How Electronic Pressure Control Works

As the trend toward automation continues, electronic control of pressure is a logical progression. Such electronic control of pressure has in fact become commonplace — both to allow automatic control of pressure for production machinery and for controlling pressure from a central location, even if the regulator is placed in an inaccessible or hard-to-reach location.

Instead of requiring operators to set pressure manually, a regulator may contain an electric motor that turns an adjusting stem until the desired outlet pressure is reached.

Another design — sometimes referred to as an I/P, E/P or U/P transducer — accepts an electronic input signal (either I for current, E or U for voltage input), and produces an output pressure that is proportional to that signal.

If the command signal 4-20 mA (or 1-5 V DC) or 0-10 V DC calls for greater pressure, a valve in the regulator shifts to expose the outlet connection to the higher incoming pressure.
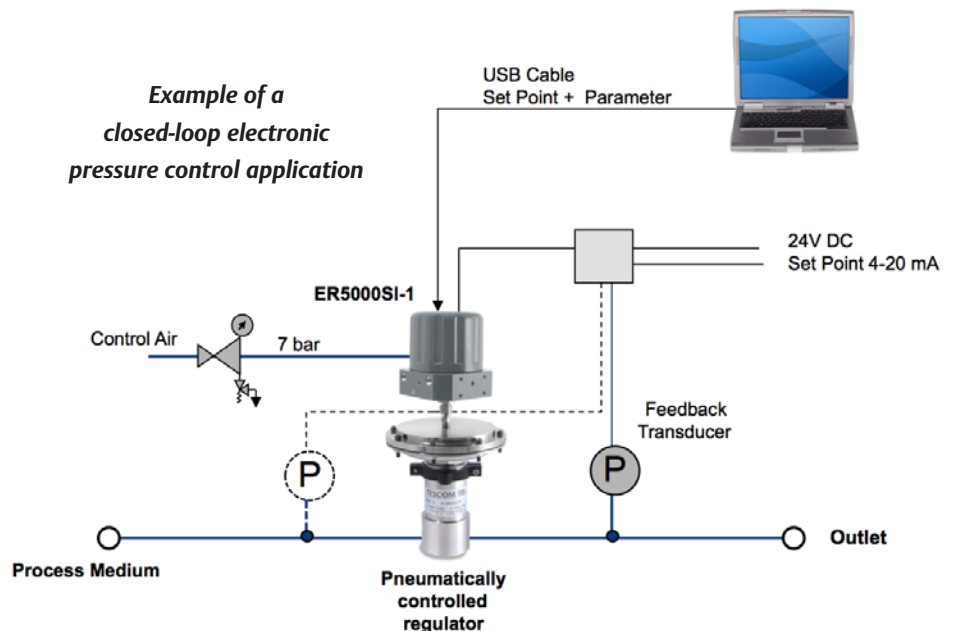
If lower pressure is called for, a valve shifts to open and bleed the outlet to atmospheric pressure.

With the I/P, E/P or U/P designs, the device controls regulator pilot pressure, comparing this pressure to the command signal and acting accordingly to either decrease or increase outlet pressure, which in turn, increases or decreases the regulator outlet (process) pressure.

However, process pressure is affected by changes in flow, temperature and other process disturbances, so to sense these changes and adjust the pilot pressure accordingly, the "loop" is often closed in a PLC or central control room.

A third type of electronic controller "closes the loop" with an onboard microprocessor that takes an electronic signal from a pressure transmitter located on the outlet of the regulator, compares that signal to the command signal and

Example of a closed-loop electronic pressure control application

Electropnuematic PID controller with mechanical regulator produces output pressure equal to a command signal high (±0.1%) accuracy when combined with an accurate pressure transmitter. (Photo courtesy of Emerson Process Management)

automatically adjusts the pilot pressure to obtain the desired process pressure to compensate for any process disturbance.

The pneumatic controlled regulator will be selected to meet the needs of the application like inlet and outlet pressure range, flow capability, media compatibility, porting configuration while the electronic control head is common. By this combination a great variety of applications can be served.

If needed, the regulator can also supply an electronic signal representative of the process pressure for monitoring, data acquisition, etc. Versions that interface with digital controls are also available. The accuracy of such a closed loop control is down to 0.1% if using an electronic regulator TESCOM ER5000 as a standalone component. If it is working together with a pneumatic controlled pressure regulator, the accuracy of the entire system depends on many factors like hysteresis of the regulator, sticking effects of O-rings, the application environment and therefore is difficult to determine. Typically, pressure control accuracies of 0.25% can be achieved.

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