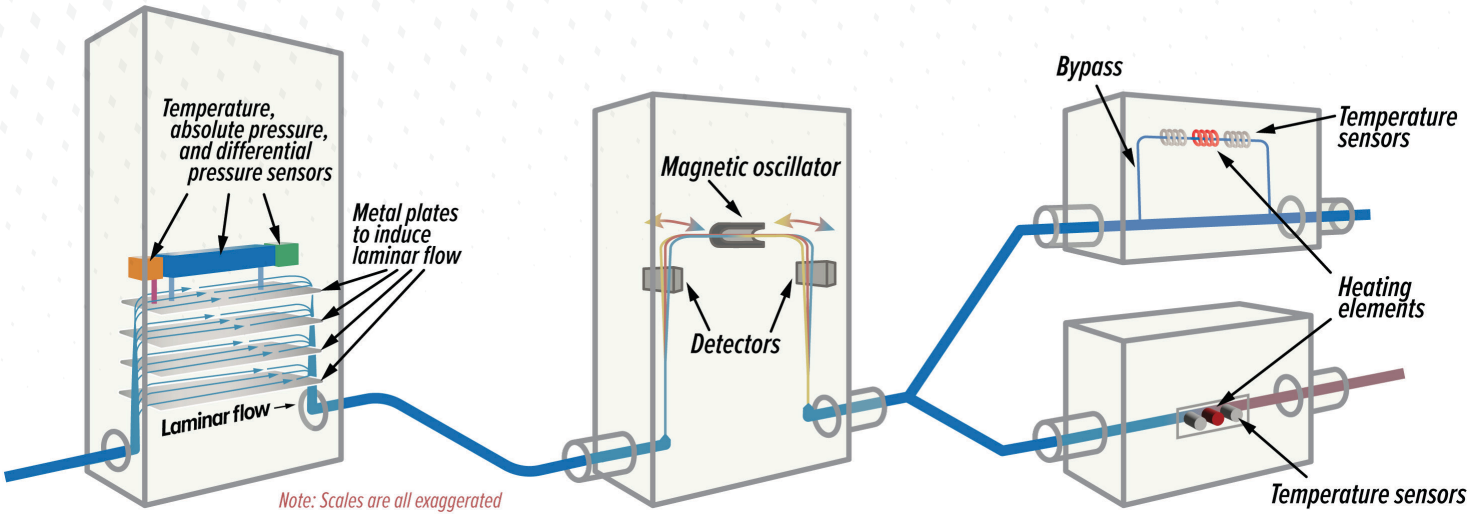
ALICAT SCIENTIFIC MASS FLOW TECHNOLOGY COMPARISON

Laminar

Coriolis

Thermal



Laminar differential pressure mass flow meters measure mass flow indirectly from differential pressure. These meters contain flat, metal plates that convert turbulent flow into laminar flow. A sensor measures the pressure drop across these plates, and the meter uses this data along with the Poiseuille equation to calculate a flow rate. The device can calculate both volumetric and standardized mass flow with the help of preloaded tables of gas properties that take temperature and pressure into account.

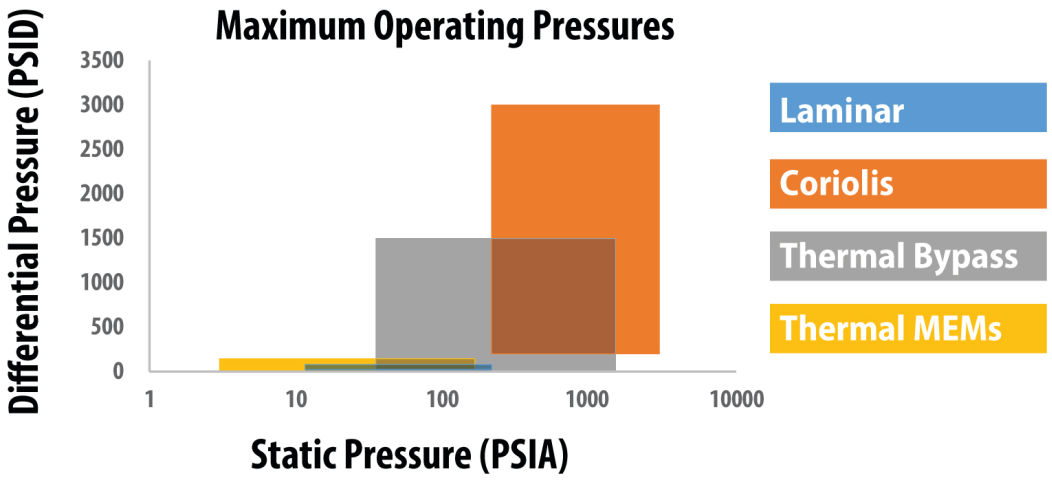
Coriolis mass flow meters measure mass flow for many fluids, including gases or liquids of unkown or changing composition. These meters contain one or two tubes that are electromagnetically oscillated at the tube's resonance frequency, and this oscillation is measured by sensors at different points along the length of the tube. When there is no flow, the tube oscillates symmetrically, and there is no phase difference between the points. As flow passes through, the tube twists, inducing a phase shift between the points that is directly proportional to the fluid mass flow rate.

Thermal bypass meters direct a small portion of fluid through a capillary tube wrapped in a heating element with temperature sensors on either side. When there is no flow, the differential across the sensors is constant. As fluid passes the heating element, the temperature increases at the second sensor, causing a temperature differential which is directly proportional to the flow rate.

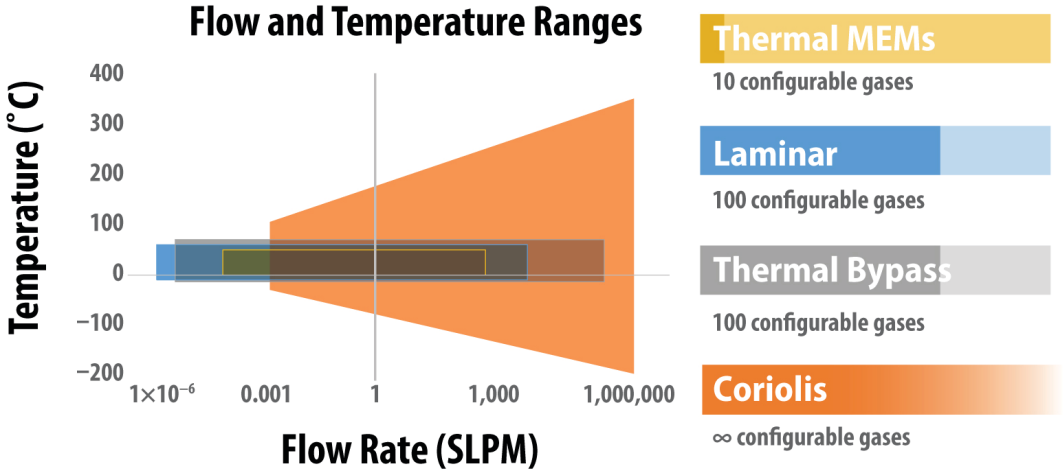
Thermal MEMs or CMOS flow meters operate similarly to bypass meters by maintaining a temperature differential across a heated sensor and a flow temperature sensor. A flow causes the temperature sensor to cool, and the amount of heating electrical current required to keep a constant temperature is directly proportional to the mass flow rate.

WHEN TO USE WHICH TECHNOLOGY

When deciding which technology to use, it's important to consider the operating parameters. Laminar and Thermal MEMS are great choices when a low differential pressure is required, while Coriolis and Thermal Bypass are much better suited in high pressure applications.



By far, Coriolis is the most widely used technology over a variety of temperature and flow rates due to the ease of scalability and the sensors being outside the flow stream. The other three models can be used almost interchangeably, assuming the gases required are available.



	Differential Pressure	Coriolis	Thermal
Requires known gas composition	Yes	No	Yes
Gas-specific calibration	No	No	Yes
Requires "straight runs" of pipe	No	No	Yes
Simple internal structure	No	Yes	Yes