GP:50

Pressure, Level & Temperature Transmitters & Transducers

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DETECTING LEAKS

Technical Note #2

Pressure vessels, valves, tanks, heat exchangers, radiators, drums, welds, and gasket integrity are just a few products that require high seal integrity to insure a reliable leak free product. There are a few ways to insure this integrity, pressure decay or leak testing is the most common. Helium or Ion leak detection systems work very well but require expensive equipment and may exceed the requirements necessary.

Pressure decay utilizing a pressure transmitter is simple to use, cost effective and can be more efficient in a production environment, especially if higher pressures are required to test the integrity of the vessel.

Pressurizing the vessel or test piece and monitoring pressure output from the transmitter will indicate any subsequent loss of pressure due to a leak in the vessel.

There are two methods,utilizing either a gauge or differential pressure transmitter to measure pressure decay.

Setup 1: (Single Ended - Gauge Pressure)

Diagram 1 shows a container being tested utilizing a 150 PSI gauge type transmitter. If the container is pressurized to 150 PSI and then the valve is closed, the transducer will sense a leak in pressure via a drop in output.

Small leaks may be detected with this setup but the process can be time consuming.

Percent error of the transmitter, and pressure range of the transmitter greatly affect the decay resolution.

If the gauge transmitters total error band is 1%FSO a 1.5 PSI (41.52" WC) error may be present. (150 PSI x 1% TTL Error band = 1.5 PSI). This may be too large of an error if small leak rates need to be detected.

Diagram 1

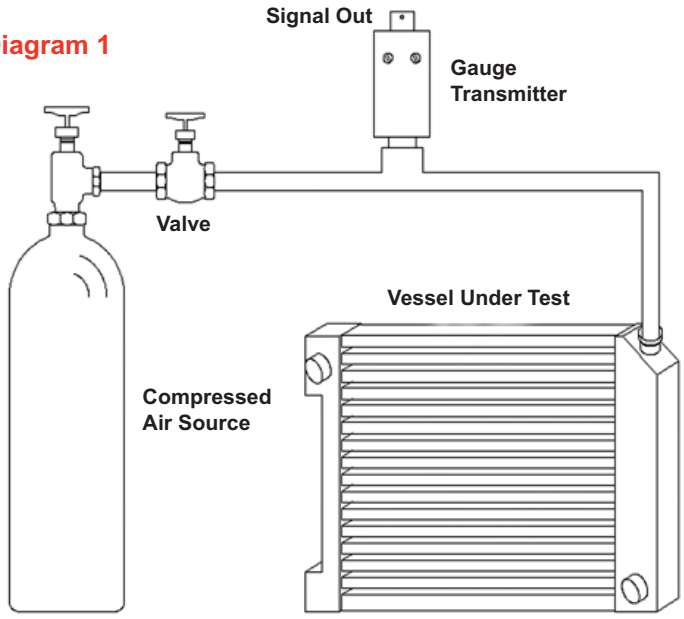
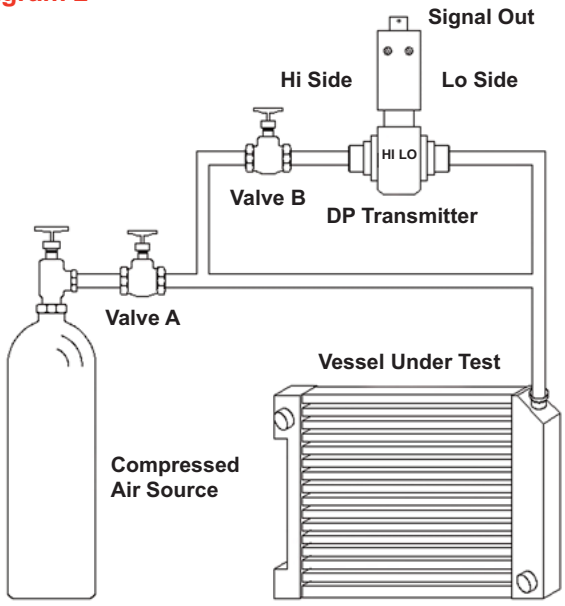


Diagram 2



Setup 2: (Differential Pressure)

Diagram 2 shows a container being tested utilizing a Differential Pressure Transmitter.

In this example the container and system is pressurized to 150 PSI with all valves open but now we utilize a 5 in WC Differential Pressure (DP) transmitter. Once the system is stabilized valve A is then closed. The DP transmitter will read Zero output because of a zero differential pressure. (150 PSI on both the Low & Hi sides)

Valve B is then closed. This isolates the 150 PSI in the vessel under test to the Low side of the DP. If a leak is present the Low side will sense this pressure decay as indicated by a drop in output from the DP transmitter.

Lets assume this 5" WC transmitter has a 1% FSO error spec like the gauge transmitter. The pressure drop or decay can then be accurately detected at 0.050" WC. (5" WC x 1% TTL Error Band = 0.05"WC)

As you can see from the first gauge pressure example, utilizing a differential pressure system produces more accurate and faster results. The decay measurement is more than 800 times better utilizing the DP transmitter.