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Trigas FI
Flow Measurement & Calibration

Pressure Control Loop feature of Alicat

TrigasDM in Neufahrn, located near to Munich now presents itself as exclusive partner of Alicat Scientific in the DACH region, as well as a European Calibration and Service Center for Alicat products. But Alicat not only produces excellent products, they also support customers with interesting application know-how. Here TrigasDM presents one of the interesting posts of Alicat engineer Alyssa Jenkins about a special feature for Alicat pressure controllers.

What is the pressure control loop feature and in which applications will it be especially useful?

"As an application engineer at Alicat Scientific, I talk to people in every industry all over the world and learn about how they use our product", lets us Alyssa know. "One of the most interesting applications I've seen is in a **chemical reactor**, where our mass flow controllers are used to control pressure and make sure that processes are repeatable.

Our flow controllers can be set to control on pressure while measuring mass flow. Our mass flow controllers measure volumetric flow rate, mass flow rate, temperature, and pressure. (It's possible to control on any of those except temperature.) By controlling on pressure, you essentially have a pressure controller and mass flow meter in a single device. It's a fairly unique option, and it takes a second to appreciate how valuable it can be.

Most other mass flow controllers don't provide much flexibility, allowing only for control of mass flow. Take, for example, the pressure decay method to perform a leak check—you'll use a pressure controller to set the pressure, stop the flow, and wait for pressure to decrease. Then you can perform calculations based on the exact volume and gas used. (This requires you to have extensive knowledge beforehand.)

If you have a pressure controller with mass flow measurement, you'll **see the leak rate instantaneously**—as soon as the pressure settles. This saves you time, calculations, and physical space, too.

What is Closed Loop Pressure?

Closed loop pressure is our term for using a feedback loop based on pressure instead of mass flow. A mass flow controller will typically measure the mass flow and adjust the valve open or closed to increase/decrease the mass flow to the desired level.

When controlling on pressure, the valve will adjust based on the pressure measurement. For example, let's say you're controlling pressure downstream of the Alicat and want to reach 100 psi. If you're currently at 80 psi, the mass flow controller will open the valve further until the pressure reaches your set point. This is useful whenever you have an application where you want to control pressure and determine the flow rate. It could be leak checking, flow checking, or quality checking where you have a specific flow vs. pressure curve that needs to be met. Here, your end goal would be to keep variation within certain tolerances to make sure that the product meets your quality standards.

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MCD With CLP and Totalizer

Our mass flow controller with dual valves, closed loop pressure, and totalizer is a bidirectional controller with three ports (inlet, process, outlet) and two valves: one with incoming flow and another separate exhaust valve. It can control a closed volume of pressure, meaning not only can one valve open or close to increase/decrease the flow rate, but it can also exhaust to atmosphere or vacuum pump if you overshoot the pressure.

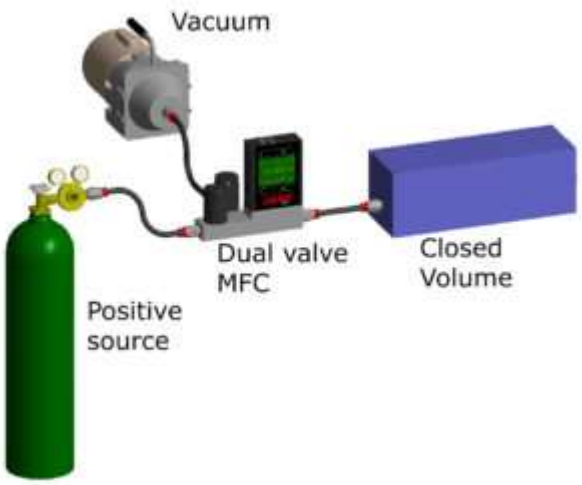
The totalizer measures the amount of flow that has occurred. There are four different ways to determine the total amount of flow using these bidirectional meters:

1.) Add positive flow and subtract negative, allowing the total flow to go negative

2.) Add positive flow and subtract negative, not allowing the total flow to go negative

3.) Add positive flow and ignore negative flow

4.) Add positive flow and subtract negative flow, resetting when it reaches 0



You'll know how much is in that specific volume at any given time, which is important if you want to measure the amount of gases going into a system.

Using Alicat With Rotameters

A rotameter has a floating indicator in a graduated tube.

Rotameters measure volumetric flow rate, and they are tuned at a very specific pressure to give the mass flow rate. While they may be marked in standard litres per minute (slpm) or standard cubic centimetres per minute (sccm), this reading is only valid at the pressure for which the rotameter was tuned. An Alicat, on the other hand, is valid at all times because it has a pressure sensor that adjusts the reading when the pressure changes.

Comparing rotameters to Alicats is like comparing apples to oranges because they are measuring different things unless the rotameter is at it's very specific calibrated pressure.

However, since we can control pressure with an Alicat mass flow device, why not control to the pressure to which the rotameter is tuned?

We're typically talking about the setting the pressure downstream of the rotameter, so it's simply a matter of placing the Alicat downstream with the valve on the opposite side, so that you are controlling the back pressure from the valve, through the Alicat and the rotameter. Then you can measure the flow directly on the mass flow meter and the rotameter at the same time. Of course, you must make sure that the Alicat has the rotameter's gas and standard conditions selected. They aren't adjustable on the rotameter, but they are adjustable on the Alicat. You can choose from hundreds of gases (up to 130, but most standard series have 98 selectable options) along with user-selectable standard temperature and pressure.

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Why Choose Alicat?

Solving unique problems is probably my favourite part of being an applications engineer. When it comes to Alicat products, everything can be **customized to suit a customer's needs**. If a customer has a unique application that we haven't seen before, the solution might involve making some small tweaks, like putting a valve in a different place or adding a relative humidity sensor.

For instance, right now we're figuring out how to **work with 500 litres per minute of sulphur dioxide**. Because it's highly corrosive, we need to use 316 stainless steel and FFKM.

One of my colleagues is also working on **making our new IP or NEMA rated instruments more durable**. We started a whole redesign of the system based on the input of a couple of customers.

If you have an application that you think might require a customized solution, call us directly or address to our partner TrigasDM to speak with an applications engineer."

And Anita Renc, director sales and marketing of Trigas, adds: "We'll be happy to answer your technical questions help you figure out if there is a solution for your application in cooperation with Alicat engineers. Alicat is not only a producer of great equipment, but also a great application partner!"

Watch the related video at this link: https://www.youtube.com/watch?time_continue=37&v=NACq8RPmR8w

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