

## Operation Manual

### Vacuum Generators

*(Models AP7, AP70, AP71, and AP72)*

#### A. General information

The AP7, AP70, AP71, and AP72 are venturi type vacuum generators used in gas delivery systems to assist in purging of piping systems. The AP71 and AP72 models also contain a check valve and an operator controlled shut-off valve integrated into the vacuum generator body. The shut-off valve is used to shut off supply nitrogen to the vacuum venturi. The check valve prevents backflow into the nitrogen supply. The AP71 models contain a pneumatically actuated shut-off valve. The AP72 series of models contain either a pneumatically actuated shut-off valve (AP72540 and AP72550 models) or a manually actuated shut-off valve (AP72600, AP72625, and AP72650 models). Many configurations are available with different operating characteristics and porting. Refer to the appropriate catalog data sheet for specific product information.

**Note:** Venturi vacuum generators are intended to be used to create vacuum using compressed inert gas to assist in purging gases from gas systems. For proper operation, there must be sufficient gas inlet pressure, suitable purged area and exhaust conductance to enable sufficient vacuum. Care must be taken to prevent blockage of the venturi jet and exhaust stream.

#### B. System Design / Product Selection

1. When selecting the vacuum generator model and configuration, verify that the operating characteristics of the vacuum generator as described below are appropriate for the system in which it will be installed.
  - a. Verify the materials of construction are compatible with the intended process gas.
  - b. Verify the pressure and temperature ratings are acceptable for the intended application.
  - c. Verify that the vent system is appropriately sized to prevent back-pressure from affecting the vacuum level.
  - d. Verify that the nitrogen source meets the pressure and flow requirements.
  - e. For the AP71 and pneumatically actuated AP72 models, verify that the actuation pressure is within the required pressure range.

#### C. Installation

1. Inspect the vacuum generator to determine the location of the inlet, outlet, and vacuum ports and how the device will need to be installed in the system.
  - a. The vacuum generator inlet and outlet ports are either marked “IN” and “OUT” on the body, or an arrow (located on the body or model number label) will point from the inlet port to the outlet port.

- b. The vacuum port runs perpendicular to the inlet and outlet ports, which are inline with each other. The vacuum port may be marked “VAC”.
  - c. Refer to the catalog data sheet for additional help in identifying the ports.
2. Inspect the system to determine the connections to the vacuum generator.
  - a. Identify the nitrogen source line to be connected to the vacuum generator inlet port.
  - b. Identify the vent system line to be connected to the vacuum generator outlet port.
  - c. Identify the gas delivery system vent line to be connected to the vacuum generator vacuum port.
3. Install the vacuum generator to the system connections using the appropriate method described below.
  - a. For tube stub connections, weld connectors or other components to the tube stubs per standard industry practice (reference SEMI standard F78).
  - b. For metal face seal connectors, assemble connections per standard practice described by fitting supplier (typically 1/8 turn past finger-tight).
4. For the AP71 and pneumatically actuated AP72 models, connect a nitrogen or clean dry air actuation pressure source of appropriate pressure to the actuation port.
  - a. AP71 and AP72550 models have a 10-32 female thread actuation port on the side.
  - b. AP72540 models have a 1/8 inch NPT actuation port on the top of the valve actuator.
5. After installation, perform a helium leak test of all face seal connections and welds per standard industry practice (reference SEMI standard F1).
6. For AP7 and AP70 vacuum generators, a check valve is recommended between the vacuum generator “IN” port and nitrogen supply. The check valve is best positioned on the inlet side of the N2 supply valve.

## C. Operation: All Vacuum Generators

NOTE: Consult appropriate safety standards for safe dilution guidelines.

1. Initiate vacuum generator N2 flow prior to venting process gas.
2. Venting process gas at high pressure is not recommended as a standard procedure.
3. Venting process gas at a pressure higher than vacuum generator N2 supply pressure may close the vacuum generator check valve. No dilution of process gas or vacuum will be generated when the check valve is closed.
4. Venting process gas through the vacuum generator will impact generated vacuum level and process gas dilution. The level of impact depends on the vented system volume and initial process gas pressure.

## D. Operation of AP7 and AP70

1. To generate a vacuum using the AP7 and AP70, apply nitrogen pressure to the inlet port.
2. When sufficient nitrogen pressure is supplied to the inlet port, a vacuum will be generated at the vacuum port.

3. To shut-off the vacuum, shut-off the nitrogen supply to the inlet port.

## **E. Operation of AP71 and AP72**

1. Perform the following to generate a vacuum using the AP71 and AP72.
  - a. Apply nitrogen pressure to the inlet port.
  - b. Open the shut-off valve to allow flow through the vacuum venturi.
    - i) For pneumatically actuated models this requires applying actuation pressure.
    - ii) For manually actuated models this requires turning the knob counter-clockwise.
2. Perform the following to shut off the vacuum using the AP71 and AP72 series.
  - a. Close the shut-off valve.
    - i) For pneumatically actuated models, vent off the actuation pressure. Note that if the nitrogen pressure on the inlet port is higher than the inlet pressure rating, the shut-off valve may not close or may be forced open even with no actuation pressure.
    - ii) For manually actuated models, turn the knob fully clockwise.
3. The integrated check valve on AP71 and AP72 series prevents back flow through the inlet port in case pressure on the vacuum or vent ports ever exceeds the inlet port pressure. The check valve functions regardless of whether the integrated shut-off valve is opened or closed and regardless of whether the unit has a constant bleed option. The check valve does not prevent back flow from the vent port to the vacuum port.
4. For units with the constant bleed option, if nitrogen pressure is supplied to the inlet port, a small hole bypassing the integrated shut-off valve will allow a continuous, small flow rate of nitrogen to bleed through the module even when the integrated shut-off valve is closed.

*Please contact the factory or your local representative to answer questions or for further information.*