

► The advantages of Mott flow restrictors?

Semiconductor Industry – High Purity Flow Restrictors

Porous metal flow restrictors provide permanent, reliable flow control in high purity applications without the high cost of mass flow controllers or needle valves. Mott flow restrictors allow gas to move through hundreds of microchannels without increasing flow velocity or creating irregular flow streams. By distributing the flow over the entire porous metal insert, particle plugging is prevented. When it comes to controlling gas flow in critical applications, there's no better solution than using Mott porous metal flow restrictors.

Flow Restrictors

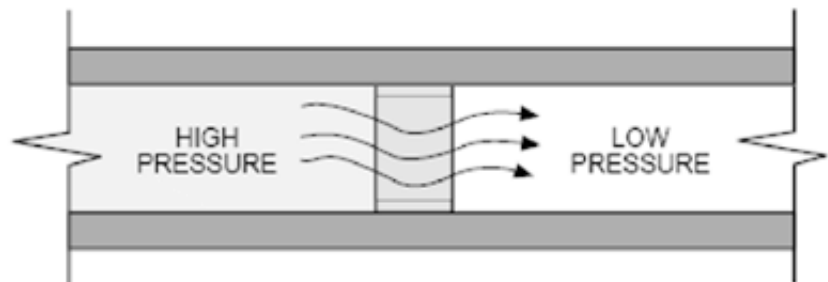
Mott High Purity Flow Restrictors

The high-reliability, cost-effective choice for flow control

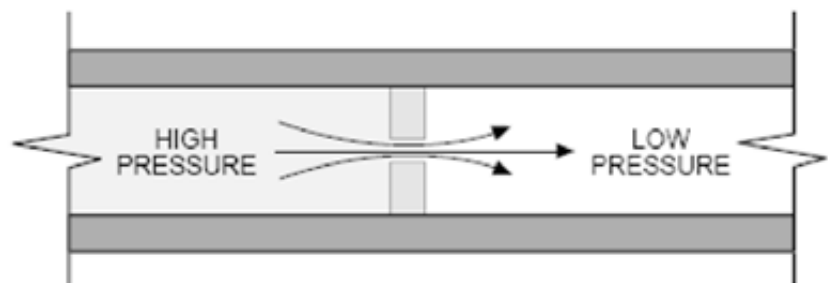
A flow restrictor is a flow control device for given pressure conditions. Mott's flow restrictors consist of a porous metal element permanently inserted into a standard fitting or specialty hardware. In operation, the porous metal element meters or limits the uniform flow of gas from high pressure to low pressure in a precisely controlled manner. In comparison, competitive technology, including single orifice and capillary tubes, experience limitations in accuracy and capabilities.

Major advantages over restrictive flow orifices

- **Reduces the flow burden** – From one pore to hundreds
- **Prevents plugging** – By distributing flow over the entire porous metal insert



Flow Restrictor: Gas moves uniformly through porous metal element with minimal friction due to viscosity



Standard Orifice: Speed, pressure, and heat increase as gas moves through the orifice, causing wear and tear.

Since porous metal consists of a myriad of small pores and often operates at a high differential pressure, a limited deposition of particulate will have negligible affect on the overall gas flow rate versus pressure drop characteristics. Competing static technologies are sensitive to the presence of any particulate matter that could deposit in the orifice, thereby adversely altering the gas flow rate versus pressure drop.

Semiconductor Industry Users:

- Tool Designers
- Gas Distribution Panels
- Chamber Fill Lines

High Purity Flow Restrictor Applications:

- **Safety** – Flow limiting for hazardous production materials. In a catastrophic event, the flow restrictor will limit the flow of gas and reduce the size of the vent lines required.
- **Flow Control** – Flow restrictors provide flow accuracies up to +/-1% of flow rate. The flow restrictors provide a tamper proof method of maintaining a constant flow eliminating more costly needle valves or mass flow controllers.
- **Flow Mixing or Dilution** – Two or more gas streams can be accurately blended in any ratio using flow restrictors.
- **Component Protection** – The restrictors laminar flow conditioning provides unique upstream protection for critical flow components (i.e., mass flow controllers).
- **Flow Balancing** – Balance the flow from a single gas source through multiple ports of entry to a system or single chamber. System Maintenance / Pump Purge / Purge Gas Bleed



Mott High Purity Flow Restrictor – A device containing porous metal component(s) that limits the volumetric flow of a given gas at a given upstream and downstream pressure with a high degree of accuracy.

Why the Mott Solution

Mott flow restrictors offer several key advantages over competitive methods of flow control.

- Mott restrictors replace a single calibrated opening (i.e. orifice) with hundreds of smaller pore openings, reducing the flow burden
- Flow velocity approaching and leaving the porous metal restrictor are much lower due to larger total surface area
- By distributing energy of the flow over a cross-sectional area of media:
 - Laminar flow is achieved
 - Reduces the potential for plugging

Specifications

Features and benefits of Mott High Purity Flow Restrictors include:

- Materials of construction: Media and housing are 316L SS with a 10 Ra

surface finish on all measurable wetted surfaces.

- Stainless steel flow restrictors withstand sustained temperatures of 450°C (inert gas), and pressures to 120 psig, standard; up to 1500 psig by request.
- Encapsulated in 1/4" and 1/2" face seal fittings (male VCR unions as standard, other fitting types as optional).
- Mott can provide virtually any desired flow, from 100 slpm to < 1X10⁻⁶ sccm/sec.
- Standard downstream flow rates from 50 slpm - higher flows available.
- Flow tolerance: ±7% of rated flow at rated pressure (±1-2% available upon request).
- Assembled, tested, cleaned & bagged in a Class 100 clean room.
- Calibrated to inert gas flow for specialty gas applications. Flows are correlated through viscosity, specific gravity, temperature and pressure curves.
- Externally labeled for identification.

Restrictors are primarily fabricated from 316L stainless steel; however, in special cases, other alloys are available for more demanding applications. Principal applications criteria are that no corrosion or significant buildup of contaminants are allowable, thereby ensuring the integrity of the porous media and thus the unique gas flow rate versus pressure drop characteristics of a given restrictor.

Appropriate restrictor sizing requires knowledge of the following design specifications:

- Design flow rate
- Upstream pressure
- Downstream pressure
- Temperature
- Gas composition
- Hardware configuration (gas fittings or custom hardware)

Flow restrictors are robust and reliable choices for metering or limiting fluid flow. Benefits of porous metal restrictors include multiple flow paths that resist plugging and improve their repeatability and accuracy, a compact size and tamper-proof design with no moving parts and maintenance requirements, materials that are corrosion resistant, and a manufacturing process that individually calibrates each restrictor at its designed operating condition.

For more information

Click on the image below to download our [4-page High Purity Flow Restrictors Brochure](#). You may also contact us at High Purity Sales, Mott Corporation, 84 Spring Lane, Farmington, CT 06032, 1-860-747-6333 or Toll-Free 1-800-BUY-MOTT; E-mail: quest@mottcorp.com for additional information; or check our website at www.mottcorp.com to find a distributor in your area.

High Purity Porous Metal
Flow Restrictors

