

Alicat Scientific vs. the Others

Mass Flow Instruments

Thermal Mass Flow Instruments

Benefits

Greater Flexibility, Less Inventory

A single Alicat mass flow meter or controller can replace multiple thermal units, resulting in reduced inventory.

Orientation independence. Alicat mass flow instruments can be mounted in any orientation, even upside-down, without recalibration. Thermal mass flow instruments are subject to thermal siphoning, which yields greater error the further they deviate from their specified orientations.

Universal voltage. Alicat mass flow devices can operate on supply voltage as low as 12 Vdc or as high as 30 Vdc and may be powered by a standard barrel-type power adapter. Thermal mass flow devices typically have more narrow voltage requirements and proprietary power connections.

Matching pinouts. Alicat can match any preexisting pinout on the 9-pin or 15-pin D-sub connectors supplied with its instruments. Manufacturers of thermal units do not offer this degree of customization.

Simultaneous readings. Alicat mass flow instruments display simultaneous real-time readings of mass flow, volumetric flow, pressure and temperature. Thermal instruments measure mass flow but typically do not also provide volumetric flow, pressure or temperature data.

Selectable control loops. Alicat mass flow controllers can control on mass flow, volumetric flow or pressure with one device. Thermal mass flow controllers can only control on mass flow.

High turndown ratio. Alicat mass flow meters and controllers maintain their accuracy down to 0.5% of their full-scale ranges, a turndown ratio of 200:1. Thermal mass flow controllers lose accuracy at the bottom of their 50:1 turndown ranges where minute temperature differences get lost in the noise.

Gas Select. Alicat mass flow instruments calculate flow based on gas properties data for the selected gas. This data yields 30 or more complete gas calibrations that are selectable in real time. Most thermal mass flow instruments require the use of imprecise conversion (K) factors when switching gases after the device has been built.

Custom gas mixes. Alicat can easily generate gas properties models for custom gas mixes that are then added to the customer's Gas Select list. Thermal mass flow instruments regularly operate on pure gases only because it is much more difficult and expensive to calibrate them on gas mixtures.



Greater Precision, Less Error

Alicat mass flow technology permits greater accuracy and precision by virtue of the technology itself.

No warm-up. Alicat mass flow devices are ready to operate with full accuracy in less than one second and so can be turned off when not in use to conserve power. Thermal mass flow instruments require up to 30 minutes or more of warm-up time to achieve their rated specifications.

Full temperature and pressure compensation. Alicat mass flow instruments use real-time data to compensate for changes in temperature and pressure to maintain precise volumetric and mass flow measurements. Thermal mass flow instruments lose accuracy as temperature and pressure deviate from expected operating conditions.

Rapid response and settling. Alicat mass flow instruments feature all-digital meter read speeds of less than 10 ms and valve control speeds of 50-100 ms, which minimizes overshoot. Thermal mass flow technologies require longer settling times.

Micro flow. Alicat mass flow instruments can read flow rates down to 2.5 microliters (0.0025 ml) per minute. Thermal mass flow instruments cannot detect flows this low because the effects of thermal dispersion are lost in the signal noise.

Low pressure drop. Alicat mass flow instruments have comparatively low full-scale pressure drops. Alicat's Whisper series generates pressure drops as low as 0.0179 mbar (0.00026 psid, 2.5 µl/min in a 0.5 sccm body) but never higher than 47.5 mbar (0.6885 psid) at full scale, even at 500 slpm. Thermal mass flow instruments typically have much higher differential pressure requirements.

Greater Durability, Less Worry

Insensitivity to bumps and dings. Alicat mass flow instruments feature all-metal construction of the flow bodies and electronics casings, and the Laminar Flow Element stack cannot be damaged by typical operational bumps or drops. Thermal mass flow instruments house delicate thermal dispersion assemblies that do not hold up well when dropped.

Insensitivity to humidity. Alicat mass flow instruments can operate in humidities up to 100% non-condensing and can withstand brief periods of water ingestion. Thermal mass flow instruments cease productive operation in such conditions.

Lifetime warranty. Alicat supports every instrument with a lifetime warranty, including free technical support. No other manufacturer includes more than 3 years of warranty service with its products.

