



Top Ten Questions and Answers from Customers:

1) **What is the Flow Matrix Device?**

- a. The Flow Matrix device is a self-regulating mechanical flow controller that is immune to both inlet and outlet pressure changes and transients. Flow Matrix offers manual knob operated, air actuated, electro-mechanical, and high/low pressure versions of the mechanical flow control technology. The electronic versions of Flow Matrix technology still have the same internal self-regulating mechanisms, but can attain a user-defined set point electronically. After set point has been attained, they do not require the electronics to maintain the flow rate. All Flow Matrix devices are **volumetric control** devices fundamentally, but mass flow control options can be performed in certain cases.

2) **Does Flow Matrix have hazardous area classifications?**

- a. The Flow Matrix manual and air-actuated devices do not require hazardous area classifications in the U.S. and Canada because there are no electrical components. The electro-mechanical devices are slated for Class 1, Div 2 (Zone 2) classification in 2005. If there is a need for electronically controlled flow control in a Class 1, Div 1 or 2 zones, Flow Matrix offers a fully closed-loop air actuated solution called the Safe-T-Flow Matrix where all non-classified electronics can be put into a safe zone.

3) **What is a pressure-immune flow controller?**

- a. A pressure immune flow controller, such as the Flow Matrix devices, can maintain a constant, pre-set flow rate regardless of pressure changes on the inlet and outlet of the device (within specified operational parameters).

4) **What are the benefits of using Flow Matrix technology over more traditional approaches such as regulators/needle valves or mass flow controllers?**

- a. Although there are many specific benefits of this approach to flow control, the general benefits are:
 - i. Flow Matrix mechanical units self-regulate with changes in inlet or outlet pressure to keep flow rate constant without human interaction. Pressure regulators and needle valve combinations require constant adjustment as process/pressure conditions change.
 - ii. Flow Matrix devices can effectively control the flow of liquids. There is not a wide product offering of liquid control devices that are cost-effective for most applications.
 - iii. Traditional mass flow controllers are highly pressure dependent meaning that they must have very stable pressure conditions which require additional pressure regulation devices.
 - iv. Flow Matrix devices do not have to "hunt" for set point; meaning that once set, they keep a very stable flow rate. Mass flow controllers have to constantly hunt and re-adjust whenever conditions change which leads to instabilities or long stabilization times.
 - v. Flow Matrix controllers do not require power to maintain flow rate. Even the electronic units maintain a stable and constant flow rate when power is removed from the device.

5) **What are the flow-ranges that Flow Matrix devices can control?**

- a. Standard Flow Matrix products can be ranged to control anywhere from 5 cc/min up to 3 gal/min of liquid flow (i.e. water, we can attain higher flows if the specific gravity is lower than water). For gas flows, we can range the device anywhere from 20 cc/min up to 110 liters/min of air (can attain higher flows for gases that have lower density or viscosity of air). Special low-flow or low-pressure/vacuum calibrations can be performed for a nominal add-on charge.

6) What are the pressure limitations of Flow Matrix devices?

- a. The overall pressure limits are a function of the fluid type and flow rate, but in general, Flow Matrix has solutions that can operate anywhere from 3500 psig of inlet pressure down to small inlet pressures of 10 psig or less. Typical operational differentials for all normal gas and liquid applications is around 15-30 psig, but special accommodations can be met with the proper specifications provided at time of quotation request. Backpressure (or outlet pressure) limitations of our higher pressure products are 2500-2700 psig and 125 psig on our lower pressure electro-mechanical units (provided there is sufficient differential to create a flow condition through the device).

7) What types of fluids and temperatures can the Flow Matrix accommodate?

- a. Flow Matrix devices can be calibrated for either liquid or gas service. We can accommodate aggressive media such as acids and caustics provided that the proper materials are utilized. We typically can handle liquids with entrained air or small particulates provided that this is specified at time of quotation request. We commonly recommend a standard 5 micron particle filter upstream for most applications, with exception to special low flow liquids. Standard temperature ratings are up to 100°C for manual devices and 70°C for electronic devices. Higher temperature options are available for applications up to 150°C for electronic devices and 300°C for manual devices.

8) What types of materials does Flow Matrix offer?

- a. Standard materials include 316 stainless, brass, and aluminum. Flow Matrix also offers novel materials such as Hastelloy C and Monel Alloy 400. Flow Matrix also offers a wide range of sealing materials such as Buna, Viton, EPDM, Perfluoroelastomer (Kalrez® equivalent), Neoprene and valve materials such as titanium alloy, Monel, and Inconel. Valve seat material options include Kel-F® or PEEK.

9) What types of options are available with Flow Matrix devices?

- a. Flow Matrix offers manual devices with knob adjustments, pneumatic devices with electronic pressure control systems and integrated sensors, fully electronic units with voltage, current, or digital communications. There are different product series that come in traditional regulator footprints, MFC footprints, and the new ANSI/ISA 76.00.02-2002 (also called NeSSi or ISASP76) modular surface mount footprint. Flow Matrix also offers the manual units with integrated gauge or differential pressure transducers that can be calibrated for flow rate. This enables users to have a manual set point and an electronic flow feedback signal.

10) What are the fundamental limitations of Flow Matrix technology?

- a. The fundamental limitations of Flow Matrix technology are:
 - i. Flow Matrix devices cannot necessarily replace pressure regulators. We can replace regulators that are used for flow control, but Flow Matrix devices do not regulate pressure, they regulate flow. They do not require regulated or stable pressure to regulate the flow as do more traditional devices.
 - ii. Flow Matrix devices cannot control the flow of two phase flows (gas and liquid) although they will let entrained air pass through the device without major upset in most cases.
 - iii. The stream composition must be specified at the time of order for mechanical and electronic devices so that they can scale properly for viscosity and density/specific gravity issues. Flow Matrix manual devices can normally be switched over to different stream compositions without difficulty provided that the overall density and viscosity differences are relatively small.
 - iv. Flow Matrix devices cannot handle slurries, heavy particulates, liquids with viscosities higher than ~30cP (centipoise), or media that can crystallize or condense (other than some small amounts of ambient moisture condensation) under normal operating conditions. Flow Matrix does not handle non-Newtonian (i.e. non-linear) fluids such as ketchup, syrup, etc.
 - v. Flow Matrix devices cannot be used for positive shut-off applications without the use of a properly rated isolation valve.

For further questions and answers, you may contact your local-area Flow Matrix representative or a factory technical assistance person.