



A Halma company

**Do what you want, faster**

Since 1991, Alicat has worked closely with those at the forefront of scientific discovery and technological development. We provide fast instruments, fast delivery, and fast answers so you can focus on getting fast results.

**Alicat offers:**

- Custom-engineered mass flow and pressure devices with multivariate measurement and control
- NIST-traceable calibrations, ISO and ATEX certifications, ROHS compliance, and CE marks
- Lifetime warranty and free technical support from our skilled applications engineers

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*Precision Flow, Pressure,  
and Temperature Control for  
Hydrogen Fuel Cell  
Manufacturers*



# Control for the Future of Fuel

## Reliable and adaptable control for mass flow and pressure

- **Control stability and speed:** 1000 readings per second, control response time as low as 30 ms, and customizable tuning PID available.
- **Multivariate control** that monitors and controls the delicate interaction of pressure, flow, and temperature.
- **Controllable ranges exceeding 10,000:1** allows for the testing of multiple devices and flow ranges with a single device.
- **Precise measurements:**  $\pm 0.6\%$  of reading accuracy on most ranges, with accurate measurements through major changes in temperature and pressure.



## Flexible configurations, customized solutions

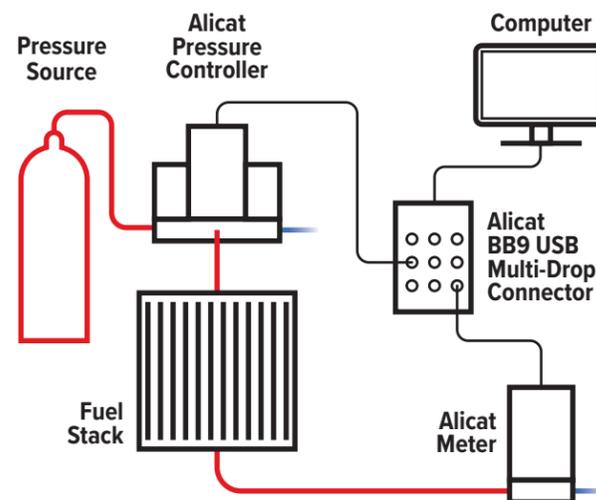
- **Gas Select™** built-in system can select 98+ pure gases and gas mix calibrations, including Hydrogen, Oxygen, and many fuel gas mixtures: Accurate measurement and control of many gases with a single, versatile unit.
- **On-screen menus** are easy to read in any lighting situation, and allow for complex configuration from the device, in addition to RS-232 and other digital communication protocols.
- **Customized solutions** for pressure and flow control are developed with our knowledgeable and resourceful applications engineers for SOFC/PEM fuel stack and test stand integrations.
- **Wide variety of configurations** include flow ranges from 0.5 sccm to 5000 SLPM, with process connections designed to work for your system.

## Alicat in Action: Testing a Fuel Cell Membrane

This system is used to increase reliability, repeatability, and speed of helium leak tests on Solid Oxide Fuel Cell (SOFC) membranes. There are two Alicat units, one dual-valve pressure controller, replaced a manual regulator, and a mass flow meter, which replaced a simple bubble meter.

With the automatic adjustments for line pressure changes, the dual-valve pressure controller takes measurements every millisecond, and makes control adjustments in as little as 30 milliseconds to ensure highly repeatable tests. The Alicat controller automatically compensates for density effects due to line pressure and temperature changes, ensuring a safe and repeatable process.

Data communication for the dual-valve pressure controller and the mass flow meter with a single PC allows for easy automation and data storage.



## Alicat in Action: Temperature Safety through Pressure Control

Solid oxide fuel cell (SOFC) fuel cell stacks depend on precise mass flow control to regulate the required heating of fuel prior to the start of power generation. Without precise control, the transition from room temperature to operating temperature can cause catastrophic damage to fuel cell stacks.

Customers' control computers monitor temperature vs. time profiles and rely on Alicat to adjust fuel pressure transients as small as  $\frac{1}{64,000}$  of their full scale pressure. The lightning-fast 50 millisecond stabilizing time for Alicat controllers make this process stable and reliable.

