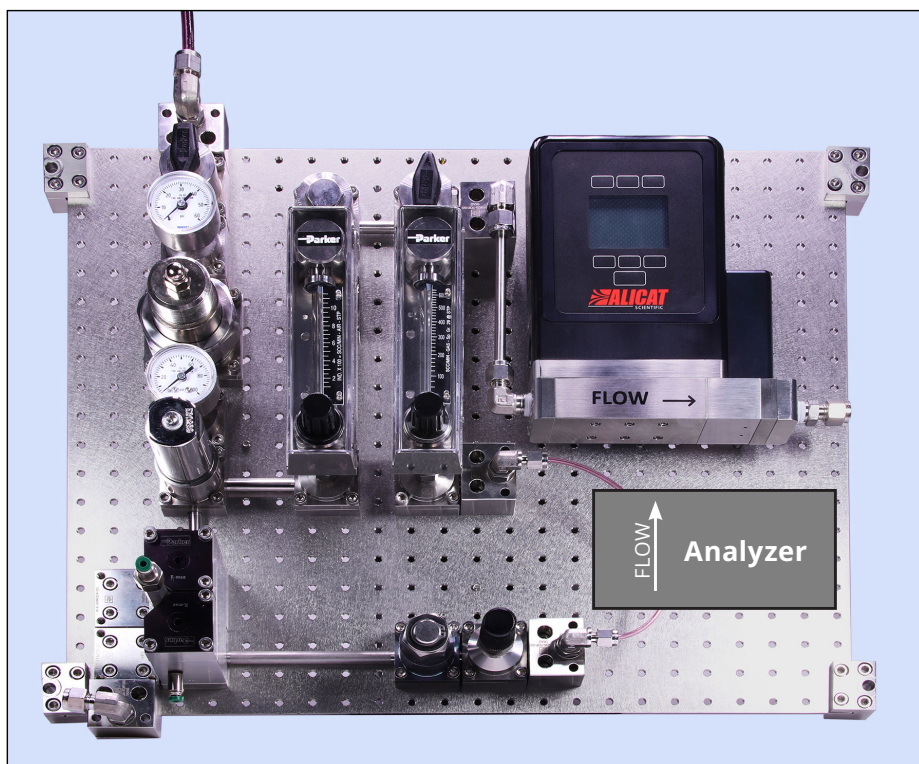


Intrinsically Safe Instruments for Gas Chromatography



How to control flow and pressure of gases in explosive environments, get better insights from more data, and decrease process variability.

Flow concept for analyzer using a mass flow controller set for back pressure control.

Improving flow control for GC in hazardous areas

Alicat M, MC, and PC series instruments offer fast, accurate, and repeatable flow and pressure control for gas chromatography (GC) (see alicat.com/knowledge-base/in-house-check-of-gas-chromatograph-operation/).

For certain industries and applications, however, the gas chromatographs must be installed in hazardous areas. The equipment and modules must therefore be rated for operation within this area.

To meet this need, Alicat now offers Intrinsically Safe flow and pressure products for use in Class 1 Division 1

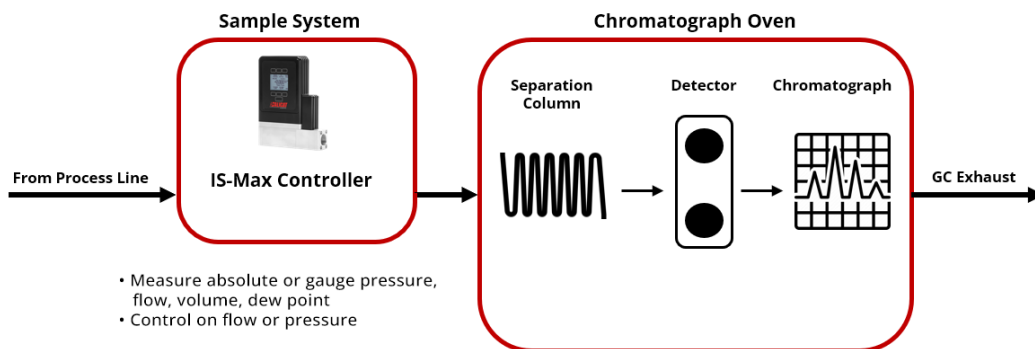
(Zone 0 or Zone 1) environments. These Intrinsically Safe instruments provide the same level of fast, accurate, and repeatable results expected from the standard Alicat products. The IS-Max flow and IS-Pro pressure instruments enable remote monitoring and control via analog I/O or digital I/O options without entering a hazardous area.

Intrinsically Safe GC Flow Control

IS-Max (mass flow) meters and controllers offer a multi-variate output of mass flow, volumetric flow, temperature, absolute pressure, gauge pressure, barometric pressure, totalizer, and valve drive percentage. Paired with the multi-gas calibration for gases including Air, N₂, He, H₂, etc., it replaces the need for additional gauges or valves to be installed in the system.

Each GC is calibrated for specific pressure and temperature conditions, gas types, and column length. To ensure the system is operating as intended, IS-Max flow meters are used to precisely monitor or control the flow through the GC, ensuring the correct gas flow rate or gas velocity through the column.

IS-Max flow controllers are used upstream or downstream of the GC, depending on which operating principle is used. Upstream of the GC, they are used to regulate the process gas, or to batch a specific amount of gas volume on the sample



Typical IS-Max flow control arrangement before the analyzer.

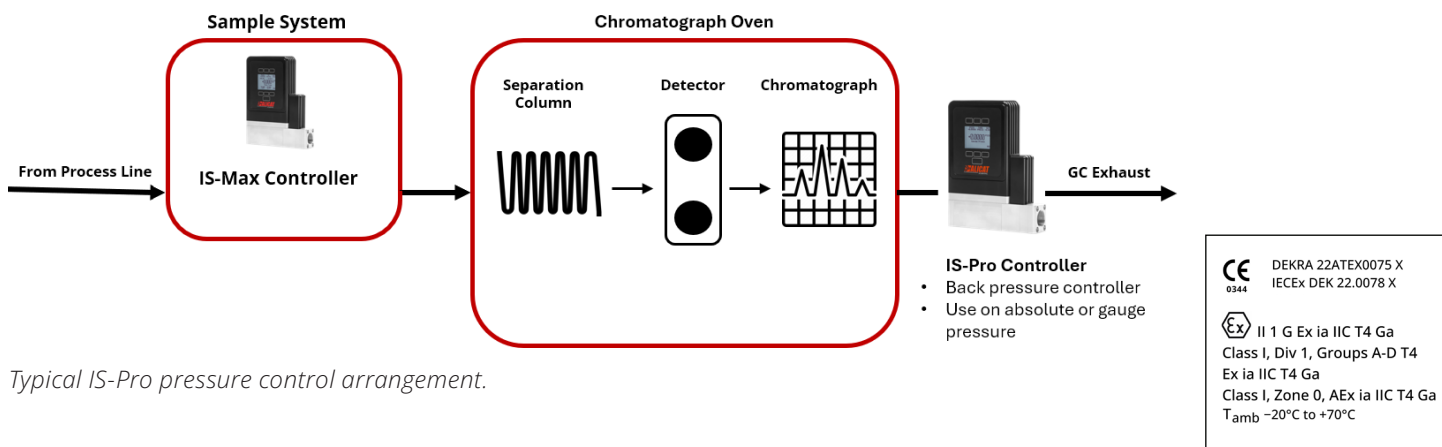
line, using the totalizer function. Since these systems are dependent on stable pressure and temperature, volumetric flow is most commonly used as the variable for control and measurement. An additional sensor can be added to the instrument to monitor the dew point of the process gas.

On the downstream or vent of the GC, an IS-Max can control absolute back pressure on the column and report volumetric flow and temperature. Mass flow measurement from the device can also be used to calculate the volumetric flow at any point in the GC, but it must correspond to the pressure and temperature conditions of the GC at that point.

Intrinsically Safe GC Pressure Control

For GC pressure control, an IS-Pro instrument can be installed downstream of the GC vent. IS-Pro instruments can be used with both gauge and absolute pressure. The advantage of using absolute pressure in this application is that it allows the instrument to operate independent of atmospheric pressure changes, removing the need for an additional reference valve.

In some systems, to determine the composition, the sample loop is expected to detect dynamic mixtures of gases that are regulated to column. For these cases, absolute pressure-based control can be used to fill the sample loop volume up to a certain absolute pressure, then a smaller portion of that volume can be split to the column at a known flow rate.



Typical IS-Pro pressure control arrangement.