Gas Purge Valve

1-1 General

The gas purge valve is a protection device to protect the pump bearings against particulate and corrosive gases that could move into the pump.

This device is available with:

- Small leak
- Large leak.

Both versions are available with six different fitting combination for a total of 12 different models (see Fig. 1).

The following table summarize the models part number:

Version / Fittings	Small Leak	Large leak
NW16 M5	969-9231	969-9235
NW16 M12	969-9239	969-9241
NW16 Swagelock 7/16”	969-9233	969-9237
Swagelock 7/16” Swagelock 7/16”	969-9232	969-9236
Swagelock 7/16” M5	969-9234	969-9238
Swagelock 7/16” M12	969-9240	969-9242

Every valve is made with a thin calibrate sapphire orifice mounted into a cartridge, with two special PTFE membranes on each tube side.
This is to avoid any particulate, powder and any liquid to come into and occlude the thin hole.

The pieces are mounted altogether into a SST leak tight body.

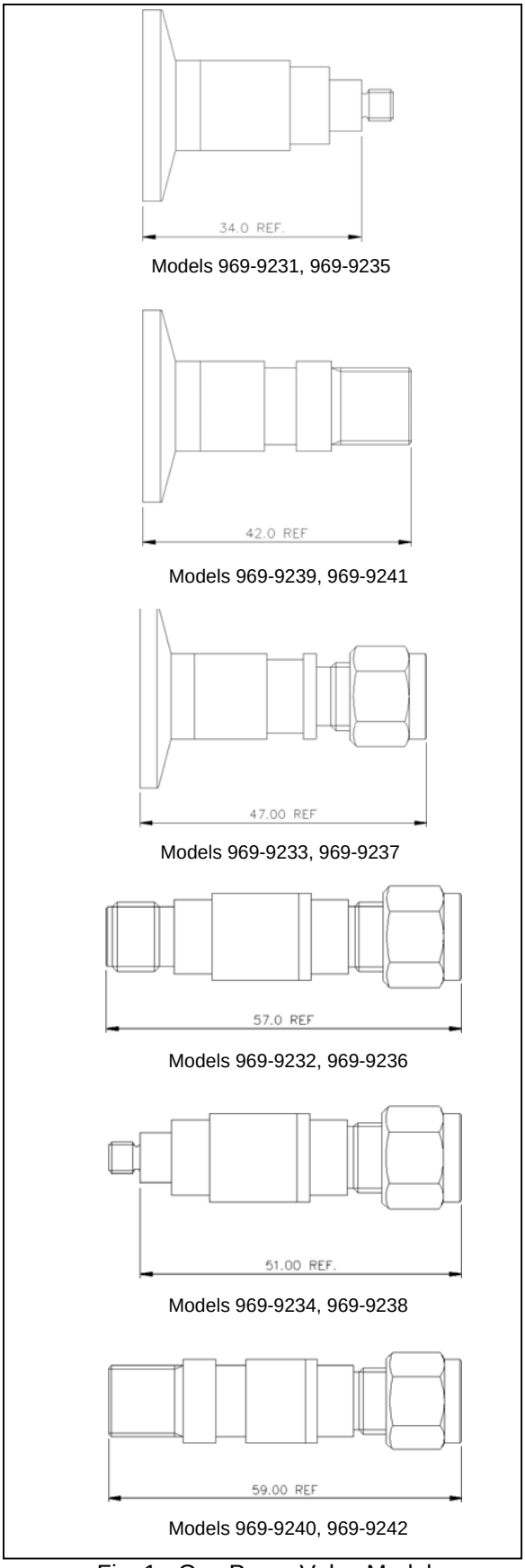


Fig. 1 - Gas Purge Valve Models

1-2 Gas Purge Valve Characteristics

Each version of the valve is suited for a particular applcation:

- the Small leak (~ 10 sccm at 1000 mbar) for mild corrosive operation when the partial pressure of the corrosive gas is maximum 10^{-5} mbar (analytical instruments, ion implanters);

- the Large leak (~ 20 sccm at 1000 mbar) for heavy corrosive operations (etching, CVD), when the partial pressure of the corrosive gas is $>10^{-5}$ mbar.

If you wish to use a different flowrate, you might change the supply pressure. For a given supply pressure value, the gas purge valve can give you a fixed flowrate value.

Please note that the flow amount does not depend on the vacuum side pressure of the valve, if the pressure is lower than ~ 0.5 of the supply pressure.

Refers to the following diagrams to find the precise correlation. These diagrams refer to dry nitrogen and argon, for other gases you may correct the flowrate according to the calibration factor:

$$fx = \sqrt{\frac{M_x}{M_{N2}}}$$

where:

- M_{N2} is the molecular weight of Nitrogen

- M_x is the molecular weight of the other gas.

For example the gas purge flow rate for 1000 mbar of Ar for the single tube valve is:

$$Q \approx Q_{N2} \bullet fAr = Q_{N2} \bullet \sqrt{\frac{28}{40}}$$

where Q_{N2} is the corresponding nitrogen flowrate at 1000 mbar.

1-3 Operation Notes

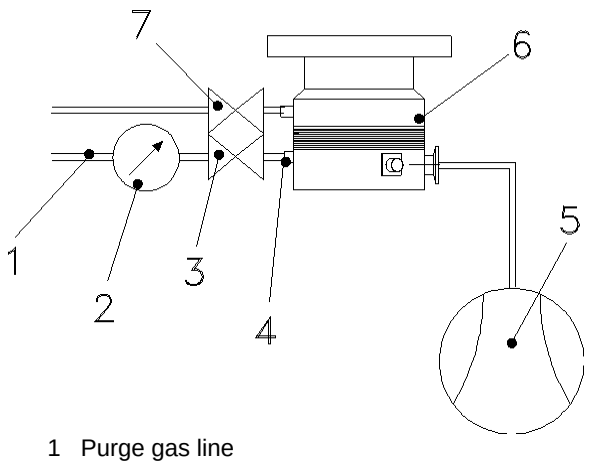
Always use no less than Varian minimum suggested purge flow rates to properly purge the pump (see the relevant pump manual). Pleae note that you can use all the purging flows between the minimum specified into the instruction manual and 3500 sccm, if your system is able to pump and withstand higher flow-rates.

Always operate the pump with gas purge on: during pump running, during stops, even if corrosive gases were not flowing. This provides protection against particulate that could move into the pump.

Non-observation of this basic, simple rules could affect pump warranty.

NOTE

The Soft start is recommended for the installation of the pump and may be disabled when the pump is continuously operated and the interval between different run is not more than 1 week.



1 Purge gas line
2 Pressure regulator
3 Gas Purge valve
4 Gas Purge port
5 Forevacuum pump
6 Turbopump
7 Vent valve

Fig. 2 - Installation diagram

1-4 Vent Procedure

Venting may be done in three different ways:

1. **Through the vent port** (using vent valve or vent device).
   In this case the only precaution required is to keep the gas purge port on even during vent procedure.

2. **Through the gas purge port**
   The maximum air flow allowed for venting through the gas purge port is 3500 sccm (58.3 mbarl/sec). If the required flow for venting the turbopump is higher than the flow allowed by the gas purge valve, a "T" connector can be put on the purge port. On one side is connected the vent valve, and on the other side is connected the gas purge valve.

CAUTION

When venting is performed through the gas purge port, be sure that the foreline pump is on, in order to avoid overpressure.

3. **Through the chamber**
   The vent flow rate into the chamber must be less than three times the chamber volume (in litres) multiplied by the flow rate through the gas purge port. This is done to maintain the pressure into the pump body higher than into the chamber in order to avoid any corrosive or powder flow-back.

   E.g. **chamber volume** : 250 litres;
   gas purge flow: 20 sccm
   (0.33 mbarl/sec)

   chamber venting flow rate =
   3x250x20 = 15000 sccm

   and the venting time will be:

   chamber venting =
   =(chamber volumex1000)/chamber flow rate=
   = (250 x 1000)/15000 = 17 min.

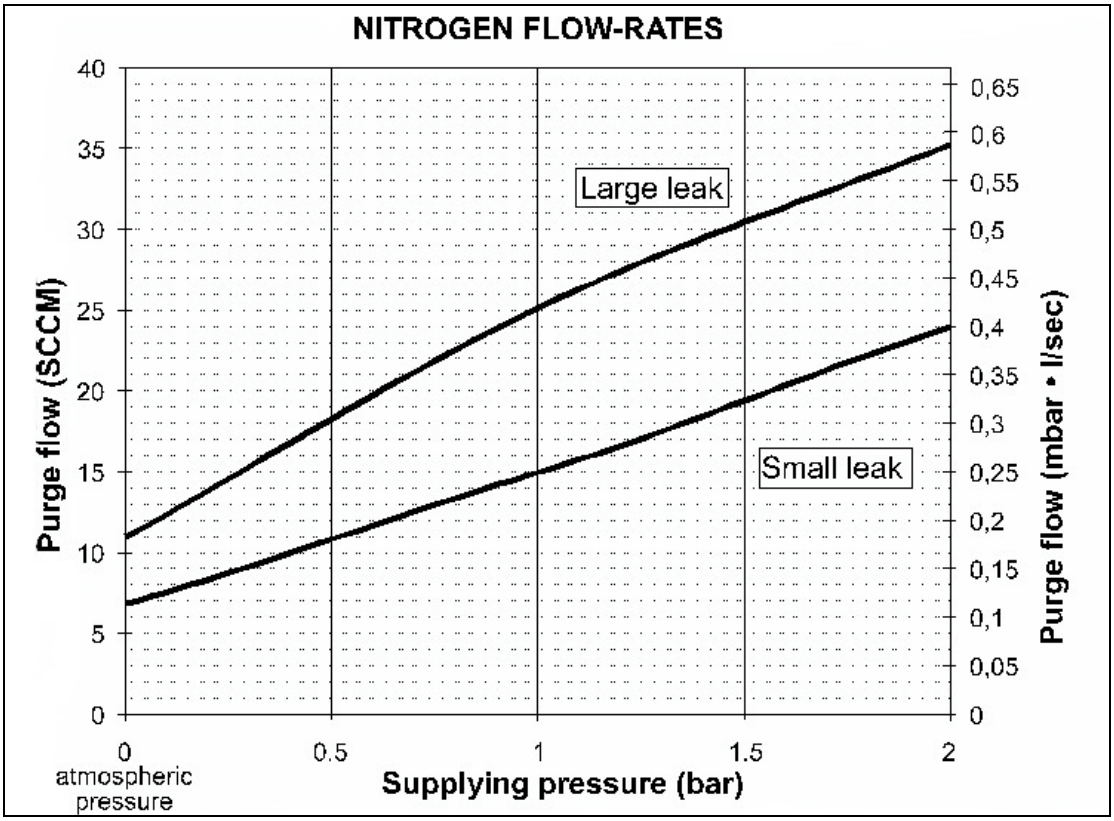


Fig.4 - Gas Purge Valve flow rate vs supplying pressure for Nitrogen

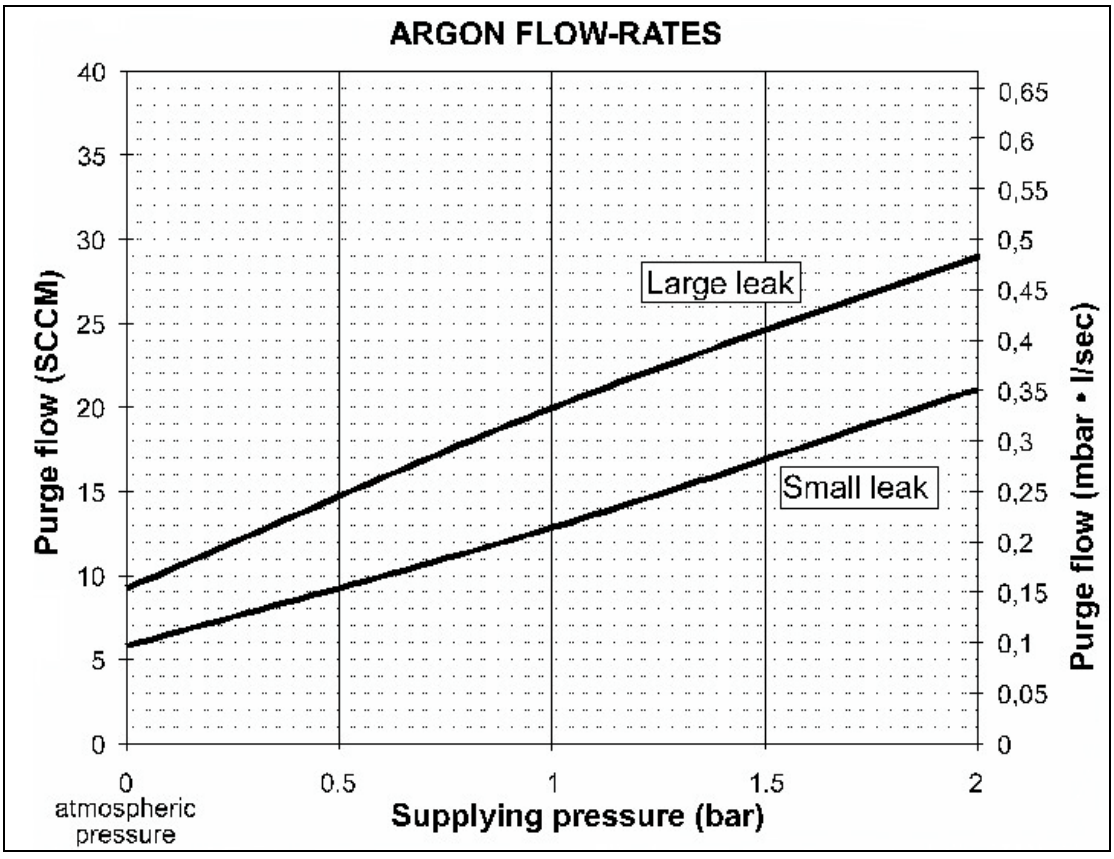


Fig. 3 - Gas purge Valve flow rate vs supplying pressure for Argon