch has two operating points; the operating point on increasing pressure or vacuum, and the operating point on decreasing pressure or vacuum. These are commonly referred to as pressure or vacuum rise and fall set points. The air switch can be set to only one of these points, either rise or fall. The difference between the two readings is called the switching differential or hysteresis of the air switch.
3. Air switches are most commonly mounted with the diaphragm in a vertical position in order to meet the published specifications, but they can also be mounted in a horizontal position so long as the effect of the weight of atmosphere on the switch's diaphragm is considered when determining the behavior of the switch. For this reason, either when adjusting a set point, or identifying a set point, it is important to follow the instructions for the specific device that the air switch is being installed in to verify that the air switch is tested and/or adjusted in the correct mounting position.
4. Air switches should never be mounted with the process connectors pointed upward.

Technical Bulletins:

These bulletins provide detailed calibration information for specific types of Cleveland Controls Air Switches. They are available in PDF format for download from the website or via e-mail from Customer Service.

TBAFS04-01
Field Calibration of AFS Sensing Switches
TBRFS04-01
Field Calibration of RFS Sensing Switches
TBRSS04-01
Field Calibration of RSS Sensing Switches
IM-NS2-0000-xx-0x
Series NS2™ Field Adjustable Sensing Switch Kits



IM-PVG-1.00

Cleveland Controls
Division of UniControl Inc.

PRESSURE/VACUUM GENERATOR

PVG-1

(PATENT PENDING)

Carton Contents

- (1) **PVG-1** Pressure Vacuum Generator
- (1) P/N 31901 Tubing Kit
- (1) Protective case with stand
- (3) "AA" Batteries
- (1) Instruction Sheet IM-PVG-1.00

COMPACT CONSTANT AIR SOURCE FOR FIELD TESTING & CALIBRATION

First prepare the air switch for service.

If the air switch is already installed, disconnect it from the power source before working on it. If the air switch is in a contractor kit, and requires assembly, follow the kit instructions to assemble it.

The **PVG-1** is a compact pressure or vacuum generator that provides a **constant air source** ideal for field calibrating and testing differential pressure air flow sensing switches. The **PVG-1** has an output range of ±0.10 to ±12.0" w.c.

Operator controls consist of an on/off push-button, separate coarse adjustment valves for initial pressure or vacuum range selection, and a fine tune output adjustment potentiometer.

The **PVG-1** requires three (**3**) standard **AA** batteries, which provide a minimum of ten (10) hours operating life. To install the batteries, open the battery cover on the back of the **PVG-1**. No tools are required.

The two common air switch applications that require the use of the **PVG-1** are:

- Adjusting the set point of a switch to a desired value.
- Determining the value of an existing unknown set point.

These two applications are discussed in sections 2 and 3 below, following preliminary set up instructions in section 1 that apply to all applications of the PVG-1 . Please note that in addition to the **PVG-1**, two other devices are needed to calibrate or test air switches: a ***manometer*** to provide indication of the pressure or vacuum level, and a ***multimeter or continuity meter*** to monitor the status of the switch's electrical contacts. Three pieces of flexible tubing and a compatible "tee" fitting are also needed; these are included with the PVG-1. Be sure to have all of these items on hand before beginning the calibration. (Note: the Cleveland Controls Series 6650 Digital Manometer **includes** an integral ***continuity tester***.)

Specifications

MODEL PVG-1
PRESSURE/VACUUM GENERATOR

Operating Temperature:
50 ºF to 120 ºF (10 °C to 49 °C)
Power Requirement: 3 AA batteries
Operating Time (Battery): Min.10 hrs
Dimensions:
3.6"x 5.7" x 1.2" for housing.
4.3" x 6.8" x 1.8" for protective case.
Shipping Weight:< 1 lb.
Connectors/Ports:
Slip-on connectors accept ⅛" & ¼" ID flexible tubing
Range: ±0.1"w.c. to ± 12.0"w.c.

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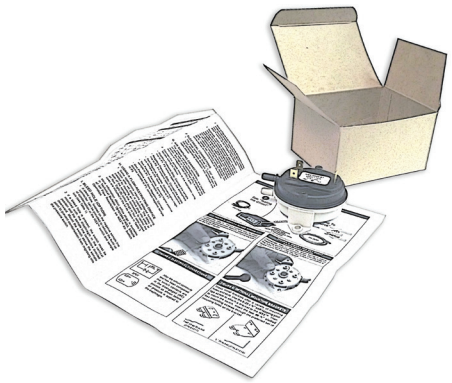
I. Preparing to Use the PVG-1

1. Gather all the necessary equipment before beginning:
   - PVG
   - Manometer
   - Continuity Meter
   - Tubing Kit
   - Test Lead Assembly
   - Set Point Screw Adjusting Tool
2. Identify the negative and positive sides of the **PVG-1** and connect one piece of tubing to the desired output port of the PVG-1. **The maximum length for this piece of tubing is 6 feet.**
3. Identify the negative and positive sides of the manometer and connect another piece of tubing to the desired input port of the manometer. **Note that length of this tube must closely match the length of the tube identified in item 4, below. Maximum length for this piece of tubing is 3 feet.**
4. Identify negative and positive ports of the air switch and connect another piece of tubing to the desired input port of the air switch **Note that length of this tube must closely match the length of the tube identified in item 3, above. Maximum length for this piece of tubing is 3 feet.**
5. Join all three pieces of tubing with a tee fitting as shown.
6. Connect the test lead assembly to the continuity meter and the terminals on the air switch.
7. **Note: If the air switch has only two terminals, then only two leads are required. In this case, be sure that the unused lead does not come into contact with one of the connected leads.**
8. Rotate the range vacuum, range pressure and set point adjustment knobs counter-clockwise to their stop positions. This sets the pressure and vacuum bleed valves to full bleed. **Do not over-tighten the knobs.**
9. Preliminary set up is complete: proceed to one of the two applications following.

Figure 1: *The instructions included with Cleveland Controls air switches will guide you through set up and calibration of specific models, including the process connections, wiring alarm and control functions, set point screw adjustment, and mounting the air switch. If you do not have the bulletin, download a PDF copy from our website (www.clevelandcontrols.com) or contact Customer Service (216-398-0330 or saleshvac@unicontrolinc.com)and we will e-mail you a PDF.*

2. Adjust an Air Switch to a Given Set Point

1. To proceed with the air switch calibration, you first need to know:
   - What is the desired set point?
   - Does the switching action result from a change in **pressure (positive)** or **vacuum (negative)**?
   - Does the switch actuate on **RISE** or **FALL** from set point?
   - What is the mounting position of switch; specifically, is the diaphragm is in a **vertical (V)** or **horizontal (H)** plane?
2. With this information on hand, **the instructions included with Cleveland Controls air switches** will guide you through the calibration techniques for specific models, including the process connections, wiring for alarm and control functions, set point screw positioning, and mounting of the switch. **See Figure 1.** When ready to begin the calibration:
3. Depress the ON/OFF switch on the **PVG-1**. A red LED comes on, and you might hear the faint sound of the pump running.
4. Rotate the set point adjustment knob clockwise to its stop position. This sets the pump output to maximum. The sound of the pump running is clearly audible now.
5. Depending on whether the desired output range is pressure or vacuum, turn the appropriate range adjustment knob on the **PVG-1** clockwise until the output displayed on the manometer is approximately **20% higher than the desired output**. **Note:** Adjust either the range pressure knob or range vacuum knob: not both. The unused knob should remain at its stop position.
6. Turn the set point adjustment knob counter-clockwise ***slowly*** until the desire output is reached. This is a very sensitive adjustment: take care to turn it very slowly. The output of the **PVG-1** is now set.



3. Identify the Set Point of an Air Switch

1. Sometimes it is necessary to detect or verify the set point of an air switch already in service. As a reminder, disconnect the air switch from the power source before working on it.
2. Depress the ON/OFF switch on the **PVG-1**. A red LED comes on, and you might hear the faint sound of the pump running.
3. Rotate the set point adjustment knob clockwise to its stop position. This sets the pump output to maximum. The sound of the pump running is clearly audible now.
4. Determine the **approximate** set point range next. To do so, depending on whether the output range is pressure or vacuum, turn the appropriate range adjustment knob on the **PVG-1** clockwise until the indicator light on the multimeter/continuity meter changes state. This indicates that the snap switch contacts within the air switch have changed position from the open to the closed position, or vice-versa. Turn the knob clockwise approximately ⅛ **turn past this point. Note:** adjust either the range pressure knob or range vacuum knob: not both. The unused knob must remain at its stop position.
5. To determine the precise set point, turn the set point adjustment knob counter-clockwise ***slowly*** until the indicator light on the multimeter/continuity meter again changes state. This indicates that the snap switch contacts within the air switch have changed position from the open to the closed position, or vice-versa. This is a very sensitive adjustment: take care to turn it very slowly.
6. Watch the reading on the manometer and the status indication multimeter/continuity meter while slowly turning the set point adjustment knob clockwise. The manometer will indicate the pressure/vacuum signal generated by the **PVG-1** and the multimeter/continuity meter will indicate the change in snap switch contact position. The point at which the snap switch changes position is indicated on the manometer as the air switch set point.
7. The set point of the air switch can be verified multiple times by simply repeating the process of decreasing the output of the **PVG-1** by turning the set point adjustment knob clockwise until the snap switch contacts within the air switch change position, and then increasing the output of the **PVG-1** until the snap switch contacts within the air switch change position again.